Excel

YEAR 10

Mathematics Revision & Exam Workbook

- Updated Edition for the Australian Curriculum
- Over 100 Units of Work
- Eleven Topic Tests and two Exams

ESSENTIAL skills

Get the Results You Want!

AS Kalra

Excel

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AS Kalra

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Dedication

This book is dedicated to the new generation of young Australians in whose hands lies the future of our nation and who by their hard work, acquired knowledge and intelligence will take Australia successfully through the 21st century.

This book is also in the loving, living and lasting memory of my dear mum, dad and uncle, who will remain a great source of inspiration and encouragement to me for times to come.

Acknowledgements
I would especially like to express my thanks and appreciation to my dear wife and my dear son, who have helped me to find the time to write this book. Without their help and support, achievement of all this work would not have been possible.

Contents

CHAPTER 5 – Right-angled triangles and trigonometry

CHAPTER 6 – Surface area and volume

CHAPTER 7 – Further algebra

CHAPTER 8 – Linear and non-linear relationships

CHAPTER 9 – Geometric reasoning

Introduction

There are two workbooks in this series for the Year 10 Australian Curriculum Mathematics course:

- ***Excel Essential Skills Year 10 Mathematics Revision & Exam Workbook*** (this book) and
- ***Excel Essential Skills Year 10 Advanced Mathematics Revision & Exam Workbook***.

This book should be completed before the Advanced book. It is the core book, written specifically for the Year 10 Australian Curriculum Mathematics course and the fifth in a series of eight Revision & Exam Workbooks for Years 7 to 10. Each book in the series has been specifically designed to help students **revise** their work so that they can prepare for success in their **tests** during the school year and in their **half-yearly** and **yearly** exams.

The emphasis in this book is for students to master and consolidate the core skills and concepts of the course through extensive practice. This will ensure that students have a solid foundation on which to build towards both the Mathematics and Advanced Mathematics courses in senior years.

- This book is a **workbook**. Students write in the book, ensuring that they have all their questions and working in the same place. This is invaluable when revising for exams—no lost notes or missing pages!
- Each page is a **self-contained, carefully graded unit of work**; this means students can plan their revision effectively by completing set pages of work for each section.
- **Every topic** from the Year 10 Mathematics syllabus is covered in this book, so if students have a particular area of **weakness** they can concentrate on that topic.
- A **Topic Test** is provided at the end of each chapter. These tests are designed to help students test their knowledge of each syllabus topic. Practising tests similar to those they will sit at school will build students' confidence and help them perform well in their actual tests.
- **Two Exam Papers** have been included to test students on the complete Year 10 Mathematics course, helping students prepare for their **half-yearly** and **yearly exams**.
- A **marking scheme** is included in both the Topic Tests and Exam Papers to give students an idea of their progress.
- A **Topic Test and Exam Paper Feedback Chart**, found on the inside back cover, enables students to record their scores in all tests and exams.
- **Answers to all questions** are provided at the back of the book.
- There is a **page reference** to the ***Excel Mathematics Study Guide Years 9–10*** in the top right-hand corner of all pages, excluding the tests. If students need help with a specific section, they will find relevant explanations and worked examples on these pages of the study guide.

A note from the author

Mathematics is best learned if you have pen and paper with you and do every question in writing. Do not just read through the book—work through it and answer the questions, writing down all working. If this approach is coupled with a menu of motivation, realistic goal-setting and a positive attitude, it will lead to better marks in the examinations.

My best wishes are with you; I believe this book will help you achieve the best possible results. Good luck in your studies!

AS Kalra, MA, MEd, BSc, BEd

CHAPTER 1
Algebraic techniques

UNIT 1: Addition and subtraction of pronumerals

QUESTION 1 Simplify the following expressions by collecting like terms.

a $2a + 5a =$ _____ **b** $7p - 3p =$ _____

c $4a + 8a =$ _____ **d** $9x - x =$ _____

e $3m + m =$ _____ **f** $6q - q =$ _____

g $-4a + 5a =$ _____ **h** $5ab + 6ab =$ _____

i $9t - 12t =$ _____ **j** $3x^2 + 5x^2 =$ _____

k $-7n + 5n =$ _____ **l** $-4k - 3k =$ _____

QUESTION 2 Simplify the following.

a $3a + 4a + 5a =$ _____ **b** $12t - 7t + 4t =$ _____

c $8x - 3x - 2x =$ _____ **d** $-2k - 3k - 5k =$ _____

e $m - 4m + 2m =$ _____ **f** $6xy - 4xy - xy =$ _____

g $7a + 2a - 3a - 5a =$ _____ **h** $-8p + 3p - 2p =$ _____

i $15x^2 - 7x^2 - 6x^2 =$ _____ **j** $7q - 3q - 4q =$ _____

k $-5m + 2m - 3m - m =$ _____ **l** $-6y - 2y - 3y + y =$ _____

QUESTION 3 Simplify by collecting like terms.

a $8a + 5b - 3a =$ _____ **b** $6x + 4y + 2x - 2y =$ _____

c $5a^2 + 2a - 3a^2 - 4a =$ _____ **d** $-3c - 2c - 3d + d =$ _____

e $7x - 3y - 4x - 3y =$ _____ **f** $9a - 4b - 3b + a =$ _____

g $6m + 7 - 3m - 1 =$ _____ **h** $12 - 4m - 3m =$ _____

i $-3a - 5b - 6a + 7b =$ _____ **j** $7xy - 3x - 4y + x =$ _____

k $-2 + 6x + 5 =$ _____ **l** $8t - 4u + 3t - 5u =$ _____

QUESTION 4 Simplify the following.

a $3a + 7 - 9a =$ _____ **b** $5x^2 + 2x^2 - 7x^2 - x^2 =$ _____

c $7n + 8n - 3n - 5 =$ _____ **d** $4x - x + 3x - 6x =$ _____

e $8x + 3y - 5x - 3y =$ _____ **f** $-2y - 3y + 4y =$ _____

g $7a^2 - a + 4a^2 - 2 =$ _____ **h** $3m + 4m - 9m =$ _____

i $5x - 2y - 4y - 5x =$ _____ **j** $4k + 5k - 2n - 7n =$ _____

k $-5ab + 3a + b - a =$ _____ **l** $-3a - 2a + b - 5a =$ _____

m $15 - 3x - 2x - 1 =$ _____ **n** $3p + 5p - 9p =$ _____

o $9m + 2n - 5m + 4n =$ _____ **p** $5x^3 + 2x^2 + 3x - 4x^2 =$ _____

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UNIT 2: Index Laws

QUESTION 1 Simplify.

a $x^2 \times x^6 =$ _____ **b** $n^3 \times n^4 =$ _____ **c** $y^5 \times y =$ _____

d $3m^5 \times 2m^4 =$ _____ **e** $6a^6 \times 3a^3 =$ _____ **f** $a^4 \times a \times a^5 =$ _____

g $4x^3 \times x^7 =$ _____ **h** $8x^8 \times 2x^2 =$ _____ **i** $5m \times 3m^2 =$ _____

QUESTION 2 Simplify.

a $x^8 \div x^2 =$ _____ **b** $y^{10} \div y^5 =$ _____ **c** $a^8 \div a^3 =$ _____

d $15m^{15} \div 5m^5 =$ _____ **e** $12n^{12} \div 2n^4 =$ _____ **f** $6a^9 \div a^3 =$ _____

g $12y^7 \div 2y^6 =$ _____ **h** $9a^7 \div 9a =$ _____ **i** $a^9b^5 \div a^3b^3 =$ _____

QUESTION 3 Simplify.

a $(x^2)^3 =$ _____ **b** $(a^4)^5 =$ _____ **c** $(x^6)^2 =$ _____

d $(4m^3)^2 =$ _____ **e** $4(m^3)^2 =$ _____ **f** $(2a^4)^3 =$ _____

g $(a^3b^2)^4 =$ _____ **h** $(3ab^4)^3 =$ _____ **i** $5(x^2y)^7 =$ _____

QUESTION 4 Simplify.

a $7^0 =$ _____ **b** $x^0 =$ _____ **c** $(3n)^0 =$ _____

d $5m^0 =$ _____ **e** $(ab)^0 =$ _____ **f** $a^0 + b^0 =$ _____

g $x^0 - y^0 =$ _____ **h** $8a^0 + (8a)^0 =$ _____ **i** $7m^0 + 4n^0 =$ _____

QUESTION 5 Simplify the following.

a $a^8 \div a^2 =$ _____ **b** $3x^3 \times 5x^5 =$ _____

c $2(a^5)^5 =$ _____ **d** $(5x^2)^3 =$ _____

e $18x^4 \div 9x =$ _____ **f** $3a^2b^3 \times 2a^3b^2 =$ _____

g $m^4n^3 \times mn^2 =$ _____ **h** $10x^6y^4 \div 2x^3y^4 =$ _____

i $4x^2y^3 \times 5x^4y^6 =$ _____ **j** $5x^2y^2 \div 5xy =$ _____

k $5x^0 =$ _____ **l** $(6x^2)^2 =$ _____

UNIT 3: Further products

QUESTION **1** Find the following products.

a $4 \times 3a =$ _____ **b** $5x \times 3y =$ _____

c $2m \times 3m =$ _____ **d** $-6a \times 2b =$ _____

e $-3x \times -4y =$ _____ **f** $5ab \times 3 =$ _____

g $11t \times -5t =$ _____ **h** $4q^2 \times 3q =$ _____

i $xy \times x^2y =$ _____ **j** $2a \times 3b \times 4c =$ _____

k $8x^8 \times 3x^3 =$ _____ **l** $4x^2y \times 2xy =$ _____

QUESTION **2** Find the following products.

a $x^3 \times x^7 =$ _____ **b** $3x \times x^6 =$ _____

c $a^5 \times 2a =$ _____ **d** $-5q \times -q =$ _____

e $4a^2 \times 3b =$ _____ **f** $6x^2 \times 3y^2 =$ _____

g $8t^2 \times 3t =$ _____ **h** $4x^2y^2 \times -3 =$ _____

i $-3p \times 2q \times 4r =$ _____ **j** $5a \times -2b \times -6c =$ _____

k $-a \times -a \times -a =$ _____ **l** $ab \times ab \times ab =$ _____

QUESTION **3** Simplify the following.

a $3a^2b \times 2ab =$ _____ **b** $6ab^2 \times 4a =$ _____

c $5p^3q^2 \times 7q =$ _____ **d** $x^2y^3 \times x^4y^5 =$ _____

e $a^7b^2 \times a^3b^5 =$ _____ **f** $2m^5n^6 \times 3m^4n^2 =$ _____

g $5p^3q^2 \times pq =$ _____ **h** $4a^2b^4 \times 5b^3 =$ _____

i $7xy^3 \times 2xy^2 =$ _____ **j** $9ab^7 \times 3a^2b =$ _____

k $10a^5b^2c^3 \times 2a^3b^4c^7 =$ _____ **l** $3x^4y^2z \times 5xy^3z^5 =$ _____

QUESTION **4** Simplify the following.

a $2a^{-3} \times 3a^5 =$ _____ **b** $7a^2 \times 4a^{-3} =$ _____

c $6m^4 \times 3m^{-4} =$ _____ **d** $-2x^5 \times -4x^{-4} =$ _____

e $5t^{-2} \times 7t^{-3} =$ _____ **f** $8k^{-3} \times 3k^2 =$ _____

g $9n^{-2} \times 4n =$ _____ **h** $2a^{-2} \times 3a^{-3} \times 4a^{-4} =$ _____

i $-e \times e^{-3} =$ _____ **j** $4q^8 \times 2q^{-2} \times 6q =$ _____

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UNIT 4: Further quotients

QUESTION 1 Divide the following.

a $10a \div 2 =$ _____

b $9b \div 3b =$ _____

c $8c \div c =$ _____

d $6ab \div ab =$ _____

e $12k \div -3 =$ _____

f $-15m \div -5 =$ _____

g $4k \div 4k =$ _____

h $-32mn \div -8n =$ _____

i $6x^2 \div 2x =$ _____

j $-8a^2 \div 4a^2 =$ _____

k $12abc \div -2b =$ _____

l $xyz \div xz =$ _____

m $a^{12} \div a^4 =$ _____

n $20b^{20} \div 5b^5 =$ _____

o $x^6y^4 \div x^2y^3 =$ _____

p $a^5b^8 \div ab^3 =$ _____

q $27p^7q^8 \div 3p^2q^7 =$ _____

r $15a^2b^3c^5 \div 5abc^2 =$ _____

QUESTION 2 Simplify.

a $\frac{2x^3}{3x} =$ _____

b $\frac{5a^2}{7a^5} =$ _____

c $\frac{9t^4}{10t} =$ _____

d $\frac{5ab}{3a} =$ _____

e $\frac{7xy}{8y} =$ _____

f $\frac{3n^2}{5mn} =$ _____

g $\frac{6a^3}{8a} =$ _____

h $\frac{8x^4}{12x^7} =$ _____

i $\frac{15a^2b^3}{10ab} =$ _____

j $\frac{24e^9}{27e^{10}} =$ _____

k $\frac{12m^4n^8}{9m^6n^2} =$ _____

l $\frac{10a^5b^3}{15a^2b^4} =$ _____

m $\frac{5a^4}{10a^2} =$ _____

n $\frac{3t^7}{9t^5} =$ _____

o $\frac{12x^3}{4x^8} =$ _____

p $\frac{6a^2b^2}{3ab^4} =$ _____

q $\frac{2m^5n^3}{8m^4n^2} =$ _____

r $\frac{18xz}{9xyz} =$ _____

s $\frac{3}{9x} =$ _____

t $\frac{7x^2}{14x^8} =$ _____

u $\frac{6a^2}{3a} =$ _____

v $\frac{5n^3}{25n^4} =$ _____

w $\frac{21a^3b^2}{7ab} =$ _____

x $\frac{4x^2y^2}{20x^2y^3} =$ _____

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UNIT 5: Mixed operations

QUESTION **1** Simplify, where possible.

a $9x + 2x =$ _____

b $5k - k =$ _____

c $2x \times x =$ _____

d $8p \div p =$ _____

e $8p \div 8 =$ _____

f $8p \div 8p =$ _____

g $12x^2 + 3x =$ _____

h $12a^{12} \div 2a^2 =$ _____

i $5x^2 \times 3xy =$ _____

j $x \times x^6 =$ _____

k $6ab \div -2b =$ _____

l $-5m - 3m =$ _____

m $-a \times -3ab =$ _____

n $-4n^2 + 4n^2 =$ _____

o $-8abc \div 4bc =$ _____

p $7x^8 - 6x^8 =$ _____

q $-3a \times -4b =$ _____

r $-x - x =$ _____

QUESTION **2** Simplify.

a $5x \times 3x + x^2$

b $9a \times 4 \div 12a$

c $16x^2yz \div 4xy \div 2xz$

d $2a^2 \times 4a^3 + 5a^5$

e $(2p^2)^3 \div 4p^4$

f $18a^2b^3 \div 6ab^2 \times 2a$

QUESTION **3** Simplify, where possible.

a $4x^2 \times 3x^3 - 5x^2 \times 2x^3$

b $(4a^5)^2 \div 8(a^3)^3$

c $9a^2b^3 \div 3ab^2 + 5a \times 2b$

d $12m^9 \div 3m^3 - 2m^2 \times 4m^4$

e $8p^2q \times 3p \div 4pq \div 2p$

f $12 - 3n^0 + 5n \times 6n \div 10n - (3n)^0$

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UNIT 6: Substitution

QUESTION 1 If $a = 3$, $b = 5$ and $c = 9$, find the value of:

a $a + 5$ _____ **b** bc _____ **c** $ab + c$ _____

d $5a$ _____ **e** $2c - a$ _____ **f** abc _____

g $4b - 2c$ _____ **h** $a + b - c$ _____ **i** $bc - 7a$ _____

j c^2 _____ **k** $4a^2$ _____ **l** ab^2 _____

QUESTION 2 If $x = -2$, and $y = -5$, find the value of:

a $6xy$ _____ **b** $3x^2$ _____

c $4x - 5y$ _____ **d** $x^2 + 4x$ _____

e $12 - 2y$ _____ **f** xy^2 _____

QUESTION 3 Given that $A = \frac{h}{2}(a + b)$ find A when:

a $a = 12$, $b = 22$ and $h = 15$

_____

_____

_____

b $a = 9$, $b = 14$ and $h = 7$

_____

_____

_____

QUESTION 4 Given that $m = \frac{y_2 - y_1}{x_2 - x_1}$ find m when:

a $x_1 = 2$, $y_1 = 7$, $x_2 = 4$ and $y_2 = -1$

_____

_____

_____

b $x_1 = 5$, $y_1 = 6$, $x_2 = 2$ and $y_2 = 9$

_____

_____

_____

QUESTION 5 Given that $c^2 = a^2 + b^2$ and that $c > 0$, find c when:

a $a = 112$ $b = 441$

_____

_____

_____

b $a = 40.8$ and $b = 14.5$

_____

_____

_____

QUESTION 6 Given that $B = \frac{m}{h^2}$ find B when:

a $m = 81$ $h = 1.8$

_____

_____

_____

b $m = 64$ $h = 1.65$

_____

_____

_____

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UNIT 7: Expanding

QUESTION **1** Expand the following expressions.

a $5(x + 2) =$ _____ **b** $7(x - 3) =$ _____

c $4(2x + 5) =$ _____ **d** $3(5x - 3y) =$ _____

e $6(2t - 1) =$ _____ **f** $x(x + 7) =$ _____

g $a(a - 1) =$ _____ **h** $3x(2x - 5) =$ _____

i $4n(3n + 2) =$ _____ **j** $8(2a + b - c) =$ _____

k $2a(5a + 4b + 3) =$ _____ **l** $-2(3x + 4) =$ _____

m $-5(2x - 3) =$ _____ **n** $-4x(1 - 2x) =$ _____

o $-7a(a + 4) =$ _____ **p** $-(x - y) =$ _____

q $-(m + n) =$ _____ **r** $-(3p - 1) =$ _____

s $2x(x^2 - 5) =$ _____ **t** $3a^2(ab + 5) =$ _____

QUESTION **2** Expand and simplify.

a $5(2x + 3) + 4x$

_____

_____

b $4(a - 2) - 3a + 5$

_____

_____

c $12 - (x - 3)$

_____

_____

d $7x + 5y + 3(2x - 3y)$

_____

_____

e $7(x + 4) + 5(x + 2)$

_____

_____

f $9(a - 1) + 3(a - 2)$

_____

_____

g $6(2x + 5) - 4(3x + 2)$

_____

_____

h $5(4m - 2) - 3(m + 2)$

_____

_____

i $3(4a + 7) - 2(5a - 3)$

_____

_____

j $x(x + 5) - 3(x - 4)$

_____

_____

k $3a(2a - 1) - 2a(3a - 1)$

_____

_____

l $x(x + 3y) - y(x - 3y)$

_____

_____

UNIT 8: Binomial products (1)

QUESTION **1** Expand and simplify.

a $x(x + 3) + 2(x + 3)$

b $x(x + 7) - 2(x + 7)$

c $x(x - 3) + 7(x - 3)$

d $x(x + 5) - 3(x + 5)$

e $2x(x + 3) + 5(x + 3)$

f $3x(x - 2) - 2(x - 2)$

g $x(2x + 3) - 5(2x + 3)$

h $x(3x - 5) + 2(3x - 5)$

i $3x(2x + 1) + 2(2x + 1)$

j $2x(3x - 2) - 1(3x - 2)$

QUESTION **2** By matching with an expansion in question 1, write down each binomial product.

a $(x + 2)(x + 3) =$ _____

b $(x - 3)(x + 5) =$ _____

c $(x - 5)(2x + 3) =$ _____

d $(2x - 1)(3x - 2) =$ _____

e $(2x + 5)(x + 3) =$ _____

f $(x - 2)(x + 7) =$ _____

g $(3x + 2)(2x + 1) =$ _____

h $(x + 7)(x - 3) =$ _____

i $(3x - 2)(x - 2) =$ _____

j $(x + 2)(3x - 5) =$ _____

QUESTION **3** Write the areas in each part of the rectangle and hence find the binomial product.

a

	x	+	5
x			
+			
3			

$(x + 5)(x + 3)$ = _____

= _____

b

	x	+	7
x			
+			
4			

$(x + 7)(x + 4)$ = _____

= _____

UNIT 9: Binomial products (2)

QUESTION **1** Expand and simplify the following.

a $(x + 1)(x + 2)$ **b** $(x + 2)(x + 3)$ **c** $(a + 3)(a + 5)$ **d** $(m + 6)(m + 1)$

e $(p + 8)(p + 2)$ **f** $(y + 3)(y + 7)$ **g** $(a + 4)(a + 7)$ **h** $(d + 3)(d + 9)$

i $(2a + 3)(a + 5)$ **j** $(3a + 1)(2a + 6)$ **k** $(4a + 6)(2a + 3)$ **l** $(2x + 5)(3x + 1)$

QUESTION **2** Expand and simplify.

a $(a + 3)(a - 2)$ **b** $(x - 3)(x + 2)$ **c** $(y - 4)(y + 6)$ **d** $(y + 5)(y - 3)$

e $(a + 7)(a - 3)$ **f** $(x + 6)(x - 2)$ **g** $(2y + 1)(y - 2)$ **h** $(3x + 2)(x - 3)$

i $(2x + 1)(3x - 1)$ **j** $(x + 7)(2x - 1)$ **k** $(x + 8)(3x - 5)$ **l** $(x - 3)(x - 4)$

QUESTION **3** Find the following products and simplify.

a $(a + 3)(4 + a)$ **b** $(a + 5)(6 + a)$ **c** $(2a + 1)(3 - a)$ **d** $(4 + x)(x + 9)$

e $(5 - n)(n + 7)$ **f** $(x - 6)(7 - x)$ **g** $(3x + 2)(2 + x)$ **h** $(3n + 1)(5 - n)$

i $(2a - 6)(a + 7)$ **j** $(x + y)(x - y)$ **k** $(2m + n)(2m - n)$ **l** $(a - b)(a + b)$

m $(2x - 3y)(2x + 3y)$ **n** $(a - b)(a - b)$ **o** $(2x + 3)(2x - 3)$ **p** $(3x - 4)(2x + 5)$

UNIT 10: Special products—perfect squares

QUESTION **1** Expand and simplify the following.

a $(x + 3)^2 =$ _____ **b** $(y + 2)^2 =$ _____

c $(m + 7)^2 =$ _____ **d** $(x - 4)^2 =$ _____

e $(x - 9)^2 =$ _____ **f** $(x - 3)^2 =$ _____

g $(y + 11)^2 =$ _____ **h** $(x - 5)^2 =$ _____

i $(m - 2)^2 =$ _____ **j** $(x + y)^2 =$ _____

k $(a - b)^2 =$ _____ **l** $(m + n)^2 =$ _____

QUESTION **2** Expand and simplify.

a $(2x + 3)^2 =$ _____ **b** $(2m + 1)^2 =$ _____

c $(3y - 1)^2 =$ _____ **d** $(4a + 1)^2 =$ _____

e $(3x - 4)^2 =$ _____ **f** $(2x - 3y)^2 =$ _____

g $(2a + 1)^2 =$ _____ **h** $(5m - 1)^2 =$ _____

i $(6y + 1)^2 =$ _____ **j** $(3n + 2)^2 =$ _____

k $(2x + 5y)^2 =$ _____ **l** $(a + 3b)^2 =$ _____

m $(2x + y)^2 =$ _____ **n** $(x - 3y)^2 =$ _____

QUESTION **3** Expand and simplify the following.

a $(x + 3)^2 + 3(x - 1)$

_____

_____

b $(2a - 1)^2 - 4(a - 3)$

_____

_____

c $(y - 2)^2 + (y + 3)(y - 3)$

_____

_____

d $(a + b)^2 - (a + b)(a - b)$

_____

_____

e $(a + b)^2 + (a - b)^2$

_____

_____

f $(a + 3b)(a - 3b) + (a + b)^2$

_____

_____

g $(3x + 4y)(3x - 4y) + (x + y)^2$

_____

_____

h $(x + 1)^2 + (x + 2)^2$

_____

_____

UNIT 11: Special products—difference of two squares

QUESTION **1** Expand and simplify the following.

a $(x + 2)(x - 2) =$ _____ **b** $(x + 3)(x - 3) =$ _____

c $(y + 1)(y - 1) =$ _____ **d** $(m + 5)(m - 5) =$ _____

e $(n + 7)(n - 7) =$ _____ **f** $(p + 4)(p - 4) =$ _____

g $(8 + x)(8 - x) =$ _____ **h** $(y + 6)(y - 6) =$ _____

i $(a + b)(a - b) =$ _____ **j** $(x + y)(x - y) =$ _____

k $(m + n)(m - n) =$ _____ **l** $(l + m)(l - m) =$ _____

QUESTION **2** Expand the following products and simplify.

a $(3a + 1)(3a - 1) =$ _____ **b** $(2x + 3)(2x - 3) =$ _____

c $(4a + 5)(4a - 5) =$ _____ **d** $(7m + n)(7m - n) =$ _____

e $(4q - 3)(4q + 3) =$ _____ **f** $(5x + 7)(5x - 7) =$ _____

g $(4a + 3b)(4a - 3b) =$ _____ **h** $(2x + y)(2x - y) =$ _____

i $(5x + 4y)(5x - 4y) =$ _____ **j** $(x + 9y)(x - 9y) =$ _____

k $(2a + 7b)(2a - 7b) =$ _____ **l** $(5m + n)(5m - n) =$ _____

m $(9a + 11b)(9a - 11b) =$ _____ **n** $(3a + 8b)(3a - 8b) =$ _____

QUESTION **3** Express the following as the difference of two squares.

a $(5x + 1)(5x - 1) =$ _____ **b** $(7a + 2)(7a - 2) =$ _____

c $(8x + 7)(8x - 7) =$ _____ **d** $(2x + 3y)(2x - 3y) =$ _____

e $(4x - 9y)(4x + 9y) =$ _____ **f** $(6x - 7y)(6x + 7y) =$ _____

g $(a - 12)(a + 12) =$ _____ **h** $(2x - 9)(2x + 9) =$ _____

i $(3x - 10)(3x + 10) =$ _____ **j** $(2m - n)(2m + n) =$ _____

k $(5 - 2q)(5 + 2q) =$ _____ **l** $(5x - 11)(5x + 11) =$ _____

m $(8a + 11b)(8a - 11b) =$ _____ **n** $(3a + 7b)(3a - 7b) =$ _____

UNIT 12: Addition and subtraction of algebraic fractions

QUESTION 1 Find the sum of these algebraic fractions.

a $\frac{m}{5} + \frac{3m}{5} =$ _____

b $\frac{x}{3} + \frac{2x}{3} =$ _____

c $\frac{2t}{7} + \frac{3t}{7} =$ _____

d $\frac{5y}{8} + \frac{3y}{8} =$ _____

e $\frac{6a}{11} + \frac{3b}{11} =$ _____

f $\frac{19k}{8} + \frac{14k}{8} =$ _____

g $\frac{15x}{17} + \frac{2x}{17} =$ _____

h $\frac{10p}{7} + \frac{4p}{7} =$ _____

i $\frac{6m}{19} + \frac{3m}{19} =$ _____

QUESTION 2 Subtract the following algebraic expressions.

a $\frac{12y}{7} - \frac{9y}{7} =$ _____

b $\frac{5x}{11} - \frac{3x}{11} =$ _____

c $\frac{8a}{9} - \frac{5a}{9} =$ _____

d $\frac{12a}{17} - \frac{5a}{17} =$ _____

e $\frac{9m}{23} - \frac{7m}{23} =$ _____

f $\frac{5m}{12} - \frac{3m}{12} =$ _____

g $\frac{9a}{7} - \frac{5a}{7} =$ _____

h $\frac{12x}{10} - \frac{7x}{10} =$ _____

i $\frac{5a}{11} - \frac{2b}{11} =$ _____

QUESTION 3 Simplify the following.

a $\frac{x}{2} + \frac{x}{3} =$ _____

b $\frac{a}{4} - \frac{a}{5} =$ _____

c $\frac{m}{3} + \frac{m}{5} =$ _____

d $\frac{2x}{5} + \frac{x}{4} =$ _____

e $\frac{2a}{5} - \frac{a}{10} =$ _____

f $\frac{y}{8} - \frac{y}{32} =$ _____

g $\frac{8y}{3} - \frac{3y}{5} =$ _____

h $\frac{5p}{8} - \frac{p}{4} =$ _____

i $\frac{x}{4} - \frac{3x}{8} =$ _____

j $\frac{8y}{3} - \frac{3y}{4} =$ _____

k $\frac{4m}{7} - \frac{2m}{21} =$ _____

l $\frac{3a}{8} - \frac{2b}{4} =$ _____

QUESTION 4 Write in simplest form.

a $\frac{3x}{5} - \frac{x}{10} =$ _____

b $\frac{2x}{3} - \frac{x}{6} =$ _____

c $\frac{3t}{7} - \frac{2t}{21} =$ _____

UNIT 13: Multiplication and division of algebraic fractions

QUESTION 1 Find the products of these algebraic fractions.

a $\frac{a}{5} \times \frac{b}{7} =$ _____

b $\frac{m}{2} \times \frac{n}{6} =$ _____

c $\frac{x}{3} \times \frac{y}{8} =$ _____

d $\frac{5x}{3} \times \frac{4y}{9} =$ _____

e $\frac{a}{3} \times \frac{a}{11} =$ _____

f $\frac{2x}{5} \times \frac{3x}{7} =$ _____

g $\frac{a}{2} \times \frac{1}{4} =$ _____

h $\frac{2}{3} \times \frac{n}{7} =$ _____

i $\frac{5x}{7} \times \frac{5}{7} =$ _____

QUESTION 2 Find these products. Give the answer in simplest form.

a $\frac{2a}{3} \times \frac{b}{4} =$ _____

b $\frac{5x}{2} \times \frac{x}{5} =$ _____

c $\frac{4t}{3} \times \frac{3t}{4} =$ _____

d $\frac{3c}{5} \times \frac{2d}{9} =$ _____

e $\frac{3a}{4} \times \frac{8b}{9} =$ _____

f $\frac{5x}{2} \times \frac{4y}{15} =$ _____

g $\frac{6x}{5} \times \frac{2x}{3} =$ _____

h $\frac{9m}{10} \times \frac{5n}{6} =$ _____

i $\frac{9t}{8} \times \frac{4t}{3} =$ _____

QUESTION 3 Divide the following algebraic fractions.

a $\frac{a}{2} \div \frac{b}{3} =$ _____

b $\frac{3x}{4} \div \frac{2y}{9} =$ _____

c $\frac{m}{3} \div \frac{2n}{5} =$ _____

d $\frac{a}{5} \div \frac{a}{15} =$ _____

e $\frac{3n}{8} \div \frac{5n}{16} =$ _____

f $\frac{20p}{11} \div \frac{10p}{22} =$ _____

g $\frac{k}{18} \div \frac{km}{36} =$ _____

h $\frac{xyz}{15} \div \frac{yz}{5} =$ _____

i $\frac{pq}{20} \div \frac{q}{40} =$ _____

j $\frac{4a^2b^3}{7} \div \frac{16a^3b^2}{21} =$ _____

k $\frac{20ab}{27} \div \frac{4a}{36} =$ _____

l $\frac{3xy}{4} \div \frac{5xy}{6} =$ _____

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UNIT 14: Harder algebraic fractions

QUESTION 1 Find, giving the answer in simplest form.

a $\frac{8a}{5b} + \frac{9a}{5b} =$

b $\frac{5a}{7x} - \frac{4a}{7x} =$

c $\frac{16}{5a} + \frac{4}{5a} =$

d $\frac{14}{5t} - \frac{9}{5t} =$

e $\frac{16}{3x^2} - \frac{10}{3x^2} =$

f $\frac{2a}{5x} + \frac{8a}{5x} =$

g $\frac{9}{x} + \frac{3}{4x} =$

h $\frac{5a}{7b} - \frac{3a}{14b} =$

i $\frac{8m}{5n} - \frac{3m}{20n} =$

QUESTION 2 Simplify the following.

a $\frac{5}{y} \times \frac{3}{t} =$

b $\frac{4}{a} \times \frac{5}{b} =$

c $\frac{6}{5a} \times \frac{3}{2b} =$

d $\frac{8}{3t} \times \frac{4}{2t} =$

e $\frac{2x}{3y} \times \frac{3x}{2y} =$

f $\frac{4}{m} \times \frac{2a}{3n} =$

g $\frac{5b}{3c} \times \frac{2b}{9c} =$

h $\frac{3t}{20} \times \frac{10}{24t} =$

i $\frac{15x}{11y} \times \frac{33y}{60x} =$

j $\frac{8ab}{c} \times \frac{ac}{4b} =$

k $\frac{24a}{17b} \times \frac{34b}{16a} =$

l $\frac{x}{y} \times \frac{y}{z} \times \frac{z}{x} =$

m $\frac{x^2y}{m} \times \frac{m}{xy} =$

n $\frac{4ab}{5c} \times \frac{10c}{8a} =$

o $\frac{15x}{8y} \times \frac{32x^2y}{25x^3y^2} =$

QUESTION 3 Divide the following fractions.

a $\frac{9}{2n} \div \frac{3p}{8n} =$

b $\frac{8}{x} \div \frac{5}{x} =$

c $\frac{7}{2y} \div \frac{14}{10y} =$

d $\frac{a}{b} \div \frac{5a}{b} =$

e $\frac{9n}{5m} \div \frac{27n}{15m} =$

f $\frac{xy}{z} \div \frac{z}{xy} =$

g $\frac{15t}{m} \div \frac{5t}{7m} =$

h $\frac{18mn}{11p} \div \frac{48m}{33p} =$

i $\frac{35mn}{6p} \div \frac{7m^2}{12p} =$

UNIT 15: Further algebraic fractions

QUESTION 1 Add the following algebraic fractions.

a $\frac{5a}{3} + \frac{a}{3} =$ _____

b $\frac{7x}{10} + \frac{3x}{10} =$ _____

c $\frac{8m}{5} + \frac{2m}{5} =$ _____

d $\frac{a}{2} + \frac{a}{3} =$ _____

e $\frac{2a}{5} + \frac{a}{3} =$ _____

f $\frac{3a}{7} + \frac{2a}{5} =$ _____

g $\frac{3}{x} + \frac{5}{2x} =$ _____

h $\frac{7}{9x} + \frac{4}{3x} =$ _____

i $\frac{3m}{2n} + \frac{m}{6n} =$ _____

QUESTION 2 Simplify the following.

a $\frac{7a}{4} - \frac{3a}{4} =$ _____

b $\frac{5x}{9} - \frac{2x}{9} =$ _____

c $\frac{11m}{15} - \frac{6m}{15} =$ _____

d $\frac{2x}{3} - \frac{x}{2} =$ _____

e $\frac{3a}{10} - \frac{a}{5} =$ _____

f $\frac{4q}{5} - \frac{q}{15} =$ _____

g $\frac{3}{x} - \frac{5}{2x} =$ _____

h $\frac{7}{9x} - \frac{4}{3x} =$ _____

i $\frac{3m}{2n} - \frac{m}{6n} =$ _____

QUESTION 3 Simplify the following products.

a $\frac{x}{4} \times \frac{y}{5} =$ _____

b $\frac{a}{3} \times \frac{a}{4} =$ _____

c $\frac{a}{b} \times \frac{m}{n} =$ _____

d $\frac{ab}{10} \times \frac{5}{a} =$ _____

e $\frac{x^2}{y^2} \times \frac{y^2}{x^2} =$ _____

f $\frac{8m}{3a} \times \frac{12a}{16m} =$ _____

g $\frac{pq}{m} \times \frac{3m}{p} =$ _____

h $\frac{12m}{5} \times \frac{10m}{9} =$ _____

i $\frac{2x}{y} \times \frac{4y}{3x} =$ _____

QUESTION 4 Divide the following.

a $\frac{x}{3} \div \frac{x}{9} =$ _____

b $\frac{2n}{7} \div \frac{3n}{14} =$ _____

c $\frac{p}{5} \div \frac{7p}{10} =$ _____

d $\frac{6}{x} \div \frac{3}{x} =$ _____

e $\frac{5}{2y} \div \frac{10}{y} =$ _____

f $\frac{x}{y} \div \frac{3x}{y} =$ _____

g $\frac{8m}{5n} \div \frac{4m}{15n} =$ _____

h $\frac{ab}{c} \div \frac{b}{ac} =$ _____

i $\frac{12a}{b} \div \frac{5a}{7b} =$ _____

UNIT 16: Negative indices

QUESTION 1 Write the following with positive indices.

a $2^{-5} =$ _____ **b** $7^{-2} =$ _____ **c** $3^{-4} =$ _____

d $5^{-6} =$ _____ **e** $8^{-3} =$ _____ **f** $10^{-8} =$ _____

g $x^{-4} =$ _____ **h** $a^{-2} =$ _____ **i** $9m^{-4} =$ _____

j $(-7)^{-3} =$ _____ **k** $\dfrac{1}{2^{-4}} =$ _____ **l** $\left(\dfrac{5}{6}\right)^{-2} =$ _____

QUESTION 2 Evaluate the following.

a $3^{-2} =$ _____ **b** $2^{-3} =$ _____ **c** $4^{-3} =$ _____

d $5^{-3} =$ _____ **e** $10^{-5} =$ _____ **f** $(3^{-1})^3 =$ _____

g $\left(\dfrac{2}{3}\right)^{-2} =$ _____ **h** $\left(\dfrac{3}{2}\right)^{-3} =$ _____ **i** $\left(\dfrac{1}{4}\right)^{-2} =$ _____

j $\left(\dfrac{1}{2}\right)^{-4} =$ _____ **k** $\left(\dfrac{1}{3}\right)^{-3} =$ _____ **l** $\left(\dfrac{5}{6}\right)^{-2} =$ _____

QUESTION 3 Write the following with negative indices.

a $\dfrac{1}{9} =$ _____ **b** $\dfrac{1}{3^5} =$ _____ **c** $\dfrac{1}{a} =$ _____

d $\dfrac{1}{y^2} =$ _____ **e** $\dfrac{4}{x^3} =$ _____ **f** $\dfrac{8}{x^5} =$ _____

g $\dfrac{7}{y} =$ _____ **h** $\dfrac{6}{a^4} =$ _____ **i** $\dfrac{1}{3x^4} =$ _____

j $\dfrac{a}{5^3} =$ _____ **k** $\dfrac{1}{5m^2} =$ _____ **l** $\dfrac{9n}{3m^3} =$ _____

QUESTION 4 Simplify the following, giving your answers as fractions.

a $5^{-2} =$ _____ **b** $6^{-3} =$ _____ **c** $2^{-6} =$ _____

d $3^{-2} \times 2^{-1} =$ _____ **e** $7 \times 2^{-3} =$ _____ **f** $8^{-1} =$ _____

g $5^{-3} \times 5^{0} =$ _____ **h** $8 \times 10^{-2} =$ _____ **i** $5 \times 10^{-3} =$ _____

j $2^{-3} \times 3^{-1} =$ _____ **k** $5^{-7} \div 5^{-9} =$ _____ **l** $(3^{-1})^3 =$ _____

QUESTION 5 Find the value of x in the following.

a $10^{-3} = 10^{x}$ _____ **b** $10^{-3} = \dfrac{1}{10^{x}}$ _____ **c** $\dfrac{1}{9} = 9^{x}$ _____

d $5^3 \times 5^{-7} = 5^{x}$ _____ **e** $10^{7} \div 10^{-4} = 10^{x}$ _____ **f** $3^8 \times \dfrac{1}{3^4} = 3^{x}$ _____

g $(\frac{2}{5})^7 \times (\frac{2}{5})^{-3} = (\frac{2}{5})^{x}$ _____ **h** $5^{-6} \div 5^3 = 5^{x}$ _____ **i** $\dfrac{1}{8^{-3}} = 8^{x}$ _____

j $6^5 \times 6^{-3} = 6^{x}$ _____ **k** $7^8 \div 7^5 = 7^{x}$ _____ **l** $5^{-3} \div 5^2 = 5^{x}$ _____

QUESTION 6 Simplify the following.

a $3^8 \times 3^{-4} \times 3^{-2} =$ _____ **b** $2^8 \div 2^2 \div 2^3 =$ _____ **c** $5^7 \div 5^8 \div 5^2 =$ _____

d $(8^2)^{-7} =$ _____ **e** $7^4 \times 7^8 \div 7^5 =$ _____ **f** $(6^3)^{-2} \times (6^2)^{-5} =$ _____

g $(7^2)^{-3} \div 7^8 =$ _____ **h** $(4^7)^{-3} =$ _____ **i** $8^5 \times 8^3 \div 8^{10} =$ _____

j $(4^5)^{-2} \times 4 =$ _____ **k** $\dfrac{(x^3)^2 \div (x^{-1})^3}{x^{-3}} =$ _____ **l** $a^5 \times a^{-4} =$ _____

Algebraic techniques

TOPIC TEST — PART A

Time allowed: 15 minutes — **Total marks: 15**

					Marks
1 $x^4 + x^4 =$	(A) x^8	(B) x^{16}	(C) $2x^4$	(D) $2x^8$	1
2 $5mn^2 =$	(A) $5 \times m \times n \times 2$	(B) $5 \times mn \times mn$	(C) $5mn \times 5mn$	(D) $5 \times m \times n \times n$	1
3 $6x^6 \times 3x^3$	(A) $9x^9$	(B) $18x^9$	(C) $9x^{18}$	(D) $18x^{18}$	1
4 $7p^2 - 9p - 4p^2 + 5p =$	(A) $3p^2 - 4p$	(B) $3p^2 - 14p$	(C) $3p^2 + 4p$	(D) $3p^2 + 14p$	1
5 If $x = -5$ then $2x^2 =$	(A) 50	(B) –50	(C) 100	(D) –100	1
6 $4x^0 + 4^0 =$	(A) 1	(B) 2	(C) 4	(D) 5	1
7 $(x - 4)(x - 3) =$	(A) $x^2 - 7x - 12$	(B) $x^2 - 7x + 12$	(C) $x^2 + 7x - 12$	(D) $x^2 + 7x + 12$	1
8 $\frac{x}{4} + \frac{x}{5} =$	(A) $\frac{2x}{9}$	(B) $\frac{x}{10}$	(C) $\frac{x^2}{20}$	(D) $\frac{9x}{20}$	1
9 $3(x + 5) - 2x =$	(A) $x + 5$	(B) $-3x + 5$	(C) $x + 15$	(D) $-3x + 15$	1
10 $12x^{12} \div 3x^3 =$	(A) $4x^4$	(B) $4x^9$	(C) $9x^4$	(D) $9x^9$	1
11 $x^2y(2x^3 - y^2) =$	(A) $2x^6y - x^2y^2$	(B) $2x^5y - x^2y^2$	(C) $2x^6y - x^2y^3$	(D) $2x^5y - x^2y^3$	1
12 $\frac{a}{3} \times \frac{a}{5} =$	(A) $\frac{a}{4}$	(B) $\frac{a^2}{8}$	(C) $\frac{2a}{15}$	(D) $\frac{a^2}{15}$	1
13 $5 - 2(x - 4) =$	(A) $-2x - 3$	(B) $1 - 2x$	(C) $9 - 2x$	(D) $13 - 2x$	1
14 $\frac{2a^2b^3}{6ab^4}$	(A) $\frac{a}{3b}$	(B) $\frac{3a}{b}$	(C) $\frac{b}{3a}$	(D) $\frac{3b}{a}$	1
15 $(x + 2)(x - 5) =$	(A) $x^2 - 3x - 10$	(B) $x^2 + 3x - 10$	(C) $x^2 - 3x + 10$	(D) $x^2 - 7x - 10$	1

Total marks achieved for PART A ____/15

Algebraic techniques

TOPIC TEST — PART B

Instructions
- This part consists of 5 questions.
- Write only the answer in the answer column.
- For any working use the question column.

Time allowed: 20 minutes **Total marks: 15**

Questions	Answers	Marks
1 Simplify.		
a $(2x^3y^2)^2$		1
b $\frac{3xy}{6x^2y}$		1
c $9x^2 + 3x \times 2x$		1
d $12n^{12} \times 3n^2 \div 4n^6$		1
e $9x^2 \times 5x^3 + 3x^4 \times 6x$		1
2 Expand and simplify. $5(2x - 3) - 2(x + 1)$		1
3 If $l = \sqrt{\frac{3V}{h}}$ what is the value of l when $V = 1024$ and $h = 12$		1
4 Find these binomial products.		
a $(x - 6)(x + 4)$		1
b $(2x + 5)(3x + 7)$		1
c $(3a - 2)(3a + 2)$		1
d $(x + 3)^2$		1
5 Find in simplest form.		
a $\frac{4x}{5} - \frac{3x}{5}$		1
b $\frac{6x}{25} \times \frac{5y}{6}$		1
c $\frac{a}{3} \div \frac{3}{4}$		1
d $\frac{3x}{14} + \frac{x}{2}$		1

Total marks achieved for PART B 15

CHAPTER 2

Financial maths

UNIT 1: Simple interest (1)

QUESTION **1** Use the formula $I = PRN$ to find I if

a $P = \$2000$, $R = 0.08$, $N = 3$

b $P = \$7000$, $R = 0.05$, $N = 6$

c $P = \$18\,000$, $R = 0.07$, $N = 4$

d $P = \$65\,000$, $R = 0.075$, $N = 5$

QUESTION **2** Find the simple interest on an investment of:

a \$5000 for 3 years at 6% p.a.

b \$12 000 at 8% p.a. for 4 years.

c \$9000 for 7 years at 5% p.a.

d \$30 000 for 10 years at 7% p.a.

e \$6500 at 6.5% p.a. for 2 years.

f \$27 500 at 9% p.a. for 6 months.

g \$12 500 at 6% p.a. for 18 months.

h \$11 000 for 4 years at $7\frac{1}{2}$% p.a.

QUESTION **3** \$7500 is borrowed at 6% p.a. simple interest for 5 years. Find:

a the interest paid

b total amount to be repaid

UNIT 2: Simple interest (2)

QUESTION **1** Find the simple interest on:

a $15 000 at 6% p.a. for 4 years.

b $8000 at 7.5% p.a. for 6 years.

QUESTION **2** Find the amount that needs to be invested to earn an amount of simple interest of:

a $2000 if invested at 4% p.a. for 2 years.

b $4375 invested at 7% p.a. for 5 years.

QUESTION **3** Find the number of years that the amount must have been invested if:

a $7000 earned $560 interest at 8% p.a.

b $13 000 earned $3510 at 9% p.a.

QUESTION **4** Find the rate of simple interest if:

a $8000 earns $1200 interest in 3 years.

b $15 000 earned $4800 interest in 4 years.

QUESTION **5** $25 000 is invested and earns $12 000 simple interest. Find the:

a number of years if interest rate is 8% p.a.

b interest rate if invested for 10 years.

QUESTION **6** An amount of money was borrowed over 7 years at 5.5% p.a. simple interest. The total interest paid was $5390. Find:

a amount of money borrowed.

b total amount repaid on loan.

UNIT 3: Application of simple interest

QUESTION **1** Maddie decides to buy a computer marked at $4500. She pays 20% deposit and the balance over 2 years with simple interest charged at 14% p.a. on the balance.

a Find the deposit paid.

b Calculate the balance owing.

c Calculate the interest paid.

d Find the total amount to be repaid.

e Find the monthly repayment.

QUESTION **2** Suzy borrows $4500 and agrees to repay it in equal monthly instalments over 3 years. Simple interest at 7.2% p.a. is charged on the loan. Find the:

a total amount of interest paid.

b amount of each instalment.

QUESTION **3** The cash price of a car is $32 000. Tyson buys the car on terms. He pays 15% deposit and agrees to pay $680 every month for 4 years. Find the:

a deposit.

b amount borrowed.

c total paid for the car.

d total amount of interest paid.

e yearly rate of simple interest.

QUESTION **4** Monique buys a house for $750 000, pays a deposit of $150 000 and then pays off the balance at $4100 per month for 25 years. Find the:

a total cost of the house.

b yearly interest paid.

UNIT 4: Interest rates

QUESTION **1** For an interest rate of 8% p.a. find the:

a monthly rate.

b quarterly rate.

c six-monthly rate.

d four-monthly rate.

QUESTION **2** Find the monthly interest rate if the annual rate is:

a 6.5%

b 10%

QUESTION **3** Find the quarterly interest rate if the annual rate is:

a 9%

b 6%

QUESTION **4** Find the number of:

a months in 6 years.

b quarters in 4 years.

c six-monthly periods in 8 years.

d four-monthly periods in 2 years.

QUESTION **5** Interest on an investment is to be paid quarterly. If the principal is invested for 5 years and the annual interest rate is 12%. Find:

a the number of quarters.

b the quarterly interest rate.

QUESTION **6** Find the annual interest rate:

a 3.5% per quarter.

b 0.8% per month.

c 7.5% per six-monthly period.

d 0.035% per day.

UNIT 5: Compound interest by repeated use of simple interest

QUESTION **1** This table compares the interest earned on $1000 at 10% p.a. simple interest with the interest earned on $1000 at 10% p.a. compound interest compounded annually. (Amounts are given the nearest dollar.)

Time (years)	1	2	3	4	5	6	7	8	9
Simple interest	$100	$200	$300	$400	$500	$600	$700	$800	$900
Compound interest	$100	$210	$331	$464	$611	$772	$949	$1144	$1358

a How much more interest is earned at the compound interest rate than at the simple interest rate over a period of:

i 2 years? _____ **ii** 5 years? _____ **iii** 7 years? _____

b The interest earned after 1 year by either simple interest or compound interest is the same. Why?

_____

_____

QUESTION **2** Find the total compound interest earned in each case by repeated use of the simple interest formula. (Interest is compounded yearly.)

a $7200 is invested for 2 years at 8% p.a.

b $4500 is invested for 2 years at 7% p.a.

c $14 000 is invested for 3 years at 6% p.a.

d $6800 is invested for 3 years at 6.5% p.a.

e $9300 is invested for 4 years at 10% p.a.

UNIT 6: Compound interest

QUESTION **1** Use the compound interest formula $A = P(1 + \frac{r}{100})^n$ to find the compound interest earned on the following investments:

a $18 000 at 6% for 3 years, compounded annually.

b $12 000 at 12% p.a. for 2 years, compounded six-monthly.

c $45 000 at 8% p.a. for 2 years, compounded quarterly.

d $64 000 for 3 years at 18% p.a. compounded monthly.

e $85 000 for 10 years at 4% p.a. interest compounded monthly.

f $8600 for 6 years at 8.5% p.a. compounded daily.

QUESTION **2** Calculate the total amount returned when:

a $9000 is invested for 5 years at 12% p.a. compounded yearly.

b $25 600 is invested for 4 years at 9% p.a. compounded six-monthly.

c $120 000 is invested for 6 years at 8.5% p.a., compounded monthly.

d $48 000 is invested for 3 years at 12% p.a., compounded quarterly.

e $72 500 is invested for 5 years at 18% p.a., compounded monthly.

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Unit 7: Applying the compound interest formula

QUESTION **1** What sum of money would need to be invested to be worth $10 000 at the end of 5 years at the given interest rate?

a 7% p.a. compounded yearly.

b 6% p.a. compounded quarterly.

c 5% p.a. compounded six-monthly.

d 12% p.a. compounded monthly.

e 13% p.a. compounded weekly.
(1 year = 52 weeks)

f 18% p.a. compounded annually.

QUESTION **2** Using the compound interest formula, work out the amount of interest earned on $75 000 at the end of the stated period.

a At 7% p.a. compounded annually for 4 years.

b At 10% p.a. compounded quarterly for 3 years.

c At 8% p.a. compounded monthly for 2 years.

d At 12% p.a. compounded six-monthly for 3 years.

e At 9% p.a. compounded four-monthly for 5 years.

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UNIT 8: Compound interest tables

QUESTION **1** The table shows the total amount $1 increases to if invested at the given interest rate for the given number of periods, where interest is compounded per period.
Use the table to find the total amount returned in each situation:

Periods	Interest rate per period							
	1%	2%	2.5%	4%	5%	6%	10%	12%
1	1.0100	1.0200	1.0250	1.0400	1.0500	1.0600	1.1000	1.1200
2	1.0201	1.0404	1.0506	1.0816	1.1025	1.1236	1.2100	1.2544
3	1.0303	1.0612	1.0769	1.1249	1.1576	1.1910	1.3310	1.4049
4	1.0406	1.0824	1.1038	1.1699	1.2155	1.2625	1.4641	1.5735
5	1.0510	1.1041	1.1314	1.2167	1.2763	1.3382	1.6105	1.7623
6	1.0615	1.1262	1.1597	1.2653	1.3401	1.4185	1.7716	1.9738
7	1.0721	1.1487	1.1887	1.3159	1.4071	1.5036	1.9587	2.2107
8	1.0829	1.1717	1.2184	1.3686	1.4775	1.5938	2.1436	2.4760

a $8000 invested for 8 years at 6% p.a. compounded annually.

b $20 000 invested for 1 year at 10% p.a. compounded quarterly.

c $15 000 invested for 4 years at 8% p.a. compounded six-monthly.

QUESTION **2** Use the above table to find the amount of money which could be invested now to give $50 000 at the end of 5 years at 10% p.a. compounded annually.

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UNIT 9: Depreciation

QUESTION 1 Use the depreciation formula $A = P(1 - \frac{r}{100})^n$ to find the value of the following items after the given time.

a A car bought for \$16 000 depreciates at 8% p.a., find its value after 3 years.

b A coffee machine is worth \$5000 and depreciates at 7% p.a., find its value after 5 years.

c A computer costs \$3500 and depreciates at 25% p.a., find its value after 4 years.

d A photocopier costs \$20 000 and depreciates at 15% p.a., find its value after 3 years.

QUESTION 2 A business buys new computers for \$90 000. They depreciate at the rate of 20% p.a. Calculate:

a their value after 3 years

b the amount of depreciation

QUESTION 3

a Each year the population of a town decreases by 7%. If its population is now 20 000 people, what will it be in 4 years?

b A library depreciates by 10% p.a. If it is now worth \$50 000, what will its value be after 5 years?

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UNIT 10: Solving problems involving interest

QUESTION **1** Find the amount of interest earned if $12 000 is invested for 5 years at 7% p.a. if the interest is:

a simple interest.

b compounded yearly.

QUESTION **2** An amount of $20 000 is invested for 8 years at 6% p.a. interest, compound monthly. Find the annual rate of simple interest (as a percentage to one decimal place) that will give the same result.

QUESTION **3** An amount of $15 000 is to be invested for 4 years. Find the interest earned if it is.

a simple interest at 9% p.a.

b compounded yearly at 8% p.a.

c Which gives the best result and by how much?

QUESTION **4** What sum of money, (to the nearest $100), could be invested at 7% p.a. compounded yearly to give $35 000 at the end of 5 years?

QUESTION **5** Use a 'guess and check' method to find the number of years $8000 needs to be invested at 6% p.a. compounded yearly to produce $5515 interest.

Financial maths

TOPIC TEST — PART A

Time allowed: 15 minutes — **Total marks: 15**

Marks

1 The simple interest on $5400 at 7% pa for 8 years is
(A) $302.40 (B) $387.80 (C) $3024 (D) $3878 — 1

2 $800 invested for 3 years at 12% p.a. compound interest becomes:
(A) $545.18 (B) $944 (C) $1088 (D) $1123.94 — 1

3 $4000 invested for 5 years at 8% p.a. compound interest becomes:
(A) $5877.31 (B) $5600 (C) $5400 (D) $5870 — 1

4 Which amount of money will give $2400 simple interest when invested at 8% p.a. for 5 years.
(A) $600 (B) $960 (C) $6000 (D) $9600 — 1

5 Find the simple interest on $4500 at 7% p.a. for 5 years.
(A) $6075 (B) $1575 (C) $6311.48 (D) $1811.48 — 1

6 $500 invested for 3 years at 15% p.a. simple interest becomes:
(A) $225 (B) $725 (C) $760.44 (D) $26.44 — 1

7 $2000 invested for 4 years at 10% p.a. interest compounded annually becomes:
(A) $800 (B) $2800 (C) $928.20 (D) $2928.20 — 1

8 Find the simple interest on $1200 at 12% p.a. for 5 years.
(A) $720 (B) $1920 (C) $914.81 (D) $2114.81 — 1

9 A sum of $8500 amounted to $8925 after being invested for 6 months at simple interest. What was the interest rate earned?
(A) 8% p.a. (B) 9% p.a. (C) 10% p.a. (D) 11% p.a. — 1

10 Calculate the compound interest earned on $10 000 at 9% p.a. for 3 years compounded monthly (correct to the nearest dollar).
(A) $13 086 (B) $3086 (C) $2700 (D) $12 700 — 1

11 $15 000 is invested for 5 years at 10% p.a. interest compounded quarterly becomes:
(A) $22 500 (B) $7500 (C) $9579.25 (D) $24 579.25 — 1

12 A computer costs $2800 and depreciates at 20% p.a. Find its value after 3 years.
(A) $1433.60 (B) $1366.40 (C) $156.80 (D) $1665.20 — 1

13 A mobile phone is worth $800 and depreciates at 20% p.a. Find its value after 5 years.
(A) $537.86 (B) $262.14 (C) $360.80 (D) $315.34 — 1

14 A debt of $30 000 is to be paid in equal instalments of $625. How many instalments are needed?
(A) 36 (B) 48 (C) 60 (D) 72 — 1

15 After how many years will a sum of money double if invested at 5% pa simple interest?
(A) 25 (B) 20 (C) 10 (D) 5 — 1

Total marks achieved for PART A ____/15

Financial maths

TOPIC TEST — PART B

Instructions
- This part consists of 8 questions.
- Write only the answer in the answer column.
- For any working use the question column.

Time allowed: 20 minutes **Total marks: 15**

Questions	Answers	Marks
1 $8000 is invested for 4 years at 10% p.a. interest compounded annually. Find:		
a The total amount at the end of 4 years.		1
b The compound interest earned.		1
c The rate of simple interest that would produce the same result.		1
2 $8000 is invested for 8 years at 8% p.a., find the:		
a simple interest.		1
b extra amount earned if interest is compounded annually?		1
3 James decides to buy a car marked at $13 500. He pays a 15% deposit and the balance over 4 years with interest charged at 7% p.a. on the balance. Find the:		
a deposit paid.		1
b balance owing.		1
c simple interest paid.		1
d total to be repaid.		1
e monthly repayment?		1
4 Find the simple interest on $9500 at 7.5% p.a. for 12 months.		1
5 Find the length of time for $1200 to be the simple interest on $4800 at 5% p.a.		1
6 Find the compound interest on $24 000 at 7% p.a. for 2 years.		1
7 Calculate the total amount of interest earned when $7200 is invested for 3 years at 8% p.a. compounded half-yearly.		1
8 Each year a property increases in value by $10\frac{1}{2}$%. What is the value of a $600 000 property after 5 years. Answer to the nearest $1000.		1

Total marks achieved for PART B 15

CHAPTER 3
Equations, inequalities and formulae

UNIT 1: Simple equations

QUESTION **1** Solve:

a $x + 5 = 9$ **b** $x - 4 = 7$ **c** $x + 6 = 3$ **d** $x - 8 = -2$

e $7 + x = 23$ **f** $a - 21 = 15$ **g** $m + 6 = -4$ **h** $14 - n = 8$

i $5x = 45$ **j** $3a = -21$ **k** $7p = 56$ **l** $-4t = -36$

m $\frac{x}{2} = 8$ **n** $\frac{a}{3} = 3$ **o** $\frac{x}{5} = -2$ **p** $\frac{m}{4} = 20$

QUESTION **2** Solve the following equations.

a $2x + 8 = 18$ **b** $3a + 5 = 11$ **c** $6m - 1 = 41$

d $5n - 7 = 23$ **e** $4p + 9 = -3$ **f** $3k - 8 = -5$

g $9 - 2p = 1$ **h** $x - 7 = 18$ **i** $12 - 3a = 24$

j $\frac{x}{3} + 4 = 8$ **k** $\frac{a}{7} - 1 = 1$ **l** $\frac{t}{5} - 7 = -2$

m $\frac{2x}{3} = 6$ **n** $\frac{4a}{5} = 12$ **o** $\frac{3b}{7} = -6$

p $\frac{3x}{5} - 4 = 8$ **q** $\frac{5a}{6} + 3 = 13$ **r** $\frac{2n}{3} - 1 = -7$

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Unit 2: Equations with pronumerals on both sides

QUESTION **1** Solve the following equations.

a $8x + 5 = 7x + 12$

b $3x - 2 = 2x + 7$

c $5x + 8 = 4x + 3$

d $5x + 6 = 2x + 15$

e $7x - 3 = 5x + 9$

f $8x - 1 = 3x + 4$

g $9a + 5 = 4a + 5$

h $6p - 2 = p + 8$

i $5e - 6 = 2e - 3$

j $7k + 2 = 3k - 10$

k $4m + 3 = 9 - m$

l $11k - 2 = 5k - 8$

m $5x - 4 = 10 - 2x$

n $8n = 5n + 12$

o $7y + 8 = -3y + 28$

p $9n + 15 = 5n + 47$

q $8q + 7 = 31 - 4q$

r $6m - 16 = 2m + 52$

QUESTION **2** Solve, after first collecting like terms.

a $5x - 9 + 2x = 3x + 35$

b $7q + 5 - 2q - 8 = 3q - 7$

c $11a + 18 - 3a = 9a + 6 + a$

UNIT 3: Equations with grouping symbols

QUESTION **1** Solve the following equations.

a $4(x + 5) = 28$

b $3(x + 2) = 27$

c $5(x + 6) = 20$

d $7(x - 1) = 35$

e $2(3x - 2) = 8$

f $5(2x + 7) = -5$

g $3(x - 7) = 2x + 5$

h $2(4x + 5) = 7x - 3$

i $3(2x + 3) = 5x + 4$

j $7(x - 3) = 2x + 9$

k $4(3x + 1) = 7x - 11$

l $3 + 7x = 2(6x - 1)$

QUESTION **2** Solve the following equations.

a $5(a + 3) = 4(a + 4)$

b $3(x - 5) = 2(x + 4)$

c $7(m - 1) = 3(2m + 1)$

d $8(y + 2) = 3(y - 3)$

e $10(a - 1) = 4(2a + 3)$

f $3(5k - 1) = 7(k + 3)$

g $5(3m - 2) = 2(4m + 9)$

h $9(3a + 5) = 5(5a - 3)$

i $2(5m + 7) = 3(2m - 1)$

j $6(x + 5) + 5(x - 2) = 9$

k $5(2x + 3) - 2(3x - 4) = 31$

l $8k - 3(3k + 1) = 5$

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UNIT 4: Equations with fractions (1)

QUESTION **1** Solve the following equations.

a $\frac{x}{3} + 2 = 7$

b $\frac{a}{2} - 5 = 3$

c $\frac{n}{5} + 4 = 7$

d $\frac{m}{6} - 3 = 10$

e $\frac{x + 3}{5} = 2$

f $\frac{a - 1}{4} = 4$

g $\frac{x - 5}{3} = -1$

h $\frac{t + 6}{2} = \frac{1}{2}$

i $\frac{3x + 2}{5} = 4$

j $\frac{5x - 3}{2} = 1$

k $\frac{2k + 7}{3} = 5$

l $\frac{4p - 1}{5} = -3$

m $\frac{4n}{5} - 2 = 6$

n $\frac{7x}{3} + 4 = -3$

o $\frac{5k}{4} - \frac{1}{2} = 2$

p $\frac{3e}{4} + 6 = 0$

QUESTION **2** Solve.

a $\frac{x + 4}{3} - 2 = 2$

b $\frac{a - 2}{5} + 1 = 7$

c $\frac{m + 5}{2} + 3 = -4$

d $\frac{4c + 5}{3} - 1 = 2$

e $\frac{3b - 2}{5} + 7 = 12$

f $\frac{7h + 3}{5} + 5 = 0$

UNIT 5: Equations with fractions (2)

QUESTION **1** Solve the following equations.

a $\frac{y}{2} - \frac{y}{3} = 1$

b $\frac{t}{3} - \frac{t}{4} = 7$

c $\frac{p}{2} - \frac{p}{4} = 8$

d $\frac{x}{4} - \frac{x}{5} = 2$

e $\frac{x}{2} + \frac{x}{5} = 7$

f $\frac{n}{3} + \frac{n}{6} = \frac{2}{3}$

g $\frac{y}{5} - \frac{2}{5} = \frac{7}{10}$

h $\frac{8x}{5} - \frac{2x}{3} = 1$

i $\frac{5p}{3} + \frac{2p}{4} = 9$

j $\frac{2x}{3} + \frac{3x}{4} = -11$

k $\frac{3x}{2} + \frac{5x}{4} = \frac{5}{2}$

l $\frac{5x}{3} + \frac{3x}{5} = \frac{4}{15}$

QUESTION **2** Solve the following equations.

a $\frac{a+3}{5} = \frac{a+7}{3}$

b $\frac{2m+9}{3} = \frac{3m+5}{4}$

c $\frac{t-1}{3} = \frac{t-4}{2}$

d $\frac{3m-1}{4} = \frac{m}{2}$

e $\frac{x+3}{5} = \frac{2x-3}{3}$

f $\frac{x+2}{3} = \frac{x-2}{2}$

g $\frac{p+3}{2} + \frac{p+5}{3} = 6$

h $\frac{x+1}{2} + \frac{x+1}{3} = 7$

i $\frac{6m}{10} - \frac{m-2}{4} = 0$

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UNIT 6: Solving problems (1)

QUESTION **1** Write an equation for each of the following and then solve it to find the value of the unknown number.

a If 9 is added to the product of 5 and a number, the result is 29.

b If 12 is subtracted from 3 times a number, the result is 48.

c The product of a certain number and 7 is subtracted from 63 and the result is twice the number.

d If 4 times a certain number is subtracted from 25, the result is 85.

e If 15 is subtracted from a certain number we are left with $\frac{5}{6}$ of the number.

f 8 more than twice a number equals that number plus 20.

g When 24 is subtracted from 3 times a number, the result equals the number increased by 30. Find the number.

h 31 more than 5 times a number equals 83 more than 3 times the number. Find the number?

i 6 times a number is subtracted from 72. The result equals 27 less than 5 times the number. Find the number.

QUESTION **2** Write an equation and solve to find the unknown.

a The sum of 3 consecutive even numbers is 96.
Find the numbers.

b If 12 years are added to a man's present age and this value is doubled, it is equal to 96.
Find the man's present age.

c Sarah's age is 3 times Nick's age. If Sarah is 28 years older than Nick, find their ages.

UNIT 7: Solving problems (2)

QUESTION **1** Write an equation and solve.

a Kyle's present age is x years. He is 7 years older than his wife Laurie, and his son Isaac is one-third of Kyle's age. If the sum of their ages is 91 years, how old is Kyle now?

b Georgie is 4 years older than her sister Isabel. The sum of their ages is 32 years. Find their ages.

c A mother is twice as old as her daughter now, but 10 years ago, she was 3 times as old as her daughter. Find their ages at present.

d When Tom was 10 years old, his father was 38 years old. Now Tom's father is twice as old as Tom. How old is Tom?

QUESTION **2** Write an equation and solve.

a The length of a rectangle is 4 times the width of the rectangle, and the perimeter is 120 cm. Find the width and the length of the rectangle.

b The angles of a triangle are in the ratio 2 : 3 : 4. Find the size of each angle.

c One angle of a triangle measures 60° more than the smallest angle. The third angle measures twice as much as the smallest angle. Find the sizes of the 3 angles.

d In a parallelogram, each obtuse angle is $(3x - 7)°$ and each acute angle is $(x + 3)°$. Find x.

QUESTION **3** The adjacent sides of a rectangle are $(3x - 8)$ cm and 6 cm. Given that the area of the rectangle is 96 cm^2, find the length of the rectangle and the value of x.

a Find x.

b Find the length of the rectangle.

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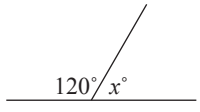
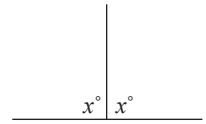
UNIT 8: Using equations in geometry

QUESTION 1 Find the value of x in each diagram:

a



b



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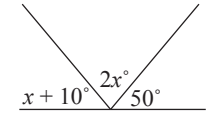

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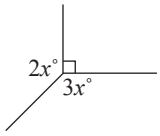

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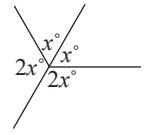

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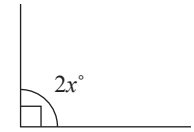

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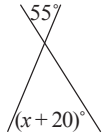

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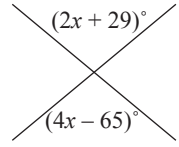
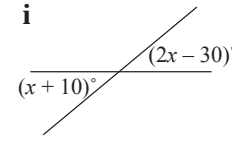
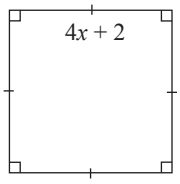


i



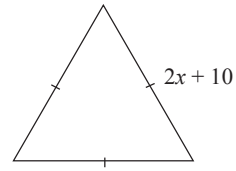
QUESTION 2 Find the value of the pronumeral in each diagram. All length measurements are in centimetres.

a



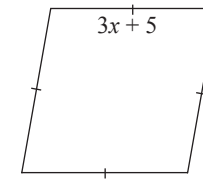
Perimeter = 40 cm

b



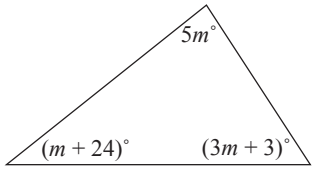
Perimeter = 60 cm

c



Perimeter = 128 cm

d



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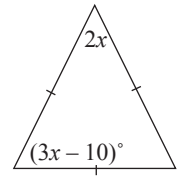

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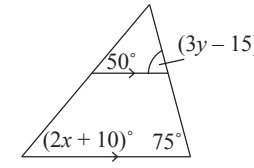

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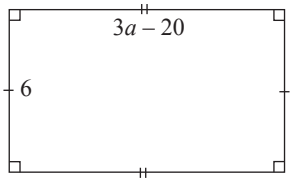
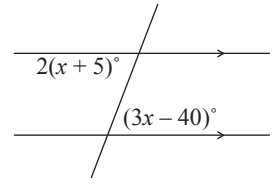
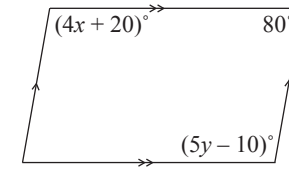


Area = 96 cm^2

h



i



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UNIT 9: Formulae: finding the subject

QUESTION 1 Find the value of the pronumerals in capital letters.

a $A = \frac{1}{2}bh$ when $b = 10$, $h = 8$

b $P = 2(l + b)$ when $l = 10$, $b = 7$

c $S = \frac{n}{2}(a + l)$ when $n = 6$, $a = 5$, $l = 143$

d $S = n(n + 1)$ when $n = 12$

e $V = \frac{abh}{3}$ when $a = 4$, $b = 6$, $h = 8$

f $A = l^2$ when $l = 10$

g $C = \pi d$ when $\pi = 3.14$, $d = 12$

h $P = a + b + c$ when $a = 3$, $b = 4$, $c = 5$

i $F = ma$ when $m = 9$, $a = 7$

j $E = \frac{1}{2}mv^2$ when $m = 6$, $v = 5$

k $V = u + at$ when $u = 8$, $a = 6$, $t = 5$

l $C = 2\pi r$ when $\pi = 3.14$, $r = 14$

m $A = \pi r^2$ when $\pi = \frac{22}{7}$, $r = 7$

n $V = l^3$ when $l = 5$

QUESTION 2 If $P = 2(l + b)$; find:

a P when $l = 16$ and $b = 10$.

b l when $P = 36$ and $b = 10$.

c b when $P = 64$ and $l = 17$.

QUESTION 3 If $V = lbh$; find:

a V when $l = 8$, $b = 6$ and $h = 4$.

b l when $V = 60$, $b = 4$ and $h = 3$.

c b when $V = 480$, $l = 10$ and $h = 8$.

d h when $V = 450$, $b = 5$ and $l = 10$.

QUESTION 4 If $A = \frac{1}{2}h(x + y)$; find

a A when $h = 12$, $x = 14$ and $y = 18$.

b h when $A = 40$, $x = 13$ and $y = 7$.

c x when $A = 64$, $h = 8$ and $y = 6$.

d y when $A = 132$, $h = 12$ and $x = 10$.

UNIT 10: Changing the subject of the formula

QUESTION 1 Make the letter indicated in the brackets the subject of the formula.

a $F = ma$ $[a]$

b $V = lbh$ $[h]$

c $C = \pi d$ $[d]$

d $P = a + b + c$ $[c]$

e $D = \frac{M}{V}$ $[M]$

f $D = ST$ $[T]$

g $P = 2(l + b)$ $[b]$

h $A = \frac{1}{2}h(x + y)$ $[h]$

i $v = u + at$ $[a]$

j $A = \frac{1}{2}bh$ $[h]$

k $v^2 = u^2 + 2as$ $[s]$

l $I = \frac{PRT}{100}$ $[T]$

m $E = \frac{1}{2}mv^2$ $[m]$

n $S = \frac{n}{2}(a + l)$ $[l]$

o $y = mx + b$ $[m]$

QUESTION 2 Make the letter indicated in the brackets the subject of the formula.

a $\mathrm{M} = \frac{5k}{18}$ $[k]$

b $C = 2\pi r$ $[r]$

c $V = \frac{1}{3}\pi r^2 h$ $[h]$

d $C = ad$ $[d]$

e $t = a + (n - 1)d$ $[n]$

f $P = \frac{RT}{V}$ $[T]$

g $V = \frac{4}{3}\pi r^3$ $[r]$

h $I = A - P$ $[P]$

i $E = mc^2$ $[m]$

j $V = \frac{1}{3}Ah$ $[A]$

k $S = \frac{a}{1 - r}$ $[a]$

l $v^2 = u^2 + 2as$ $[a]$

UNIT 11: Equations arising from substitution in formulae

QUESTION 1 Given the formula $S = ut + \frac{1}{2}at^2$, find the value of S.

a When $u = 12$, $a = 10$ and $t = 8.5$

b When $u = 14$, $a = 9$ and $t = 7.6$

QUESTION 2 Given that $P = 2L + 2B$

a Find L when $P = 100$, $B = 8$

b Find B when $P = 120$, $L = 15$

QUESTION 3 Find h, given that $A = 84$ and $b = 12$

a $A = \frac{1}{2}bh$

b $A = \frac{1}{2}h(a + b)$ and $a = 32$

QUESTION 4 If $v^2 = u^2 + 2as$, find:

a u if $v = 15$, $a = 7$ and $s = 16$

b a if $v = 40$, $u = 5$ and $s = 60$

QUESTION 5 Find the value of r, correct to one decimal place.

a $C = 2\pi r$ and $C = 360$

b $A = \pi r^2$ and $A = 240$

QUESTION 6 Given the formula $v = u + at$, find:

a u if $v = 48$, $a = 5$, $t = 6$

b t if $v = 78$, $u = 30$ and $a = 8$

QUESTION 7 Given the formula $A = P(1 + \frac{r}{100})^n$, find the value of P correct to one decimal place.

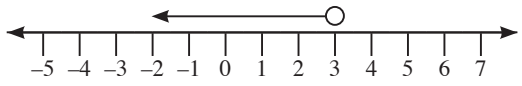
a $A = 9750$, $r = 5\%$ p.a. and $n = 7$

b $A = 12\,500$, $r = 8\%$ p.a. and $n = 8$

UNIT 12: Simple inequalities

QUESTION 1 State the inequality that is graphed on each number line.

a



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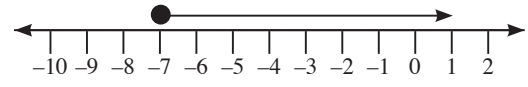

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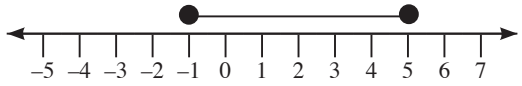

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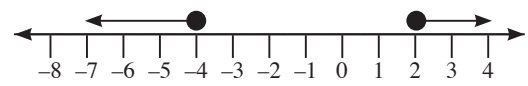

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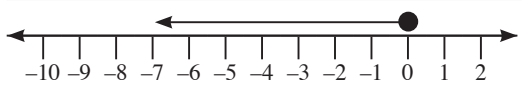

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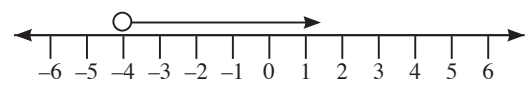

QUESTION 2 Graph each inequality on a number line.

a $x \geq 2$

b $x > 0$

c $x < 1$ or $x > 2$

d $x < -1$

e $-3 < x < 7$

f $x \geq 2\frac{1}{2}$

g $x \leq 3$ or $x \geq 5$

h $1 \leq x < 6$

i $-3 \leq x \leq 4$

QUESTION 3 Solve each inequality and graph the solution on a number line.

a $x + 3 < 7$

b $a - 3 > 5$

c $m + 4 > 8$

d $6 + y \leq 10$

e $15 > 8 + y$

f $x - 3 > 2$

g $m - 4 \leq 5$

h $9 \geq m - 2$

i $8 \geq x + 3$

j $m - 4 \leq 10$

k $m - 2 \geq 8$

l $-6 > y + 3$

m $-3 \leq a + 1$

n $-8 \geq x - 4$

o $-5 < y - 7$

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UNIT 13: Inequalities

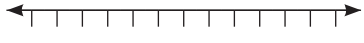
QUESTION 1 Solve the following inequalities and graph the solutions on the number lines provided.

a $x + 1 < 3$

b $m + 5 > 7$

c $t - 3 < 1$

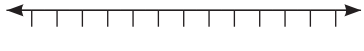
d $p + 5 \geq 2$



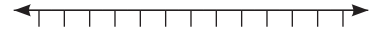
e $y - 2 \leq 1$

f $x + 4 \geq 6$

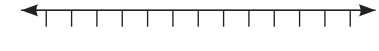
g $3x < 12$



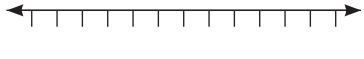
h $4p \geq 8$



i $6m < 12$



j $\frac{x}{3} \geq 1$



k $\frac{x}{2} < 3$

l $\frac{x}{4} \leq 2$

QUESTION 2 Solve the following inequalities.

a $6x < 24$

b $5x - 2 < 18$

c $3x - 1 \leq 5$

d $3x - 2 \geq -5$

e $4x - 7 \leq 9$

f $3t + 1 \geq 7$

g $6y - 7 < 5$

h $3(x + 2) \geq 12$

i $4(x - 3) \leq -16$

j $2(3x - 1) \geq 28$

k $8x < 5x + 15$

l $7x - 5 \leq 9$

m $\frac{x}{3} - 1 < 1$

n $\frac{y - 1}{2} > 2$

o $\frac{m}{3} + \frac{m}{2} \leq 1$

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UNIT 14: Inequalities involving negatives

QUESTION 1 Determine whether each inequality is True or False.

a $3 > 2$ **b** $-3 > -2$ **c** $5 < 8$ **d** $-5 < -8$

e $-2 < 8$ **f** $2 < -8$ **g** $3 > -4$ **h** $-3 > 4$

QUESTION 2 Solve, remembering to reverse the inequality sign if multiplying or dividing by a negative number.

a $2x > 8$ **b** $-2x > 8$ **c** $-2x > -8$ **d** $2x > -8$

e $-3a \leq 9$ **f** $-5p > -10$ **g** $6k \geq 12$ **h** $-4q < -56$

i $-x < 7$ **j** $-m \geq -2$ **k** $-\frac{x}{3} \leq -6$ **l** $-\frac{x}{4} > 1$

QUESTION 3 Solve.

a $9 - 2x \leq 7$ **b** $-3a + 5 > 11$ **c** $-4m - 1 < 23$

d $-5x + 8 \geq -2$ **e** $12 - 7x < 82$ **f** $9 + 2x \geq -5$

g $7 - \frac{x}{2} \geq 3$ **h** $\frac{7 - x}{2} \geq 3$ **i** $5 - \frac{a}{10} < -2$

j $13 - 3x \geq -14$ **k** $-(\frac{x - 2}{3}) \leq -5$ **l** $\frac{9 - 2x}{5} > 7$

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UNIT 15: Mixed inequalities

QUESTION 1 Solve and graph.

a $2(y + 5) \leq 6$

b $3(x - 1) > 5$

c $4(2p + 3) \geq 10$

d $3(2y + 1) > 9$

e $4(2 - x) \leq -7$

f $2(x + 5) \leq 12$

g $3(y + 3) \geq 12$

h $2(5 - 2x) > 6$

i $3(2x - 4) < 5x$

j $3(2 - x) > 17$

k $3(2x - 3) \leq -8$

l $3m - 2(m - 1) < 8m$

QUESTION 2 Solve and graph.

a $\frac{a}{5} + 4 < 6$

b $8 - \frac{x}{2} > 9$

c $\frac{1}{3}x + 4 \leq 5$

d $\frac{3x}{7} < 10 - 2x$

e $\frac{-6p}{5} \geq 4$

f $\frac{m}{2} - \frac{m}{3} < 6$

g $\frac{3x}{5} + \frac{x}{5} \geq -1$

h $\frac{5t - 2}{3} < 1$

i $\frac{6 - x}{5} > -3$

j $10 - x \geq \frac{x}{5}$

k $\frac{a + 3}{5} - \frac{a}{10} \geq 2$

l $\frac{t}{3} + 5 \leq \frac{2t}{3}$

QUESTION 3 Solve.

a $3(x - 4) > 5$

b $2(2y - 1) \leq 3$

c $5(p - 2) \leq 10$

d $6(x - 3) \geq 12$

e $3(2a - 1) > 6$

f $2(7 - x) < 21$

g $5(2x + 3) < 9x + 3$

h $5(2 - x) \geq 15$

i $2(2x - 5) > -8$

j $3(2x + 1) \leq 9$

k $5(x - 4) \leq 4x + 3$

l $3y - 2(y + 1) \geq -6$

Equations, inequalities and formulae

TOPIC TEST — PART A

Instructions
- This part consists of 10 multiple-choice questions.
- Fill in only ONE CIRCLE for each question.
- Each question is worth 1 mark.

Time allowed: 15 minutes **Total marks: 10**

Marks

1 If $2x + 5 = 19$, find the value of x.

(A) 7 (B) 9 (C) 11 (D) 12 — 1

2 If $\frac{x}{5} + 3 = 9$, then x is equal to

(A) 1.2 (B) 2.5 (C) 30 (D) 60 — 1

3 If $2y - x = 5$, find x.

(A) $2y - 5$ (B) $5 - 2y$ (C) $-2y - 5$ (D) $2y + 5$ — 1

4 Find the value of x that satisfies the equation $5(x - 4) = 20$

(A) 0 (B) 4 (C) 8 (D) none of these — 1

5 When $\frac{m + 5}{3} = \frac{m + 2}{4}$, find the value of m.

(A) -14 (B) -3 (C) 7 (D) none of these — 1

6 When $3(a + 7) = 42$, find the value of a.

(A) 5 (B) 6 (C) 7 (D) 8 — 1

7 If $S = \frac{a}{1 - r}$, find S when $a = 12$ and $r = \frac{1}{4}$

(A) 3 (B) 4 (C) 9 (D) 16 — 1

8 Find the solution of $2x - 1 > 3$

(A) $x < 1$ (B) $x < 2$ (C) $x > 1$ (D) $x > 2$ — 1

9 Find the solution of $9 - x < 8$

(A) $x < 1$ (B) $x > 1$ (C) $x > -1$ (D) $x \leq 1$ — 1

10 Find the correct solution to the inequality $-x \geq -10$

(A) $x \leq 10$ (B) $x \geq 10$ (C) $x \geq -10$ (D) $x \leq -10$ — 1

Total marks achieved for PART A 10

Equations, inequalities and formulae

TOPIC TEST — PART B

Instructions
- This part consists of 4 questions.
- Write only the answer in the answer column.
- For any working use the question column.

Time allowed: 20 minutes **Total marks: 15**

Questions | **Answers** | **Marks**

1 Solve the following equations.

a $9y - 15 = 30$ — 1

b $\frac{x+4}{5} + 2 = 3$ — 1

c $7x - 5 = 3x + 11$ — 1

d $5(x+3) + 2(x-1) = -8$ — 1

e $\frac{3n-1}{4} = \frac{4n+1}{5}$ — 1

f $\frac{x}{2} + \frac{x}{3} = 10$ — 1

2 Solve the inequality and graph the solution on the number line provided.

a $4x - 3 > 2x + 7$ — 1 + 1

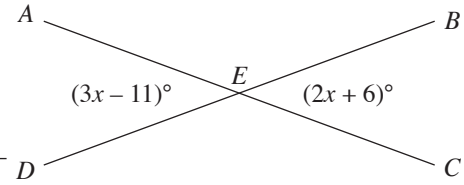
b $12 - 3x \leq 15$ — 1 + 1

3 Find A given that $b = 12$ and $h = 9$

a $A = \frac{1}{2}bh$ — 1

b $A = \frac{h}{2}(a+b)$ and $a = 7$ — 1

4 **a** Write down an equation that could be solved to find the value of x. — 1



b Find the value of x. — 1 + 1

c Find the size of $\angle AED$. — 1 + 1

Total marks achieved for PART B 15

CHAPTER 4
Simultaneous equations

UNIT 1: Using tables of values

QUESTION 1 Write down four pairs of integers for x and y that satisfy the equation.

a $x + y = 6$ **b** $x - y = 4$ **c** $2x + y = 3$ **d** $x + 2y = 5$

QUESTION 2 Substitute the values given in parentheses to determine whether they satisfy each pair of simultaneous equations.

a $x + y = 4$, $x - y = 6$ $(5, -1)$

b $2x + y = 6$, $3x - y = 4$ $(2, 2)$

c $x + 3y = 15$, $y - x = 1$ $(3, 4)$

d $2x + 5y = 0$, $3x - 5y = 5$ $(0, 5)$

e $2m + n = 11$, $m - n = -2$ $(3, 1)$

f $a + 3b = 6$, $2a - 4b = 8$ $(2, 1)$

QUESTION 3 Complete.

a Complete the table of values.

i $y = 2x$

x	0	1	2	3
y				

ii $x + y = 6$

x	0	1	2	3
y				

b Use the tables of values to find the simultaneous solution of $y = 2x$ and $x + y = 6$ _____

QUESTION 4 Complete the tables of values and find the simultaneous solution for each pair of equations.

a $x - y = -5$, $3x + y = 9$ _____

x	–2	–1	0	1	2
y					
y					

b $x - y = -3$, $2x - y = -5$ _____

x	–2	–1	0	1	2
y					
y					

c $x - y = 4$, $3x - y = 6$ _____

x	–2	–1	0	1	2
y					
y					

d $2x + y = 12$, $5x - y = 2$ _____

x	–2	–1	0	1	2
y					
y					

QUESTION 5 Solve each pair of simultaneous equations by setting up tables of values.

a $x + y = 5$, $x - y = -1$ _____

b $5x + y = 5$, $2x - y = 2$ _____

c $2x + 3y = 6$, $2x - 3y = -2$ _____

Simultaneous equations

UNIT 2: The 'guess and check' method

QUESTION 1 Write down three pairs of integers for x and y that satisfy the equation.

a $x + y = 7$

b $x - y = 9$

c $x + 2y = 6$

d $x - 3y = -6$

e $x - 2y = 4$

f $2x + y = 5$

g $3x - y = 8$

h $2x + 3y = 12$

QUESTION 2 Substitute the values given in parentheses to determine whether they satisfy each pair of simultaneous equations.

a $x + y = 1$ $(-1, 2)$
$x - y = -3$

b $x + y = 9$ $(2, 7)$
$x - y = -5$

c $x - y = -1$ $(1, 1)$
$x + y = 3$

d $x + y = 15$ $(5, 10)$
$x - y = 5$

e $x - y = 2$ $(2, 4)$
$x + y = 6$

f $2x - y = 6$ $(1, -1)$
$2x - y = -2$

QUESTION 3 Find the value of each pronumeral by using the 'guess and check' approach.

a $x - y = 3$
$x - 2y = 0$

b $2x + y = 4$
$x - y = 2$

c $3x + y = 8$
$x - y = 0$

d $m + n = 5$
$m - 2n = 2$

e $x + 3y = -1$
$x - 3y = 3$

f $2x + y = 6$
$x - y = -3$

g $x + y = 4$
$x - y = 2$

h $x - y = -2$
$2x - y = -1$

QUESTION 4 Solve each pair of simultaneous equations by using the 'guess and check' method.

a $x - y = -2$
$x + y = 6$

b $3x - y = -2$
$5x - y = 4$

c $x - y = 4$
$2x + y = 2$

d $x + y = 7$
$x - y = -3$

e $2x + y = 5$
$x - y = 1$

f $5x + y = 10$
$x - y = 2$

g $x - 2y = 4$
$x + 2y = -2$

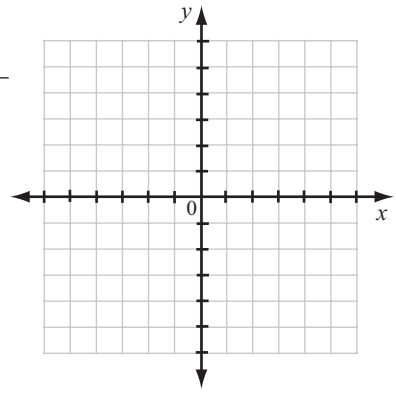
h $2x - 3y = -1$
$3x + 3y = -4$

Simultaneous equations

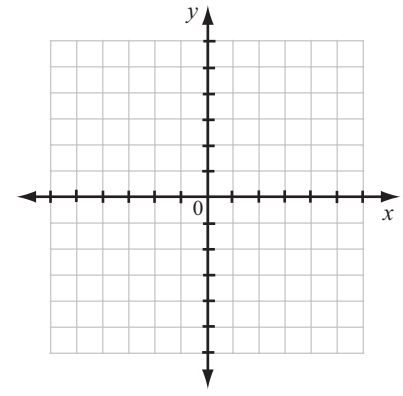
UNIT 3: The graphical method

QUESTION **1** Solve, by drawing graphs, the following pairs of simultaneous equations.

a $y = x + 5$
$y = -3x + 9$

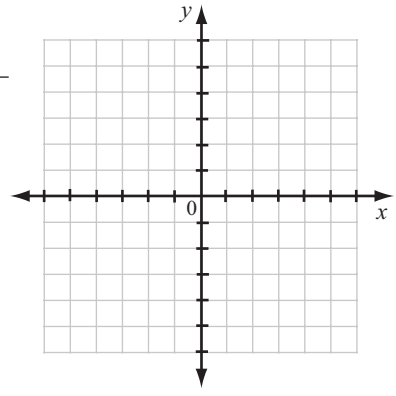


b $y = x + 3$
$y = 2x + 5$

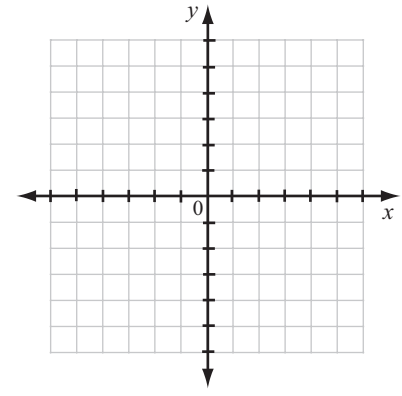


QUESTION **2** Solve graphically the following pairs of simultaneous equations.

a $y = x + 1$
$y = 2x + 3$

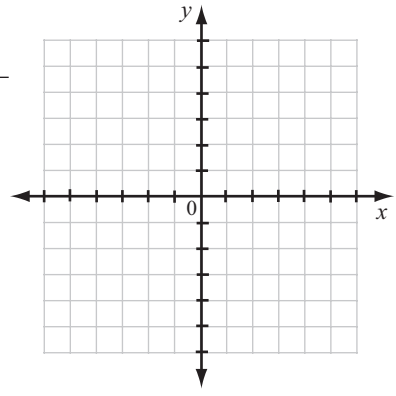


b $y = x - 4$
$y = 3x - 6$

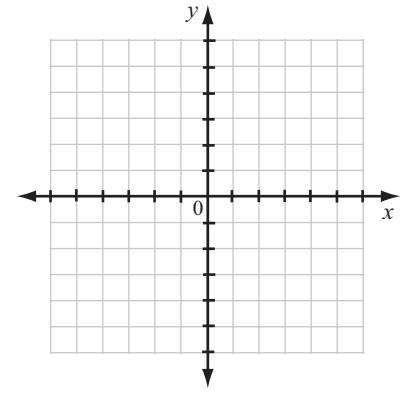


QUESTION **3** Graph each pair of equations on the same number plane to find their solution.

a $y = -x + 2$
$y = 2x - 7$



b $x + y = 3$
$2x - y = -9$



Simultaneous equations

UNIT 4: The method of substitution

QUESTION **1** Solve the following pairs of simultaneous equations by substitution.

a $x + y = 10$
$y = x - 8$

b $2p - q = 12$
$p = 3 - q$

c $x + 3y = 15$
$y = x + 1$

d $x + 4y = 21$
$x = 12 - y$

e $y = 6 - x$
$2x - y = -6$

f $2x + y = 7$
$x = 4 - y$

QUESTION **2** Use the method of substitution to solve the following pairs of simultaneous equations.

a $2m + 3n = 8$
$3m + 3n = 5$

b $2x + 3y = 12$
$4x - 3y = 6$

c $2x - 5y = 11$
$2x - 3y = 7$

d $y = 2x + 1$
$y = x + 4$

Simultaneous equations

UNIT 5: Adding or subtracting to eliminate a variable

QUESTION **1** Solve simultaneously after adding the two equations together.

a $a + b = 11$
$a - b = 3$

b $2x + y = 17$
$x - y = 1$

c $3m - n = 22$
$2m + n = 23$

d $5p + 2q - 26 = 0$
$3p - 2q - 6 = 0$

e $7x + 4y = 113$
$5x - 4y = 19$

f $6k + 7d = 16$
$3k - 7d = 29$

QUESTION **2** Solve simultaneously, after subtracting one equation from the other.

a $5x + 2y = 39$
$4x + 2y = 32$

b $9p + q = 79$
$5p + q = 47$

c $6a + 5b = 62$
$4a + 5b = 38$

d $3a - b = 17$
$a - b = 3$

e $8m - 3n = 102$
$5m - 3n = 57$

f $12x - 7y = 94$
$x - 7y = -5$

Simultaneous equations

UNIT 6: Solving by elimination

QUESTION **1** Multiply the second equation so that the coefficients of y are the same and then solve simultaneously.

a $3x + 2y = 21$
$x - y = 2$

b $5x + 8y = 64$
$3x + 2y = 30$

c $7x - 6y + 5 = 0$
$4x - 3y + 2 = 0$

QUESTION **2** Solve simultaneously, using the elimination method after multiplying one or both equations.

a $5a - 4b = 9$
$3a + b = 2$

b $6x + y = 25$
$2x + 3y = 27$

c $3x + 2y = -1$
$x - 4y = -33$

d $3m + 2n = 10$
$5m + 3n = 17$

e $9a - 4b = 2$
$7a - 3b = 1$

f $a + 5b = 18$
$6a - 2b = 44$

g $2x + 7y - 1 = 0$
$5x - 3y - 64 = 0$

h $8y + 3z = 104$
$5y - 6z = 2$

i $m - 6n = 23$
$8m - 9n = 28$

Simultaneous equations

UNIT 7: The method of elimination

QUESTION **1** Solve the following pairs of simultaneous equations by the method of elimination.

a $x + 2y = 8$
$3x - 2y = 4$

b $2x - 3y = 6$
$x + 3y = 9$

c $2x + 5y = 19$
$3x - 5y = 6$

d $2x + y = 10$
$3x - y = 5$

e $3x + 4y = 14$
$x + y = 3$

f $2x - y = 3$
$x - 2y = 9$

QUESTION **2** Use the method of elimination to solve the following pairs of simultaneous equations.

a $3x + 4y = 12$
$x - y = 4$

b $4x + 5y = 22$
$x + y = 10$

c $2x + 3y = 11$
$x - y = -2$

d $5x - 3y = 9$
$3x + y = 4$

Simultaneous equations

UNIT 8: Mixed questions

QUESTION **1** Solve the following pairs of simultaneous equations by the method of elimination.

a $9a - 2b = 36$
$a + 2b = 14$

b $2x + y = 8$
$5x + 2y = -3$

c $x + 3y = 8$
$3x - y = 9$

QUESTION **2** Use the method of substitution to solve the following pairs of simultaneous equations.

a $2x - y = 9$
$3x - 2y = 15$

b $3x + 8y = 4$
$3x + 2y = -2$

c $5m - 2n = 20$
$3m - 4n = 12$

QUESTION **3** Solve the following simultaneous equations by any suitable method.

a $x + y = 10$
$3x - 4y = 2$

b $x + 5y = 15$
$-x + 2y = 6$

c $2x + y = -8$
$3x - 2y = -12$

d $3x + y = 7$
$x + 2y = 9$

e $3x + 5y = 25$
$2x - y = 8$

f $2x - 5y = 13$
$5x - 3y = -15$

Simultaneous equations

UNIT 9: Word problems

QUESTION **1** Solve each problem by forming a pair of simultaneous equations. Let the unknown values be x and y.

a The sum of two numbers is 23 and their difference is 7. Find the numbers.

b The sum of two numbers is 80 and their difference is 42. Find the numbers.

c The sum of two numbers is 56 Twice the first number minus the second number is equal to 25. Find the numbers.

d The sum of two numbers is 36 and one of the two numbers is twice the other. Find the numbers.

e The difference between two numbers is 15 and the smaller number plus twice the larger number is equal to 36. Find the numbers.

f Five apples and three oranges cost \$2.70, whereas three apples and one orange cost \$1.30. Find the price of each piece of fruit.

QUESTION **2** Form a pair of simultaneous equations to solve each problem.

a There are 620 students in a school. If there are 80 more girls than boys, how many boys and girls are there?

b The difference between the length and width of a room is 4 m and the perimeter of the room is 48 m. Find the length and the width of the room.

c The equation $y = mx + b$ is satisfied when $x = 1$ and $y = 1$, and when $x = 2$ and $y = 4$. Find m and b.

d In her yearly tests, Georgie got 20 more marks in Maths than in English. The total of her marks for both tests was 130. Find her marks in each test.

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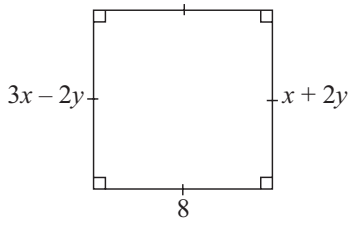
UNIT 10: Solving geometrical problems

QUESTION 1 Solve each problem by forming a pair of simultaneous equations. Let the unknown values be x and y.

a



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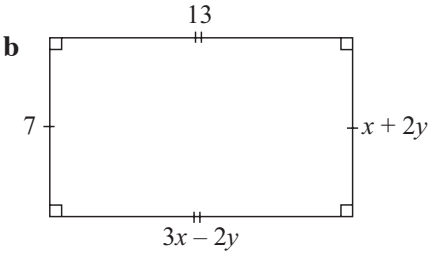

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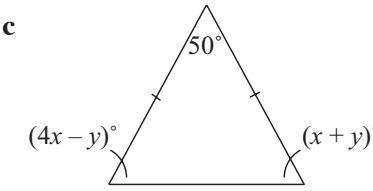

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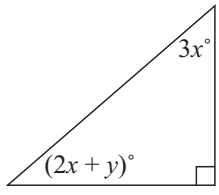

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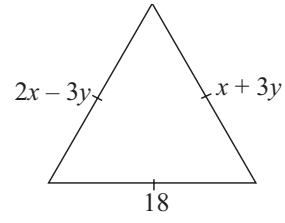

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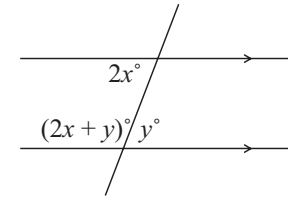
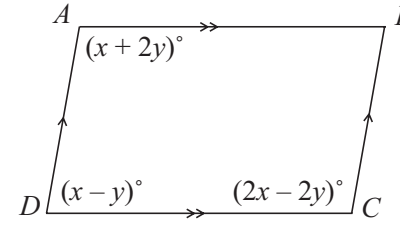


QUESTION 2 $ABCD$ is a parallelogram.

a Find the values of x and y.



b Find the size of $\angle BAD$.

Simultaneous equations

TOPIC TEST — PART A

Instructions
- This part consists of 10 multiple-choice questions.
- Fill in only ONE CIRCLE for each question.
- Each question is worth 1 mark.

Time allowed: 15 minutes **Total marks: 10**

Marks

1 The solution to the simultaneous equations $2x - y = 2$ and $x + y = -5$ is:
(A) $x = -1, y = 4$ (B) $x = 1, y = 4$ (C) $x = -1, y = -4$ (D) $x = 1, y = -4$ [1]

2 Which pair of values satisfies the equations $x + y = 9$ and $x - y = 3$?
(A) $x = -6, y = 3$ (B) $x = 6, y = -3$ (C) $x = 6, y = 3$ (D) $x = -6, y = -3$ [1]

3 Find the value of x that satisfies the equations $x + 3y = 9$ and $x - 3y = 1$.
(A) $x = -1$ (B) $x = 1$ (C) $x = 5$ (D) $x = -5$ [1]

4 Solve $x + y = 5$ and $3x - y = 7$ simultaneously.
(A) $x = -3, y = 2$ (B) $x = -3, y = -2$ (C) $x = 3, y = 2$ (D) $x = 2, y = 3$ [1]

5 The solution to the simultaneous equations $y = 5x - 2$ and $2x + y = 12$ is:
(A) $x = 2, y = 8$ (B) $x = 8, y = 2$ (C) $x = -2, y = 8$ (D) $x = -8, y = -2$ [1]

6 Which pair of values satisfies the equations $x - 5y = 14$ and $x - 3y = 6$?
(A) $x = 4, y = 6$ (B) $x = -4, y = -6$ (C) $x = -6, y = -4$ (D) $x = -6, y = 4$ [1]

7 Solve $9a - 2b = 91$ and $5a + 2b = 35$ simultaneously.
(A) $a = 9, b = 5$ (B) $a = -9, b = -5$ (C) $a = -9, b = 5$ (D) $a = 9, b = -5$ [1]

8 The solution to the simultaneous equations $2x + 3y = -6$ and $x + 3y = 0$ is:
(A) $x = -2, y = 6$ (B) $x = -6, y = 2$ (C) $x = 6, y = 2$ (D) $x = -6, y = -2$ [1]

9 Which pair of values satisfies the equations $3x - 2y = 5$ and $2x + 2y = 10$?
(A) $x = 3, y = -2$ (B) $x = -3, y = 2$ (C) $x = -3, y = -2$ (D) $x = 3, y = 2$ [1]

10 Find the value of x that satisfies the equations $x + y = 9$ and $2x - y = 6$ simultaneously.
(A) $x = -5$ (B) $x = 5$ (C) $x = -4$ (D) $x = 4$ [1]

Total marks achieved for PART A [/10]

Simultaneous equations

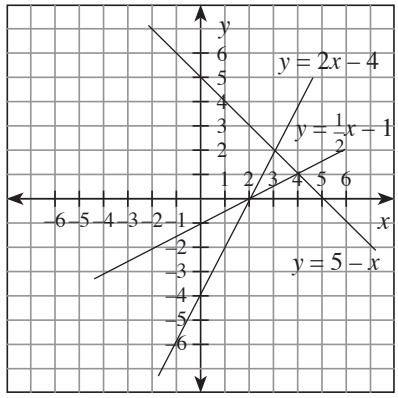
TOPIC TEST — PART B

Instructions
- This part consists of 2 questions.
- Write only the answer in the answer column.
- For any working use the question column.

Time allowed: 20 minutes **Total marks: 15**

Questions	Answers	Marks

1 The diagram shows the lines $y = 5 - x$, $y = \frac{1}{2}x - 1$ and $y = 2x - 4$



Write down the simultaneous solution of:

a $y = 5 - x$ and $y = 2x - 4$ _____ 1

b $y = 2x - 4$ and $y = \frac{1}{2}x - 1$ _____ 1

c $y = \frac{1}{2}x - 1$ and $y = 5 - x$ _____ 1

2 Solve simultaneously.

a $y = 5x - 2$, $2x + y = 12$ _____ 2

b $x + y = 9$, $x = y + 7$ _____ 2

c $x + 3y = 5$, $x - 3y = 7$ _____ 2

d $7x + 2y = 8$, $3x + 2y = -8$ _____ 2

e $5p - q = 36$, $2p - 3q = 17$ _____ 2

f $9a - 7b = 116$, $5a + 2b = 35$ _____ 2

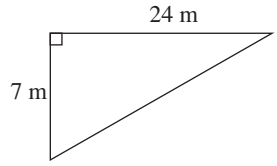
Total marks achieved for PART B 15

CHAPTER 5
Right-angled triangles and trigonometry

UNIT 1: Review of Pythagoras' theorem

QUESTION 1 Find the length of the hypotenuse.

a



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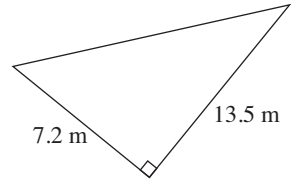

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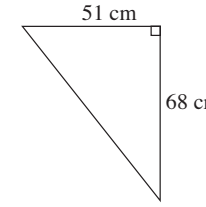
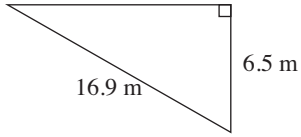


QUESTION 2 Find the length of the unknown side.

a



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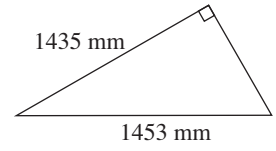

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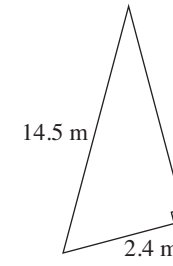
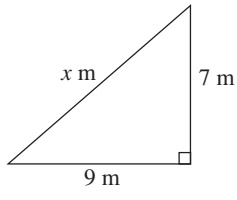


QUESTION 3 Find the value of x. Give your answer correct to 1 decimal place if necessary.

a



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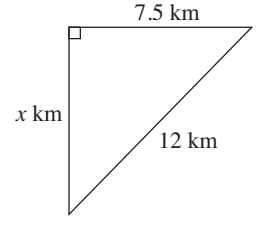

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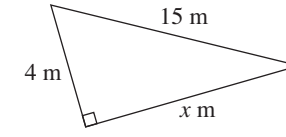

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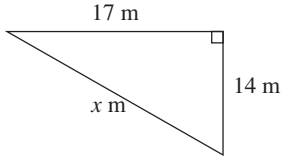

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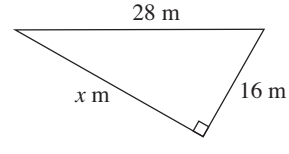

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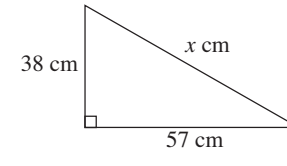
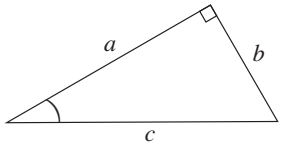


UNIT 2: The trigonometric ratios

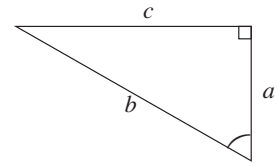
QUESTION 1 In each of the following triangles, state whether a, b and c are the opposite side, adjacent side or hypotenuse with reference to the angle marked.

a



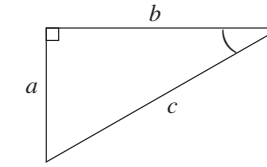
$a =$ _____, $b =$ _____, $c =$ _____

b



$a =$ _____, $b =$ _____, $c =$ _____

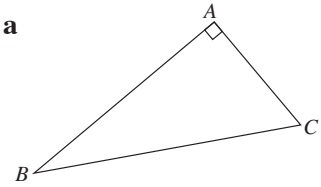
c



$a =$ _____, $b =$ _____, $c =$ _____

QUESTION 2 Name the hypotenuse in each triangle given below.

a



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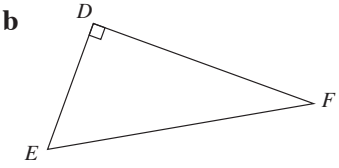
b



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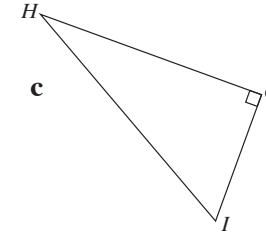
c



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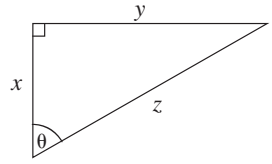
QUESTION 3 Write the trigonometric ratios (sine, cosine and tangent) for the following triangles.

a



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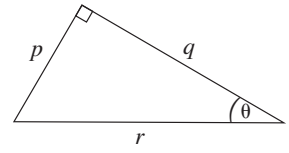
b



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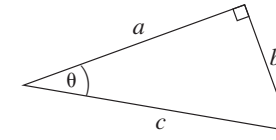
c



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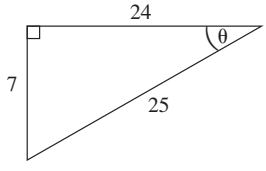
QUESTION 4 Find the fraction sin θ, cos θ and tan θ in the following triangles.



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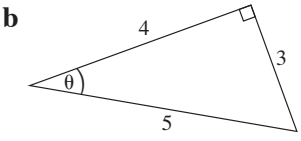
b



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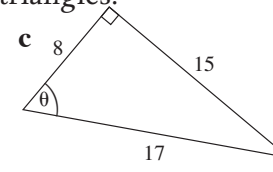
c



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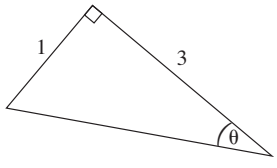
QUESTION 5 Which ratio (sin, cos or tan) could be used to find the angle θ.

a



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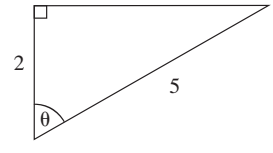
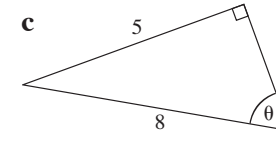
b



_____

c



_____

UNIT 3: Using a calculator with trigonometric ratios

QUESTION 1 Express to the nearest degree.

a 27°15' _____ **b** 46°19'32" _____ **c** 29°34'8" _____

d 78.325° _____ **e** 77.638° _____ **f** 82.5° _____

g 21°34' _____ **h** 55°18'59" _____ **i** 64°43'32" _____

QUESTION 2 Round off to the nearest minute.

a 83°24'36" _____ **b** 89°34'27" _____ **c** 63°28'18" _____

d 27°15'32" _____ **e** 41°45'26" _____ **f** 30°45'32" _____

g 24.76° _____ **h** 57.349° _____ **i** 54.469° _____

QUESTION 3 Find the value of the following, correct to three decimal places.

a sin 58° = _____ **b** tan 40° _____ **c** cos 38° _____

d cos 82° = _____ e sin 60° _____ f tan 54° _____

QUESTION 4 Find the value, correct to three significant figures.

a 1.5 sin 36° = _____ **b** tan 68°28' = _____ **c** cos 39°41' _____

d 7 cos 25° = _____ e sin 73°25' _____ **f** tan 51°36' _____

g 81.6 cos 60° = _____ h 52.63 sin 78° = _____ i 8.34 tan 61°25' = _____

QUESTION 5 Use a calculator to find the value, correct to three decimal places.

a $\frac{\sin 56^\circ}{8.3}$ = _____ **b** $\frac{\cos 83^\circ}{2.5}$ = _____ **c** $\frac{25.8}{\sin 23^\circ 8'}$ = _____

d $\frac{\cos 59^\circ 35'}{3.4}$ = _____ **e** $\frac{\sin 81^\circ}{5.4}$ = _____ **f** $\frac{14.932}{\cos 18^\circ 32'}$ = _____

g $\frac{\tan 72^\circ 18'}{5}$ = _____ **h** $\frac{\tan 69^\circ}{3.2}$ = _____ **i** $\frac{120.96}{\tan 65^\circ 28'}$ = _____

QUESTION 6 A is an acute angle. Find its size to the nearest degree.

a $\sin A = 0.5671$ _____ **b** $\cos A = 0.5632$ _____ **c** $\tan A = 3.3815$ _____

d $\cos A = 0.8321$ _____ **e** $\tan A = 2.6815$ _____ **f** $\cos A = 0.6953$ _____

g $\tan A = 1.3654$ _____ **h** $\sin A = 0.3496$ _____ **i** $\sin A = 0.8325$ _____

QUESTION 7 B is an acute angle. Find its size in degrees and minutes.

a $\tan B = 1.6837$ _____ **b** $\sin B = 0.3153$ _____ **c** $\cos B = 0.5673$ _____

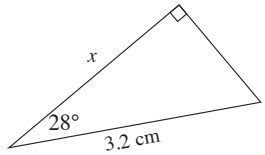
d $\sin B = 0.3459$ _____ **e** $\cos B = 0.4567$ _____ **f** $\tan B = 0.8364$ _____

g $\cos B = 0.8621$ _____ **h** $\tan B = 2.8327$ _____ **i** $\sin B = 0.5389$ _____

UNIT 4: Finding a side

QUESTION 1 Find the length of the unknown side correct to one decimal place.

a



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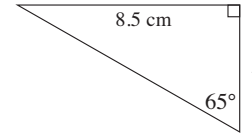

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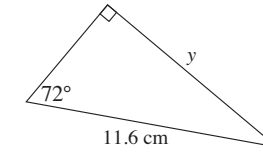

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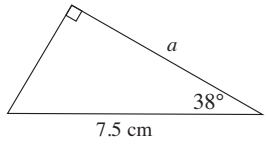

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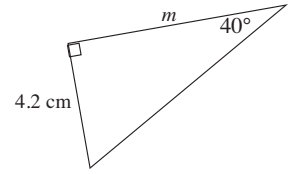

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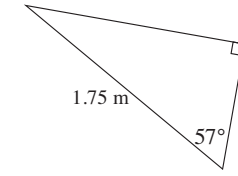
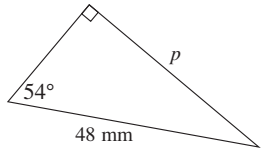


QUESTION 2 Find the value of the pronumeral in each triangle correct to two decimal places.

a



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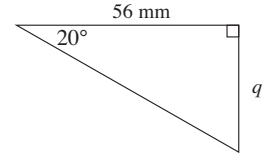

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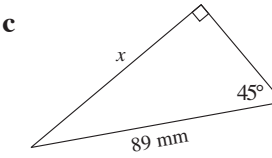

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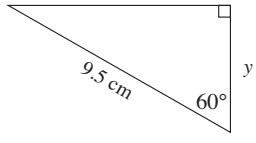

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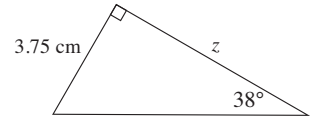

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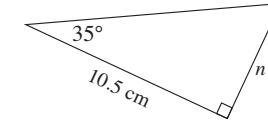
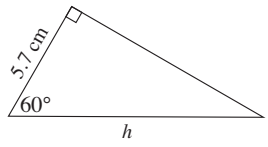


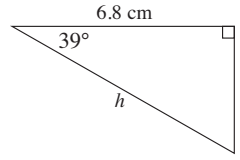
UNIT 5: Finding the hypotenuse

QUESTION **1** Find the length of the hypotenuse correct to two decimal places.

a



b



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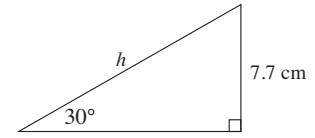

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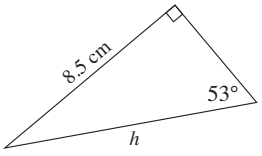

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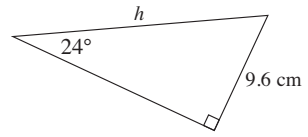

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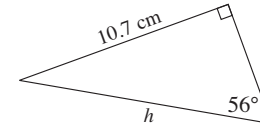
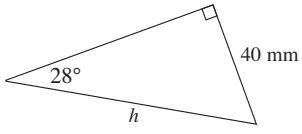


QUESTION **2** Find the length of the hypotenuse correct to one decimal place.

a



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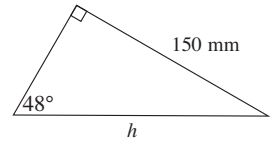

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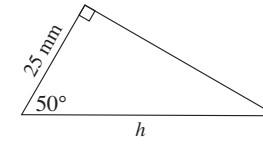

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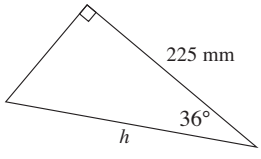

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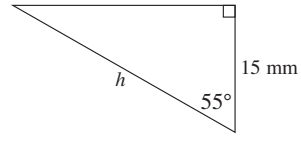

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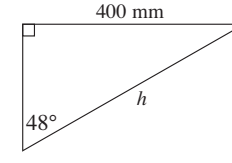
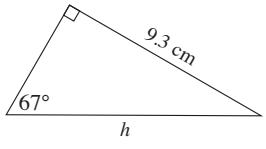


QUESTION **3** Find the length of the hypotenuse correct to two decimal places.

a



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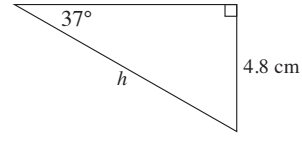

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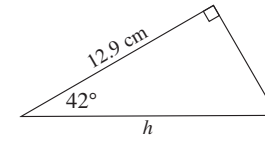
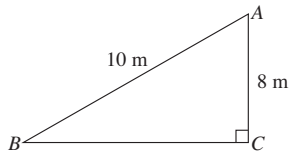


UNIT 6: Finding an unknown angle

QUESTION 1 Find the size of angle B. Give the answer to the nearest degree.

a



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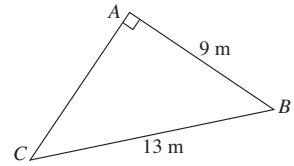

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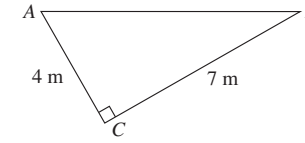
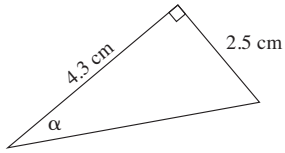
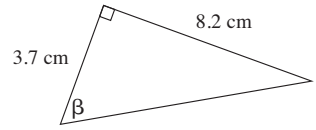


QUESTION 2 Find, in degrees and minutes, the size of the marked angle.

a



b



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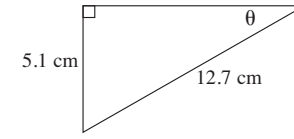

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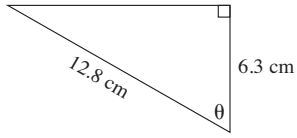

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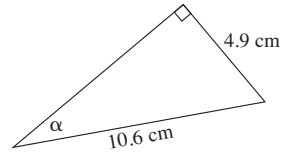

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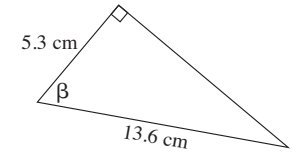
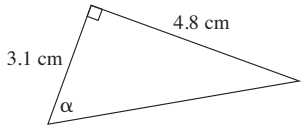


QUESTION 3 Find, in degrees and minutes, the size of the marked angle.

a



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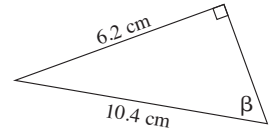

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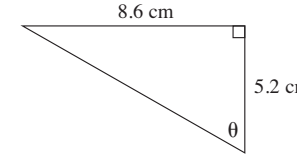
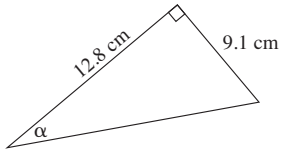


QUESTION 4 Find, in degrees and minutes, the size of the marked angle.

a



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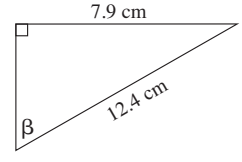

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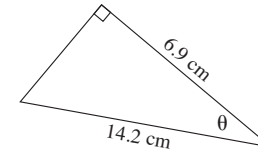


UNIT 7: Mixed problems

QUESTION **1** In ΔABC, $\angle C = 90°$, $\angle B = 38°40'$ and $AB = 14.6$ cm. Find BC correct to one decimal place.

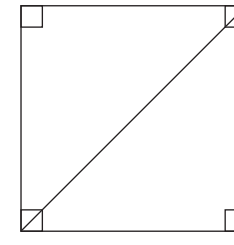
QUESTION **2** A ladder leans against a vertical wall with its foot 1.5 metres from the wall making an angle of 45°36' with the ground. How long is the ladder? Give your answer to the nearest centimetre.

QUESTION **3** A tree 18 metres tall casts a shadow 19.5 metres long. What angle do the rays of the Sun make with the ground?

QUESTION **4** The height of a ramp is 4.2 m. Given that the ramp is inclined at 30° to the ground, find the length of the ramp to the nearest centimetre.

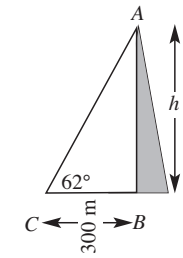
QUESTION **5** A tree casts a shadow 20.7 m long. If the Sun's rays meet the ground at 29°36', what is the height of the tree to the nearest metre?

QUESTION **6** The diagonal of a square is 24.6 cm long. Find the length of one side to the nearest millimetre.

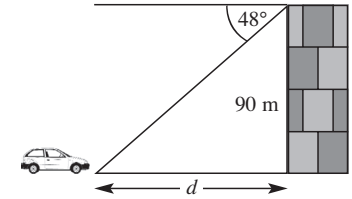


UNIT 8: Angles of elevation and depression (1)

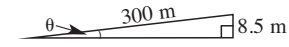
QUESTION 1 The angle of elevation of the top of a tower AB is 62° from a point C on the ground 300 m from the base of the tower. Calculate the height of the tower to the nearest metre.



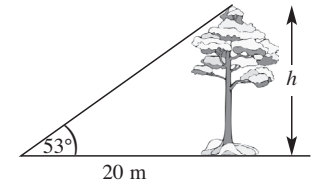
QUESTION 2 From the top of a building 90 m tall, the angle of depression of a car parked on the ground is 48°. Find the distance of the car from the base of the building. Write your answer correct to two decimal places.



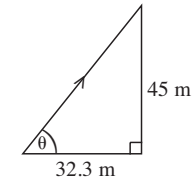
QUESTION 3 A railway track rises uniformly 8.5 m for every 300 m along the track. Find the angle of elevation of this track to the nearest degree.



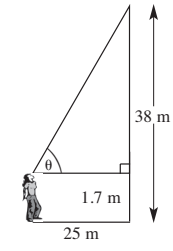
QUESTION 4 From a point on the ground 20 m from the base of a tree, the angle of elevation of the top of the tree is 53°. Find the height of the tree to the nearest metre.



QUESTION 5 A building that is 45 m tall casts a horizontal shadow 32.3 m long. Find the angle of elevation of the sun to the nearest degree.

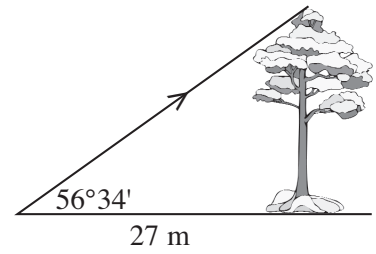


QUESTION 6 Anna is 1.70 m tall and is 25 metres away from a building 38 m high. What is the angle of elevation of the top of the building from her eyes? Answer to the nearest degree.



UNIT 9: Angles of elevation and depression (2)

QUESTION **1** From a point on the ground 27 m from the base of a tree, the angle of elevation ofthe top of the tree is 56°34'. Find the height of the tree to the nearest metre.



QUESTION **2** A railway track rises uniformly 5.4 m for every 250 m along the track. Find the angle of elevation of this track to the nearest minute.

QUESTION **3** Find the angle of depression from the top of a vertical cliff 80 m high to a boat 388 m from the foot of the cliff. Give your answer correct to the nearest minute.

QUESTION **4** Ryan is sitting in a Park and looks towards the top of a 120 m tall tower at an angle of elevation of 31°28'. How far is he sitting from the base of the tower, to the nearest metre?

QUESTION **5** A statue is 25 m tall and casts a horizontal shadow 26.3 m long. Find the angle of elevation of the Sun to the nearest degree.

QUESTION **6** From a point on top of a building that is 98 m tall, the angle of depression of a car is 39°27'. How far is the car from the foot of the building? Give your answer correct to the nearest metre.

UNIT 10: Compass bearings

QUESTION 1 What is the size of the angle between each pair of directions?

a N and E _____ **b** N and S _____ **c** S and SW _____

d S and ESE _____ e N and NE _____ f N and ENE _____

QUESTION 2 Which compass bearing is found between:

a E and NE _____ **b** SE and S _____ **c** NW and W _____

d S and SW _____ e N and NW _____ f SE and E _____

QUESTION 3 A lighthouse is 10 nautical miles north-east of a ship. How far is the ship west of the lighthouse (correct to two decimal places).

_____

_____

_____

_____

QUESTION 4 Town Q is southwest of town P. Town R is 80 km due south of P and due east of Q.

a Briefly explain why R is the same distance from both P and Q.

_____

_____

_____

_____

_____

b Find the distance from P to Q to the nearest kilometre.

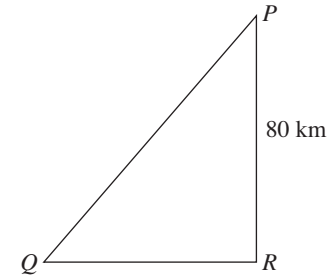
_____

_____

_____

_____

_____



QUESTION 5 Town B is SSW of Town A and Town A is WNW of Town C.

a What is the size of $\angle BAC$? _____

b If $\angle ABC = 40°$ and find, to the nearest kilometre, the distance from:

i A to B

_____

_____

_____

_____

_____

ii B to C

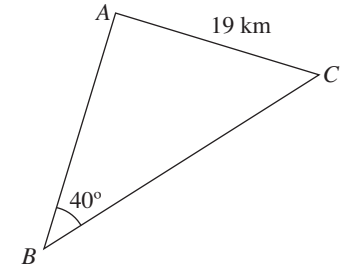
_____

_____

_____

_____

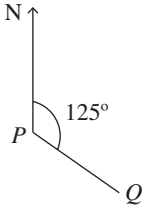
_____



UNIT 11: True bearings

QUESTION **1** For each diagrams write down the true bearing of Q from P.

a



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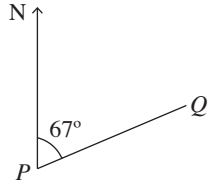

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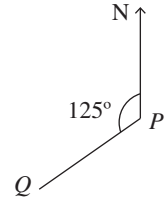

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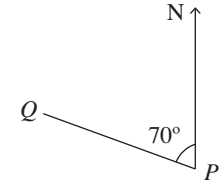

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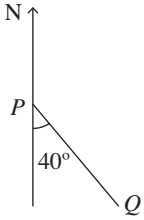

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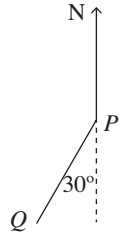

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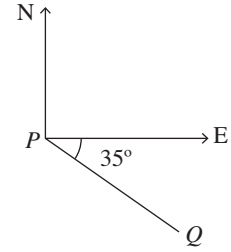
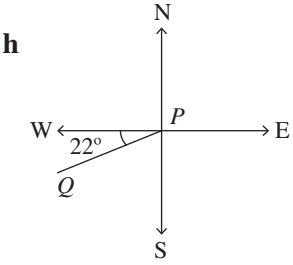


h



QUESTION **2** Show the position of point Q on the diagram if the bearing of:

a Q from P is 160°

P•

b Q from P is 240°

P•

c Q from P is 080°

P•

QUESTION **3** A ship sailed 12 nautical miles north and then 20 nautical miles west. Find its bearing (to the nearest degree) from the starting point.

QUESTION **4** A helicopter flies 215 km from P to Q on a bearing of 130°. From Q it flies on a bearing of 220° to R which is due south of P.

a Show this information on a diagram

b What is the size of $\angle PQR$?

c What is the size of $\angle QPR$?

d How far is it, to the nearest kilometre, from Q to R?

Right-angled triangles and trigonometry

TOPIC TEST — PART A

Instructions
- This part consists of 10 multiple-choice questions.
- Fill in only ONE CIRCLE for each question.
- Each question is worth 1 mark.

Time allowed: 10 minutes **Total marks: 10**

Marks

1 The hypotenuse of a right-angled triangle is 25 cm. If one side is 7 cm, the third side is

(A) 25.96 cm (B) 24 cm (C) 26 cm (D) 26.52 cm [1]

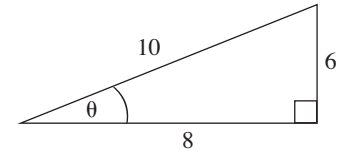
2 Evaluate 15 cos 70° correct to two decimal places.

(A) 0.34 (B) 0.02 (C) 5.13 (D) 43.86 [1]

3 If $\sin\theta = \frac{3}{5}$, calculate the size of θ to the nearest degree.

(A) 53° (B) 37° (C) 31° (D) 59° [1]

4 In relation to the diagram, which statement is correct?



(A) $\cos\theta = \frac{6}{10}$ (B) $\tan\theta = \frac{8}{6}$
(C) $\sin\theta = \frac{6}{10}$ (D) $\sin\theta = \frac{8}{10}$ [1]

5 If $\cos\theta = 0.5$, find the size of angle θ.

(A) 30° (B) 45° (C) 55° (D) 60° [1]

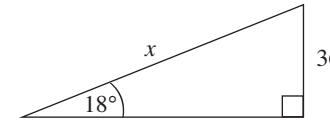
6 The value of sin 49°28' is closest to:

(A) 0.650 (B) 0.760 (C) 1.169 (D) 0.482 [1]

7 If $\tan\theta = 1$, calculate the size of angle θ.

(A) 30° (B) 45° (C) 60° (D) 72° [1]

8 The value of x in the diagram is given by:

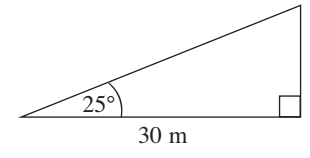


(A) $36 \times \cos 18°$ (B) $36 \times \sin 18°$
(C) $\frac{36}{\cos 18°}$ (D) $\frac{36}{\sin 18°}$ [1]

9 In ΔABC, the angle B is 90°, AB is 6 m and AC is 10 m. Find the size of angle A correct to the nearest degree.

(A) 27° (B) 30° (C) 37° (D) 53° [1]

10 From the diagram the correct expression for h is:



(A) $h = 30\tan 25°$ (B) $h = 25\tan 30°$
(C) $h = \frac{\tan 25°}{30}$ (D) $h = \frac{30}{\tan 25°}$ [1]

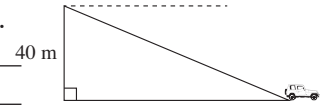
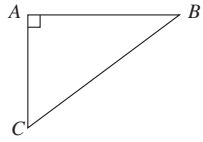
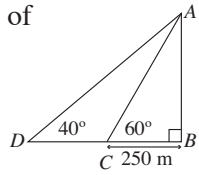
Total marks achieved for PART A ___/10

Right-angled triangles and trigonometry

TOPIC TEST — PART B

Instructions
- This part consists of 5 questions.
- Write only the answer in the answer column.
- For any working use the question column.

Time allowed: 20 minutes **Total marks: 15**

Questions	Answers	Marks
1 The angle of depression of a car from the top of a building is 64°. The building is 40 m tall. How far is the car from the base of the building? Give the answer correct to one decimal place. 		1
2 Point B is due east of A and northeast of C. 		
a What is the bearing of: i B from C?		1
ii C from B?		1
b How far is it from B to C if it is 70 m from A to B?		1
3 The bearing of R from P is 240° and the bearing of R from Q is 270°.It is 6 km from R to Q. P is due north of Q.		
a Show the information on a diagram.		1
b What is the size of: **i** $\angle PQR$?		1
ii $\angle QPR$?		1
c Find the distance from P to R.		1
4 The angle of elevation of A from C is 60° and the angle of elevation of A from D is 40°. C is 250 m from B. 		
a Using ΔACB, find the length of AB.		1
b Using the answer to part **a** and ΔADB, find the length of DB.		1
c What is the length of DC?		1
5 Town Y is 40 km due south of town X and due west of town Z. The bearing of Z from X is 110°.		
a Show the information on a diagram.		1
b What is the size of **i** $\angle XYZ$?		1
ii $\angle ZXY$?		1
c What is the distance from X to Z (to nearest kilometre)?		1

Total marks achieved for PART B 15

CHAPTER 6
Surface area and volume

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Pages 124–138

UNIT 1: Area of plane shapes

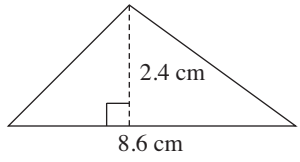
QUESTION **1** Complete the following table by writing the formula of the given plane shape

	Shape	Area
a	Triangle	$A =$
b	Square	$A =$
c	Rectangle	$A =$
d	Parallelogram	$A =$

	Shape	Area
e	Trapezium	$A =$
f	Rhombus	$A =$
g	Kite	$A =$
h	Circle	$A =$

QUESTION **2** Find the area of each shape:

a



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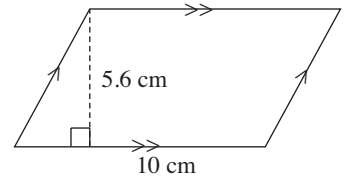

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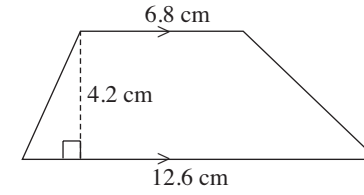

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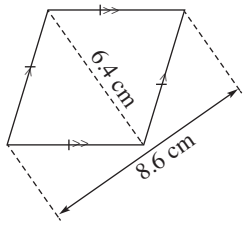

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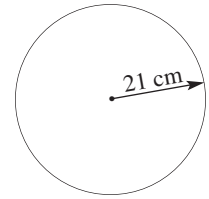

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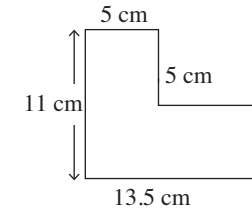

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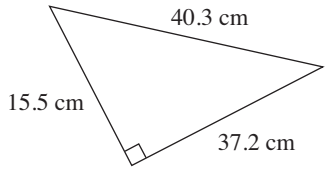

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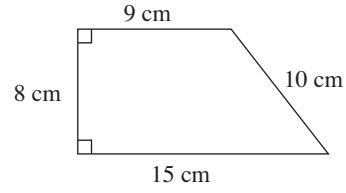
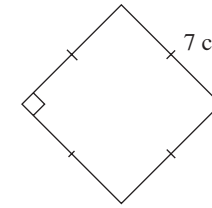


i

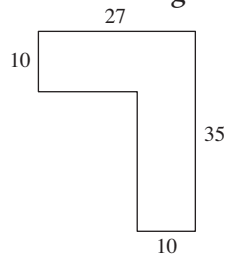


Surface area and volume

UNIT 2: Area of composite shapes (1)

QUESTION **1** Find the area of each shape. All measurements are in centimetres, and all angles are right angles.

a



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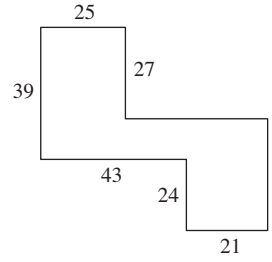

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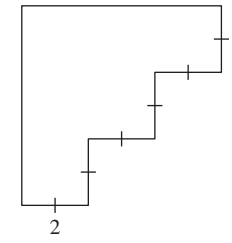
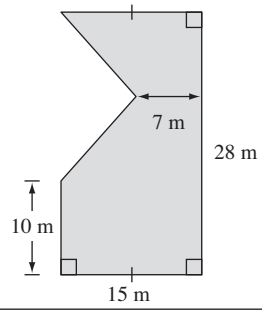


QUESTION **2** Find each shaded area.

a



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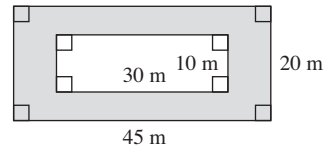

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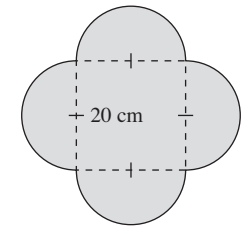

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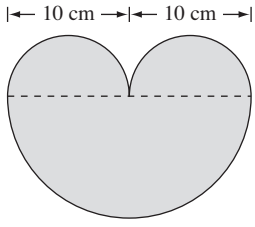

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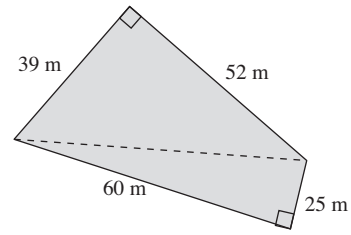

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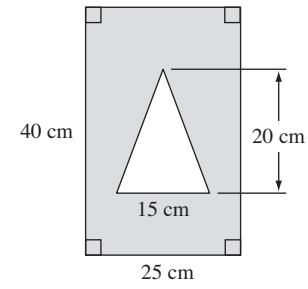

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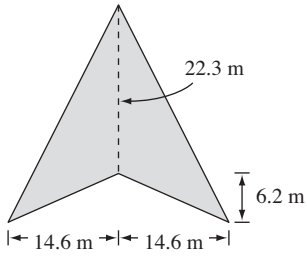
UNIT 3: Area of composite shapes (2)

QUESTION **1** Find each shaded area.

a



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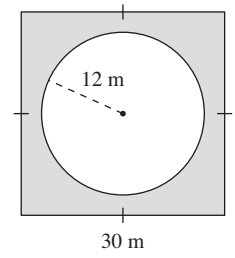

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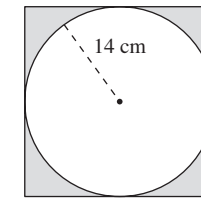

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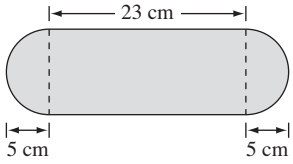

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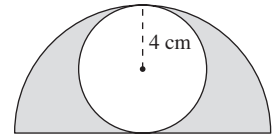

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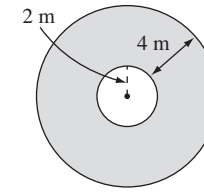

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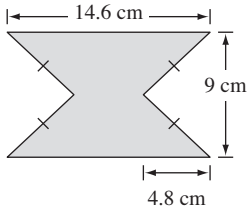

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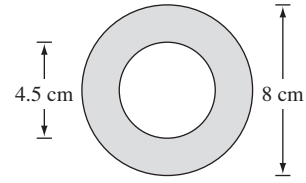

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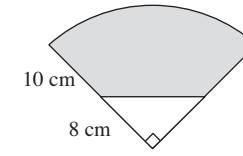

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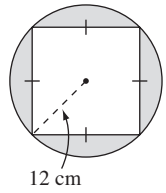
UNIT 4: Area of composite shapes (3)

QUESTION **1** Find each shaded area.

a



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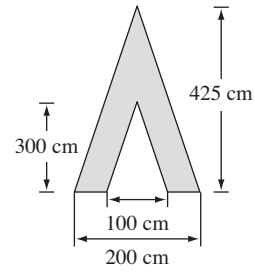

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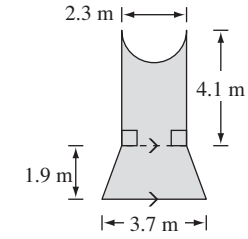

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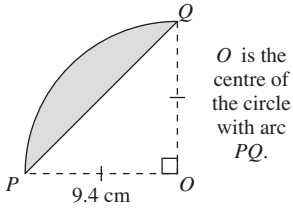

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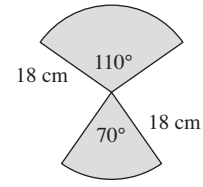
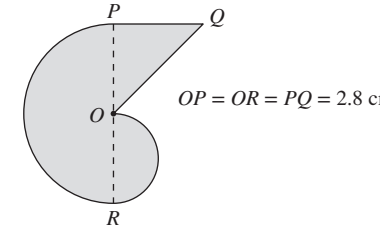


f



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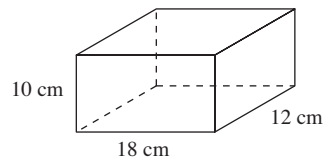
UNIT 5: Surface areas of right prisms (1)

QUESTION **1** Find the surface area of each shape.

a



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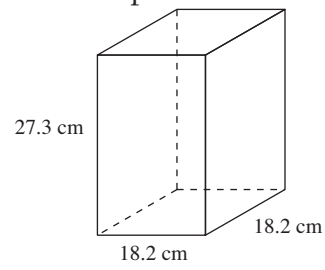

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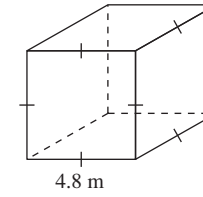
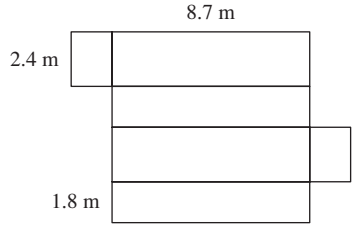
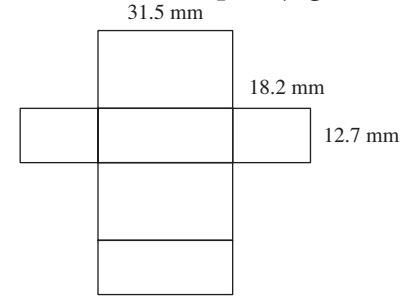


QUESTION **2** Find the surface area of each solid (correct to 1 decimal place), given its net.

a

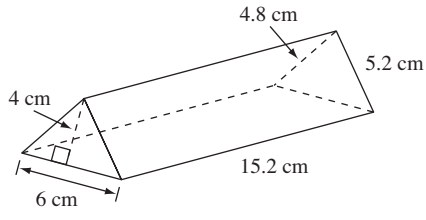


b



QUESTION **3** Find the surface area of each prism.

a



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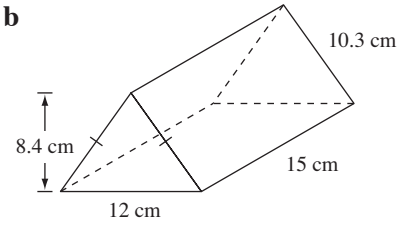
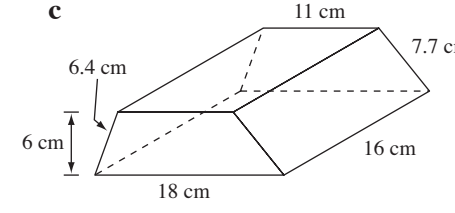


c



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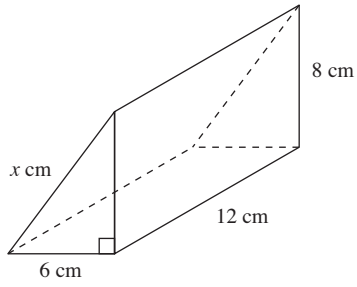
Unit 6: Surface areas of right prisms (2)

QUESTION **1** Calculate the surface area of each shape (correct to 1 decimal place where necessary). You will need to use Pythagoras' theorem to calculate an unknown length.

a



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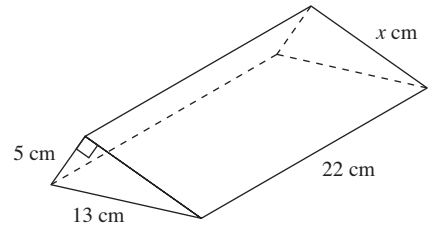

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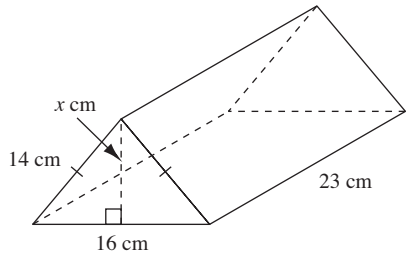

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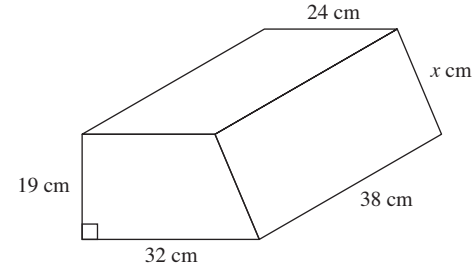

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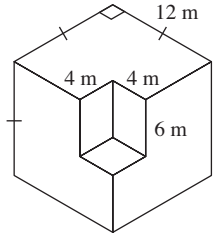
UNIT 7: Surface area of composite solids

QUESTION **1** Calculate the surface area of each shape (correct to 1 decimal place where necessary). You will need to use Pythagoras' theorem to calculate an unknown length.

a



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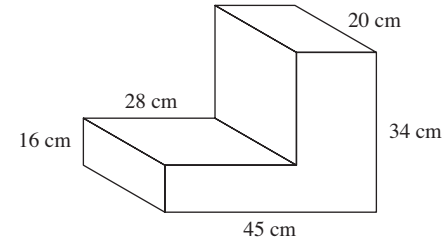

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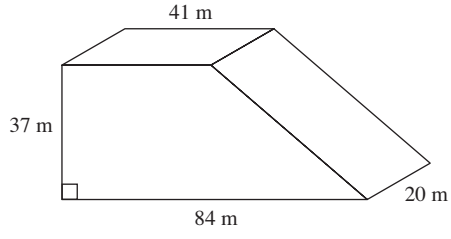

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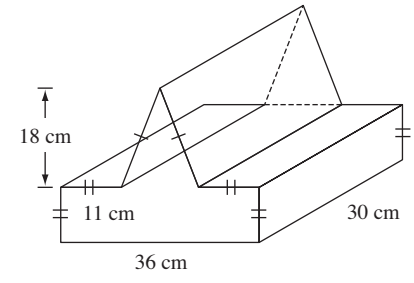

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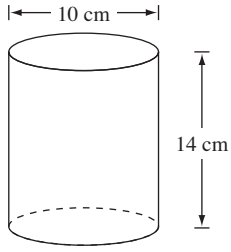
UNIT 8: Surface area of right cylinders (1)

QUESTION **1** For each cylinder, find (i) the area of a circular base (ii) the area of the curved surface, correct to 2 decimal places.

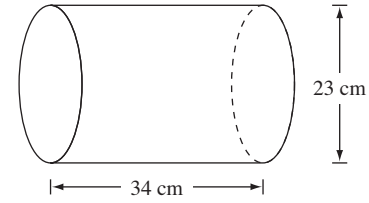
a



i

ii

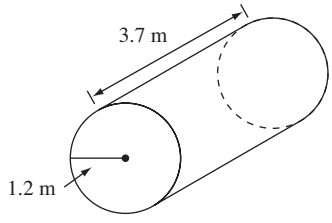
b



i

ii

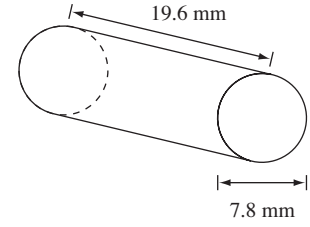
c



i

ii

d

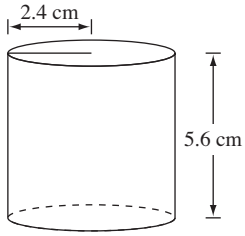


i

ii

QUESTION **2** Find the curved surface area of each cylinder, leaving your answers in terms of π.

a



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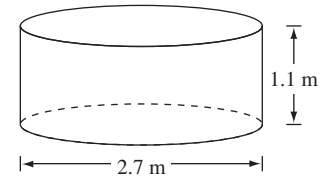
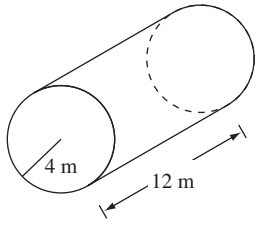


c



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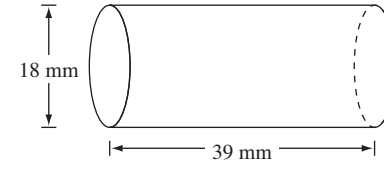

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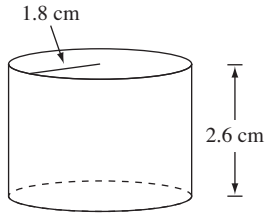
UNIT 9: Surface area of cylinders (2)

QUESTION 1 For each cylinder, find to 3 significant figures (i) the area of the two circular ends (ii) the area of the curved surface (iii) the total surface area.

a

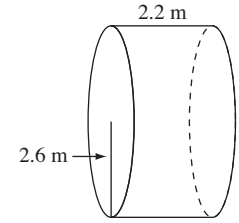


i

ii

iii

b

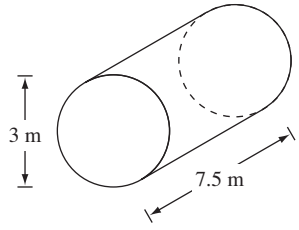


i

ii

iii

c

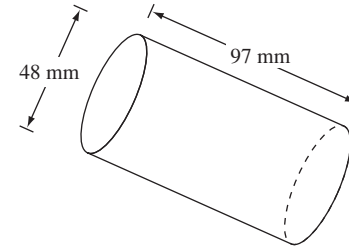


i

ii

iii

d



i

ii

iii

QUESTION 2 A pipe, open at both ends, is 12 m long and has a radius of 80 cm. Find its external surface area.

QUESTION 3 A cylindrical container, open at one end, is to be made from metal. Find the area of metal needed for the container if it will have a radius of 0.6 m and be 0.7 m high.

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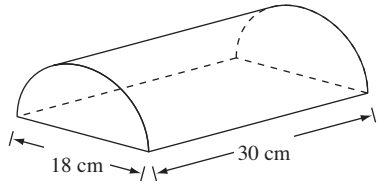
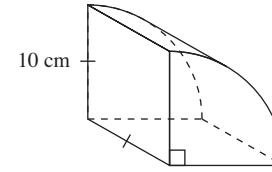
UNIT 10: Surface area of cylindrical objects

QUESTION **1** The following solids were formed from cylinders. Find the total surface area of each solid correct to 2 significant figures.

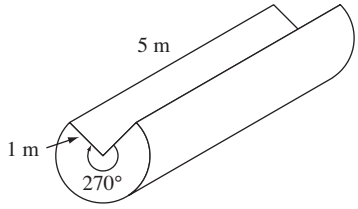
a



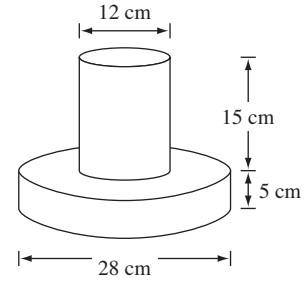
b



c



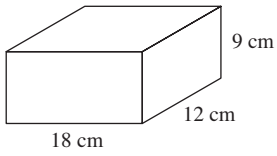
d



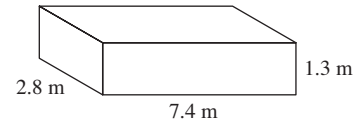
UNIT 11: Volume of right prisms

QUESTION 1 Calculate the volume of each rectangular prism (correct to 1 decimal place if necessary).

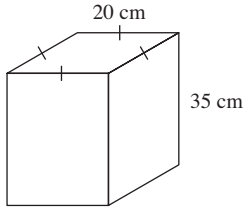
a



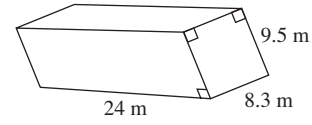
b



c

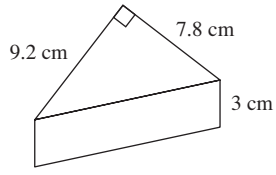


d



QUESTION 2 Calculate the volume of each triangular prism, giving your answers correct to 2 significant figures.

a



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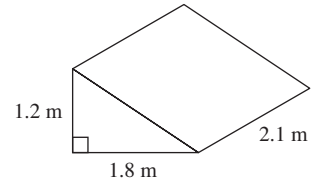
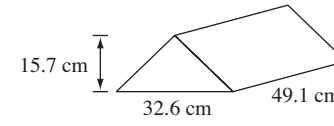
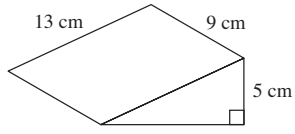


c



QUESTION 3 Use Pythagoras' theorem to find the height of each triangle, then calculate the volume of each triangular prism to the nearest cubic centimetre.

a



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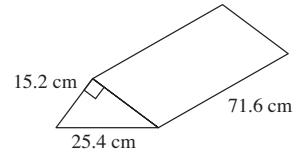

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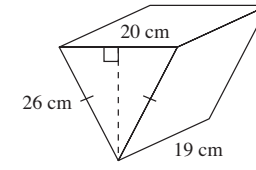
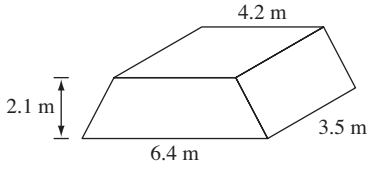


QUESTION 4 Find the volume of each trapezoidal prism to the nearest square unit.

a



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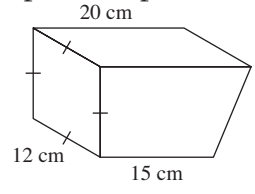

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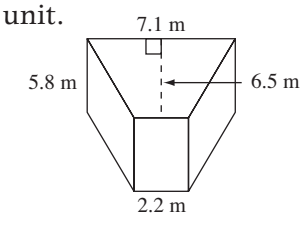

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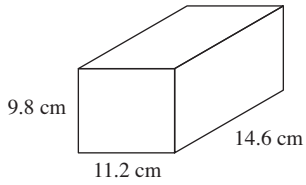
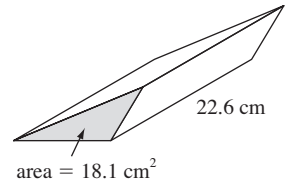
UNIT 12: Volume of right prisms and composite solids

QUESTION **1** Find the volume, correct to two significant figures.

a



b



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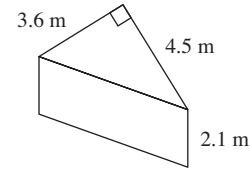
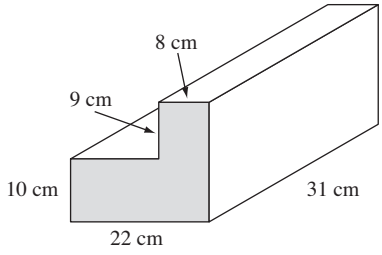
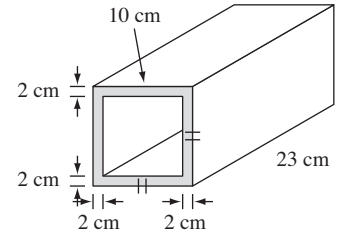


QUESTION **2** Find the volume of each prism (correct to 1 decimal place if necessary).

a



b



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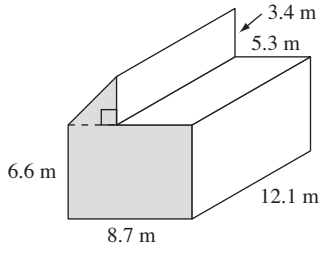

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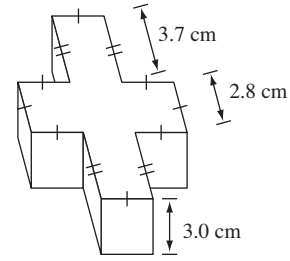


Surface area and volume

UNIT 13: Volume of right cylinders

QUESTION **1** Find the volume of each cylinder correct to 2 significant figures.

a radius 4 cm and height 15 cm

b radius 7.8 cm and height 6.5 cm

c radius 1.4 m and height 1.5 m

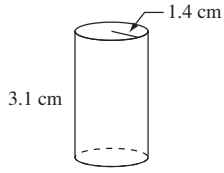
d radius 95 cm and height 4.7 m

e radius 0.5 m and height 136 cm

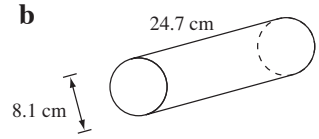
f radius 2.5 m and height 250 cm

QUESTION **2** Find the volume of each shape, correct to 2 decimal places if necessary.

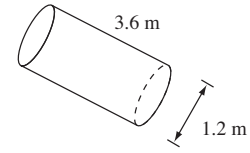
a



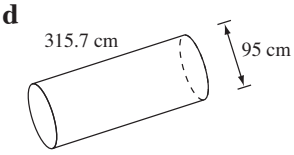
b



c



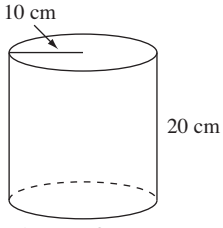
d



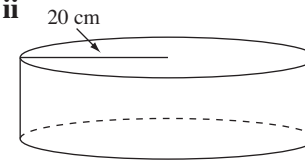
QUESTION **3**

a Which of the following cylinders has the larger volume?

i



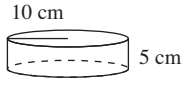
ii



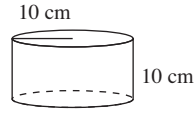
b Are the surface areas of the cylinders the same? Explain.

QUESTION **4** Find how many times larger than the volume of cylinder **i** the volume of cylinder **ii** is?

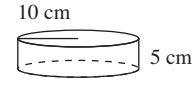
a **i**



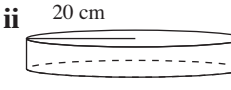
ii



b **i**



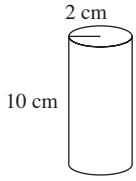
ii



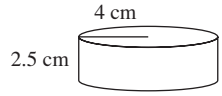
UNIT 14: Volume of right cylinders and composite solids

QUESTION **1** Find the volume of each cylindrical can, leaving your answers in terms of π.

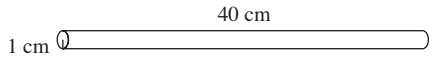
a



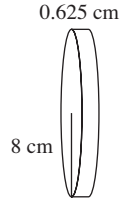
b



c

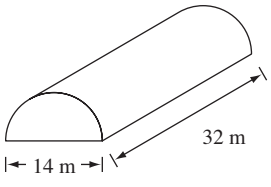


d

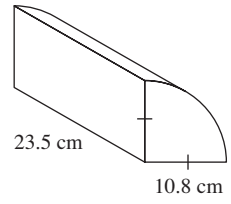


QUESTION **2** Calculate the volume of each solid correct to 3 significant figures.

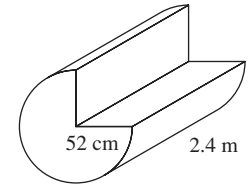
a



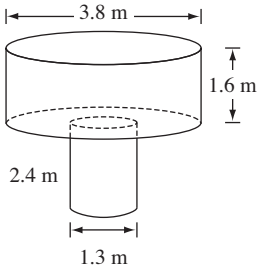
b



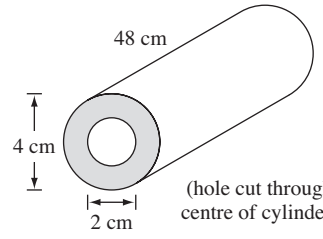
c



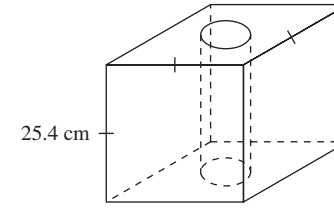
d



e



f



UNIT 15: Problems involving volume and surface area

QUESTION **1** A flat rectangular roof is 18 m long and 11 m wide.

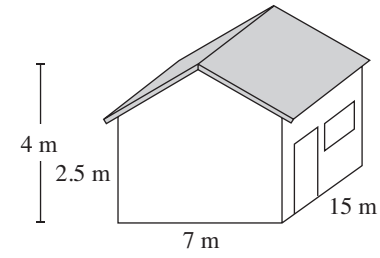
a If 10 mm of rain falls on the roof, find the total volume of water in cubic metres.

b How many litres of water is this? (1 m^3 = 1000 L)

c The water flows into a cylindrical tank of radius 1.5 m. How much will the height of water in the tank increase. Give the answer in cm to the nearest cm.

QUESTION **2** A building has 2 walls that are pentagonal in shape and 2 other rectangular walls.

a Find the area of a pentagonal wall.



b Find the total area of all 4 walls.

c Find the area to be painted if a door 1.8 m wide and 2 m tall and a window 1.5 m wide and 1.2 m tall are not painted.

d Find the total amount of paint required, to the nearest litre, if the walls require 2 coats and one litre of paint covers 13 m^2.

QUESTION **3** A concrete bollard will be cylindrical in shape. It has height 1.2 m and radius 15 cm.

a Find the amount of concrete needed to make the bollard.

b How many of the bollards could be made from 8 m^3 of concrete?

Surface area and volume

TOPIC TEST — PART A

Instructions
- This part consists of 10 multiple-choice questions.
- Fill in only ONE CIRCLE for each question.
- Each question is worth 1 mark.

Time allowed: 15 minutes **Total marks: 10**

Marks

1 What is the surface area of a cube of side length 5 m?

(A) 100 m^2 (B) 125 m^2 (C) 150 m^2 (D) 225 m^2 — 1

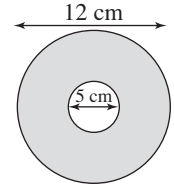
2 What is the volume of a pentagonal prism if the area of the cross-section is 87 m^2 and the perpendicular height is 11 m?

(A) 191.4 m^3 (B) 696 m^3 (C) 957 m^3 (D) 4785 m^3 — 1

3 A cylinder has height 5 m and diameter 3.2 m. Its volume is closest to:

(A) 20.1 m^3 (B) 40.2 m^3 (C) 80.4 m^3 (D) 160.8 m^3 — 1

4 The shaded area is closest to:

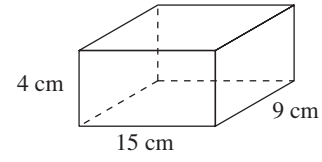


(A) 38 cm^2 (B) 93 cm^2
(C) 154 cm^2 (D) 374 cm^2 — 1

5 What is the volume of a cube of side length 8 cm?

(A) 256 cm^3 (B) 384 cm^3 (C) 448 cm^3 (D) 512 cm^3 — 1

6 What is the volume of the prism at right?



(A) 848 cm^3 (B) 540 cm^3
(C) 462 cm^3 (D) 231 cm^3 — 1

7 What is the surface area of the prism above?

(A) 848 cm^2 (B) 540 cm^2 (C) 462 cm^2 (D) 231 cm^2 — 1

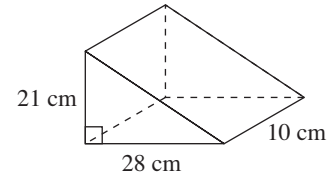
8 Which is closest to the curved surface area of a cylinder of radius 14 cm and height 20 cm?

(A) 1230 cm^2 (B) 1760 cm^2 (C) 2990 cm^2 (D) 3520 cm^2 — 1

9 What is the surface area of the prism?

(A) 1428 cm^2 (B) 1470 cm^2
(C) 2940 cm^2 (D) 4900 cm^2 — 1

10 What is the volume of the prism?



(A) 1428 cm^3 (B) 1470 cm^3
(C) 2940 cm^3 (D) 4900 cm^3 — 1

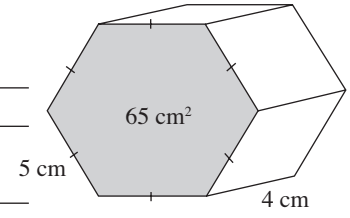
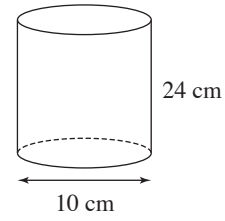
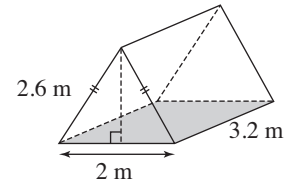
Total marks achieved for PART A ___/10

Surface area and volume

TOPIC TEST — PART B

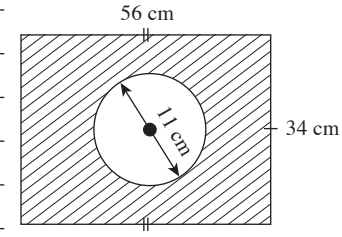
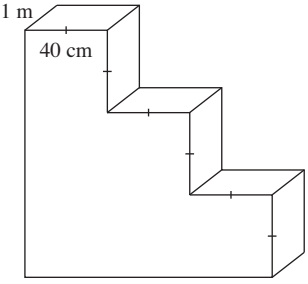
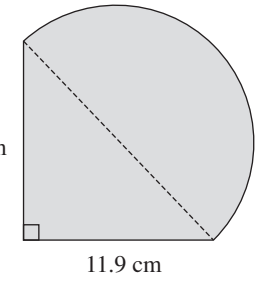
Instructions
- This part consists of 6 questions.
- Write only the answer in the answer column.
- For any working use the question column.

Time allowed: 20 minutes **Total marks: 15**

Questions	Answers	Marks
1 For this prism, find the:		
a volume 		1
b surface area		1
2 For the closed cylinder on the right, find the:		
a volume (to nearest cubic centimetre) 		1
b capacity in litres (1 cm^3 = 1 mL)		1
c surface area (to nearest square centimetre)		1
3 **a** Find the perpendicular height of the triangular face of this prism. 		1
b Find the area of the triangular face.		1
c Find the volume of the prism.		1
d Find the total surface area of the prism.		1

Continued on the next page

TOPIC TEST — PART B

Questions	Answers	Marks
4 a Find the shaded area (to the nearest square centimetre). 		1
b The shaded area shown is the cross-section of a prism. The perpendicular height of the prism is 48 cm. Find the volume of the prism.		1
5 Find the surface area of this prism in square metres to one decimal place. 		1
6 The machinery part is made up of a right-angled triangle and semi-circle. **a** What is the diameter of the semi-circle? 		1
b What is the shaded area in square centimetres to one decimal place?		1
c What is the volume if the part is 3.6 cm thick?		1

Total marks achieved for PART B 15

CHAPTER 7

Further algebra

UNIT 1: Common factors

QUESTION 1 Factorise the following by taking out the common factor.

a $5x + 10 =$ _____ **b** $3x + 6 =$ _____ **c** $8y + 16 =$ _____

d $m^2 + m =$ _____ **e** $2x^2 + 4x =$ _____ **f** $3xy + 6x =$ _____

g $6a^2 - 3a =$ _____ **h** $3m + 15 =$ _____ **i** $9x + xy =$ _____

j $4x + 16 =$ _____ **k** $5b^2 + 10ab =$ _____ **l** $3m + 21 =$ _____

m $6m - 3mn =$ _____ **n** $5x + 15 =$ _____ **o** $ay - y =$ _____

p $7mn - 14mp =$ _____ **q** $x^2y^2 - xyz =$ _____ **r** $8m^2n^2 - 16m^2n =$ _____

QUESTION 2 Factorise the following by taking out the negative common factor.

a $-3x - 6 =$ _____ **b** $-4a - 8 =$ _____ **c** $-5y - 15 =$ _____

d $-m^2 + m =$ _____ **e** $-x^2 + 5x =$ _____ **f** $-l^2 + 2lm =$ _____

g $-x + 4x^2 =$ _____ **h** $-4m + m^2 =$ _____ **i** $-3x - 2x^2 =$ _____

j $-6a - 18a^2 =$ _____ **k** $-7y + 21 =$ _____ **l** $-8x + 16xy =$ _____

m $-3a - 9 =$ _____ **n** $-5xy + 15x^2y^2 =$ _____ **o** $-a^2y^2 + ay =$ _____

QUESTION 3 Factorise the following.

a $ab + ac + ad =$ _____ **b** $px + py + pz =$ _____

c $2a^2b + 3a^2b^2 - 5abc =$ _____ **d** $5m^3 + 10m^2 + 15m =$ _____

e $2a + 4b + 6c =$ _____ **f** $12x^2 + 15xy + 18xz =$ _____

g $x^2y^2 + xy^2 + x^2y =$ _____ **h** $9a^2b - 12a^2b^2 =$ _____

i $5a^2 - 5b^2 - 10c^2 =$ _____ **j** $6mp + 12m^2p - 18m^2p^2 =$ _____

k $3ab - 6ac - 9ad =$ _____ **l** $12x^2y^2 - 36x^3y^3 =$ _____

QUESTION 4 Factorise each of the following.

a $8a^2b^3 - 10a^3b^5 =$ _____ **b** $16xy + 6x^3 =$ _____

c $9p^3q^2 + 12pq^5 =$ _____ **d** $6a^2bc^3 - 9abc^2 =$ _____

e $12x^3y^4 - 15x^2y^6 =$ _____ **f** $2a^2b^3c - 8ab^2c =$ _____

g $10p^2q^5 - 25p^3q^5 =$ _____ **h** $28x^4y^7 + 42x^4y =$ _____

i $2a^4b^2c^6 - 12a^5b^3c^7 =$ _____ **j** $9t^2u^3 - 6tu^4 =$ _____

k $15x^2y^2 - 10x^3y + 20xy^3 =$ _____ **l** $24pq^4 + 16p^2q^3 + 8pq^2 =$ _____

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UNIT 2: The grouping method

QUESTION **1** Factorise each of the following.

a $x(y + z) + 2(y + z) =$ _____ **b** $a(b + 3) + 7(b + 3) =$ _____

c $2x(m + 5) + 3(m + 5) =$ _____ **d** $7(y^2 + 8) + x^2(y^2 + 8) =$ _____

e $p(p - 3) - 2(p - 3) =$ _____ **f** $t(a + 7) - 5(a + 7) =$ _____

g $x(y - 2) - (y - 2) =$ _____ **h** $a(m - n) - b(m - n) =$ _____

i $6(x + y) + z(x + y) =$ _____ **j** $x(m - n) - y(m - n) =$ _____

k $3x(2a - 1) - 5(2a - 1) =$ _____ **l** $3a(p - q) - 2(p - q) =$ _____

QUESTION **2** Find the factors.

a $ax + ay + bx + by$

_____

_____

b $2a + 2b + ay + by$

_____

_____

c $ax + 7a + bx + 7b$

_____

_____

d $x^2 - x^2y + z^2 - z^2y$

_____

_____

e $x^3 + x^2 + x + 1$

_____

_____

f $ab + a + b + 1$

_____

_____

QUESTION **3** Factorise the following.

a $ab + ac + db + dc$

_____

_____

b $a^2 - ab + 7a - 7b$

_____

_____

c $a^3 - a^2 + 5a - 5$

_____

_____

d $am + an - bm - bn$

_____

_____

e $p^2q^2 - pq + apq - a$

_____

_____

f $3x^2 - 9yx + 8x - 24y$

_____

_____

QUESTION **4** Factorise.

a $x^3 - x^2 + 3x - 3$

_____

_____

b $y^3 + y^2 + y + 1$

_____

_____

c $9a - 9b + 4a^2 - 4ab$

_____

_____

d $pq^2 - p^2q + 7q - 7p$

_____

_____

e $am - 2m - 5a + 10$

_____

_____

f $3xy + 3xz + 2y + 2z$

_____

_____

UNIT 3: Difference of two squares

QUESTION 1 Factorise the following.

a $x^2 - 4 =$ _____ **b** $x^2 - 9 =$ _____ **c** $x^2 - 16 =$ _____

d $x^2 - 1 =$ _____ **e** $x^2 - 25 =$ _____ **f** $x^2 - 36 =$ _____

g $a^2 - b^2 =$ _____ **h** $x^2 - y^2 =$ _____ **i** $m^2 - n^2 =$ _____

j $a^2 - 49 =$ _____ **k** $y^2 - 64 =$ _____ **l** $t^2 - 81 =$ _____

m $p^2 - 4q^2 =$ _____ **n** $x^2 - 9y^2 =$ _____ **o** $m^2 - 25n^2 =$ _____

p $25a^2 - b^2 =$ _____ **q** $49x^2 - y^2 =$ _____ **r** $64p^2 - q^2 =$ _____

s $4x^2 - 9y^2 =$ _____ **t** $9m^2 - 16n^2 =$ _____ **u** $16x^2 - 25y^2 =$ _____

QUESTION 2 Factorise each of the following.

a $x^2 - 121 =$ _____ **b** $25y^2 - 16 =$ _____ **c** $1 - 4y^2 =$ _____

d $100x^2 - 49y^2 =$ _____ **e** $y^2 - 4z^2 =$ _____ **f** $1 - 25m^2 =$ _____

g $49m^2 - 100n^2 =$ _____ **h** $16a^2 - 49 =$ _____ **i** $9x^2 - 25y^2 =$ _____

j $9x^2 - 16y^2 =$ _____ **k** $a^2 - b^2c^2 =$ _____ **l** $a^2b^2 - c^2 =$ _____

m $36x^2 - 49y^2 =$ _____ **n** $p^2 - 64q^2 =$ _____ **o** $25 - 64a^2 =$ _____

QUESTION 3 Find the factors of the following.

a $144 - 25a^2 =$ _____ **b** $a^2 - x^2 =$ _____ **c** $16x^2 - 9y^2 =$ _____

d $4x^2 - 25 =$ _____ **e** $81a^2 - 121b^2 =$ _____ **f** $4x^2 - 1 =$ _____

g $81 - z^2 =$ _____ **h** $16a^2 - 49 =$ _____ **i** $9y^2 - 100 =$ _____

j $4a^2 - 49 =$ _____ **k** $36y^2 - x^2 =$ _____ **l** $16x^2 - 81y^2 =$ _____

m $1 - 100x^2 =$ _____ **n** $m^2 - 169 =$ _____ **o** $25x^2 - 121y^2 =$ _____

QUESTION 4 Factorise fully.

a $x^4 - 16$

_____

_____

b $1 - x^4$

_____

_____

c $(x + 2)^2 - 9$

_____

_____

d $(y + 1)^2 - 25$

_____

_____

_____

e $(x - 3)^2 - 16$

_____

_____

_____

f $(x + 5)^2 - (x + 3)^2$

_____

_____

_____

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UNIT 4: Factorising trinomials

QUESTION **1** Factorise the following.

a $x^2 + 7x + 12 =$ _____ **b** $x^2 - 5x + 6 =$ _____

c $x^2 + 3x + 2 =$ _____ **d** $x^2 + 4x + 4 =$ _____

e $y^2 - 7y + 12 =$ _____ **f** $m^2 + 8m + 12 =$ _____

g $a^2 + 6a + 9 =$ _____ **h** $x^2 + 11x + 28 =$ _____

i $n^2 + 2n - 3 =$ _____ **j** $x^2 + 9x + 14 =$ _____

QUESTION **2** Factorise.

a $x^2 - 8x + 15 =$ _____ **b** $y^2 - 4y - 12 =$ _____

c $x^2 + 5x - 6 =$ _____ **d** $x^2 + 19x + 90 =$ _____

e $x^2 + 4x - 12 =$ _____ **f** $m^2 - m - 56 =$ _____

g $x^2 - 3x - 4 =$ _____ **h** $y^2 - 6y - 7 =$ _____

QUESTION **3** Factorise.

a $x^2 - 8x =$ _____ **b** $m^2 + 6m + 5 =$ _____

c $t^2 - t - 6 =$ _____ **d** $y^2 - 9y + 20 =$ _____

e $a^2 - 7a - 18 =$ _____ **f** $x^2 + 8x + 16 =$ _____

g $x^2 - 12x =$ _____ **h** $y^2 - 11y + 24 =$ _____

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UNIT 5: Further factorisation of quadratic trinomials

QUESTION **1** Take out the highest common factor and then factorise the monic quadratic trinomial.

a $2a^2 + 10a + 12 =$ _____

b $3x^2 + 9x - 12 =$ _____

c $4x^2 + 36x + 80 =$ _____

d $2x^2 - 8x + 6 =$ _____

e $3m^2 - 27m + 60 =$ _____

f $3t^2 + 24t - 27 =$ _____

g $2x^2 + 22x + 36 =$ _____

h $4a^2 - 32a + 48 =$ _____

i $5y^2 - 15y + 10 =$ _____

j $6n^2 - 42n + 36 =$ _____

QUESTION **2** Factorise these trinomials.

a $3x^2 - 27x + 54 =$ _____

b $2y^2 - 20y + 48 =$ _____

c $4a^2 - 44a + 120 =$ _____

d $5m^2 + 25m - 70 =$ _____

e $3n^2 + 12n - 63 =$ _____

f $6p^2 + 18p - 168 =$ _____

g $4y^2 + 8y - 140 =$ _____

h $2n^2 - 2n - 84 =$ _____

QUESTION **3** Factorise.

a $am^2 + am - 20a =$ _____

b $2t^2 + 14t + 20 =$ _____

c $2y^2 - 18y + 36 =$ _____

d $3x^2 - 30x + 63 =$ _____

e $pn^2 - 12pn + 27p =$ _____

f $2x^2 - 26x + 60 =$ _____

g $a^2b + 6ab - 7b =$ _____

h $2y^2 + 16y + 14 =$ _____

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UNIT 6: Combining methods of factorising

QUESTION **1** Factorise.

a $3x^2 - 27$

b $5a^2 - 20$

c $3x^2 - 15x + 18$

d $14a - 42a^2$

e $a^4 - 16b^4$

f $16a^2 - 81b^2$

g $3x^2 - 21x + 36$

h $12t - 48t^2$

i $a^2 - 25b^2 + 4a + 20b$

j $(2m - 3n)^2 - 25p^2$

k $1 - 49t^2$

l $3a^2 - 4ab + 6a - 8b$

QUESTION **2** Factorise.

a $8y - 12y^2$

b $x^3 - x$

c $4a^2 - 8a$

d $4x^2 + 8x - 12$

e $9x - 9$

f $5t^2 + 35t + 50$

g $64 - a^2b^2c^2$

h $ab + ac + b + c$

i $a^2b^2 - c^2$

j $x^2 + 2x - 24$

k $3x^2 + 9x + 6$

l $x^2 - 16x + 39$

m $m^2n^2 - 1$

n $4a^2 - 4ax$

o $am + an - m - n$

UNIT 7: Miscellaneous questions

QUESTION 1 Factorise the following.

a $7x - 7 =$ _____ **b** $x^2 - 9 =$ _____

c $m^2 - 25 =$ _____ **d** $x^2 - 2xy =$ _____

e $-5m - 5n =$ _____ **f** $ay + ab =$ _____

g $4a^2 - 8a =$ _____ **h** $2(x + y) + m(x + y) =$ _____

i $x^2 - 121 =$ _____ **j** $a^3 - 3a^2b =$ _____

k $n^2 - 9n =$ _____ **l** $9x^2 - 16y^2 =$ _____

m $3x - 6 =$ _____ **n** $-a^2 - 2a - ay =$ _____

QUESTION 2 Factorise.

a $18y - 12y^2 =$ _____ **b** $4a^2 - 4ax =$ _____

c $ab + ac + b + c =$ _____ **d** $m^2n^2 - 1 =$ _____

e $a^2b^2 - c^2 =$ _____ **f** $(x - y)^2 - z^2 =$ _____

g $x^3 - x =$ _____ **h** $m^3 + m^2 + m + 1 =$ _____

i $xy + my - 7x - 7m =$ _____ **j** $am + an - m - n =$ _____

QUESTION 3 Factorise the following.

a $x^2 + 2x - 24 =$ _____ **b** $x^2 - 6x - 27 =$ _____

c $t^2 - 2t - 8 =$ _____ **d** $x^2 - 10x + 21 =$ _____

e $a^2 - 5a + 6 =$ _____ **f** $x^2 - x - 2 =$ _____

g $m^2 + 10m + 25 =$ _____ **h** $y^2 - 9y + 20 =$ _____

QUESTION 4 Find the factors.

a $4x^2 + 8x - 12 =$ _____ **b** $2x^2 - 10x + 12 =$ _____

c $3x^2 + 9x + 6 =$ _____ **d** $2x^2 + 6x + 4 =$ _____

e $9x^2 - 9x - 18 =$ _____ **f** $3x^2 - 9x - 30 =$ _____

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UNIT 8: Simple quadratic equations

QUESTION **1** Solve.

a $x^2 = 9$ **b** $x^2 = 16$ **c** $x^2 = 25$ **d** $x^2 = 1$

e $x^2 = 4$ **f** $x^2 = 64$ **g** $x^2 = 36$ **h** $x^2 = 49$

i $x^2 = 121$ **j** $x^2 = 400$ **k** $x^2 = 625$ **l** $x^2 = 1369$

m $x^2 - 100 = 0$ **n** $x^2 - 81 = 0$ **o** $x^2 - 169 = 0$ **p** $x^2 - 900 = 0$

q $2x^2 = 72$ **r** $3x^2 = 27$ **s** $5x^2 = 125$ **t** $7x^2 = 1008$

QUESTION **2** Solve giving each answer to two decimal places.

a $x^2 = 23$ **b** $m^2 = 53$ **c** $5y^2 = 29$ **d** $k^2 - 19 = 0$

QUESTION **3** Solve the following equations.

a $4x^2 - 25 = 0$ **b** $9x^2 - 16 = 0$ **c** $16x^2 - 25 = 0$ **d** $x^2 - 2\frac{1}{4} = 0$

e $9x^2 - 1 = 0$ **f** $3x^2 - 3 = 0$ **g** $9 - x^2 = 0$ **h** $2x^2 - 18 = 0$

i $4x^2 - 9 = 0$ **j** $25x^2 - 36 = 0$ **k** $5x^2 - 20 = 0$ **l** $(x + 5)^2 - 4 = 0$

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UNIT 9: Quadratic equations in factorised form

QUESTION **1** Solve the following quadratic equations that are already expressed in factorised form.

a $(x - 1)(x - 2) = 0$

b $(x - 2)(x + 3) = 0$

c $(x - 1)(x - 3) = 0$

d $x(x + 5) = 0$

e $2x(x - 4) = 0$

f $(x - 3)(x - 7) = 0$

g $(x - 3)(x - 5) = 0$

h $(x + 1)(x - 3) = 0$

i $(x + 2)(x - 4) = 0$

j $(x + 3)(x - 3) = 0$

k $(x - 2)(x + 2) = 0$

l $(x - 5)(x + 5) = 0$

m $(x + 1)(x - 6) = 0$

n $(x + 2)(x + 3) = 0$

o $x(x + 8) = 0$

QUESTION **2** Solve the following quadratic equations.

a $x(2x - 1) = 0$

b $(x + 6)(2x - 1) = 0$

c $(3x - 2)(x + 1) = 0$

d $(x - 2)(3x - 1) = 0$

e $5x(2x - 1) = 0$

f $3x(x - 2) = 0$

g $(x + 3)(3x - 1) = 0$

h $4x(2x - 5) = 0$

i $-2x(x - 1) = 0$

j $(3x + 1)x = 0$

k $(x - 3)2 = 0$

l $3x(x - 3) = 0$

QUESTION **3** Solve the following equations.

a $(x - 4)(x - 5) = 0$

b $(x - 8)(x + 8) = 0$

c $x(x - 3) = 0$

d $2x(x - 2) = 0$

e $(x - 7)(x - 9) = 0$

f $(x + 1)(x - 5) = 0$

g $(2x - 1)(x + 4) = 0$

h $(2x + 3)(2x - 3) = 0$

i $(4x + 5)(5x - 4) = 0$

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UNIT 10: Equations involving a common factor

QUESTION **1** Solve the following quadratic equations.

a $x^2 - 5x = 0$

b $x^2 - 4x = 0$

c $x^2 - 2x = 0$

d $x^2 + 7x = 0$

e $x^2 + 5x = 0$

f $x^2 + 9x = 0$

g $x^2 = 4x$

h $x^2 = 9x$

i $x^2 = 12x$

j $6x^2 - 12x = 0$

k $x^2 + 8x = 0$

l $x^2 - 10x = 0$

m $3x^2 + 21x = 0$

n $5x^2 - x = 0$

o $4x^2 = -12x$

QUESTION **2** Solve the following equations.

a $6x^2 - 24x = 0$

b $5x^2 + 25x = 0$

c $9x^2 - 9x = 0$

d $8x^2 - 16x = 0$

e $3x^2 - 3x = 0$

f $6x^2 - 6x = 0$

g $6x^2 + 2x = 0$

h $3x^2 - 7x = 0$

i $5x^2 - 3x = 0$

j $7x^2 - 21x = 0$

k $9x^2 - 27x = 0$

l $8x^2 - 4x = 0$

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UNIT 11: Solving quadratic equations by factorising

QUESTION **1** Solve the following quadratic equations by factorising.

a $x^2 + 5x + 6 = 0$

b $x^2 - 2x - 35 = 0$

c $x^2 - 5x - 6 = 0$

d $x^2 + 7x + 12 = 0$

e $x^2 - 5x + 6 = 0$

f $x^2 + 2x - 48 = 0$

g $x^2 - 8x + 16 = 0$

h $x^2 + 2x - 15 = 0$

i $x^2 + 9x + 20 = 0$

j $x^2 - 8x + 15 = 0$

k $x^2 + 4x - 12 = 0$

l $x^2 - 3x - 10 = 0$

m $x^2 + 11x + 30 = 0$

n $x^2 - 9x + 14 = 0$

o $x^2 + 3x - 28 = 0$

p $x^2 - 2x - 99 = 0$

q $x^2 + 6x + 8 = 0$

r $x^2 + 6x - 7 = 0$

s $x^2 - 6x + 5 = 0$

t $x^2 + 8x + 16 = 0$

u $x^2 - 4x - 60 = 0$

QUESTION **2** Factorise and solve the following quadratic equations.

a $x^2 = 3x + 18$

b $x^2 + 40 = 13x$

c $x^2 + 5x = 36$

d $x^2 = 15x - 54$

e $x^2 - 2x = 24$

f $x^2 = 24 - 5x$

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UNIT 12: Completing the square

QUESTION **1** What number must be added to make each of the following a perfect square?

a $x^2 + 6x$ _____ **b** $x^2 - 10x$ _____ **c** $x^2 + 9x$ _____

d $x^2 + 8x$ _____ **e** $x^2 + 5x$ _____ **f** $x^2 + 14x$ _____

g $x^2 - 12x$ _____ **h** $x^2 - 14x$ _____ **i** $x^2 - 18x$ _____

j $x^2 - 7x$ _____ **k** $x^2 - 3x$ _____ **l** $x^2 + 11x$ _____

QUESTION **2** Complete.

a $x^2 - 6x + \_\_\_\_\_^2 = (x - \_\_\_\_\_)^2$ **b** $x^2 + 4x + \_\_\_\_\_^2 = (x + \_\_\_\_\_)^2$

c $x^2 - 2x + \_\_\_\_\_^2 = (x - \_\_\_\_\_)^2$ **d** $x^2 + 10x + \_\_\_\_\_^2 = (x + \_\_\_\_\_)^2$

e $x^2 + 3x + \_\_\_\_\_^2 = (x + \_\_\_\_\_)^2$ **f** $x^2 - 7x + \_\_\_\_\_^2 = (x - \_\_\_\_\_)^2$

QUESTION **3** Solve the following quadratic equations by completing the square.

a $x^2 + 5x + 4 = 0$

b $x^2 + 6x + 4 = 0$

c $x^2 - 8x + 1 = 0$

d $x^2 + 9x = 4$

e $x^2 + 7x + 6 = 0$

f $x^2 = 8x + 9$

g $x^2 = 5x + 6$

h $x^2 + 10x = 5$

i $x^2 + 3x = 4$

j $x^2 + 4x = -4$

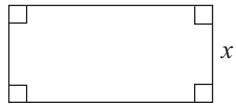
k $x^2 + 12x - 8 = 0$

l $x^2 - 10x = 3$

UNIT 13: Using quadratic equations to solve problems

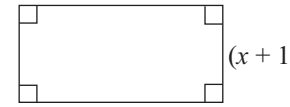
QUESTION **1** In each of the following diagrams, find x. All measurements are in centimetres.

a



Area = 9 cm^2

b



Area = 24 cm^2

QUESTION **2**

a A number when added to its square gives twelve. Find the number(s).

b The area of a rectangle is 15 cm^2 and its length is 2 cm longer than its width. Find the dimensions of the rectangle.

QUESTION **3**

a When a number is subtracted from its square, the result is 30. Find the possible numbers.

b The square of a number is equal to nine times the number. Find the possible numbers.

c The sum of the squares of two consecutive positive integers is 25. Find the integers.

Further algebra

TOPIC TEST — PART A

Instructions
- This part consists of 10 multiple-choice questions.
- Fill in only ONE CIRCLE for each question.
- Each question is worth 1 mark.

Time allowed: 15 minutes **Total marks: 10**

Marks

1 When $(6m - 2)$ is factorised, one of the factors is

(A) m (B) 3 (C) $3m - 2$ (D) $3m - 1$ — 1

2 The complete factorisation of $3ab - 6a$ is

(A) $3(ab - 6a)$ (B) $3a(a - 2)$ (C) $3a(b - 2)$ (D) $3a(b - 6)$ — 1

3 If $(x + 2)(x - 3) = 0$ then the values of x must be

(A) 2 or –3 (B) –2 or –3 (C) 2 or 3 (D) –2 or 3 — 1

4 $\frac{15-5p}{5}$ equals

(A) $2p$ (B) $3 - p$ (C) $3 - 5p$ (D) $15 - p$ — 1

5 If $x(x - 2) = 0$ then the value(s) of x must be

(A) 2 (B) –2 (C) 0 or 2 (D) 0 or –2 — 1

6 $x^2 - 5x + 6$ expressed as a product of factors is

(A) $(x + 3)(x + 2)$ (B) $(x + 3)(x - 2)$ (C) $(x - 3)(x + 2)$ (D) $(x - 3)(x - 2)$ — 1

7 If $x^2 - 9 = 0$ then the value(s) of x must be

(A) 0 (B) 3 (C) ± 3 (D) 9 — 1

8 $(2m + 3)(m - 2)$ equals

(A) $2m^2 - m - 6$ (B) $2m^2 - 7m - 6$ (C) $2m^2 - 4m + 6$ (D) $2m^2 + 3m + 6$ — 1

9 If $(x - 5)(4x - 3) = 0$ then the values of x must be

(A) 5 or $-\frac{3}{4}$ (B) –5 or $\frac{3}{4}$ (C) 5 or $\frac{3}{4}$ (D) –5 or $-\frac{3}{4}$ — 1

10 $mn - ml - kl + kn$ expressed as a product of factors is

(A) $(m + k)(n - l)$ (B) $(m - k)(n + l)$ (C) $(m + k)(l - n)$ (D) $(m - k)(n - l)$ — 1

Total marks achieved for PART A 10

Further algebra

TOPIC TEST — PART B

Instructions
- This part consists of 2 questions.
- Write only the answer in the answer column.
- For any working use the question column.

Time allowed: 20 minutes **Total marks: 20**

Questions	Answers	Marks
1 Factorise fully.		
a $3a + 6b - 12$		1
b $m^2 - 36$		1
c $6a^2b^3c - 12ab^4c^2$		1
d $x(a - b) + y(a - b)$		1
e $x^2 + 7x + 12$		1
f $a^2 - 9a + 18$		1
g $m^2 - 2m - 80$		1
h $p^2 + 5p - 36$		1
i $2n^2 + 16n + 30$		1
j $4 - 4x^2$		1
2 Solve.		
a $x^2 = 144$		1
b $x^2 - 16 = 0$		1
c $3x(x - 5) = 0$		1
d $(x - 4)(x - 7) = 0$		1
e $7x^2 - 28 = 0$		1
f $x^2 - 15x = 0$		1
g $x^2 - 12x + 27 = 0$		1
h $x^2 + 13x + 36 = 0$		1
i $x^2 + x - 90 = 0$		1
j $x^2 - 3x - 4 = 0$		1

Total marks achieved for PART B ___/20

CHAPTER 8
Linear and non-linear relationships

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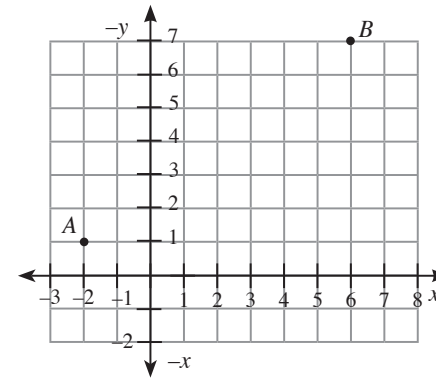
UNIT 1: Review of coordinate geometry

QUESTION **1** The diagram shows the points $A(-2, 1)$ and $B(6, 7)$.

a Find the gradient of the line joining A and B.

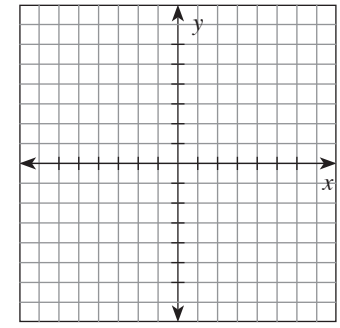


b Find the midpoint of AB.

c Find the distance from A to B.

QUESTION **2**

a Plot the points $P(-4, 3)$ and $Q(6, -2)$ and show the line that passes through those 2 points.



b Find the gradient of PQ.

c What is the y-intercept? _____

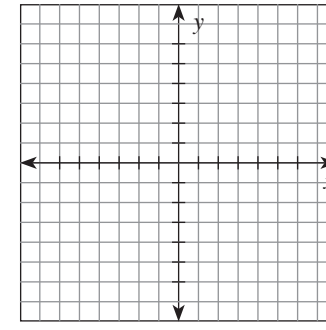
d Write down the equation of the line. _____

QUESTION **3** Consider the line $y = 3 - 2x$.

a What is the gradient? _____

b What is the y-intercept? _____

c Sketch the graph of $y = 3 - 2x$



QUESTION **4** A is the point $(7, 9)$ and B the point $(-9, -3)$. Find:

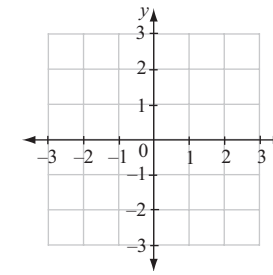
a the mid-point of AB

b the gradient of AB

c the distance from A to B

UNIT 2: Lines with the same gradient

QUESTION 1 On the same number plane, draw the graphs of the following.



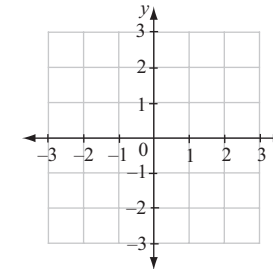
a $y = x$

b $y = x + 1$

c $y = x - 1$

d $y = x - 3$

QUESTION 2 On the same number plane, draw the graphs of the following.

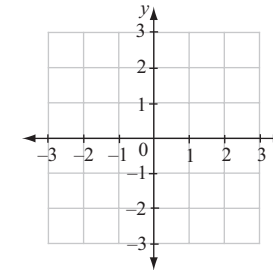


a $y = 2x$

b $y = 2x + 1$

c $y = 2x - 2$

QUESTION 3 On the same number plane, draw the graphs of the following.

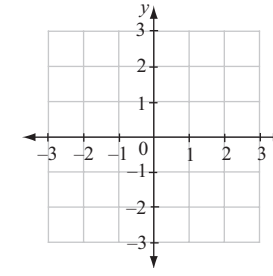


a $y = -x$

b $y = -x - 2$

c $y = 1 - x$

QUESTION 4 On the same number plane, draw the graphs of the following.

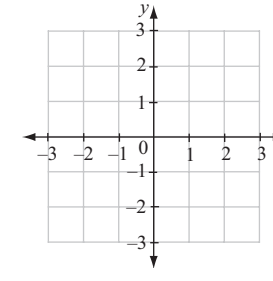


a $y = \frac{1}{3}x$

b $y = \frac{1}{3}x + 2$

c $y = \frac{1}{3}x - 1$

QUESTION 5 On the same number plane, sketch the graphs of the following.



a $y = -\frac{2}{3}x$

b $y = -\frac{2}{3}x + 1$

c $y = -\frac{2}{3}x - 1$

QUESTION 6 Complete: Lines that have the same gradient are _____.

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UNIT 3: Lines with gradients that are negative reciprocals

QUESTION 1 Find these products.

a $2 \times -\frac{1}{2} =$ _____ **b** $-3 \times \frac{1}{3} =$ _____ **c** $\frac{1}{5} \times -5 =$ _____ **d** $-\frac{1}{7} \times 7 =$ _____

e $\frac{2}{3} \times -\frac{3}{2} =$ _____ **f** $-\frac{3}{4} \times \frac{4}{3} =$ _____ **g** $\frac{8}{5} \times -\frac{5}{8} =$ _____ **h** $-\frac{5}{3} \times \frac{3}{5} =$ _____

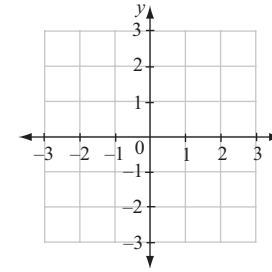
QUESTION 2 Complete

a The product of any number and its negative reciprocal is always _____.

QUESTION 3 On the same number plane, draw the graphs of the following.

a $y = x$

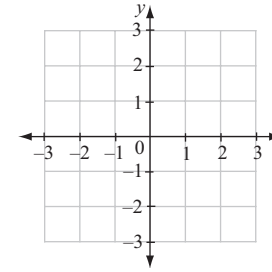
b $y = -x + 1$



QUESTION 4 On the same number plane, draw the graphs of the following.

a $y = -2x$

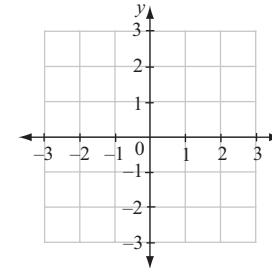
b $y = \frac{1}{2}x - 1$



QUESTION 5 On the same number plane, draw the graphs of the following.

a $y = \frac{2}{3}x + 1$

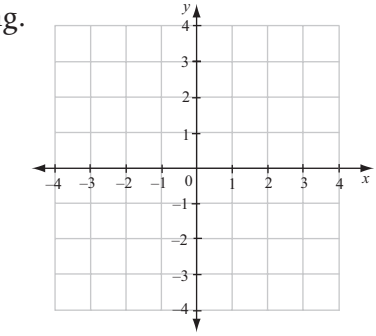
b $y = -\frac{3}{2}x - 1$



QUESTION 6 On the same number plane, draw the graphs of the following.

a $y = -\frac{3}{4}x$

b $y = \frac{4}{3}x$



QUESTION 7 Complete.

a Lines whose gradients are negative reciprocals are always _____.

UNIT 4: Parallel and perpendicular lines (1)

QUESTION 1 Complete.

a Lines that are parallel have gradients that are _____.

b Lines that are perpendicular have gradients that are _____.

QUESTION 2 Determine whether the two given lines are parallel or perpendicular or neither.

a $y = 2x + 3$
$y = 2x - 1$
_____

b $y = \frac{1}{2}x + 5$
$y = 2x - 3$
_____

c $y = \frac{3}{2}x + 1$
$y = -\frac{2}{3}x - 1$
_____

d $y = \frac{x}{4} + \frac{2}{3}$
$y = -4x + 2$
_____

e $y = 6 - x$
$y = -x + 3$
_____

f $y = 1 - 2x$
$y = \frac{x}{2} + 5$
_____

g $y = -\frac{3}{4}x - 2$
$y = -\frac{4}{3}x + 2$
_____

h $y = \frac{5x}{6} - 7$
$y = -\frac{6}{5}x + 1$
_____

QUESTION 3 Write down the equation of the line that passes through the point (0, 2) and which is parallel to the given line.

a $y = 3x + 1$
_____

b $y = -2x - 3$
_____

c $y = \frac{1}{2}x + \frac{1}{4}$
_____

d $y = -\frac{5x}{3} - 4$
_____

QUESTION 4 Write down the equation of the line that passes through the origin and which is perpendicular to the given line.

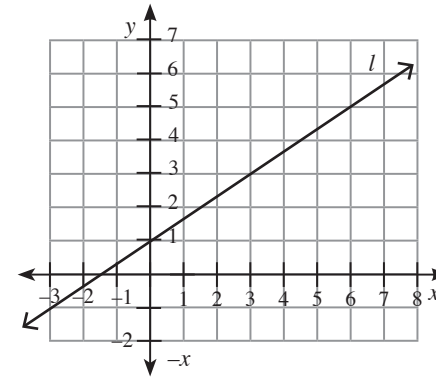
a $y = 4x + 3$
_____

b $y = -\frac{x}{3} + 7$
_____

c $y = 9 - 2x$
_____

d $y = \frac{3}{2}x + 4$
_____

QUESTION 5 The diagram shows the graph of line l.



a What is the gradient of l? _____

b What is the gradient of any line parallel to l? _____

c What is the gradient of any line perpendicular to l? _____

d Line m has equation $y = -\frac{3}{2}x - 12$. It intersects line l at P. If l meets the y-axis at Q and m meets the y-axis at R. What is the size of $\angle QPR$? _____

UNIT 5: Parallel and perpendicular lines (2)

QUESTION **1** State whether the following pairs of lines are parallel or not.

a $x + 3y + 9 = 0$ and $x + 3y - 7 = 0$ _____ **b** $2x + y = 6$ and $3x - 7y = 9$ _____

c $3x - 7y + 8 = 0$ and $3x - 7y = 2$ _____ **d** $x + 2y = 6$ and $x + 2y - 5 = 0$ _____

e $x + y - 2 = 0$ and $x + y - 7 = 0$ _____ **f** $y = 4x + 3$ and $y = 4x - 5$ _____

g $y = 2x + 1$ and $y = 2x + 8$ _____ **h** $y = 3x - 1$ and $y = -5x + 7$ _____

QUESTION **2** State whether the following pairs of lines are perpendicular or not.

a $x - 3y = 7$ and $3x - y - 2 = 0$ _____ **b** $5x - 3y + 7 = 0$ and $3x + 5y - 6 = 0$ _____

c $2x + 7y = 8$ and $3x - 4y + 7 = 0$ _____ **d** $8x - 3y = 2$ and $3x + 8y = 9$ _____

e $5x - 6y = 15$ and $6x - 5y + 3 = 0$ _____ **f** $2x - 3y + 7 = 0$ and $3x + 2y + 5 = 0$ _____

g $2x - 9y = 7$ and $3x + 6y = 8$ _____ **h** $x - 2y = 6$ and $2x + y = 7$ _____

QUESTION **3** State whether the following pairs of lines are parallel, perpendicular or neither.

a $x - 2y + 5 = 0$ and $2x - 4y - 8 = 0$ _____ **b** $3x - y - 3 = 0$ and $9x - 3y + 1 = 0$ _____

c $x + 7y = 0$ and $2x - 9y = 0$ _____ **d** $x + y - 7 = 0$ and $3x - 3y + 3 = 0$ _____

e $3x - 4y + 2 = 0$ and $8x + 6y - 3 = 0$ _____ **f** $4x - 8y = 8$ and $2x + 9y = 6$ _____

g $x + 3y - 2 = 0$ and $2x + 6y - 5 = 0$ _____ **h** $x - 5y - 2 = 0$ and $10x + 2y + 3 = 0$ _____

QUESTION **4** Find the general form of the equation of the straight line passing through

a (2, 5) parallel to $3x - y + 7 = 0$

b (0, 0) parallel to the line $4x - 5y + 6 = 0$

c (–2, 3) perpendicular to $2x + y = 9$

d the point (3, –4) and perpendicular to the line $x - y + 5 = 0$

QUESTION **5** Show that the lines $x - 2y + 7 = 0$ and $2x + y - 16 = 0$ are perpendicular to each other.

UNIT 6: Quadratic graphs

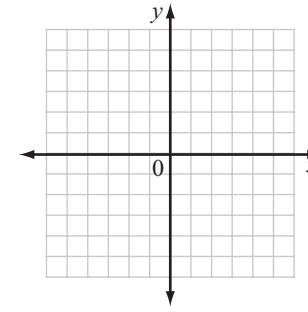
QUESTION 1 Complete the table of values and then, on the same number plane, draw the graphs of the following.

a $y = x^2$

b $y = 2x^2$

c $y = \frac{1}{2}x^2$

x	–3	–2	–1	0	1	2	3
$y = x^2$							
$y = 2x^2$							
$y = \frac{1}{2}x^2$							



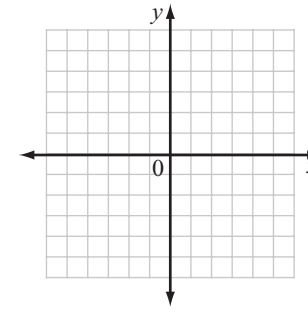
QUESTION 2 Complete the table of values and then, on the same number plane, draw the graphs of the following.

a $y = x^2$

b $y = x^2 + 1$

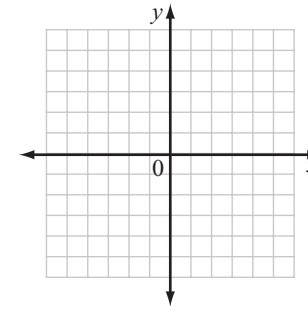
c $y = x^2 - 1$

x	–3	–2	–1	0	1	2	3
$y = x^2$							
$y = x^2 + 1$							
$y = x^2 - 1$							



QUESTION 3 Complete the table of values for $y = 1 - x^2$ and sketch its graph.

x	–3	–2	–1	0	1	2	3
$1 - x^2$							



a What is the equation of its axis of symmetry? _____

b What are the coordinates of its vertex? _____

c What is the maximum value for $y = 1 - x^2$? _____

d Find the x-intercepts. _____

e Find the y-intercept. _____

QUESTION 4 Sketch the graphs of the following.

a $y = x^2$

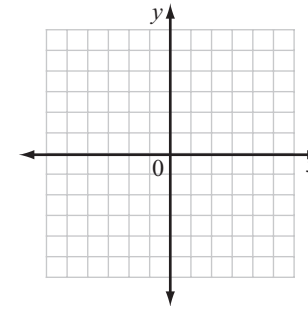
b $y = x^2 + 2$

c $y = x^2 - 2$

d Explain how the graphs of $y = x^2 + 2$ and $y = x^2 - 2$ can be drawn using $y = x^2$.

_____

_____



UNIT 7: The circle

QUESTION 1 Write the coordinates of the centre and the length of the radius for each of the following circles.

a $x^2 + y^2 = 4$ _____ **b** $x^2 + y^2 = 49$ _____

c $x^2 + y^2 = \frac{4}{9}$ _____ **d** $x^2 + y^2 = 81$ _____

QUESTION 2 Write the equation of each of the following circles, whose centre and radius are given.

a Centre (0, 0), radius = 3 units

_____

_____

b Centre (0, 0), radius = 7 units

_____

_____

c Centre (0, 0), radius = 2 units

_____

_____

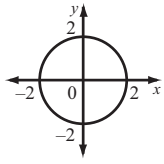
d Centre (0, 0), radius = 10 units

_____

_____

QUESTION 3 Write the equation of each of the following circles.

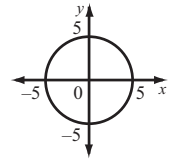
a



_____

_____

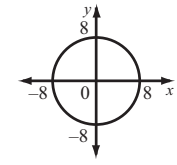
b



_____

_____

c



_____

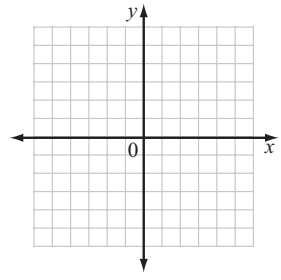
_____

QUESTION 4 Graph each of the following circles, stating the radius and the centre.

a $x^2 + y^2 = 16$

_____

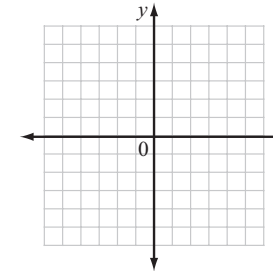
_____



b $x^2 + y^2 = 1$

_____

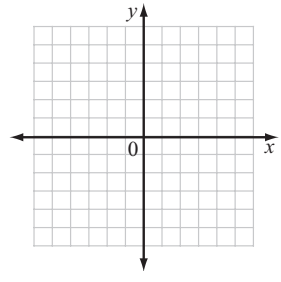
_____



c $x^2 + y^2 = 9$

_____

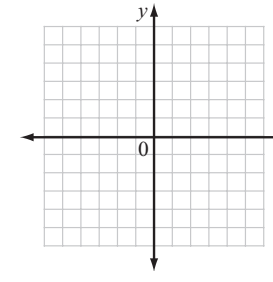
_____



d $x^2 + y^2 = 36$

_____

_____



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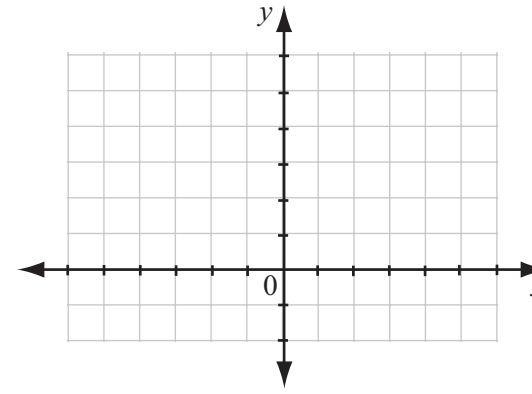
UNIT 8: Exponential graphs

QUESTION 1 Make a table of values and then draw the graphs of the following exponential functions on the same set of axes.

a $y = 2^x$

b $y = 2^{-x}$

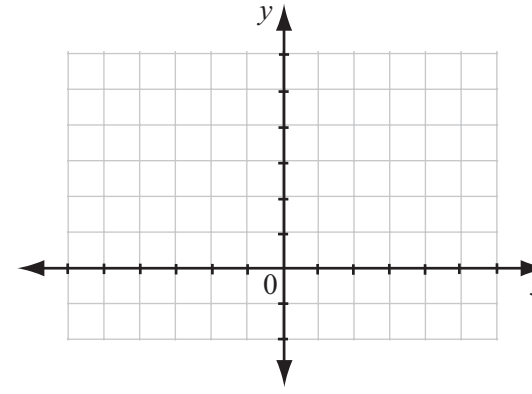


QUESTION 2 Make a table of values and then draw the graphs of the following exponential functions on the same set of axes.

a $y = 2^x$

b $y = 3^x$

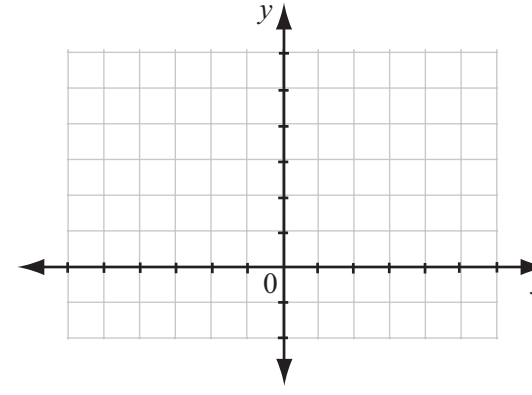
c $y = 5^x$



QUESTION 3 Complete the table of values and then draw the graph of

$$y = \frac{3^x + 3^{-x}}{2}$$

x	−1	0	1	2	3
$y = 3^x$					
$y = 3^{-x}$					
$y = \frac{3^x + 3^{-x}}{2}$					



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UNIT 9: Miscellaneous graphs

QUESTION 1 For the following equations, write whether the graphs are straight lines, parabolas, circles, exponential functions, or none of these.

a $y = x$ _____ **b** $y = -x^2$ _____ **c** $y = 0$ _____

d $y = x^2 - 5x + 6$ _____ **e** $y = x^2$ _____ **f** $y = 3 - x$ _____

g $y = x^2 - 1$ _____ **h** $y = -10^x$ _____ **i** $y = x^3$ _____

j $x^2 + y^2 = 16$ _____ **k** $y = 2^x$ _____ **l** $x^2 + y^2 = 64$ _____

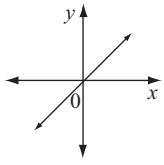
QUESTION 2 Match the equations with the graphs sketched below.

a $y = 2x + 1$ _____ **b** $y = 1 - x^2$ _____ **c** $y = 2^{-x}$ _____ **d** $x^2 + y^2 = 1$ _____

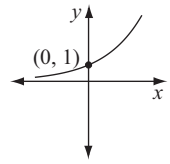
e $y = x^2 + 2$ _____ **f** $y = -2^x$ _____ **g** $y = x$ _____ **h** $y = 2^x$ _____

i $y = x^2$ _____ **j** $y = x^2 - 4x + 3$ _____ **k** $y = -x$ _____ **l** $x^2 + y^2 = 25$ _____

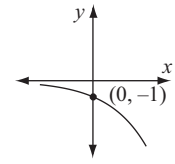
A



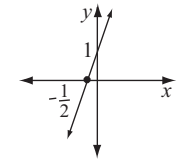
B



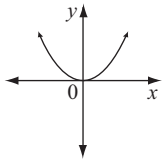
C



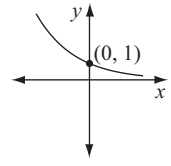
D



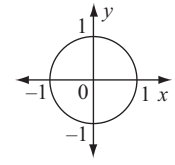
E



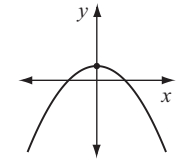
F



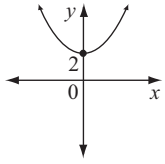
G



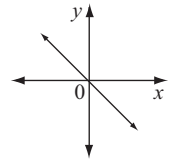
H



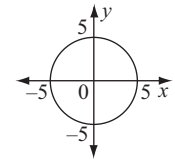
I



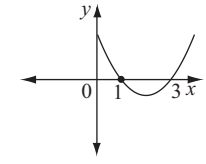
J



K

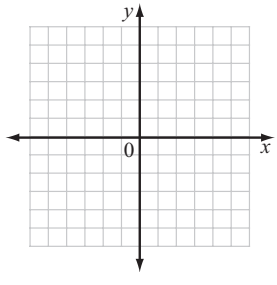


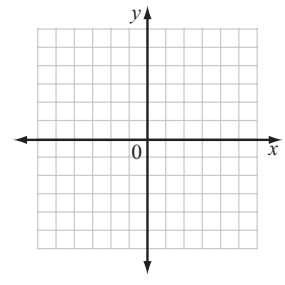
L

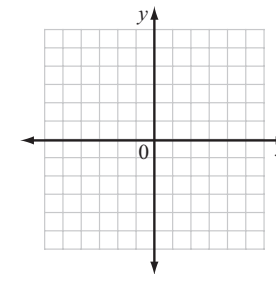


QUESTION 3 Draw a separate sketch for each of the following.

a $y = 2x + 3$ **b** $y = 2x^2$ **c** $x^2 + y^2 = 9$







Linear and non-linear relationships

TOPIC TEST — PART A

Instructions
- This part consists of 10 multiple-choice questions.
- Fill in only ONE CIRCLE for each question.
- Each question is worth 1 mark.

Time allowed: 15 minutes **Total marks: 10**

Marks

1 The straight line $y = 3x - 2$ passes through one of the following points. Which one?

(A) $(0, -2)$ (B) $(0, 2)$ (C) $(-2, 0)$ (D) $(2, 0)$ 1

2 What is the equation of the line parallel to the x-axis passing through P(2, 4)?

(A) $x = 4$ (B) $y = 2$ (C) $x = 2$ (D) $y = 4$ 1

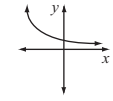
3 Which one of the following is a linear equation?

(A) $y = x^2 + 7$ (B) $y = 5 - \frac{7}{x}$ (C) $y = 6 - 7x$ (D) $y = \sqrt{x} - 3$ 1

4 The radius of the circle $x^2 + y^2 = 4$ is equal to

(A) 2 units. (B) 4 units. (C) 16 units. (D) none of these. 1

5 The graph shown could be part of the graph with equation

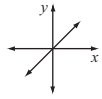


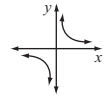
(A) $y = 2^{-x}$ (B) $y = 2^x$ (C) $y = -2^x$ (D) $y = -2^{-x}$ 1

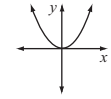
6 What is the equation of the line which passes through the point $(-2, 3)$ and has a gradient of -2?

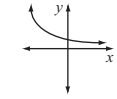
(A) $y = 2x - 1$ (B) $y = -2x - 1$ (C) $y = -2x - 7$ (D) $y = 2x + 7$ 1

7 Which graph best represents $y = x^2$?

(A) 

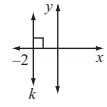
(B) 

(C) 

(D) 

1

8 The equation of the line k is



(A) $x = -2$ (B) $x = 2$ (C) $y = -2$ (D) $y = 2$ 1

9 The point (3, 6) lies on the line:

(A) $x + 2y + 12 = 0$ (B) $x + 2y - 12 = 0$ (C) $2x + y + 12 = 0$ (D) $2x + y - 12 = 0$ 1

10 What is the gradient of any line perpendicular to $y = \frac{x}{4} - 2$?

(A) $\frac{1}{4}$ (B) $-\frac{1}{4}$ (C) 4 (D) -4 1

Total marks achieved for PART A ___/10

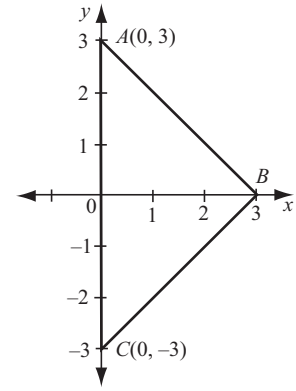
Linear and non-linear relationships

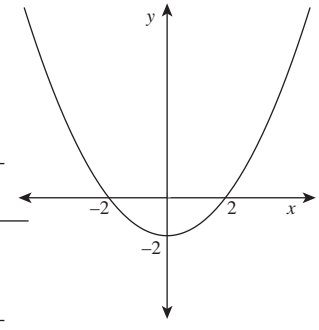
TOPIC TEST — PART B

Instructions
- This part consists of 3 questions.
- Write only the answer in the answer column.
- For any working use the question column.

Time allowed: 20 minutes **Total marks: 15**

Questions	Answers	Marks
1 The equation of a line is $2x - y - 3 = 0$		
a Make y the subject of this equation.		1
b What is the gradient of this line?		1
c What is the y-intercept of this line?		1
d Is this line parallel to the line $y = 2x + 1$?		1
2 From the diagram opposite:		
a What is the gradient of AB?		1
b What is the gradient of BC?		1
c Is AB perpendicular to BC? Justify your answer.		1
d What is the midpoint, M, of AB?		1
e Is the line joining M to $O(0, 0)$ parallel to BC? Justify your answer.		1
f What is the equation of the circle that passes through A, B and C?		1
g Will the point (2, 2) lie inside, on, or outside the circle in part **f**?		1
3 The graph shows the curve $y = ax^2 + c$		
a What name is given to the type of curve?		1
b What is the value of c?		1
c Find the value of a.		1
d Find y when $x = 6$		1





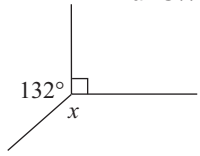
Total marks achieved for PART B 15

CHAPTER 9
Geometric reasoning

UNIT 1: Angle properties (1)

QUESTION **1** Find the value of the pronumeral in each of the following. Give reasons to justify your answer.

a



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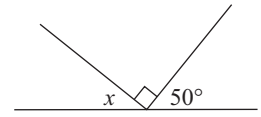

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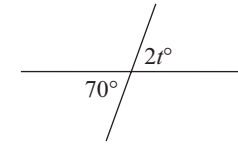

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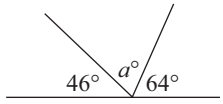

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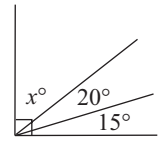

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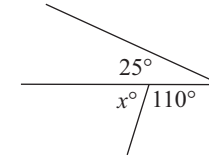

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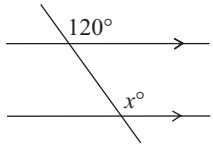

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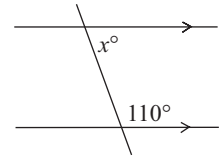

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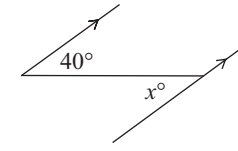

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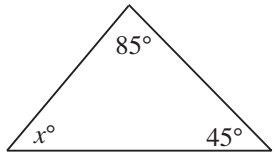

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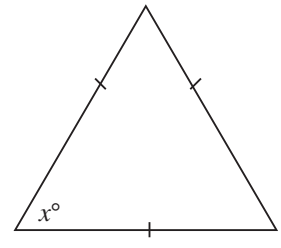

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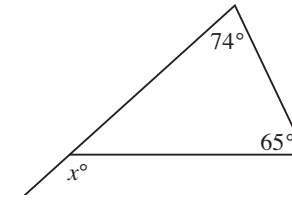

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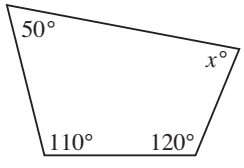

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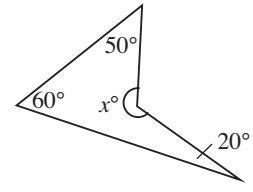

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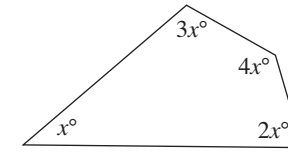
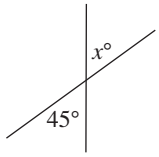


Geometric reasoning

UNIT 2: Angle properties (2)

QUESTION **1** Find the value of the pronumeral, giving reasons.

a



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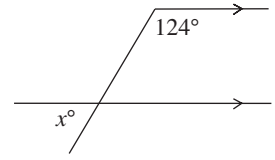

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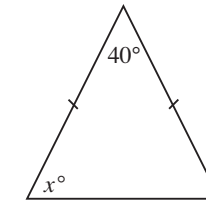

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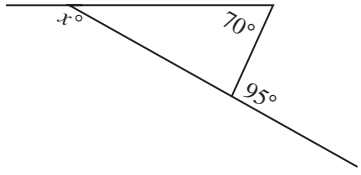

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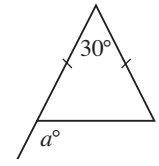

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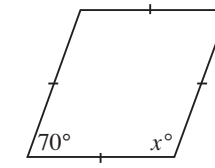
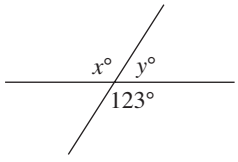


QUESTION **2** Find the value of each pronumeral.

a



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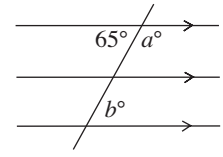

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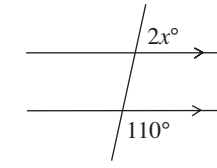

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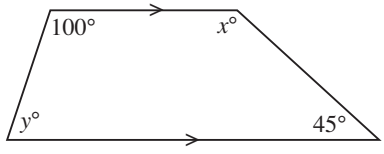

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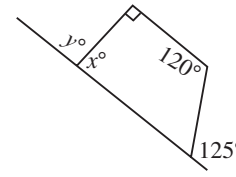

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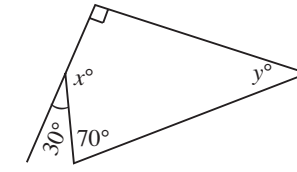

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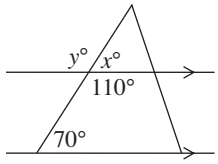

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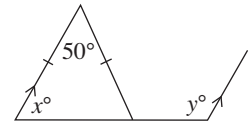

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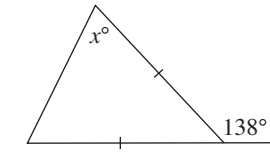
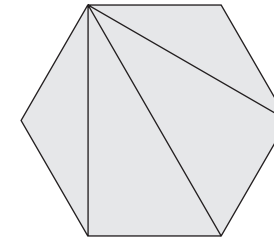


UNIT 3: Polygons

QUESTION **1** The diagram shows a hexagon divided into triangles.



a How many triangles is the hexagon divided into? _____

b What is the angle sum of a hexagon?

_____

c What is the size of each angle of a regular hexagon?

_____

QUESTION **2** Find the angle sum of:

a a pentagon

_____

_____

_____

b an octagon

_____

_____

_____

c a dodecagon

_____

_____

_____

QUESTION **3** What is the size of each angle of a regular:

a pentagon?

_____

b octagon?

_____

c dodecagon?

_____

QUESTION **4** Complete:

The sum of the exterior angles of any polygon is _____.

QUESTION **5** For a regular decagon, what is the size of each

a exterior angle?

_____

_____

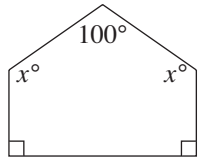
b interior angle?

_____

_____

QUESTION **6** Find the value of x.

a



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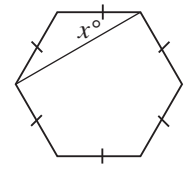
b



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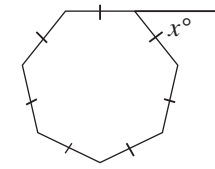
c



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Geometric reasoning

UNIT 4: Problem solving and geometry

1 In a right-angled triangle, if one angle is 55°, find the other acute angle.

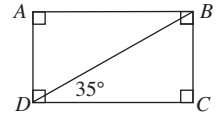
2 In a right-angled triangle the two shorter sides are equal. What is the size of each acute angle?

3 In a right-angled triangle, one acute angle is twice the size of the other. What is the size of each angle?

4 The angles of a triangle are $x°$, $2x°$ and $3x°$. Find the size of each angle.

5 The sides of a rectangle are 5 cm and 12 cm. How long is the diagonal?

6 $ABCD$ is a rectangle. If $\angle BDC = 35°$, find $\angle DBC$.



7 Three angles of a quadrilateral are 120°, 70° and 110°. Find the fourth angle.

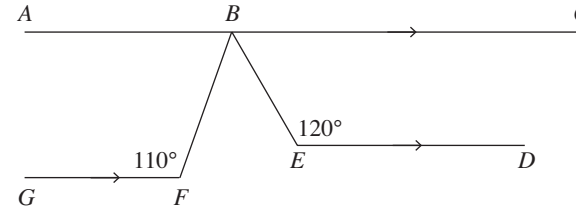
8 If one of the base angles of an isosceles triangle is 68°, find the size of the vertical angle.

9 If the vertical angle of an isosceles triangle is 86°, find the size of each of the base angles.

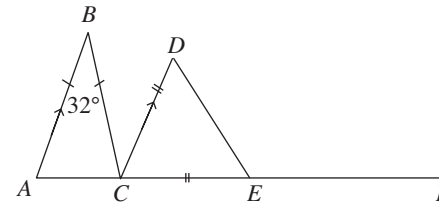
10 In $\triangle ABC$, $AB = BC$ and $BC = AC$. What is the size of $\angle A$?

UNIT 5: Reasoning involving angles

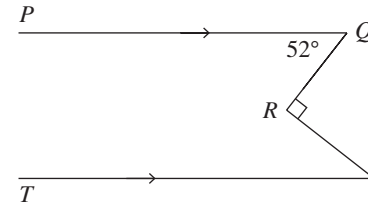
QUESTION 1 AC is parallel to ED and to GF, $\angle GFB = 110°$. $\angle BED = 120°$. Find the size of $\angle FBE$.



QUESTION 2 AB is parallel to DC. $AB = BC$, $DC = EC$. $\angle ABC = 32°$. Find the size of $\angle DEF$.



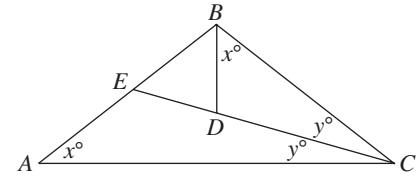
QUESTION 3 PQ is parallel to ST, QR is perpendicular to RS. $\angle PQR = 52°$. Find the size of $\angle RST$.



QUESTION 4

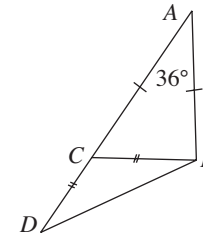
a What is the size of $\angle BDE$ in terms of x and y?

b What is the size of $\angle BED$ in terms of x and y?



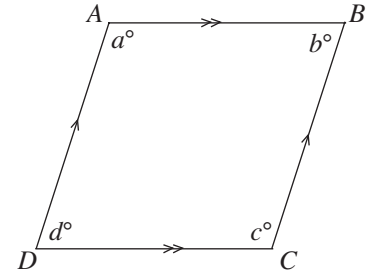
c Does $BD = BE$. Justify your answer.

QUESTION 5 $AB = AC$, $BC = CD$. $\angle DAB = 36°$. Show that $BD = AB$

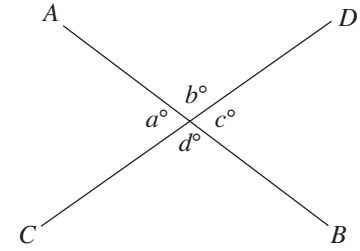


UNIT 6: Deductive geometry

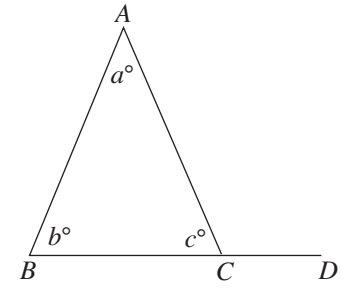
QUESTION 3 $ABCD$ is a parallelogram. Prove that $a° = c°$ and that $b° = d°$. (In other words prove that the opposite angles of a parallelogram are equal.)



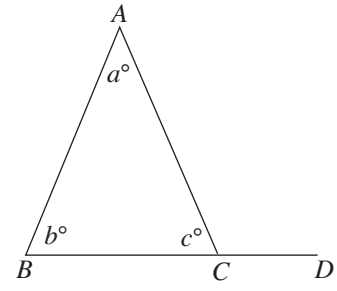
QUESTION 2 AB and CD are two intersecting lines. Prove that the vertically opposite angles are equal.



QUESTION 3 In the triangle ABC, prove that the exterior angle ACD is equal to the sum of the opposite interior angles $a°$ and $b°$. In other words, show that $\angle ACD = a° + b°$



QUESTION 4 Prove that the angle sum of a triangle is equal to 180°. In other words, show that $a° + b° + c° = 180°$



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UNIT 7: Congruent figures

QUESTION 1 Complete.

a Two plane figures are congruent if they are exactly the same _____ and exactly the same _____.

b If two figures are congruent then the corresponding sides are _____ and the corresponding angles are _____.

c If $\angle PQR$ is congruent to $\angle ABC$ then $\angle P$ corresponds to _____, $\angle Q$ corresponds to _____ and $\angle R$ corresponds to _____.

d The symbol for congruent triangles is _____.

e Two triangles are congruent if three sides of one triangle are equal to _____ of the other triangle.

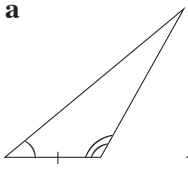
f Two triangles are congruent if two angles and a side of one triangle are equal to _____ of the other triangle.

g Two triangles are congruent if two sides and the included angle of one triangle are equal to _____ of the other triangle.

h Two right-angled triangles are congruent if the hypotenuse and one side of one triangle are equal to _____ of the other triangle.

QUESTION 2 In each pair of triangles write the congruency test that would be used to prove that the triangles are congruent.

a



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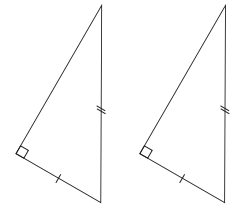

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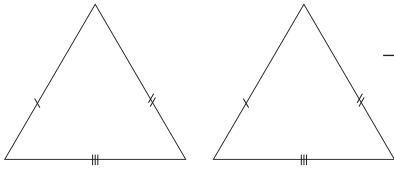
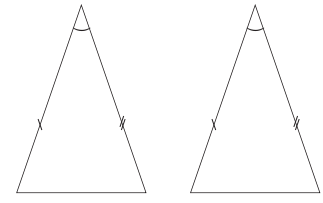
c



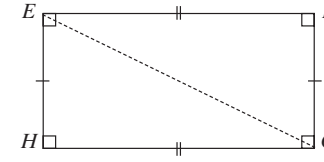
_____

d



_____

QUESTION 3 ΔEFG and ΔGHE are congruent.

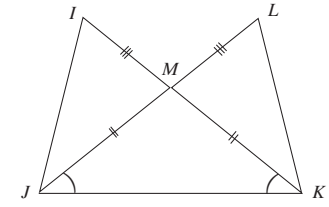


a Name all pairs of corresponding angles.

_____

b Name all pairs of corresponding sides.

_____



QUESTION 4 Complete.

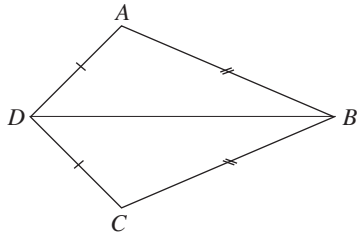
a $\Delta JIM \equiv \Delta$ _____

b $\Delta IKJ \equiv \Delta$ _____

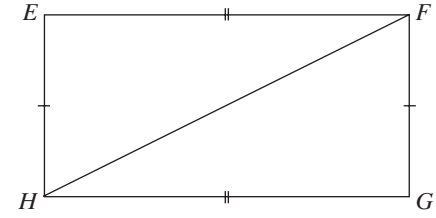
UNIT 8: Test for congruent triangles (SSS)

QUESTION 1 Prove that the two triangles are congruent. Give reasons.

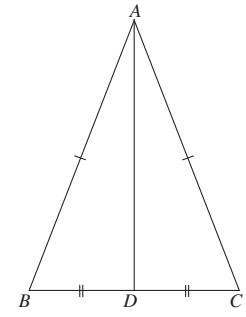
a



b

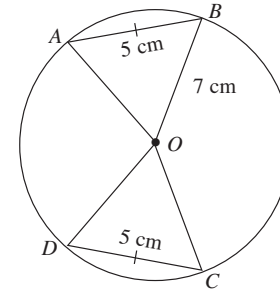


QUESTION 2 In ΔABC, $AB = AC$ and D is the midpoint of BC. prove that $\Delta ABD \equiv \Delta ACD$.



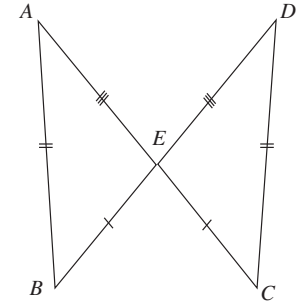
QUESTION 3 In the given circle with centre O, $AB = DC = 5$ cm.

a Prove that $\Delta AOB \equiv \Delta DOC$. Give reasons.



b Prove that $\angle AOB = \angle DOC$. Justify your answer.

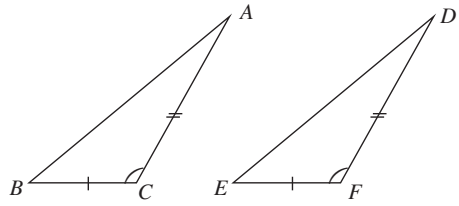
QUESTION 4 For this diagram, prove that $\Delta ABE \equiv \Delta DCE$.



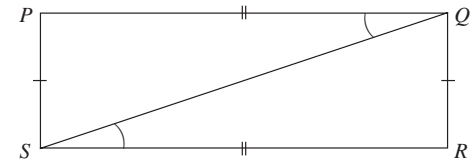
UNIT 9: Test for congruent triangles (SAS)

QUESTION 1 Prove that the two triangles are congruent. Give reasons.

a

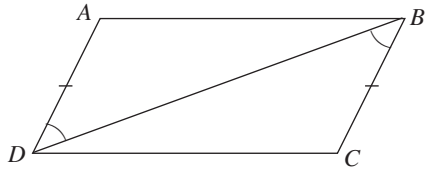


b

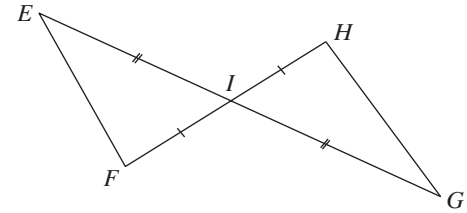


QUESTION 2 Prove that the two triangles are congruent. Give reasons.

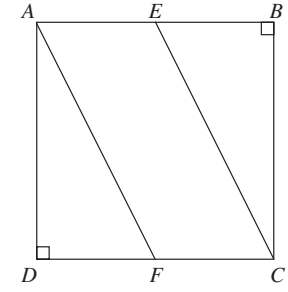
a



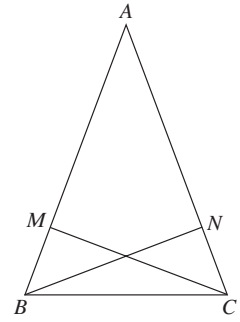
b



QUESTION 3 $ABCD$ is a square. E is the midpoint of AB and F is the midpoint of DC.
Prove that $\Delta ADF \equiv \Delta CBE$.



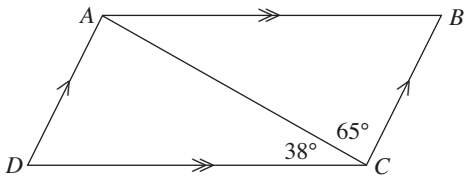
QUESTION 4 In ΔABC, $BM = CN$ and $\angle MBC = \angle NCB$.
Prove that $\Delta MBC \equiv \Delta NCB$ and hence $BN = CM$.
Give reasons.



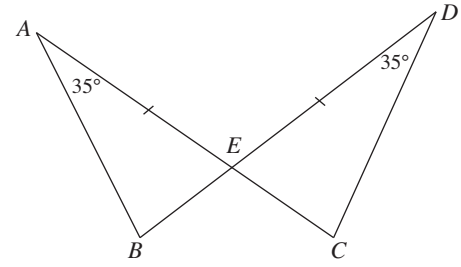
UNIT 10: Test for congruent triangles (AAS)

QUESTION 1 Prove that the two triangles are congruent. Give reasons.

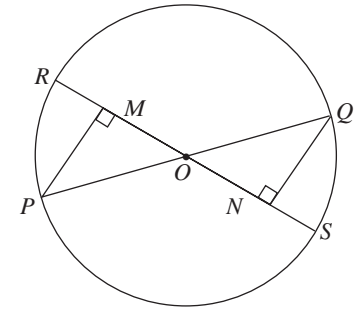
a



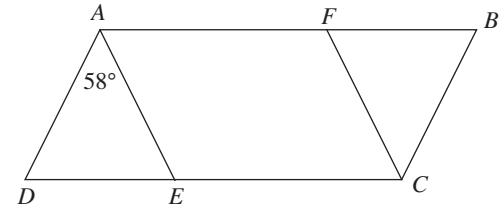
b



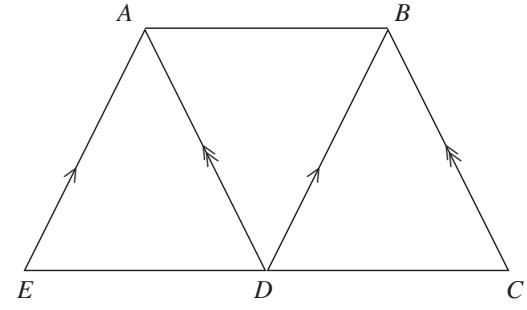
QUESTION 2 PQ and RS are diameters of a circle with centre O. PM and QN are perpendicular to RS. Prove that $\Delta OPM \equiv \Delta OQN$. Give reasons.



QUESTION 3 $ABCD$ is a parallelogram. AE bisects $\angle A$, CF bisects $\angle C$ and $\angle DAE = 58°$. Prove that $\Delta ADE \equiv \Delta CBF$. Give reasons.



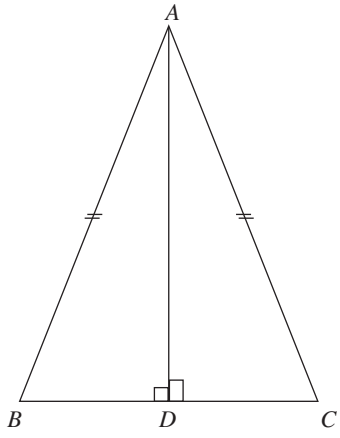
QUESTION 4 D is the midpoint of EC, $EA \parallel DB$ and $DA \parallel CB$. Prove that $\Delta EDA \equiv \Delta DCB$.



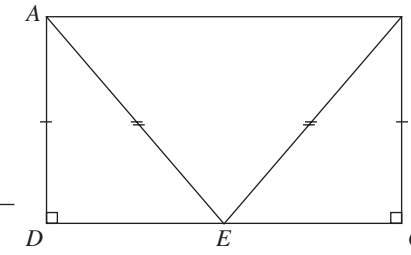
UNIT 11: Test for congruent triangles (RHS)

QUESTION 1 Prove that the two triangles are congruent. Give reasons.

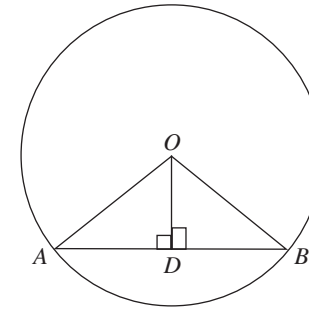
a



b

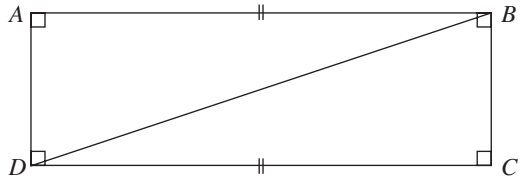


QUESTION 2 O is the centre of the circle and OD is perpendicular to AB. Prove that $\Delta OAD \equiv \Delta OBD$ and hence $AD = BD$.

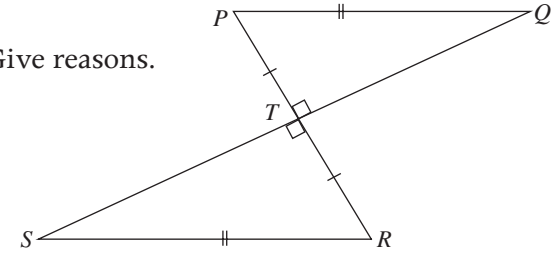


QUESTION 3 Prove that the two triangles are congruent. Give reasons.

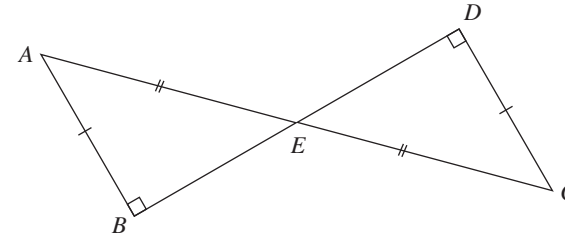
a



b



QUESTION 4 Prove that $\Delta ABE \equiv \Delta CDE$, giving reasons. Then prove that $\angle A = \angle C$ and $DE = EB$.



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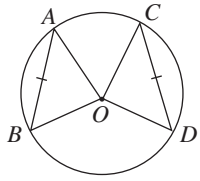
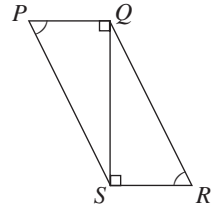
UNIT 12: Proofs of congruent triangles

QUESTION 1 In each pair of triangles, prove that the triangles are congruent.

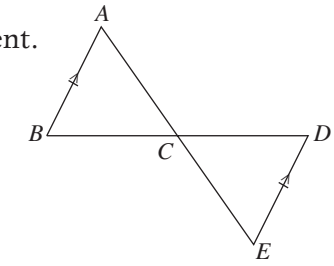
a



b

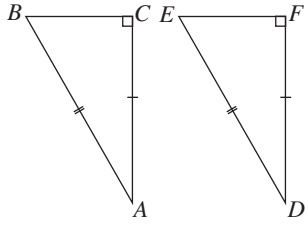


c

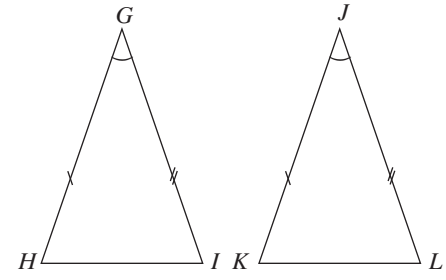


QUESTION 2 Prove that each pair of triangles is congruent.

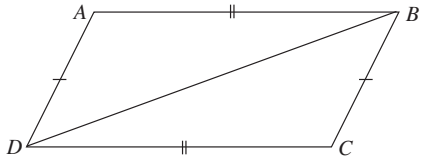
a



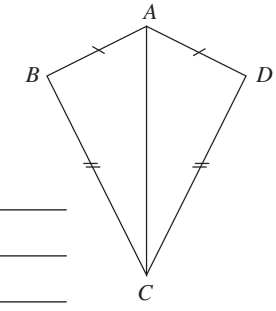
b



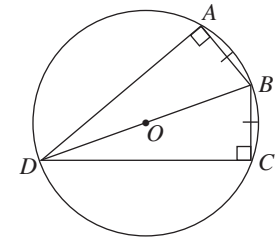
c



d

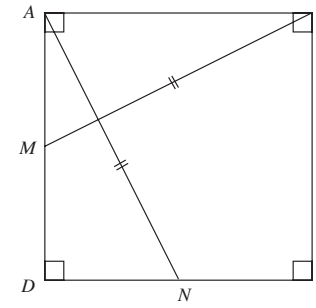


QUESTION 3 O is the centre of the circle and $AB = BC$.
Prove that $\Delta ABD \equiv \Delta CBD$

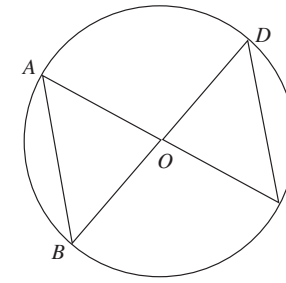


UNIT 13: Proofs involving congruent triangles

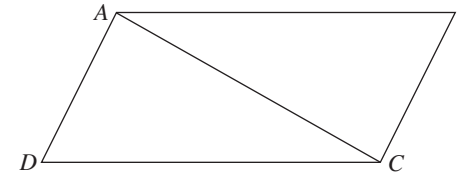
QUESTION 1 $ABCD$ is a square. M is the midpoint of AD and N is the midpoint of DC. Given that $AN = BM$, prove that $\Delta ADN \equiv \Delta BAM$. State why $\angle AMB = \angle DNA$.



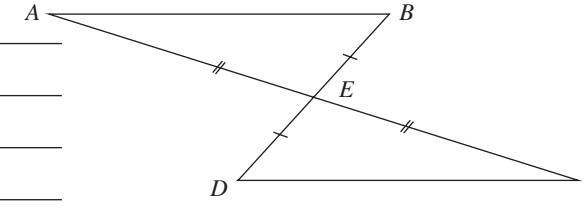
QUESTION 2 AC and BD are diameters of a circle. Prove that $\Delta AOB \equiv \Delta COD$.



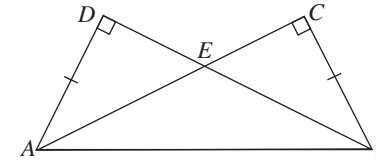
QUESTION 3 $AB = DC$ and $AD = BC$.Show that $\Delta ADC \equiv \Delta CBA$.



QUESTION 4 $AE = EC$ and $DE = EB$.Show that $\Delta ABE \equiv \Delta CDE$.



QUESTION 5 Prove that $\Delta ADB \equiv \Delta BCA$.



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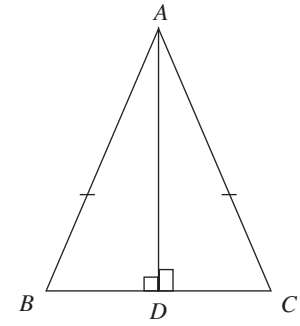
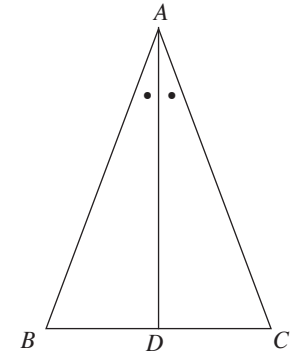
UNIT 14: Proving properties of triangles

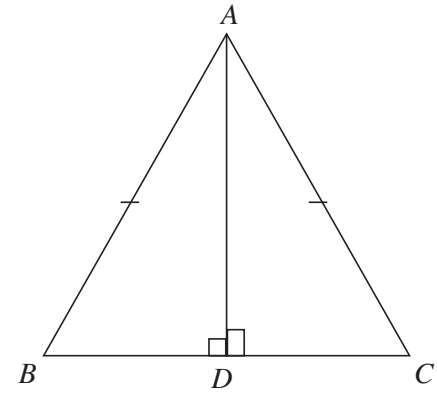
QUESTION 1 ABC is an isosceles triangle with $AB = AC$. AD is drawn perpendicular to BC. Prove that $\Delta ABD \equiv \Delta ACD$ and hence $\angle B = \angle C$.



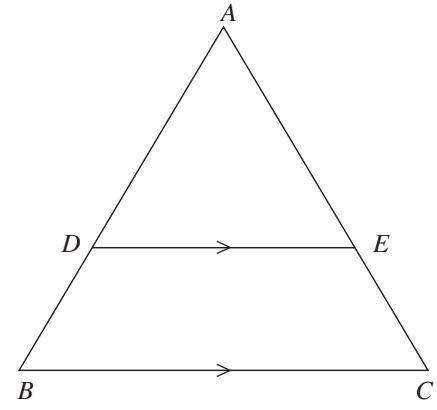
QUESTION 2 In ΔABC, $\angle B = \angle C$ and AD is the bisector of $\angle BAC$. Prove that $AB = AC$.



QUESTION 3 ABC is an equilateral triangle with $AB = BC = CA$. AD is drawn perpendicular to BC. Prove that AD bisects the base BC and bisects $\angle BAC$.



QUESTION 4 In ΔABC, $AB = AC$, $DE \parallel BC$ and $\angle C = 65°$. Prove that ΔADE is an isosceles triangle. Also find the size of $\angle ADE$.



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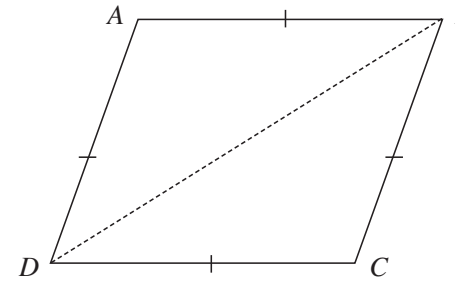
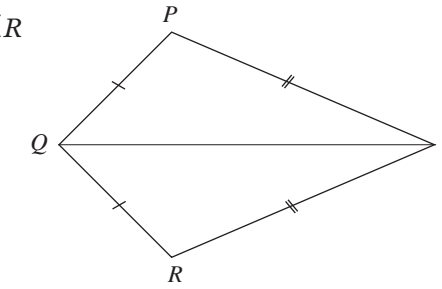
UNIT 15: Proving properties of quadrilaterals

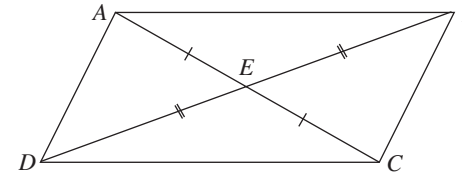
QUESTION 1 If all the sides of a quadrilateral are equal, prove that its opposite angles are equal.



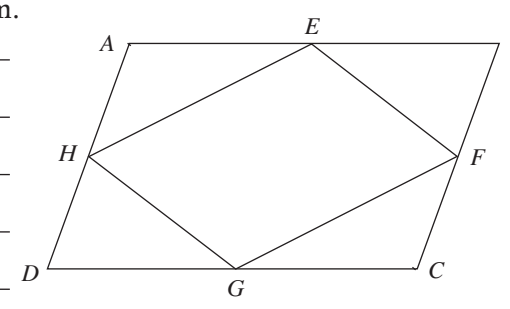
QUESTION 2 $PQRS$ is a kite in which $PQ = QR$ and $PS = RS$. Prove that $\Delta PQS \equiv \Delta RQS$ and hence that $\angle P = \angle R$



QUESTION 3 The diagonals of a quadrilateral bisect each other. Prove that the quadrilateral $ABCD$ is a parallelogram.



QUESTION 4 $ABCD$ is a parallelogram and E, F, G and H are the midpoints of the sides AB, BC, CD and DA respectively. Prove that $EFGH$ is a parallelogram.



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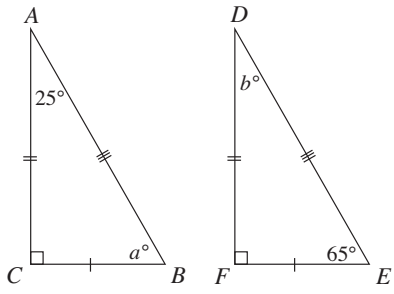
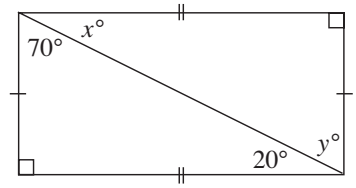
UNIT 16: Triangle congruence tests and numerical problems

QUESTION 1 Find the value of each pronumeral and justify your answer.

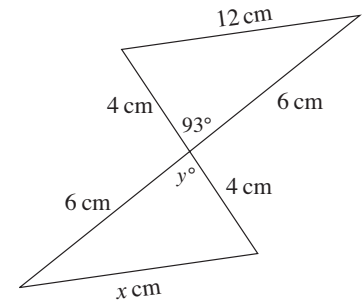
a



b

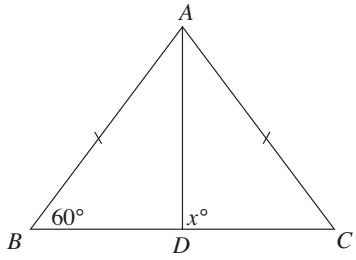


c

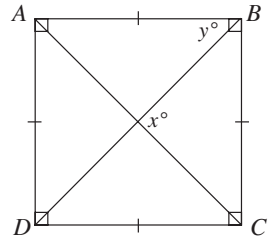


QUESTION 2 Find the value of each pronumeral.

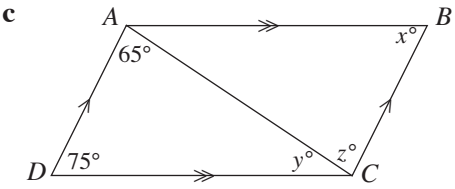
a



b

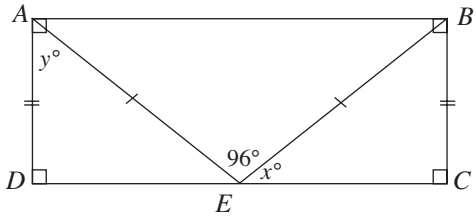


c

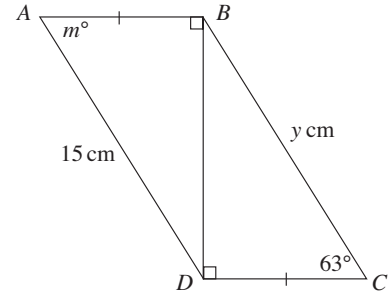


QUESTION 3 Find the value of each pronumeral and justify your answer.

a



b



UNIT 17: Similar triangles

QUESTION **1** Complete the following statements:

a The symbol for similar triangles is _____.

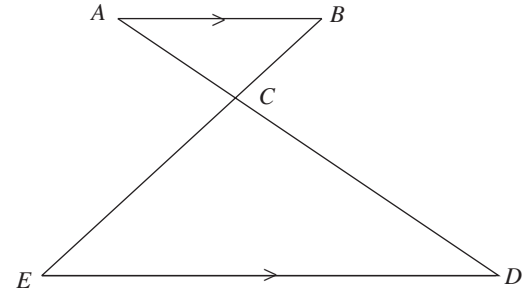
b Two triangles are similar if two angles of one triangle are equal to _____ of the other triangle.

c Two triangles are similar if their corresponding sides are in the _____.

d Two triangles are similar if one angle of one triangle is equal to _____ of the other and the lengths of the sides that form the angle are in the _____.

e Two triangles are similar if the hypotenuse and another side of one right-angled triangle are proportional to the _____ and another _____ of a second _____ triangle.

QUESTION **2**



a Why does $\angle ABC = \angle DEC$? _____

b Why does $\angle ACB = \angle DCB$? _____

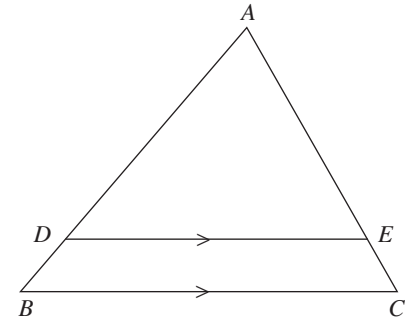
c Complete $\Delta ABC \,|||\, \Delta$ _____

d Why are the triangles similar?

_____

e If $AB = 3$ cm and $DE = 6$ cm, what is the enlargement factor? _____

QUESTION **3**



a Why does $\angle DAE = \angle BAC$? _____

b Why does $\angle ADE = \angle ABC$? _____

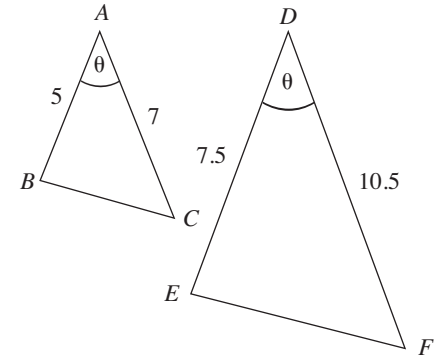
c Complete $\Delta ADE \,|||\, \Delta$ _____

d Why are the triangles similar? _____

QUESTION **4** The triangles drawn below are similar triangles.

a Find $\frac{AB}{DE}$ in simplest form. _____

b Find $\frac{AC}{DF}$ in simplest form. _____



c Which test shows the triangles similar? _____

_____

d What is the enlargement factor? _____

e List the pairs of corresponding angles. _____

_____

f List the pairs of corresponding sides. _____

_____

UNIT 18: Proving that triangles are similar

QUESTION **1** For the following statements, write True or False.

a All congruent triangles are similar. _____

b All similar triangles are congruent. _____

c All scalene triangles are similar. _____

d All acute-angled triangles are similar. _____

e All obtuse-angled triangles are similar. _____

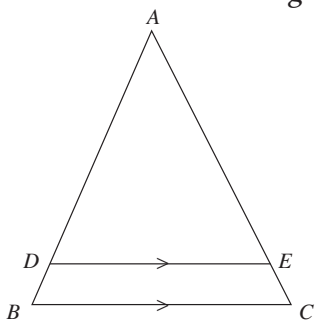
f All right-angled triangles are similar. _____

g All isosceles triangles are similar. _____

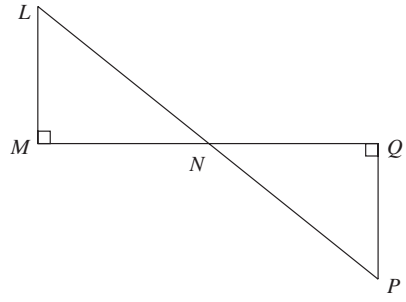
h All equiangular triangles are similar. _____

QUESTION **2** In each diagram, prove that the triangles are similar.

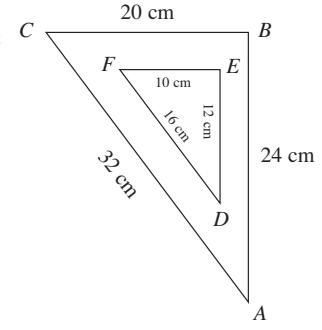
a



b

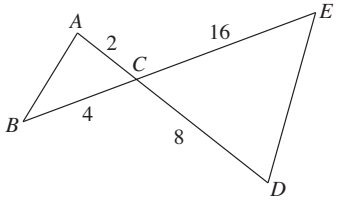


c

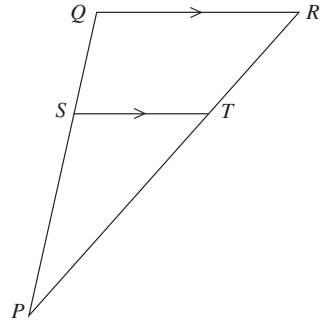


QUESTION **3** In each diagram, prove that the triangles are similar.

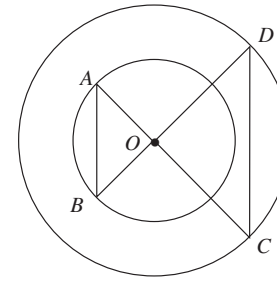
a



b



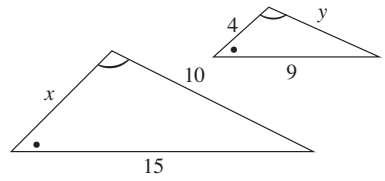
c



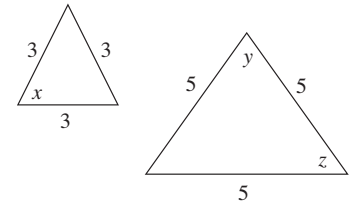
UNIT 19: Using similar triangles to find the value of pronumerals

QUESTION 1 In each diagram, use a test of similarity to find the value of the pronumeral. (All lengths are in centimetres.)

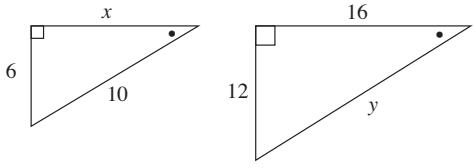
a



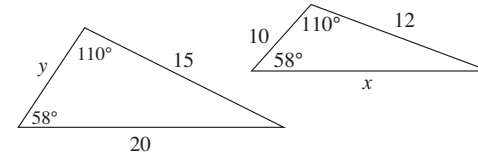
b



c

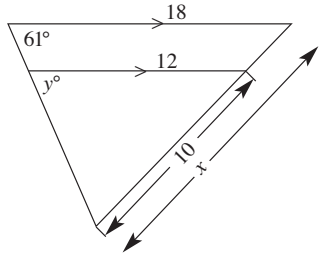


d

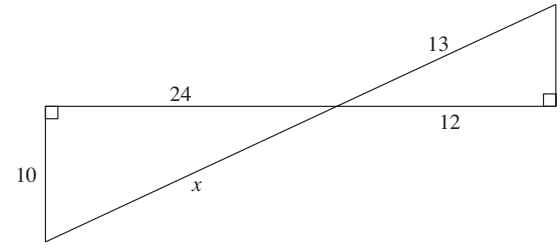


QUESTION 2 For each pair of similar triangles, find the values of the pronumerals. (All lengths are in centimetres.)

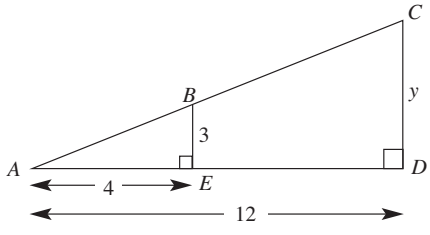
a



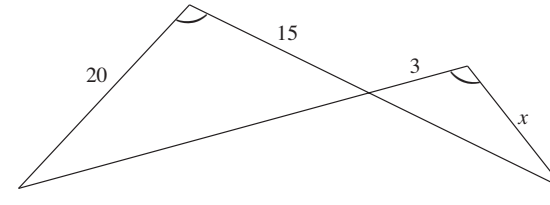
b



c



d



Geometric reasoning

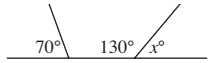
TOPIC TEST — PART A

Instructions
- This part consists of 10 multiple-choice questions.
- Fill in only ONE CIRCLE for each question.
- Each question is worth 1 mark.

Time allowed: 15 minutes **Total marks: 10**

Marks

1 $x =$

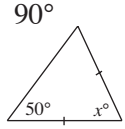


(A) 20 (B) 50 (C) 60 (D) 70 — 1

2 The sum of the exterior angles of any polygon is equal to

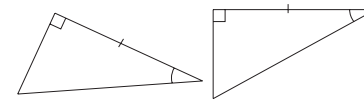
(A) 90° (B) 180° (C) 270° (D) 360° — 1

3 $x =$



(A) 50 (B) 60 (C) 70 (D) 80 — 1

4 Which test would be used to prove the two triangles congruent?

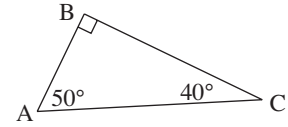


(A) SAS (B) SSS
(C) AAS (D) RHS — 1

5 All similar triangles are

(A) equilateral. (B) equiangular. (C) different. (D) congruent. — 1

6 $\Delta GHI \equiv \Delta ABC$. What is the size of the $\angle HIG$?

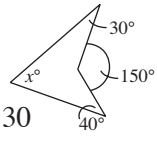


(A) 40° (B) 50°
(C) 90° (D) not enough information — 1

7 A diagonal of a parallelogram divides the parallelogram into two triangles that are

(A) equilateral. (B) isosceles. (C) congruent. (D) none of these. — 1

8 $x =$

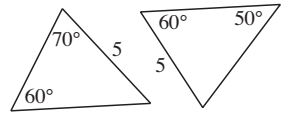


(A) 30 (B) 40 (C) 70 (D) 80 — 1

9 If the corresponding angles of two triangles are equal, the triangles are definitely

(A) congruent. (B) similar. (C) isosceles. (D) equilateral. — 1

10 These two triangles are



(A) similar but not congruent. (B) congruent but not similar.
(C) both similar and congruent. (D) neither similar nor congruent. — 1

Total marks achieved for PART A 10

Geometric reasoning

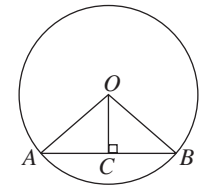
TOPIC TEST — PART B

Instructions • This part consists of 4 questions.

Time allowed: 20 minutes **Total marks: 15**

Marks

1 In the diagram,
O is the centre of the circle.
OC is drawn perpendicular to *AB*.



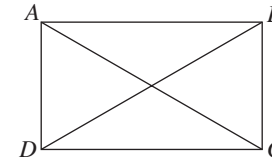
a Name triangles that are congruent. _____ 1

b State the congruency test. _____ 1

c Name the pairs of equal sides. _____ 1

d Name the pairs of equal angles. _____ 1

2 *ABCD* is a rectangle.



a Why does $AB = CD$? _____ 1

b Why does $\angle ABC = \angle CDA$? _____ 1

c Why does $BC = DA$? _____ 1

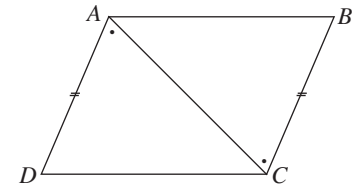
d Which test shows that $\Delta ABC \equiv \Delta CDA$? _____ 1

e Explain why this proves that the diagonals of a rectangle are equal.

_____ 1

3 *ABCD* is a quadrilateral in which $AD = CB$. $\angle DAC = \angle BCA$

a Prove that $\Delta ABC \equiv \Delta CDA$



_____ _____ 1

_____ _____ 1

_____ _____ 1

b Hence prove that $AB \parallel DC$ 1

c Why does $\angle ABC = \angle CDA$? _____ 1

d What result does the fact that $\angle ABC = \angle CDA$ show?

_____ 1

_____

4 **a** Prove that $\Delta ABC \Vert\!\Vert\!\Vert \Delta ADE$.

_____

_____

_____

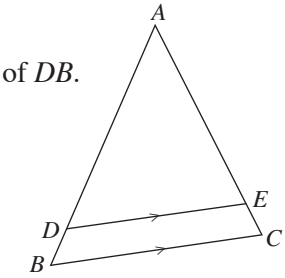
_____

b If $AB = 24$ cm, $AE = 15$ cm and $EC = 3$ cm, find the length of *DB*.

_____

_____

_____



1

1

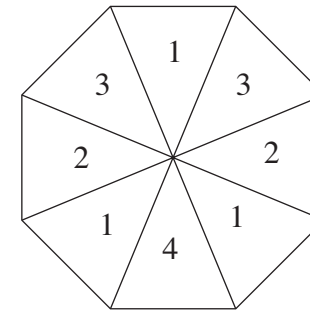
Total marks achieved for PART B 15

CHAPTER 10

Probability

UNIT 1: Review of basic probability

QUESTION **1** This spinner is spun.



a What number is most likely to be spun? _____

b What number is least likely to be spun? _____

How could you describe the probability of spinning:

c 4? _____ **d** 5? _____

e a number greater than 1? _____ **f** a number less than 6? _____

QUESTION **2** A fair die is thrown. What is the probability of it showing:

a 5? _____ **b** an even number? _____ **c** a number greater than 2? _____

QUESTION **3** A bag holds 3 red, 2 green and 5 blue pegs. One peg is selected at random. What is the probability that the peg is:

a red? _____ **b** green? _____ **c** blue? _____

d yellow? _____ **e** not red? _____ **f** red or blue? _____

QUESTION **4** A card is chosen at random from a regular pack of playing cards. What is the probability that the card is:

a the ace of spades? _____ **b** a queen? _____

c red? _____ **d** a club? _____

e a black king? _____ **f** not a diamond? _____

QUESTION **5** There are 100 tickets in a hat; 35 are blue, 40 are yellow and the rest are white. One ticket is drawn from the hat at random. What is the probability that it is:

a yellow? _____ **b** white? _____

c not white? _____ **d** not blue? _____

e yellow or white? _____ **f** not blue nor yellow? _____

QUESTION **6** A letter is chosen at random from the alphabet. What is the probability that the letter is:

a J? _____ **b** F or G? _____

c not K? _____ **d** X, Y or Z? _____

e a vowel (A, E, I, O or U)? _____ **f** not a vowel? _____

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UNIT 2: Tree diagrams

QUESTION **1** A coin is tossed three times and the results noted. Use the tree diagram to find the probability of:

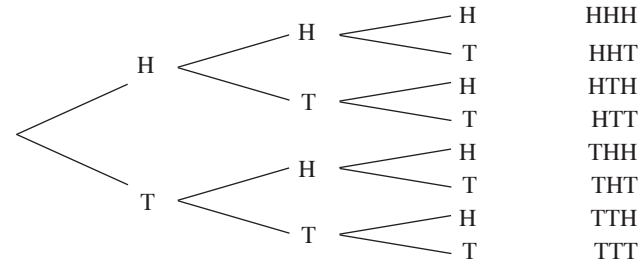
a three heads.

_____

b two heads and one tail in any order.

_____

c at least one head. _____



QUESTION **2** There are four cards marked with the numbers 1, 2, 3 and 4. They are put in a box. Two cards are selected at random, one after the other, to form a two-digit number. Draw a tree diagram to find:

a how many different two-digit numbers can be formed.

_____

b the probability that the number formed is less than 34.

_____

c the probability that the number formed is divisible by 3.

_____

d the probability that the number formed is even.

_____

QUESTION **3** Three red balls and two blue balls are placed in a bag. Two balls are selected at random, without replacement. What is the probability of having:

a two red balls? _____

b two blue balls? _____

c one red ball and one blue ball? _____

QUESTION **4** In a family of three children, use a tree diagram to find the probability of the following:

a three boys _____

b two boys and one girl _____

c one boy and two girls _____

d the eldest child being a boy _____

e the youngest child being a girl _____

f three girls _____

UNIT 3: Tables, diagrams and lists

QUESTION 1 Two dice are rolled. The smaller number is subtracted from the larger number to form the score. (If the numbers are the same the score is zero).

a Complete the table to show the possible scores.

2nd die \ 1st die	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

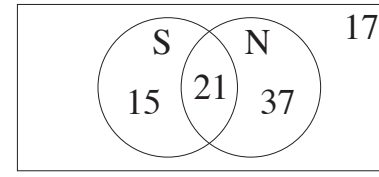
What is the probability that the score is:

b 3? _____

c 6? _____

d less than 4? _____

QUESTION 2 The Venn diagram shows the number of students at a school who played softball or netball.



a How many students were at the school? _____

b How many students played netball? _____

c How many students played softball? _____

What is the probability that a randomly selected student from the school played:

d both softball and netball? _____ **e** softball or netball? _____

QUESTION 3 Gemma has 3 cards; one card shows the number 1, a second card shows 2 and a third card has 3. Gemma places the three cards in a row to form a three-digit number.

a List the possible numbers.

_____

_____

What is the probability that the number formed:

b is 123? _____ **c** is even? _____ **d** starts with 3? _____

e is greater than 200? _____ **f** is less than 220? _____

QUESTION 4 A survey was taken of the numbers of people in cars. The results are shown in the table.

	Drivers	Passengers	Total
Men	72	38	
Women	56	44	
Total			

a Fill in all the totals on the table.

b How many women were passengers? _____

c How many men were there altogether? _____

What is the probability that:

d a man was a driver? _____ **e** a driver was a man? _____

f a woman was a passenger? _____ **g** a passenger was a woman? _____

h a person was a male driver? _____ **i** a person was a female passenger? _____

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UNIT 4: Independent events

QUESTION **1** Complete:

Two events are independent if the outcome of the first event does _____ the outcome of the second event.

QUESTION **2** Determine whether the pair of events are dependent or independent:

a tossing two coins _____

b tossing a coin and throwing a die _____

c taking and eating 2 jellybeans from a bowl, one after the other _____

d selecting two cards from a pack, one after the other, with replacement _____

e selecting two cards from a pack, one after the other, without replacement _____

QUESTION **3** A die is rolled and a coin is tossed. What is the probability of getting:

a a head on the coin? _____ **b** a 4 on the die? _____ **c** a 4 and a head? _____

QUESTION **4** A coin is tossed three times. What is the probability that:

a the first toss is a head? _____ **b** the second toss is a head? _____

c the third toss is a head? _____ **d** all three tosses are heads? _____

QUESTION **5** A bag holds 5 red, 3 blue and 2 green counters. A counter is selected at random, its colour noted, and it is then replaced. A second counter is then selected at random. What is the probability that:

a the first counter is red? _____ **b** the second counter is red? _____

c both counters are red? _____ **d** both counters are blue? _____

e both counters are green? _____ **f** one is red and one is blue? _____

g neither is green? _____ **h** at least one is green? _____

QUESTION **6** A basket holds 6 white, 4 black and 2 grey pegs. Three pegs are taken, one after the other with replacement. What is the probability that:

a all the pegs are white? _____

b all the pegs are black? _____

c all the pegs are grey? _____

d none are black? _____

e at least one is black? _____

f at least one is grey? _____

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UNIT 5: Dependent events

QUESTION **1** Complete:

a Two events are dependent if the outcome of the first event _____ the outcome of the second event.

QUESTION **2** Determine whether the pair of events are dependent or independent:

a throwing two dice _____

b spinning a spinner twice _____

c winning two prizes in a raffle _____

d taking two marbles from a bag, one after the other, without replacement _____

e taking two marbles from a bag, one after the other, with replacement _____

QUESTION **3** Jesse buys 5 tickets in a raffle. 1000 tickets are sold altogether. There are two prizes. A ticket is drawn for first prize and this ticket is discarded before a second ticket is drawn. What is the probability that Jesse wins:

a first prize? _____

b second prize if he didn't win first prize? _____

c second prize if he did win first prize? _____

d both prizes? _____

QUESTION **4** A bag holds 5 red, 3 blue and 2 green counters. A counter is selected at random and is not replaced. A second counter is then selected at random. What is the probability that:

a the first counter is red? _____ **b** the second counter is also red? _____

c both counters are red? _____ **d** both counters are blue? _____

e both counters are green? _____ **f** one is red and one is blue? _____

g neither is green? _____ **h** at least one is green? _____

QUESTION **5** A basket holds 6 white, 4 black and 2 grey pegs. Three pegs are taken, one after the other without replacement. What is the probability that:

a all the pegs are white? _____

b all the pegs are black? _____

c all the pegs are grey? _____

d none are black? _____

e at least one is black? _____

f at least one is grey? _____

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UNIT 6: Multi-stage events (1)

QUESTION **1** A coin is tossed and a die is thrown. What is the probability of getting:

a a 6 and a tail? _____

b a 6 or a tail or both? _____

c a number less than 5 and a head? _____

d a head and an even number? _____

QUESTION **2** Two fair dice are thrown. Use a table to find the probability that the sum of the 2 numbers thrown is:

a 10 _____ **b** odd _____

c even _____ **d** a prime number _____

e a multiple of 5 _____ **f** greater than 9 _____

QUESTION **3** A coin is tossed twice. What is the probability of getting a head and a tail in any order?

_____

QUESTION **4** Three cards marked with the numbers 5, 6 and 7 are put in a box. Two cards are selected at random, one after the other to form a 2-digit number.

a How many different 2-digit numbers can be formed? _____

b What is the probability that the number formed is less than 67? _____

c What is the probability that the number formed is divisible by 5? _____

QUESTION **5** There are 3 children in a family. What is the probability of:

a there being 3 boys? _____

b there being 1 boy and 2 girls? _____

c the youngest child being a girl? _____

d the eldest child being a girl? _____

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UNIT 7: Multi-stage events (2)

QUESTION **1** A team of 4 players (*A*, *B*, *C* and *D*) is to select a captain and a vice-captain.

a Write all the possible outcomes.

b Find the probability that player *A* will be either captain or vice-captain.

QUESTION **2** A poker machine has 3 wheels. The first wheel has the numbers 1, 2 and 3 on it. The other wheels each have the letters *A*, *A* and *B* on them. When the machine is played the wheels spin and line up randomly. The machine is played once. What is the probability of getting:

a 3 on the first wheel?

b 2BB?

c 1AA?

d AB or BA on the 2nd and 3rd wheels?

QUESTION **3** Three coins are tossed simultaneously. Find the probability of throwing:

a 3 heads

b 3 tails

c 3 heads or 3 tails

d 2 heads and 1 tail in any order

QUESTIONS **4** The probability of a cure with drug *A* is 0.6 and the probability of a cure with drug *B* is 0.8. If drug *A* is administered to one patient and drug *B* to another patient, what is the probability that neither patient will be cured?

QUESTON **5** The probability that a shooter will not hit a target in a single shot is 1 in 16. In a competition he fired 2 shots. Find the probability that both missed the target.

QUESTION **6** Clare Rainbow decides to have a holiday for 3 days at a resort. The probability of a day being sunny is 0.7 and the probability of a day being rainy is 0.3. Find the probability that Clare will have 3 sunny days for the holiday.

QUESTIN **7** Sharif buys 3 tickets in a raffle in which there is a total of 20 tickets. There are 2 prizes. Find the probability that he wins:

a the first prize

b the first prize only

c both prizes

d no prizes

e at least 1 prize

f 1 prize only

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UNIT 8: Conditional statements

QUESTION **1** A fair die is rolled.

a What is the probability that it shows 2?

b It is known that the number rolled is less than 4. What is the probability that it is 2?

c If the number was also greater than 1, what is the probability that it is 2?

d If the result was an even number less than 4, what is the probability that it is 2?

QUESTION **2** A card is chosen at random from a standard pack of playing cards. It is a picture card. What is the probability that the card is:

a a queen?

b the king of spades?

c a black jack?

QUESTION **3** There are 3 pens in a box. Two are black and the other is blue. Two pens are chosen, one after the other, without replacement. What is the probability that:

a the first pen is black?

b both pens are black?

c the pens are different colours?

It is known that the first pen was black. What is the probability that:

d the second pen is black?

e both pens are black?

f the pens are different colours?

QUESTION **4** There are 5 red, 4 blue and 3 green balls in a bag. Without looking, two balls are taken from the bag one after the other.

If the first ball is replaced before the second one is taken, what is the probability that:

a both balls are red?

b both balls are green?

c at least one ball is green?

If the first ball is not replaced before the second one is taken, what is the probability that:

d both balls are red?

e both balls are green?

f at least one ball is green?

If the first ball is not replaced and it was not green, what is the probability that:

g both balls are red?

h both balls are green?

i at least one ball is green?

QUESTION **5** There are 500 tickets sold in a raffle. 200 tickets are green, 120 are blue and the rest are white. Ken has 10 tickets and they are all white. The first prize is drawn and it is white. What is the probability that Ken wins first prize?

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UNIT 9: Mistakes and misconceptions

QUESTION **1** 'On any day there might be rain or there might not be any rain. Therefore there is a 50-50 chance of rain on any day.'

a Is this statement correct? _____

b Explain why or why not. _____

_____

QUESTION **2** There are 4 children in a family and they are all boys. A fifth baby is expected. 'Because having 5 boys in a family is very unusual, the next baby is more likely to be a girl than a boy.'

a Is this statement correct? _____

b Explain why or why not. _____

_____

QUESTION **3** 'If I randomly choose a letter from the alphabet, there is a 1 in 26 chance that it will be x.'

a Is this statement correct? _____

b Explain why or why not. _____

_____

QUESTION **4** 'If I open a book and randomly choose a letter from that page, there is a 1 in 26 chance that it will be x.'

a Is this statement correct? _____

b Explain why or why not. _____

_____

QUESTION **5** A fair coin is tossed 5 times and shows tails each time. It is tossed a sixth time. 'It has a greater chance of being a tail than a head.'

a Is this statement correct? _____

b Explain why or why not. _____

_____

QUESTION **6** Bill wanted to know the probability of getting rain on at least one of the next 3 days. He looked on the internet and found that there was a 10% chance of rain on each of the days. He multiplied $0.1 \times 0.1 \times 0.1$ and concluded that the chance of 0.1% meant that there was a very, very small chance of rain on at least one of the days.

a What is the correct chance of getting rain on at least one of the three days?

_____

_____

b Briefly comment on what Bill was doing wrong. _____

_____

_____

Probability

TOPIC TEST — PART A

Instructions
- This part consists of 10 multiple-choice questions.
- Fill in only ONE CIRCLE for each question.
- Each question is worth 1 mark.

Time allowed: 15 minutes **Total marks: 10**

Marks

1 If two coins are tossed together, what is the probability of 2 tails?

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) $\frac{1}{6}$ [1]

2 A fair die is rolled. What is the probability of getting a 6 or a 1?

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) $\frac{1}{6}$ [1]

3 There are 5 red, 3 blue and 2 green balls in a box. Two balls are taken, one after the other, without replacement. What is the probability that the balls are both red?

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) $\frac{2}{9}$ [1]

4 There are 5 red, 3 blue and 2 green balls in a box. Two balls are taken, one after the other, with replacement. What is the probability that the balls are both red?

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) $\frac{2}{9}$ [1]

5 The probability that a basketball player scores a goal from the free throw line is 0.3. What is the probability that the player gets 2 goals from 2 free throws?

(A) 0.3 (B) 0.6 (C) 0.06 (D) 0.09 [1]

6 A card is taken from a standard pack of playing cards. It is a club. What is the probability that it is a ten?

(A) $\frac{1}{13}$ (B) $\frac{1}{52}$ (C) $\frac{4}{13}$ (D) $\frac{1}{4}$ [1]

7 A fair coin is tossed 5 times. It shows heads each time. How could you describe the probability that it shows heads on a sixth toss?

(A) unlikely (B) likely (C) fifty-fifty (D) certain [1]

8 A die is thrown twice. What is the probability of getting at least one six?

(A) $\frac{1}{36}$ (B) $\frac{1}{6}$ (C) $\frac{11}{36}$ (D) $\frac{1}{4}$ [1]

9 A box holds 2 blue and 1 red pen. One pen is taken at random, used and replaced. A second pen is then taken at random. What is the probability that both pens were red?

(A) 0 (B) $\frac{1}{3}$ (C) $\frac{1}{9}$ (D) $\frac{2}{9}$ [1]

10 Bella buys 5 tickets in a raffle. 100 tickets are sold and there are 2 prizes. What is the probability that Bella wins both prizes?

(A) $\frac{1}{250}$ (B) $\frac{1}{495}$ (C) $\frac{1}{500}$ (D) $\frac{2}{495}$ [1]

Total marks achieved for PART A [/10]

TOPIC TEST — PART B

Instructions
- This part consists of 4 questions.
- Write only the answer in the answer column.
- For any working use the question column.

Time allowed: 20 minutes **Total marks: 15**

Questions	Answers	Marks
1 In an experiment, a card is drawn from a pack of playing cards and a coin is tossed. What is the probability of getting:		
a an ace and a head? _____	_____	1
b the queen of hearts and a tail? _____	_____	1
2 A box contains three white and seven red balls. A ball is drawn from the box and is not replaced. Then a second ball is drawn. Find the probability of drawing:		
a red then white	_____	1
b white then red	_____	1
c 2 white balls	_____	1
d 2 red balls	_____	1
e a white and red in any order	_____	1
f at least one red	_____	1
3 A coin is tossed 3 times. What is the probability of:		
a 3 tails?	_____	1
b at least one head?	_____	1
If the first toss was a tail, what is the probability of:		
c 3 tails?	_____	1
d at least one head?	_____	1
4 Three dice are thrown together.		
a What is the probability of three 6s? _____	_____	1
It is known that all the tosses produced numbers greater than 3. Kathy said, incorrectly, that the probability of three 6s will be twice what it was before.		
b What is the correct probability? _____	_____	1
c Briefly explain why Kathy is wrong.		
_____	_____	1

Total marks achieved for PART B ____/15

CHAPTER 11
Data representation and interpretation

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UNIT 1: Review of basic statistics

QUESTION 1 Answer the following questions.

a The information collected in a survey is called _____.

b The number of times a score occurs is called the _____ of that score.

c An arrangement of a set of scores is called its _____.

d A table that displays all information in an organised way and shows the frequency of each score is called a _____.

e A graph, similar to a column graph, that shows the frequency of each score is called a _____.

f The _____ frequency of a score is the number of scores equal to or less than that score.

g The _____ frequency of a score is the ratio of the frequency of that score to the total frequency.

QUESTION 2 For the scores 3, 5, 7, 7, 7, 8, 8, 9, 9, 10, 10, find the following.

a Mode _____ **b** Median _____

c Mean _____ **d** Range _____

QUESTION 3 For the scores 9, 2, 7, 6, 2, 5, 4, 8, 2, 5, find the following.

a Mode _____ **b** Median _____

c Mean _____ **d** Range _____

QUESTION 4

a Complete the frequency distribution table.

Score (x)	Frequency (f)	$f \times x$	Cumulative frequency
5	2		
6	6		
7	8		
8	9		
9	7		
10	5		
Total			

Find the:

b mean (to 1 decimal place) _____

c mode _____

d median _____

e range _____

QUESTION 5 For the scores in the stem-and-leaf plot:

1	7
2	0 3
3	1 4 5 8
4	0 2 2 5 6 7 9
5	1 3 4 6 8 8 8 9

a Find the mean. _____

b Find the mode. _____

c Find the median. _____

d Find the range. _____

e Describe the shape of the stem-and-leaf plot. _____

UNIT 2: Quartiles and interquartile range (1)

QUESTION **1** For the scores 1, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 6, 7, 7, 8, 8, 8, 9. What is the:

a lower extreme? _____

b upper extreme? _____

c range? _____

d median? _____

e lower quartile? _____

f upper quartile? _____

QUESTION **2** For the scores 10, 12, 13, 15, 17, 18, 18, 20, 23, 25. What is the:

a lower extreme? _____

b upper extreme? _____

c median? _____

d lower quartile? _____

e upper quartile? _____

f interquartile range? _____

QUESTION **3** For the scores 156, 163, 164, 168, 170, 171, 172, 174, 176, 178, 180. Find the:

a median _____

b lower quartile _____

c upper quartile _____

d interquartile range _____

QUESTIONS **4** Consider the scores 5, 13, 7, 9, 1, 14, 9, 4, 16, 9, 7, 2, 12

a Place the scores in ascending order. _____

b Find the median. _____

c Find the lower quantile. _____

d Find the upper quartile. _____

e Find the interquartile range. _____

QUESTION **5** Consider the scores 32, 35, 24, 38, 30, 31, 40, 29, 38, 34, 23, 31.

a Place the scores in ascending order. _____

b What is the lower quartile? _____

c What is the upper quartile? _____

QUESTION **6** Find the interquartile range for each set of scores.

a 5, 6, 9, 10, 12, 15, 17, 20, 24, 26 _____

b 37, 39, 41, 44, 46, 46, 49, 50, 52 _____

c 6, 2, 3, 4, 1, 6, 5, 2, 2, 4, 5 _____

d 50, 54, 59, 57, 58, 56, 51, 57, 57 _____

UNIT 3: Quartiles and interquartile range (2)

QUESTION **1** For the set of scores 19, 22, 22, 24, 25, 27, 28, 28, 29, 29, 29, 30. Find the

a median _____

b lower quartile _____

c upper quartile _____

d interquartile range _____

QUESTION **2** For a particular set of scores the lower extreme is 5, the lower quartile is 9, the median is 12, the upper quartile 17 and the upper extreme 20. What percentage of scores are between:

a 5 and 20? _____

b 9 and 17? _____

c 17 and 20? _____

d 5 and 17? _____

e 9 and 12? _____

f 12 and 20? _____

g 9 and 20? _____

h 5 and 9? _____

i 12 and 17? _____

j 5 and 12? _____

QUESTION **3** The marks for two classes in an exam are shown in the back-to-back stem-and-leaf plot.

10F		10M
	5 | 4	3 7
8 7 3 1 0	5 |	0 2 6 9
9 9 8 5 4 0	6 |	1 3 3 7 9
8 6 3 1 1	7 |	2 4 4 4 5 8
9 6 2 0	8 |	0 1 3 7
1	9 |	3

For class 10F, what is the:

a range? _____ **b** median? _____

c lower quartile? _____ **d** upper quartile? _____

e interquartile range? _____

For class 10M, what is the:

f range? _____ **g** median? _____

h lower quartile? _____ **i** upper quartile? _____ **j** interquartile range? _____

k Which class had the greater range and by how much? _____

l Which class had the greater interquartile range and by how much? _____

m Which class had the more consistent results? _____

QUESTION **4** For the scores 2, 11, 13, 14, 15, 16, 16, 16, 17, 17, 18, 19, 19, 20.

a What is the range? _____

b What is the interquartile range? _____

c Which is the better measure of the spread of the scores? Justify your answer.

_____

_____

UNIT 4: Quartiles and interquartile range (3)

QUESTION 1 For each set of scores, find: (i) the range (ii) the interquartile range

a 34, 37, 38, 38, 40, 42

i _____

ii _____

b 26, 27, 28, 28, 31, 33, 34, 36, 37, 39, 40

i _____

ii _____

c 4.2, 4.1, 3.9, 3.2, 3.5, 3.7, 4.0

i _____

ii _____

d 15.7, 14.9, 15.3, 14.8, 15.0, 15.4, 15.6, 15.1

i _____

ii _____

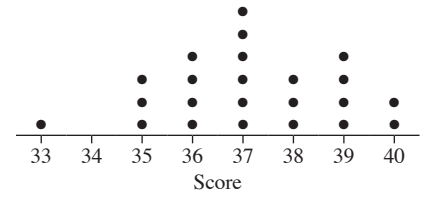
QUESTION 2 For each of the following distribution displays, find:
(i) the median (ii) the lower quartile (iii) the upper quartile (iv) the interquartile range

a

i _____ **ii** _____

iii _____ **iv** _____

b



i _____ **ii** _____

iii _____ **iv** _____

c

4	4 6 8
5	0 1 1 2 3 5 9
6	2 3 3 4 5 6 7 8 8
7	0 1 2 2 3 7
8	3 7 9
9	2

i _____ **ii** _____

iii _____ **iv** _____

d

Score	Frequency
7	2
8	3
9	5
10	8
11	12
12	10
13	8
14	6
15	1

i _____

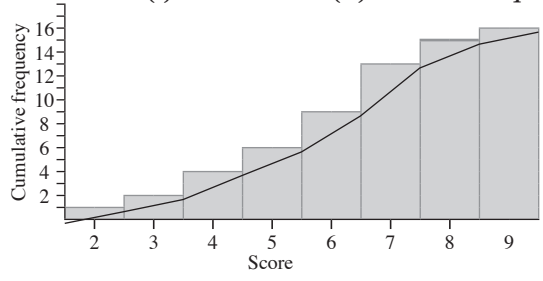
ii _____

iii _____

iv _____

QUESTION 3 Find, for each cumulative frequency histogram and polygon:
(i) the median (ii) the lower quartile (iii) the upper quartile (iv) the interquartile range

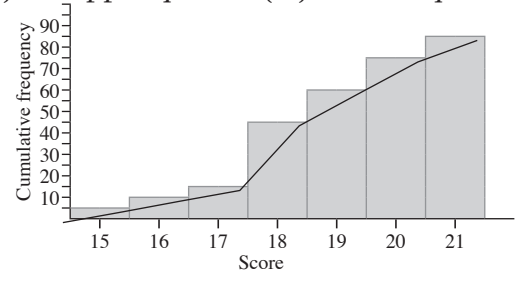
a



i _____ **ii** _____

iii _____ **iv** _____

b

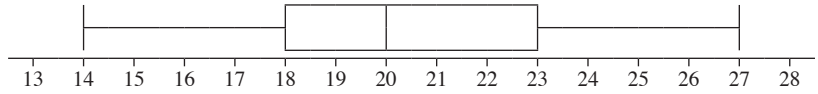


i _____ **ii** _____

iii _____ **iv** _____

UNIT 5: Box plots (1)

QUESTION 1 For this box plot, find the:



a lower extreme _____ **b** upper extreme _____ **c** range _____

d median _____ **e** upper quartile _____ **f** lower quartile _____

g interquartile range _____

QUESTION 2 The number of hours per week spent on homework by each member of a group of students is shown below.

2	4	3	2	1	5	3	6	7	7	1	2	4	4
3	1	3	4	1	2	3	4	1	5	6	7	2	3

a Rearrange these numbers into numerical order.

_____

b Find the:

i lower extreme _____ **ii** upper extreme _____ **iii** median _____

iv upper quartile _____ **v** lower quartile _____

c Write down the five point summary.

_____

d Use this five-number summary to draw a box-and-whisker plot.

QUESTION 3 The ages of 12 people present at a birthday party are shown below.

9 16 18 20 21 24 31 37 66 72 74 80

Find the:

a lower extreme _____ **b** upper extreme _____ **c** median _____

d lower quartile _____ **e** upper quartile _____

f Draw a box-and-whisker plot to represent the distribution.

UNIT 6: Box plots (2)

QUESTION **1** Construct a box-and-whisker plot for each set of data:

a lowest score = 15, highest score = 37, lower quartile = 19, median = 28, upper quartile = 32

b lowest score = 45, highest score = 72, lower quartile = 52, median = 59, upper quartile = 65

c lowest score = 3.4, highest score = 5.1, lower quartile = 4.0, median = 4.5, upper quartile = 4.8

QUESTION **2** Find the median, first quartile and third quartile for each data set, then draw a box-and-whisker plot of each:

a 18, 19, 21, 24, 24, 26, 28, 30, 32, 33

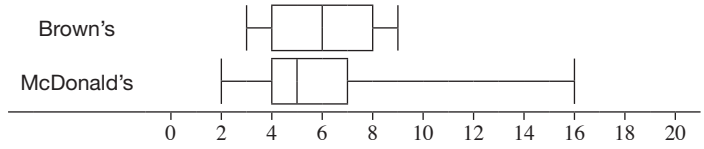
b 3, 4, 7, 9, 11, 18, 19, 20, 21

c 64, 58, 62, 67, 65, 59, 70, 69, 67, 66

d 120, 118, 105, 122, 126, 114, 109, 110, 120, 118, 114, 123

UNIT 7: Comparing box plots (1)

QUESTION **1** Jim went to two farms and collected information on the ages of cows. The results are shown in the box plots.



a On which farm is the oldest cow, and how old is she? _____

b Which measure is the same for both farms? _____

c On which farm is the distribution most skewed, and is this skewness positive or negative?

_____

d Farmer Brown has 180 cows altogether. Approximately how many of these cows are aged between 4 and 6 years?

_____

QUESTION **2** The number of years that people have been employed by 2 different companies is shown below.

Bob's boats	1	2	2	3	4	5	5	5	7	7	7	8	12	16	20	23	26	28
Carl's cars	2	2	3	5	5	6	6	9	9	9	10	14	16	17	20	20	22	23

a Find the five number summary for each data set.

i Bob's boats

_____

_____

_____

ii Carl's cars

_____

_____

_____

b Draw the box-and-whisker plots for these two sets of data on the same axis.

c Compare the two data sets referring to measures of location and spread and the shape of the displays.

_____

_____

_____

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UNIT 8: Comparing box plots (2)

QUESTION **1** The number of hours spent playing sport per week by students in 2 different classes is shown below:

Class A	2	3	4	1	5	5	3	6	7	7	4	2	1	3
	1	3	4	1	2	4	3	2	1	6	7	3	4	2
Class B	4	5	6	7	5	4	5	8	7	3	3	3	8	3
	5	3	2	2	6	7	1	5	6	2	4	2	5	2

a Find the five number summary for each data set.

b Draw the box-and-whisker plots for these two sets of data on the same axis.

c Which class spends more time on sport? Justify your answer.

d Briefly comment on any similarities or differences between the two sets of data.

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UNIT 9: Box plots and other graphs (1)

QUESTION **1** The dot plot shows the number of books read by students during the term.

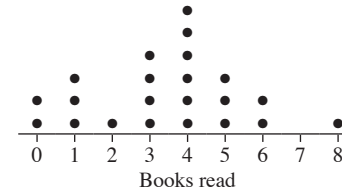
Find:

a the median. _____

b lower quartile. _____

c upper quartile. _____

d Draw a box-and-whisker plot of data.



QUESTION **2** The stem-and-leaf plot shows the marks for some students in a test.

Find:

a the median. _____

b lower quartile. _____

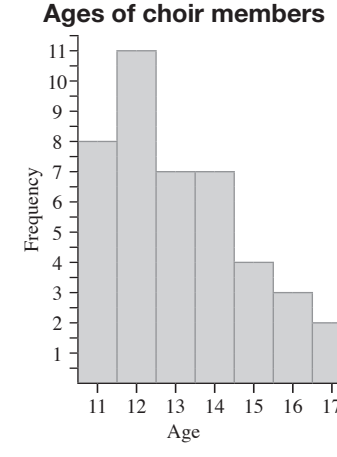
c upper quartile. _____

d Draw a box-and-whisker plot of data.

Test marks

3	8
4	0 1 3 7
5	0 1 2 3 3 8
6	0 1 2 2 3 6 9
7	1 3 4 4 5 8
8	2 7
9	4

QUESTION **3** The histogram shows the ages of students in the school choir. Draw a box plot for this data.



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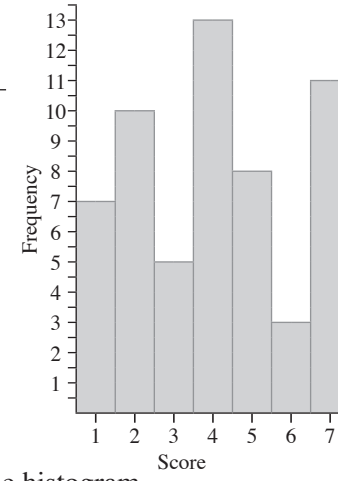
UNIT 10: Box plots and other graphs (2)

QUESTION **1** This histogram shows the frequency of each score in a competition.



a How many scores are there altogether? _____

b How many scores will be found each side of the median? _____

c What is the median? _____

d What is the lower quartile? _____

e What is the upper quartile? _____

f Draw a box plot to show this information.

g Briefly comment on the strength and weaknesses of the box plot compared to the histogram.

_____

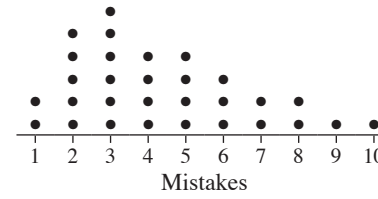
_____

QUESTION **2** This dot plot shows the number of mistakes made in a spelling competition.

a Briefly describe the shape of the dot plot.

_____

b Without drawing a box plot, briefly comment on the features you might expect to see in one based on the shape of the dot plot.



_____

_____

QUESTION **3** The back-to-back stem-and-leaf plot shows marks for 2 components of a competition.

a Which component has a symmetric display? _____

b How could you describe the skewness of the other component? _____

c Find the five-point summary for each component.

i artistic _____ **ii** technical _____

Artistic		Technical
8	0	5 7 9
5 2	1	0 2 6 8 8
7 3 0	2	1 3 4 7
6 5 4 1 1	3	0 1 5 6
8 7 7 5 2 1	4	1 2 3 3 7
6 4 4 4 3 1 0	5	0 3 4

d Draw box plots on the same scale.

e Compare the relative merits of each type of display.

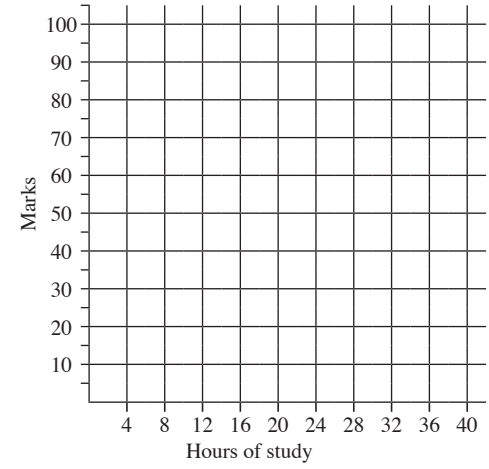
_____

_____

UNIT 11: Scatter plots (1)

QUESTION **1** In a class, the number of hours each student spent studying for an examination and the marks each one was awarded were recorded as shown in the table below.

Student	Marks	Hours	Student	Marks	Hours
1	15	2	11	72	21
2	93	35	12	82	29
3	30	5	13	85	30
4	52	8	14	9	2
5	61	15	15	27	3
6	82	30	16	39	4
7	97	36	17	48	6
8	100	39	18	92	36
9	5	1	19	67	20
10	38	7	20	99	38

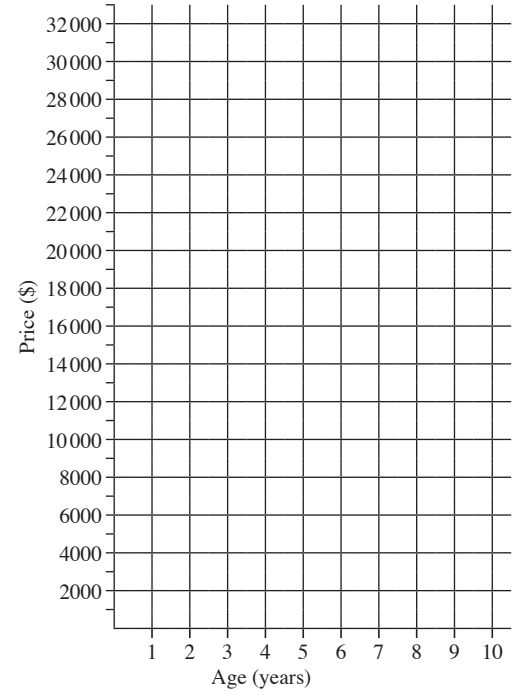


a Construct a scatter plot to show this data.

b Comment on any trends.

QUESTION **2** The following table shows the ages and advertised prices of a particular model of car.

Age (years)	Price ($)	Age (years)	Price ($)
3	20 500	10	5000
7	12 800	9	7000
2	26 900	6	9000
1	30 000	2	29 000
8	10 000	1	32 000
2	28 000	3	27 000
9	9000	8	11 000
5	14 000	9	7500
6	10 000	6	9500



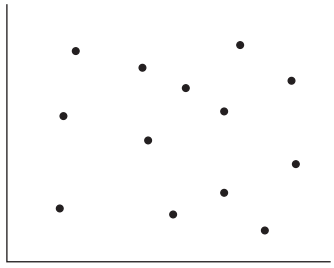
a Construct a scatter plot.

b Marcus has a 4 year old car of this model that he wants to sell. At what price would you suggest he advertise his car? Justify your answer.

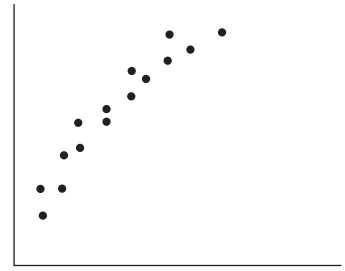
UNIT 12: Scatter plots (1)

QUESTION **1** For each scatter plot describe the strength and direction of the relationship:

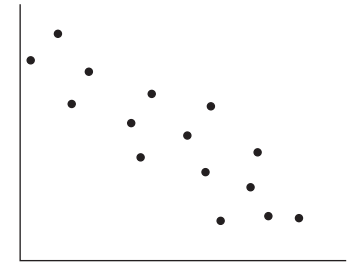
a



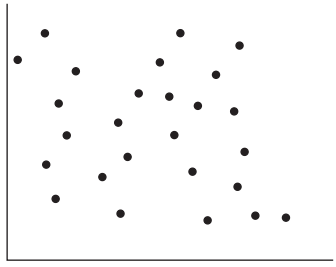
b



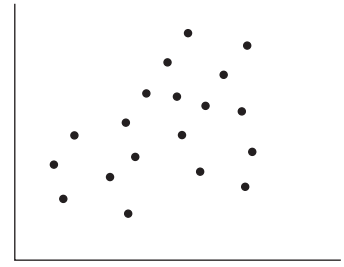
c



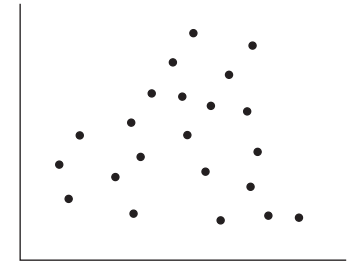
d



e

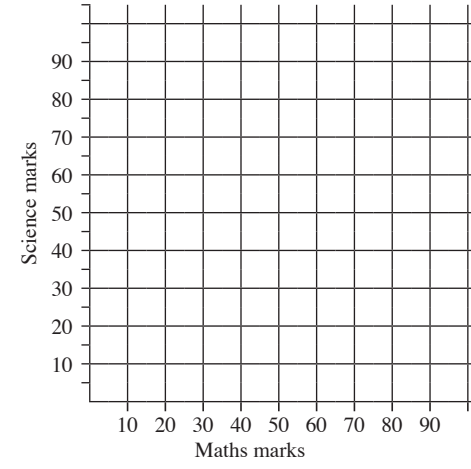


f



QUESTION **2** The assessment test results in Maths and Science of a class of 15 students are given in the table.

Student	Maths Mark	Science Mark	Student	Maths Mark	Science Mark
1	70	58	9	32	36
2	37	40	10	53	58
3	52	55	11	42	48
4	66	62	12	64	56
5	36	32	13	27	34
6	46	50	14	67	73
7	30	35	15	57	49
8	62	68			

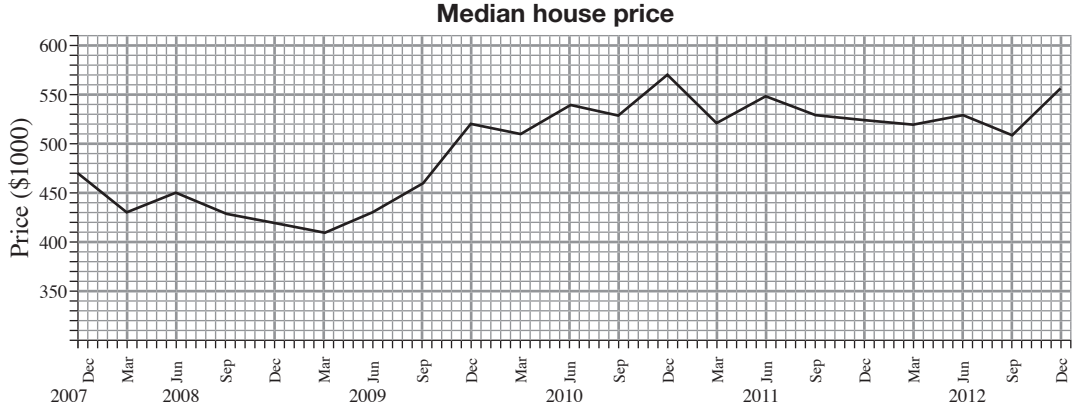


a Construct a scatter plot to show this data.

b Simone is also in the class. She scored 65 in maths but missed the science test. What would you predict her science score to be? Justify your answer.

UNIT 13: Graphs involving time

QUESTION 1 This graph shows the median house prices over time for a city.



a Why is this information best suited to a line graph?

_____

b Why is the median house price used rather than the mean?

_____

c What was the median house price in March 2010?

_____

d When was the median price $500 000?

_____

e How much did the median price decrease between June 2011 and March 2012?

_____

f The median price decreased from June 2008 until reaching its lowest point in March 2009. What international events might have influenced the prices at that time?

_____

QUESTION 2 Over the same time the price of gold can be found in the table.

Month	Dec 07	Mar 08	Jun 08	Sep 08	Dec 08	Mar 09	Jun 09	Sep 09	Dec 09	Mar 10
Price ($)	1010	900	1000	920	1300	1420	1210	1240	1250	1220
Jun 10	Sep 10	Dec 10	Mar 11	Jun 11	Sep 11	Dec 11	Mar 12	Jun 12	Sep 12	Dec 12
1390	1440	1430	1450	1460	1800	1550	1680	1600	1630	1580

a Graph this information.

b Briefly comment on any similarities and differences between the two graphs.

_____

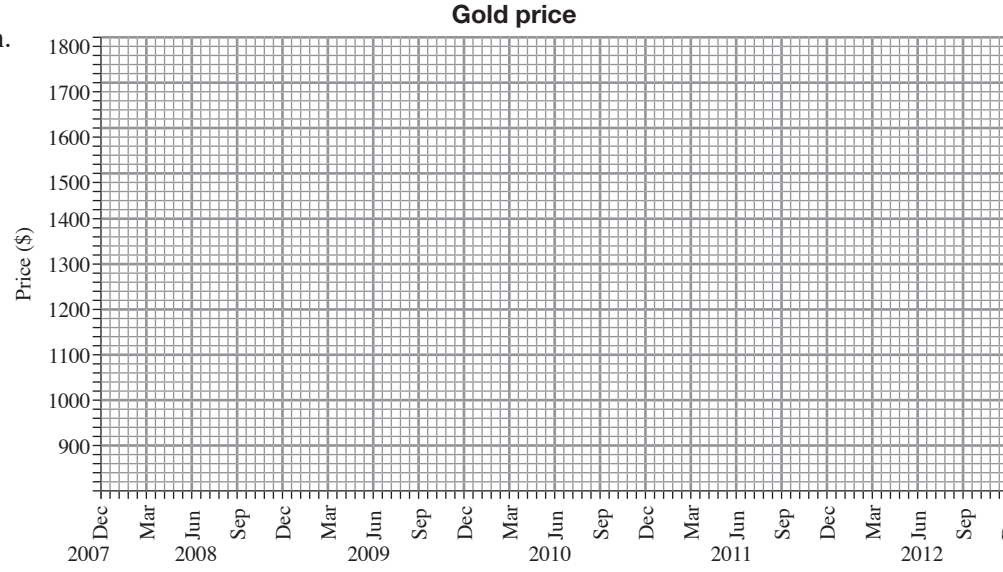
_____

_____

_____

_____

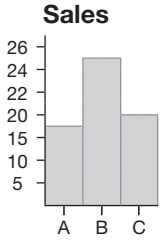
_____



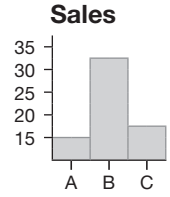
UNIT 14: Evaluating reports

QUESTION **1** Each of these displays is misleading. Briefly explain what is wrong with each graph.

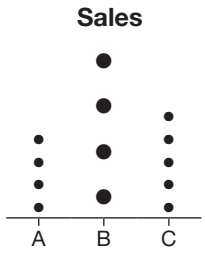
a



b



c



QUESTION **2** The opening sentence of an article in a newspaper said: 'Australians each drink 111 kg of wine, beer and other alcoholic beverages each year.'

a Could this statement possibly be true? Justify your answer.

b What do you think the statement should have said?

c Should you believe the rest of the article? What things should be considered?

d What was the affect of including the word 'possibly' in part **a** of this question?

QUESTION **3** A current affairs program showed a program about the conviction of a woman for a crime. The woman protested her innocence. The program gave details about the evidence in the case and questioned that evidence. At the conclusion of the program, viewers were asked to vote 'yes' or 'no' to the question 'Should she have been convicted?'

a How important do you think the answer to this survey would be?

b What should be taken into account when considering the results of the survey?

QUESTION **4** An advertisement says: 'Nine out of ten chemists recommend Carla's Cream as an effective treatment for corns.'

a What are the advertisers trying to achieve by including such a statement?

b Is it possible that the statement is correct, but that Carla's Cream is not an effective treatment for corns? Comment.

Data representation and interpretation

TOPIC TEST — PART A

Time allowed: 15 minutes — **Total marks: 10**

Marks

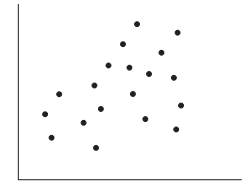
1 Consider these scores: 3, 4, 4, 5, 5, 5, 6, 9, 9, 10. The score of 6 should have been 7. Which would have been affected by this change in score?

(A) mode (B) mean (C) median (D) range — 1

2 Consider these scores: 5, 7, 7, 7, 9, 10, 12, 13, 13, 14, 15, 16, 18. What is the interquartile range?

(A) 7 (B) 7.5 (C) 8 (D) 8.5 — 1

3 How could you describe the relationship shown in this scatter plot?



(A) weak positive (B) weak negative
(C) strong positive (D) strong negative — 1

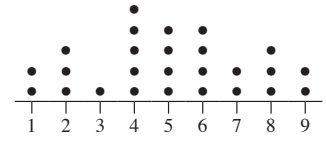
4 Consider these scores 8, 4, 7, 10, 6, 3, 6. The score 6 is the

(A) lower quartile. (B) median. (C) upper quartile. (D) upper extreme. — 1

5 Consider this box plot. The display is

(A) symmetric. (B) negatively skewed.
(C) positively skewed. (D) bimodal. — 1

6 Referring to the dot plot, the mode is:



(A) 4 (B) 5
(C) 6 (D) 8 — 1

7 Referring to the dot plot, the lower quartile is

(A) 2 (B) 3 (C) 3.5 (D) 4 — 1

8 For a set of scores the five number summary is [8, 12, 15, 19, 22]. The interquartile range is:

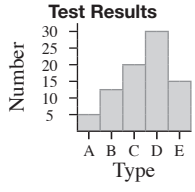
(A) 3 (B) 4 (C) 7 (D) 14 — 1

9 Referring to the five number summary in Question 8; what percentage of scores will lie between 8 and 19?

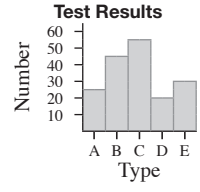
(A) 25% (B) 50% (C) 75% (D) 80% — 1

10 Which graph is misleading?

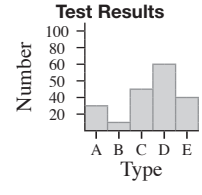
(A)



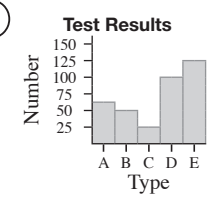
(B)



(C)



(D)



— 1

Total marks achieved for PART A — 10

Data representation and interpretation

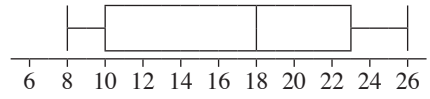
TOPIC TEST — PART B

Instructions • This part consists of 3 questions.

Time allowed: 20 minutes **Total marks: 15**

Marks

1 This box plot was drawn to show the ages of people taking part in a talent competition.

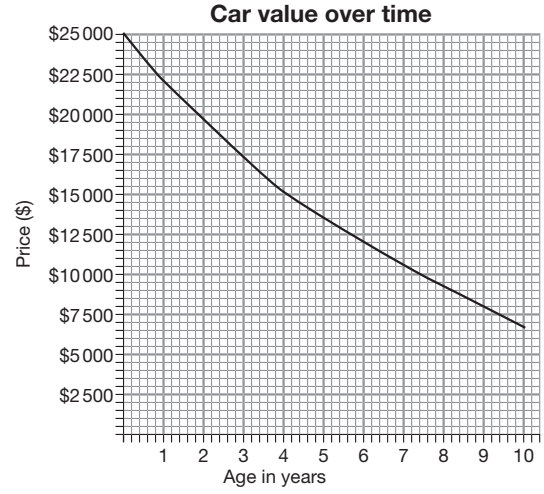


a What is the median age? _____ **b** What is the range? _____ 1 1

c What is the interquartile range? _____ 1

d If 160 people took part in the competition, about how many were younger than 10 years old? _____ 1

2 This graph shows the value of a car over time.



a What is the value of the car when it is new? _____ 1

b What is the value of the car after 8 years? _____ 1

c How old is the car when it is valued at $15 000? _____ 1

d How much does the value of the car decrease in the first year? _____ 1

e After how many years do you predict that the value of the car will fall to $5000? _____ 1

3 A stem-and-leaf plot has been drawn to illustrate the results achieved by a class in an exam.

Exam results

4	4 8
5	0 4 4 7
6	1 3 5 8 9 9 9
7	0 2 2 3 5 8
8	1 1 3 6 6 7 8 9
9	0 3 4 5

a What is the range? _____ 1

b What is the median? _____ 1

c What is the interquartile range? 1

d Draw a box plot to show the exam results. 1

e What information can be gained from the stem-and-leaf plot that cannot be gained from the box plot? _____ 1

f What information can be easily gained from the box plot? _____ 1

Total marks achieved for PART B 15

Exam Paper 1

Instructions for all parts • Attempt all questions. **Total marks: 100**
Time allowed: $1\frac{1}{2}$ hours • Allow about 45 minutes for each part.

EXAM PAPER 1 PART A

Fill in only one circle for each question.

Marks

1 Which one of the following is NOT equal to $3x$? 1
Ⓐ $x + x + x$ Ⓑ $3 \times x$ Ⓒ $4x - x$ Ⓓ $3x^2 - x$

2 Simplify $4^2 \times 4^3$ 1
Ⓐ 4^5 Ⓑ 4^6 Ⓒ 16^5 Ⓓ 16^6

3 Claudette wrote the following lines of working to solve this equation: $4x - 8 = 15$
Line 1: $4x = 15 + 8$; Line 2: $4x = 23$; Line 3: $x = \frac{23}{4}$; Line 4: $x = 5\frac{3}{23}$
In which line did she make an error? 1
Ⓐ Line 1 Ⓑ Line 2 Ⓒ Line 3 Ⓓ Line 4

4 Simplify $-6a + 8b - 3a - 6b$ 1
Ⓐ $-7ab$ Ⓑ $-9a + 2b$ Ⓒ $-3a - 2b$ Ⓓ $-6a + 2b$

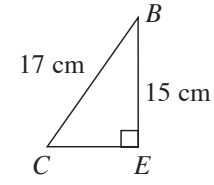
5 A 24 cm length of wire is bent to form a rectangle. If the width of the rectangle is 5 cm, find its area. 1
Ⓐ 35 cm^2 Ⓑ 25 cm^2 Ⓒ 27 cm^2 Ⓓ 49 cm^2

6 What is the median of this set of scores? 1

Score	Frequency
3	1
4	2
5	8
6	4

Ⓐ 3 Ⓑ 4
Ⓒ 5 Ⓓ 6

7 What is the area of triangle BEC? 1

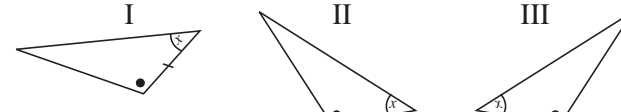


Ⓐ 289 cm^2 Ⓑ 225 cm^2
Ⓒ 127.5 cm^2 Ⓓ 60 cm^2

8 Given that $v = u + at$, $v = 10.8$, $u = 8.3$ and $a = 4.2$, find the value of t correct to two significant figures. 1
Ⓐ 0.50 Ⓑ 0.59 Ⓒ 0.595 Ⓓ 0.60

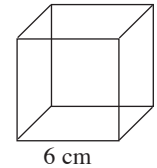
9 If $2x - 3 = 31$, we know that x equals: 1
Ⓐ 7 Ⓑ 14 Ⓒ 17 Ⓓ 34

10 Which triangles are congruent? 1



Ⓐ I and II only Ⓑ I and III only
Ⓒ II and III only Ⓓ I, II and III

11 What is the surface area of this cube? 1



Ⓐ 36 cm^2 Ⓑ 72 cm^2
Ⓒ 108 cm^2 Ⓓ 216 cm^2

12 Which expression is NOT equal to $8x$? 1
Ⓐ $x \times x \times x \times x \times x \times x \times x \times x$ Ⓑ $12x - 4x$
Ⓒ $16x \div 2$ Ⓓ $x + x + x + x + x + x + x + x$

Continued on the next page

EXAM PAPER 1 PART A

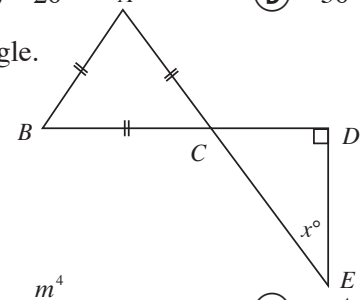
Fill in only one circle for each question.

Marks

13 For the set of scores 60, 70, 80, 60, 90, find the difference between the mean and the mode. 1

Ⓐ 10 Ⓑ 12 Ⓒ 20 Ⓓ 30

14 In the diagram $AB = BC = CA$ and $\angle CDE$ is a right angle. What is the value of x? 1



Ⓐ 30 Ⓑ 40
Ⓒ 45 Ⓓ 60

15 Simplify $\frac{m^8 n}{m^4 n^4}$ 1

Ⓐ $m^4 n$ Ⓑ $\frac{m^4}{n^3}$ Ⓒ $\frac{m^4}{n^4}$ Ⓓ $m^4 n^3$

16 The solution of $x - 3 > 2$ is: 1

Ⓐ $x < 1$ Ⓑ $x > 1$ Ⓒ $x < 5$ Ⓓ $x > 5$

17 Which of the following is a linear equation? 1

Ⓐ $y = x^2 - 4$ Ⓑ $y^2 = \frac{x}{2}$ Ⓒ $y = 8 - 3x$ Ⓓ $y = \sqrt{x + 7}$

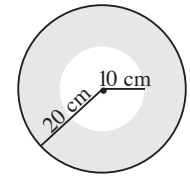
18 If $\sin \theta = \frac{1}{2}$, find the size of angle θ. 1

Ⓐ 60° Ⓑ 50° Ⓒ 45° Ⓓ 30°

19 Solve the equation $2x + 5 = 85$. 1

Ⓐ $x = 8$ Ⓑ $x = 30$ Ⓒ $x = 40$ Ⓓ $x = 45$

20 A pipe has an inner radius of 10 cm and an outer radius of 20 cm. The shaded area in square centimetres is given by: 1



Ⓐ 100π Ⓑ 200π
Ⓒ 300π Ⓓ 400π

21 The nine letters of the word AUSTRALIA are written on separate cards and placed in a bag. One card is chosen at random. What is the probability of choosing A or R or T. 1

Ⓐ $\frac{1}{3}$ Ⓑ $\frac{4}{9}$ Ⓒ $\frac{5}{9}$ Ⓓ $\frac{2}{3}$

22 Find which of the following expressions has a value of 7. 1

Ⓐ $7 + 7 \div 7$ Ⓑ $-(-7)^0$ Ⓒ $\frac{3}{21}$ Ⓓ $7^7 \div 7^6$

23 In a single throw of a die, the probability of rolling an odd number is: 1

Ⓐ $\frac{1}{5}$ Ⓑ $\frac{1}{4}$ Ⓒ $\frac{1}{3}$ Ⓓ $\frac{1}{2}$

24 $(x + 5)(x - 2) =$ 1

Ⓐ $x^2 + 7x - 10$ Ⓑ $x^2 - 7x + 10$ Ⓒ $x^2 - 3x - 10$ Ⓓ $x^2 + 3x - 10$

25 Consider the scores 1, 3, 7, 8, 10, 13, 15, 16, 17, 20, 22, 23, 28. Find the interquartile range. 1

Ⓐ 13.5 Ⓑ 14 Ⓒ 14.5 Ⓓ 15

Continued on the next page

EXAM PAPER 1 — PART A

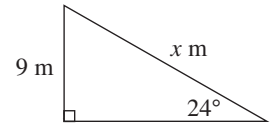
Fill in only one circle for each question.

Marks

26 Which expression will give the value of x?

Ⓐ $9 \sin 24°$ Ⓑ $\frac{9}{\sin 24°}$

Ⓒ $9 \tan 24°$ Ⓓ $\frac{9}{\tan 24°}$



1

27 $\frac{5x}{12} \times \frac{3x}{10} =$

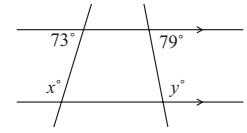
Ⓐ $\frac{x^2}{8}$ Ⓑ $\frac{25x^2}{4}$ Ⓒ $\frac{x^2}{4}$ Ⓓ $\frac{8x^2}{15}$

1

28 Which is correct?

Ⓐ $x = 73$ and $y = 79$ Ⓑ $x = 107$ and $y = 79$

Ⓒ $x = 73$ and $y = 101$ Ⓓ $x = 107$ and $y = 101$



1

29 $3a^2b^4 \times 2a^3b^2 =$

Ⓐ $5a^5b^6$ Ⓑ $6a^5b^6$ Ⓒ $5a^6b^8$ Ⓓ $6a^6b^8$

1

30 Which is closest to the curved surface area of a cylinder of height 35 cm and diameter 18 cm?

Ⓐ 1980 cm^2 Ⓑ 3960 cm^2 Ⓒ 990 cm^2 Ⓓ 8900 cm^2

1

31 Three coins are tossed together. Find the probability of at least one tail.

Ⓐ $\frac{1}{8}$ Ⓑ $\frac{1}{2}$ Ⓒ $\frac{3}{4}$ Ⓓ $\frac{7}{8}$

1

32 A solution to the equation $2x^2 - 32 = 0$ is:

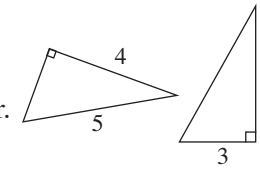
Ⓐ $x = 2$ Ⓑ $x = -4$ Ⓒ $x = 8$ Ⓓ $x = 16$

1

33 These two triangles are

Ⓐ similar but not congruent. Ⓑ congruent but not similar.

Ⓒ neither congruent nor similar. Ⓓ both congruent and similar.



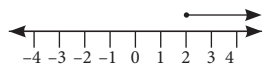
1

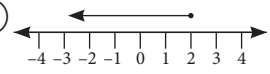
34 Find the equation of a circle, centre the origin, radius 9 units.

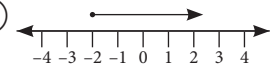
Ⓐ $x^2 + y^2 = 9$ Ⓑ $x^2 + y^2 = 3$ Ⓒ $x^2 + y^2 = 81$ Ⓓ $(x + y)^2 = 9$

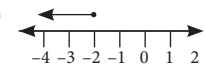
1

35 Find the solution to $-x \leq -2$ when graphed on the number line.

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

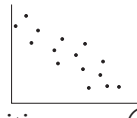
1

36 $a^2 - 6a + 5 =$

Ⓐ $(a - 2)(a - 3)$ Ⓑ $(a - 3)(a + 2)$ Ⓒ $(a - 1)(a + 5)$ Ⓓ $(a - 5)(a - 1)$

1

37 How could you describe the relationship shown by this scatter plot?



Ⓐ weak positive Ⓑ strong positive Ⓒ weak negative Ⓓ strong negative

1

38 Which of these lines is parallel to $y = 5 - x$?

Ⓐ $y = 5x + 3$ Ⓑ $y = x + 3$ Ⓒ $y = -x + 3$ Ⓓ $y = 5 - 3x$

1

Continued on the next page

EXAM PAPER 1 — PART A

Fill in only one circle for each question.

Marks

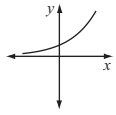
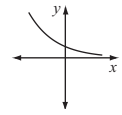
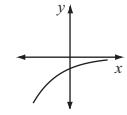
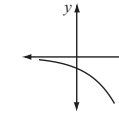
39 $x =$ 

Ⓐ 30 Ⓑ 36 Ⓒ 40 Ⓓ 45 — 1

40 A rectangular prism is 4 m long, 2 m wide and 90 cm high. Find its volume.

Ⓐ 7.2 m^3 Ⓑ 720 m^3 Ⓒ 720 cm^3 Ⓓ 7200 cm^3 — 1

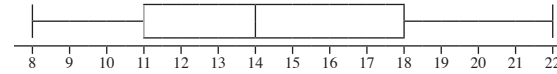
41 Which could be the graph of $y = -3^x$?

Ⓐ  Ⓑ  Ⓒ  Ⓓ  — 1

42 If $s = 4\pi r^2$, which is closest to the value of s when $r = 14$?

Ⓐ 3095 Ⓑ 7738 Ⓒ 47 Ⓓ 2463 — 1

43 This box plot was drawn for a set of scores. The middle 50% of scores are between



Ⓐ 11 and 14 Ⓑ 11 and 18 Ⓒ 14 and 18 Ⓓ 14 and 22 — 1

44 Which is NOT the equation of a parabola?

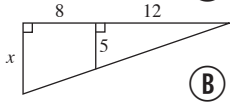
Ⓐ $y = 9 - x^2$ Ⓑ $y = x^2 + 9$ Ⓒ $y^2 = x^2$ Ⓓ $y = 2x^2 - 1$ — 1

45 Find the simultaneous solution of the equations $y = 2x + 1$ and $y = 3x - 1$.

Ⓐ $x = 1$ and $y = 3$ Ⓑ $x = 1$ and $y = 2$ Ⓒ $x = 2$ and $y = 5$ Ⓓ $x = 2$ and $y = 3$ — 1

46 Two dice are rolled together. One of the dice shows a 4. Find the probability that they both show 4.

Ⓐ $\frac{1}{11}$ Ⓑ $\frac{1}{6}$ Ⓒ $\frac{1}{36}$ Ⓓ $\frac{11}{36}$ — 1

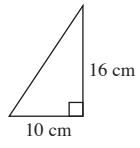
47 $x =$ 

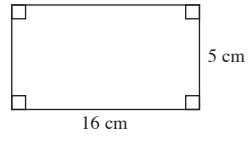
Ⓐ $7\frac{1}{2}$ Ⓑ $8\frac{1}{3}$ Ⓒ 9 Ⓓ $9\frac{3}{4}$ — 1

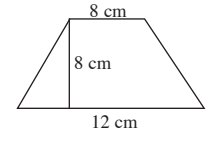
48 Find the solution to $\frac{x}{3} + \frac{x}{4} = 12$.

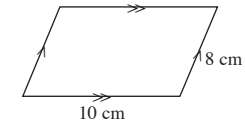
Ⓐ $x = 7$ Ⓑ $x = 12$ Ⓒ $x = 20\frac{4}{7}$ Ⓓ $x = 42$ — 1

49 Which of the following shapes does not have an area of 80 cm^2?

Ⓐ 

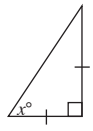
Ⓑ 

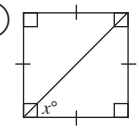
Ⓒ 

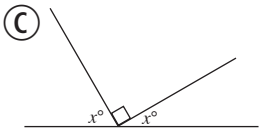
Ⓓ 

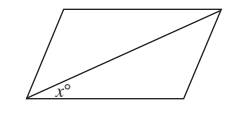
— 1

50 In which of the following is x not equal to 45?

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

— 1

Total marks achieved for PART A ____/50

EXAM PAPER 1 PART B

Show all working for each question.

Marks

1 **a** Find the simple interest earned if $7000 is invested at 6% p.a. for 3 years.

1

b Find the amount, to the nearest dollar, to which $7000 would accumulate if invested at 6% interest compounded annually for 3 years.

1

c How much more interest was earned with compound interest than with simple interest?

1

2 There are 5 red, 4 blue and 3 white balls in a bag. Two balls are taken from the bag, one after the other, without looking. Find the probability of getting 2 white balls if the balls are:

a not replaced

1

b replaced

1

3 Find :

a $\frac{x}{2} + \frac{x}{3}$

1

b $\frac{3a}{5} - \frac{2a}{3}$

1

4 Given the formula $S = V(1 - r)^n$, find:

a S when $V = 25\,000$, $r = 0.2$ and $n = 4$

1

b V if $S = 28\,900$, $r = 0.15$ and $n = 2$

1

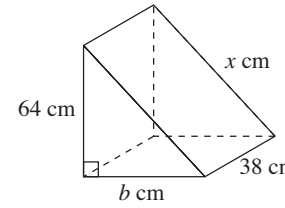
Continued on the next page

EXAM PAPER 1 PART B

Show all working for each question.

Marks

5 The area of the triangular face of this prism is 2150.5 cm^2.



a Find the length, b cm, of the base of the triangle. 1

b Find the length, x cm, of the hypotenuse. 1

c Find the surface area of the prism. 1

Factorise fully.

a $2x^3y^4 - 6x^4y^2$ 1

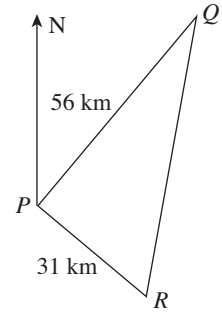
b $x^2 - 4x + 3$ 1

c $a^2 + 7a - 18$ 1

d $x^2 - 36$ 1

e $m^2 + 5m - mn - 5n$ 1

7 Q is 56 km from P on a bearing of 064°. R is 31 km from P on a bearing of 154°.



a Find the bearing of P from Q. 1

b Find the size of $\angle QPR$. 1

c Find the size of $\angle PQR$ to the nearest degree. 1

d Find the bearing of R from Q. 1

e Find the distance to the nearest kilometre from Q to R. 1

Continued on the next page

EXAM PAPER 1 PART B

Show all working for each question.

Marks

8 Solve.

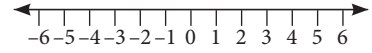
a $\frac{5x+4}{3} + \frac{3x+5}{4} = 5$ 1

b $3x^2 = 75$ 1

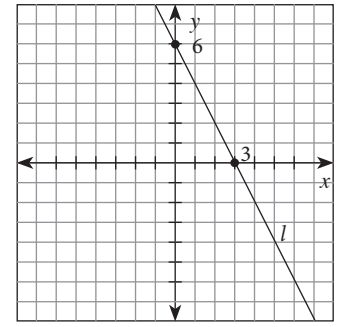
9 Solve $3x + 2y = 11$ and $2x - y = 12$ simultaneously. 1

10 a Solve $12 - 5x \geq 2$ 1

b Graph the solution on the number line provided. 1



11 a Find the gradient of line *l*. 1



b Find the gradient of any line parallel to *l*. 1

c Find the gradient of any line perpendicular to *l*. 1

d Line *m* is perpendicular to line *l* and intersects it on the *x*-axis. Graph line *m* on the diagram. 1

e Find the equation of line *m*. _____ 1

f Find the area of the triangle formed by lines *l* and *m* and the *y*-axis. 1

Continued on the next page

EXAM PAPER 1 PART B

Show all working for each question.

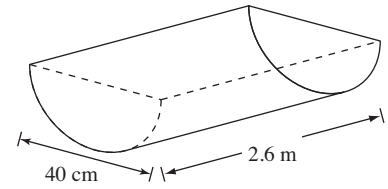
Marks

12 Expand.

a $(a + 5)(a + 4)$ 1

b $(2x - 1)(3x + 5)$ 1

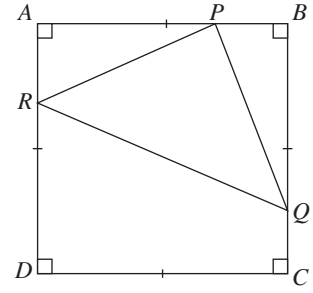
13 This water trough is in the shape of a half a cylinder. The width of the trough is 40 cm and the length is 2.6 m.



a Find the area of the semi-circular cross-section. Give the answer in square metres correct to 2 decimal places. 1

b Find the volume of water the trough will hold to the nearest 10 litres. ($1\ m^3 = 1000\ L$) 1

14 $ABCD$ is a square. $AP = BQ = DR$.



a Explain why $AR = PB$. 1

b Show that $\Delta RAP \equiv \Delta PBQ$. 1

c Find the size of $\angle RPQ$. 1

d Show that $\angle PQR$ is 45°. 1

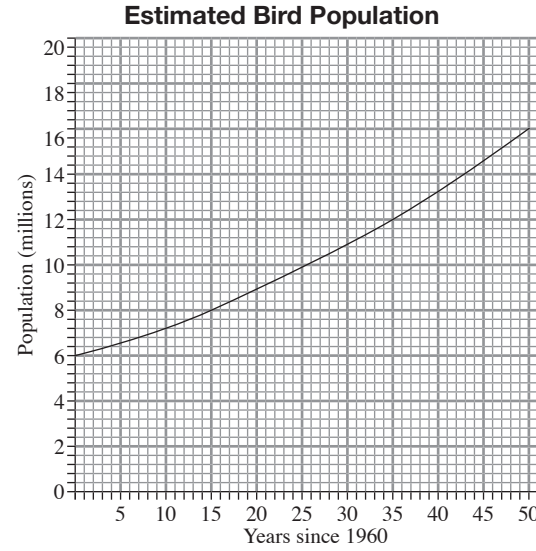
Continued on the next page

EXAM PAPER 1 PART B

Show all working for each question.

Marks

15 This graph shows the estimated population, P, of birds on an island at time t, where t is the time in years since 1960.



a What was the estimated population in 1995? _____ 1

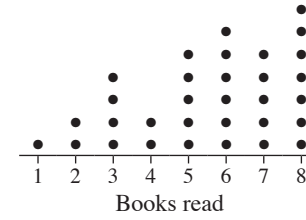
b When was the population 8 million? _____ 1

c How much did the population increase between 1960 and 2000? _____ 1

d What would you predict the population would be in 2020? _____ 1

e What type of graph is this? _____ 1

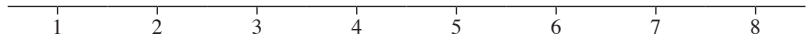
16 This dot plot was drawn to show some scores in a game.



a Find the median. _____ 1

b Find the interquartile range. _____ _____ 1

c Draw a box plot, (using the scale below) to illustrate the game scores.



1

d Briefly comment on the shape of both dot plot and box plot.

_____ _____ _____ 1

Total marks achieved for PART A /50

Exam Paper 2

Instructions for all parts • Attempt all questions. **Total marks: 100**
Time allowed: $1\frac{1}{2}$ hours • Allow about 45 minutes for each part.

EXAM PAPER 2 PART A

Fill in only one circle for each question.

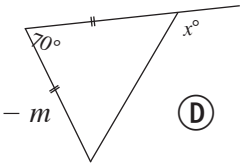
Marks

1 $a^2 + a^2 =$
Ⓐ a^4 Ⓑ $2a^2$ Ⓒ $2a^4$ Ⓓ a — 1

2 If $5x - 7 = 88$, find the value of x.
Ⓐ $\frac{81}{5}$ Ⓑ $12\frac{4}{7}$ Ⓒ 19 Ⓓ 17 — 1

3 Which pair of values satisfies the equation $x + y = 7$ and $x - y = 3$?
Ⓐ $x = 5, y = -2$ Ⓑ $x = 5, y = 2$ Ⓒ $x = -5, y = 2$ Ⓓ $x = -5, y = -2$ — 1

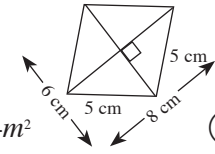
4 What is the value of x?
Ⓐ 65 Ⓑ 125
Ⓒ 55 Ⓓ 110



— 1

5 Which expression does NOT equal $4m$?
Ⓐ $m \times m \times m \times m$ Ⓑ $4 \times m$ Ⓒ $5m - m$ Ⓓ $m + m + m + m$ — 1

6 Calculate the area of the rhombus.
Ⓐ 48 cm^2 Ⓑ 24 cm^2
Ⓒ 40 cm^2 Ⓓ 30 cm^2

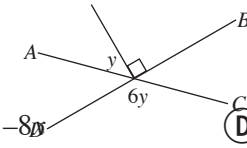


— 1

7 Which of the following is equal to m^4?
Ⓐ $4m$ Ⓑ $m + m + m + m$ Ⓒ $4m^2$ Ⓓ $m \times m \times m \times m$ — 1

8 The nine letters of the word FANTASTIC are written on separate cards and placed in a box. One card is chosen at random. Find the probability of selecting the letter A or the letter T.
Ⓐ $\frac{1}{9}$ Ⓑ $\frac{2}{9}$ Ⓒ $\frac{3}{9}$ Ⓓ $\frac{4}{9}$ — 1

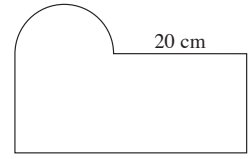
9 AC and BD are straight lines. Find the value of y.
Ⓐ 15° Ⓑ 18°
Ⓒ 25° Ⓓ 28°



— 1

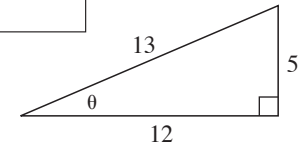
10 $-12x + x - 5x =$
Ⓐ $-16x$ Ⓑ $16x$ Ⓒ $-8x$ Ⓓ $8x$ — 1

11 The area of this shape is closest to
Ⓐ 249.1 cm^2 Ⓑ 274.3 cm^2
Ⓒ 324.5 cm^2 Ⓓ 236.6 cm^2



— 1

12 Which statement is correct for the diagram?
Ⓐ $\sin\theta = \frac{12}{13}$ Ⓑ $\sin\theta = \frac{5}{13}$
Ⓒ $\cos\theta = \frac{5}{13}$ Ⓓ $\tan\theta = \frac{12}{5}$



— 1

13 Solve for x. $8(x - 1) = 3x + 32$
Ⓐ $x = 2.5$ Ⓑ $x = 8$ Ⓒ $x = 6.2$ Ⓓ $x = 4.8$ — 1

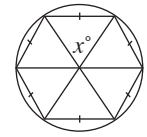
Continued on the next page

EXAM PAPER 2 PART A

Fill in only one circle for each question.

Marks

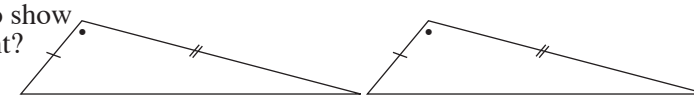
14 $x =$



Ⓐ 60 Ⓑ 72
Ⓒ 80 Ⓓ 82

1

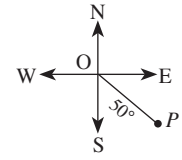
15 Which congruence test could be used to show the following pair of triangles congruent?



Ⓐ SSS Ⓑ AAS
Ⓒ SAS Ⓓ RHS

1

16 In this diagram, the true bearing of P from O is:



Ⓐ 040°T Ⓑ 050°T
Ⓒ 130°T Ⓓ 320°T

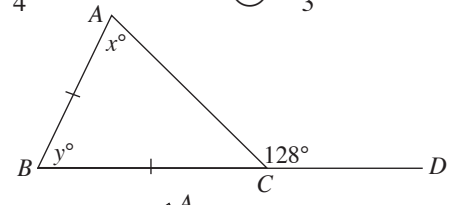
1

17 A bag contains 5 blue, 6 white and 9 black balls. If a ball is drawn at random, find the probability that it is either black or white.

Ⓐ $\frac{7}{10}$ Ⓑ $\frac{11}{20}$ Ⓒ $\frac{3}{4}$ Ⓓ $\frac{4}{3}$

1

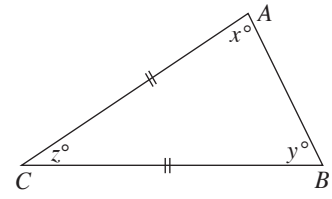
18 Which is correct?



Ⓐ $x = 52°$ $y = 52°$ Ⓑ $x = 76°$ $y = 52°$
Ⓒ $x = 52°$ $y = 76°$ Ⓓ $x = 76°$ $y = 76°$

1

19 In ΔABC, sides AC and BC are equal and side AB is shorter than side AC. Which statement is true?



Ⓐ $x = y$ Ⓑ $x = z$
Ⓒ $y = z$ Ⓓ $x = y = z$

1

20 If $\frac{2x + 1}{5} = 7$, find the value of x.

Ⓐ 18 Ⓑ 17 Ⓒ 16 Ⓓ 15

1

21 Solve $4 - t \geq 12$.

Ⓐ $t \geq 8$ Ⓑ $t \geq -8$ Ⓒ $t \leq -8$ Ⓓ $t \leq 8$

1

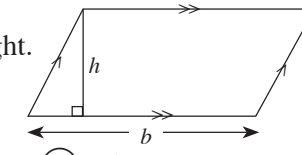
22 There are three modes for the data presented in this stem-and-leaf plot. What are the modes?

1	2 2 4
2	1 2 3
3	3 3 5
4	3 2 6
5	1 4 1
6	0 2 3
7	1 8 9

Ⓐ 2, 3, 1 Ⓑ 3, 4, 5
Ⓒ 23, 33, 43 Ⓓ 12, 33, 51

1

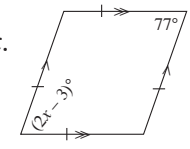
23 The area of a parallelogram is given by Area = base × perpendicular height. The height of the parallelogram is increased by 20% and its base is decreased by 20%. What fraction is the new area of the original area?



Ⓐ $\frac{4}{5}$ Ⓑ $\frac{24}{25}$ Ⓒ $\frac{6}{5}$ Ⓓ 1

1

24 A rhombus is drawn with angles as shown. Find the value of x.



Ⓐ 40 Ⓑ 37
Ⓒ 74 Ⓓ 80

1

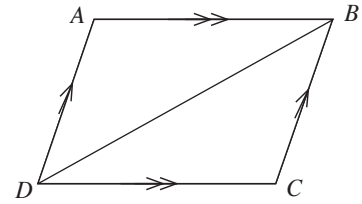
Continued on the next page

EXAM PAPER 2 PART A

Fill in only one circle for each question.

Marks

25 This is a parallelogram with one of its diagonals drawn.
Which of the following statements is true?

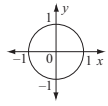


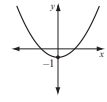
(A) Each diagonal bisects the angle through which it passes.
(B) The diagonals are equal.
(C) The diagonals bisect each other.
(D) The diagonals meet at right angles. 1

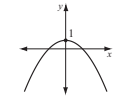
26 $(x - 3)(x - 8) =$
(A) $x^2 - 5x - 24$ (B) $x^2 - 5x + 24$ (C) $x^2 - 11x - 24$ (D) $x^2 - 11x + 24$ 1

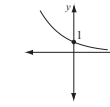
27 The compound interest earned when \$2000 is invested at 9% p.a. for 3 years is closest to:
(A) \$540 (B) \$590 (C) \$2540 (D) \$2590 1

28 $\frac{2x}{3} + \frac{x}{5} =$
(A) $\frac{2x}{15}$ (B) $\frac{3x}{8}$ (C) $\frac{2x}{3}$ (D) $\frac{13x}{15}$ 1

29 Which could be the graph of $y = 1 - x^2$?
(A) 

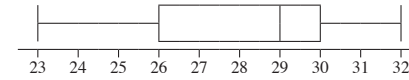
(B) 

(C) 

(D) 

1

30 What is the interquartile range?
(A) 4 (B) 6 (C) 7 (D) 9

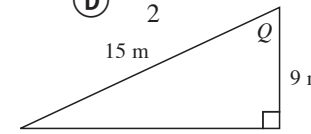


1

31 What is the gradient of any line perpendicular to $y = -\frac{2}{3}x + 4$?
(A) $-\frac{2}{3}$ (B) $\frac{2}{3}$ (C) $-\frac{3}{2}$ (D) $\frac{3}{2}$ 1

32 $\frac{6x^6}{12x^8} =$
(A) $2x^2$ (B) $\frac{1}{2x^2}$ (C) $\frac{2}{x^2}$ (D) $\frac{x^2}{2}$ 1

33 To the nearest degree, $Q =$
(A) 31° (B) 37° (C) 53° (D) 59°



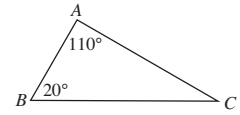
1

34 Find the probability of winning all 3 prizes in a raffle if you buy 5 tickets and 100 tickets are sold.
(A) $\frac{1}{16\,170}$ (B) $\frac{1}{8000}$ (C) $\frac{5}{38\,808}$ (D) $\frac{1}{20}$ 1

35 What is the size of each angle of a regular decagon?
(A) 120° (B) 135° (C) 144° (D) 150° 1

36 $a^2 + 10a - 24 =$
(A) $(a - 4)(a - 6)$ (B) $(a + 4)(a + 6)$ (C) $(a + 12)(a - 2)$ (D) $(a - 12)(a + 2)$ 1

37 C is due east of B. Find the bearing of C from A.
(A) 110° (B) 140°
(C) 220° (D) 250°



1

Continued on the next page

EXAM PAPER 2 — PART A

Fill in only one circle for each question.

Marks

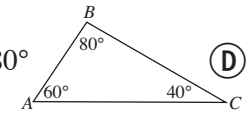
38 $(2x^3y^4)^3 =$

Ⓐ $2x^6y^7$ Ⓑ $2x^9y^{12}$ Ⓒ $8x^6y^7$ Ⓓ $8x^9y^{12}$ — 1

39 Given $B = \frac{m}{h^2}$, the value of B when $m = 81$ and $h = 1.8$ is

Ⓐ 6.7 Ⓑ 25 Ⓒ 27 Ⓓ 2025 — 1

40 $\Delta ZXY \equiv \Delta ABC$. Find the size of $\angle YXZ$.

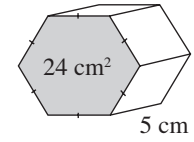


Ⓐ 40° Ⓑ 60° Ⓒ 80° Ⓓ 100° — 1

41 $(2x + 3)(5x + 7) =$

Ⓐ $10x^2 + 29x + 21$ Ⓑ $10x^2 + 12x + 21$ Ⓒ $7x^2 + 8x + 10$ Ⓓ $7x^2 + 15x + 10$ — 1

42 The shaded face of this hexagonal prism has area 24 cm^2.
The perpendicular height of the prism is 5 cm. What is the volume?



Ⓐ 120 cm^3 Ⓑ 144 cm^3
Ⓒ 100 cm^3 Ⓓ 720 cm^3 — 1

43 $\frac{a}{3} \div \frac{1}{6} =$

Ⓐ $\frac{a}{2}$ Ⓑ $\frac{a}{18}$ Ⓒ $\frac{2a}{3}$ Ⓓ $2a$ — 1

44 Which of these points does NOT lie on the circle $x^2 + y^2 = 100$?

Ⓐ (–6, 8) Ⓑ (10, 0) Ⓒ (8, 6) Ⓓ (7, 7) — 1

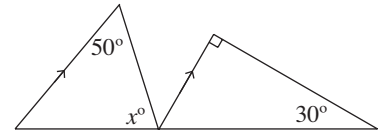
45 $x^2 - 1 =$

Ⓐ $(x - 1)^2$ Ⓑ $x(x - 1)$ Ⓒ $(x - 1)(x + 1)$ Ⓓ $(x + 1)^2$ — 1

46 The probability of winning a game is $\frac{3}{8}$. Two games are played. Find the probability of winning both games.

Ⓐ $\frac{3}{8}$ Ⓑ $\frac{3}{28}$ Ⓒ $\frac{9}{64}$ Ⓓ $\frac{3}{4}$ — 1

47 Find the value of x.



Ⓐ 30 Ⓑ 50
Ⓒ 60 Ⓓ 70 — 1

48 Which one of these lines is NOT parallel to the other three?

Ⓐ $y = \frac{x}{2} + 5$ Ⓑ $y = \frac{x + 1}{2}$ Ⓒ $y = 9 - \frac{x}{2}$ Ⓓ $y = \frac{1}{2}x - 4$ — 1

49 Which equation could have been used to get the values in this table?

x	–2	–1	0	1	2
y	4	2	1	$\frac{1}{2}$	$\frac{1}{4}$

Ⓐ $y = 2^x$ Ⓑ $y = 2^{-x}$ Ⓒ $y = -2^x$ Ⓓ $y = -2^{-x}$ — 1

50 3, 5, 5, 5, 6, 8, 8, 9, 10, 11, 13, 13, 14, 15, 17, 18, 20.
Consider the lower quartile (Q_1) and upper quartile (Q_3) for these scores. Which is correct?

Ⓐ $Q_1 = 5$ and $Q_3 = 15$ Ⓑ $Q_1 = 5$ and $Q_3 = 14.5$
Ⓒ $Q_1 = 5.5$ and $Q_3 = 15$ Ⓓ $Q_1 = 5.5$ and $Q_3 = 14.5$ — 1

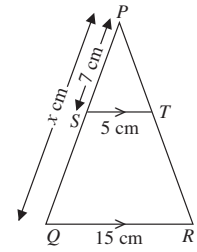
Total marks achieved for PART A ____/50

EXAM PAPER 2 PART B

Show all working for each question.

Marks

1 In this diagram $ST \parallel QR$.



a Name two similar triangles. _____ 1

b Which test can be used to prove these triangles are similar? _____ 1

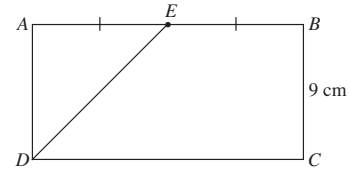
c Find the value of x.

_____

_____

_____ 1

2 $ABCD$ is a rectangle. E is the midpoint of AB. $AE = EB = 12$ cm and $BC = 9$ cm



a Find the length of DE.

_____

_____

_____ 1

b What type of quadrilateral is $EBCD$? _____ 1

$\triangle AED$ is removed. $EBCD$ is the cross-section of a prism. The perpendicular height of the prism is 8 cm.

c Find the area of $EBCD$.

_____

_____

_____ 1

d Find the volume of the prism.

_____

_____

_____ 1

e Find the surface area of the prism.

_____

_____

_____ 1

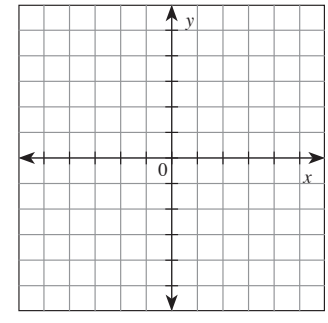
3 **a** Complete the table of values for $y = \frac{1}{2}x^2 - 4$

x	–4	–3	–2	–1	0	1	2	3	4
y									

1

b Graph the curve on the number plane. 1

c On the same diagram graph the line $y = x$. 1



d Using the graph, how many solutions are there to the equations $\frac{1}{2}x^2 - 4 = x$? _____ 1

e Find for what value(s) of x does $\frac{1}{2}x^2 - 4 = x$.

_____ 1

Continued on the next page

EXAM PAPER 2 PART B

Show all working for each question.

Marks

4 Find, in simplest form.

a $\frac{3x}{8} + \frac{5x}{12}$ 1

b $\frac{3x}{5} \times \frac{x}{6}$ 1

5 Expand and simplify.

a $(x + 2)(x + 5) + (x + 4)(x - 3)$ 1

b $3x^2y^3(4xy^2 + 5x^3y)$ 1

6 Factorise fully.

a $6a^3b^4 - 2a^2b^3$ 1

b $x^2 + 8x - 20$ 1

c $p^2 + pq + pr + qr$ 1

d $6x^2 - 6$ 1

7 **a** Find the compound interest earned if $8000 is invested for a year at 6% p.a. interest compounded quarterly. 1

b Find how much more (if any) interest is earned than if simple interest of 6% p.a. was paid on the $8000 for a year. 1

8 Solve.

a $\frac{5a + 2}{3} = \frac{3a - 5}{2}$ 1

b $\frac{x}{4} - \frac{x}{5} = 9$ 1

c $7x + 2 \geq 2x - 8$ 1

d $8x + 5 - 9x < 4$ 1

e $x^2 = 81$ 1

f $x^2 - 6x + 8 = 0$ 1

Continued on the next page

EXAM PAPER 2 PART B

Show all working for each question.

Marks

9 Solve simultaneously.

a $7a + 2b = 34$
$5a - 2b = 14$

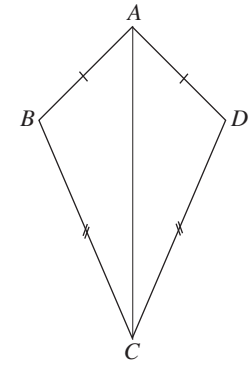
_____
_____
_____
_____
_____
_____

1
1

b $3x + y = 10$
$y = 2x - 5$

_____
_____
_____
_____
_____
_____

10 $ABCD$ is a quadrilateral. $AB = AD$ and $BC = DC$.



a Which test can be used to show $\Delta ABC \equiv \Delta ADC$? _____ 1

b Explain why $\angle BAC = \angle DAC$.

_____ 1

The diagonals meet at E.

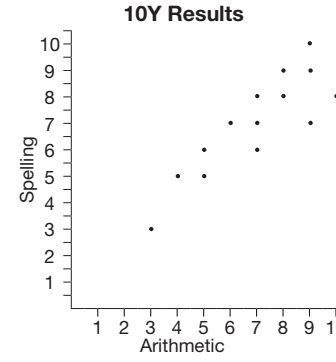
c Which test can be used to show $\Delta ABE \equiv \Delta ADE$?

_____ 1

d Find the size of $\angle AEB$. _____ 1

e What property does this prove? _____ 1

11 This scatter plot shows the marks of students in Class 10Y in quizzes in both arithmetic and spelling, marked out of ten.



a Would the relationship between the two marks be described as:

i positive or negative? _____ 1

ii strong or weak? _____ 1

b Toby is in 10Y and scored 6 in arithmetic.
What did he score in spelling? _____ 1

c Rosie is in 10Y and scored 10 in spelling.
What did she score in arithmetic? _____ 1

d Olivia is also in 10Y. Her result is not shown on the scatter plot because she was sick and missed the spelling test. She scored 7 in arithmetic. What mark would you give Olivia as an esimate for spelling? Justify your answer.

_____
_____ 1

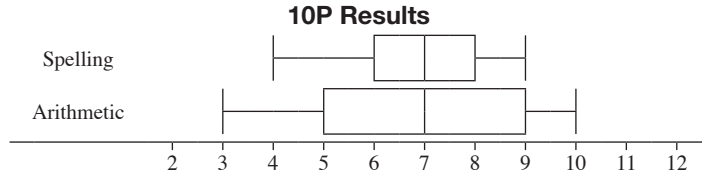
Continued on the next page

EXAM PAPER 2 PART B

Show all working for each question.

Marks

12 These 2 box plots have been drawn to show the results of quizzes in arithmetic and spelling for Class 10P.



a What was the lowest mark and in which test was it scored? _____ 1

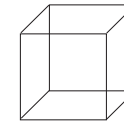
b Which measure was the same for both tests? _____ 1

c Compare the two box plots, referring to the shape and measures of spread.

_____

_____ 1

13 The surface area of a cube is 486 cm^2.



a Find the length of each side.

_____

_____

_____ 1

b Find its volume.

_____

_____

_____ 1

14 The probability of winning a game is 0.2. Two games are played. Find the probability of winning:

a neither game

_____

_____

_____ 1

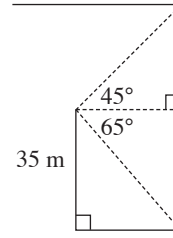
b at least one game

_____

_____

_____ 1

15 From the top of a building the angle of depression of the base of a second building is 65°. The angle of elevation of the top of the second building is 45°. The top of the first building is 35 m above the ground. Find:



a the distance between the buildings.

_____

_____

_____ 1

b the height of the second building.

_____

_____

_____ 1

Total marks achieved for PART A /50

Answers

CHAPTER 1 – Algebraic techniques

PAGE 1 **1 a** $7a$ **b** $4p$ **c** $12a$ **d** $8x$ **e** $4m$ **f** $5q$ **g** a **h** $11ab$ **i** $-3t$ **j** $8x^2$ **k** $-2n$ **l** $-7k$ **2 a** $12a$ **b** $9t$ **c** $3x$ **d** $-10k$ **e** $-m$ **f** xy **g** a **h** $-7p$ **i** $2x^2$ **j** 0 **k** $-7m$ **l** $-10y$ **3 a** $5a + 5b$ **b** $8x + 2y$ **c** $2a^2 - 2a$ **d** $-5c - 2d$ **e** $3x - 6y$ **f** $10a - 7b$ **g** $3m + 6$ **h** $12 - 7m$ **i** $-9a + 2b$ **j** $7xy - 2x - 4y$ **k** $6x + 3$ **l** $11t - 9u$ **4 a** $7 - 6a$ **b** $-x^2$ **c** $12n - 5$ **d** 0 **e** $3x$ **f** $-y$ **g** $11a^2 - a - 2$ **h** $-2m$ **i** $-6y$ **j** $9k - 9n$ **k** $-5ab + 2a + b$ **l** $-10a + b$ **m** $14 - 5x$ **n** $-p$ **o** $4m + 6n$ **p** $5x^3 - 2x^2 + 3x$

PAGE 2 **1 a** x^8 **b** n^7 **c** y^6 **d** $6m^9$ **e** $18a^9$ **f** a^{10} **g** $4x^{10}$ **h** $16x^{10}$ **i** $15m^3$ **2 a** x^6 **b** y^5 **c** a^5 **d** $3m^{10}$ **e** $6n^8$ **f** $6a^6$ **g** $6y$ **h** a^6 **i** a^6b^2 **3 a** x^6 **b** a^{20} **c** x^{12} **d** $16m^6$ **e** $4m^6$ **f** $8a^{12}$ **g** $a^{12}b^8$ **h** $27a^3b^{12}$ **i** $5x^{14}y^7$ **4 a** 1 **b** 1 **c** 1 **d** 5 **e** 1 **f** 2 **g** 0 **h** 9 **i** 11 **5 a** a^6 **b** $15x^8$ **c** $2a^{25}$ **d** $125x^6$ **e** $2x^3$ **f** $6a^5b^5$ **g** m^5n^5 **h** $5x^3$ **i** $20x^6y^9$ **j** xy **k** 5 **l** $36x^4$

PAGE 3 **1 a** $12a$ **b** $15xy$ **c** $6m^2$ **d** $-12ab$ **e** $12xy$ **f** $15ab$ **g** $-55t^2$ **h** $12q^3$ **i** x^3y^2 **j** $24abc$ **k** $24x^{11}$ **l** $8x^3y^2$ **2 a** x^{10} **b** $3x^7$ **c** $2a^6$ **d** $5q^2$ **e** $12a^2b$ **f** $18x^2y^2$ **g** $24t^3$ **h** $-12x^2y^2$ **i** $-24pqr$ **j** $60abc$ **k** $-a^3$ **l** a^3b^3 **3 a** $6a^3b^2$ **b** $24a^2b^2$ **c** $35p^3q^3$ **d** x^6y^8 **e** $a^{10}b^7$ **f** $6m^9n^8$ **g** $5p^4q^3$ **h** $20a^2b^7$ **i** $14x^2y^5$ **j** $27a^3b^8$ **k** $20a^8b^6c^{10}$ **l** $15x^5y^5z^6$ **4 a** $6a^2$ **b** $28a^{-1}$ **c** 18 **d** $8x$ **e** $35t^{-5}$ **f** $24k^{-1}$ **g** $36n^{-1}$ **h** $24a^{-9}$ **i** $-e^{-2}$ **j** $48q^7$

PAGE 4 **1 a** $5a$ **b** 3 **c** 8 **d** 6 **e** $-4k$ **f** $3m$ **g** 1 **h** $4m$ **i** $3x$ **j** -2 **k** $-6ac$ **l** y **m** a^8 **n** $4b^{15}$ **o** x^4y **p** a^4b^5 **q** $9p^5q$ **t** $3ab^2c^3$

2 **a** $\frac{2x^2}{3}$ **b** $\frac{5}{7a^3}$ **c** $\frac{9t^3}{10}$ **d** $\frac{5b}{3}$ **e** $\frac{7x}{8}$ **f** $\frac{3n}{5m}$ **g** $\frac{3a^2}{4}$ **h** $\frac{2}{3x^3}$ **i** $\frac{3ab^2}{2}$ **j** $\frac{8}{9e}$ **k** $\frac{4n^6}{3m^2}$ **l** $\frac{2a^3}{3b}$ **m** $\frac{a^2}{2}$ **n** $\frac{t^2}{3}$ **o** $\frac{3}{x^5}$ **p** $\frac{2a}{b^2}$ **q** $\frac{mn}{4}$ **r** $\frac{2}{y}$ **s** $\frac{1}{3x}$ **t** $\frac{1}{2x^6}$ **u** $2a$

v $\frac{1}{5n}$ **w** $3a^2b$ **x** $\frac{1}{5y}$

PAGE 5 **1 a** $11x$ **b** $4k$ **c** $2x^2$ **d** 8 **e** p **f** 1 **g** $12x^2 + 3x$ **h** $6a^{10}$ **i** $15x^3y$ **j** x^7 **k** $-3a$ **l** $-8m$ **m** $3a^2b$ **n** 0 **o** $-2a$ **p** x^8 **q** $12ab$ **r** $-2x$ **2 a** $16x^2$ **b** 3 **c** 2 **d** $13a^5$ **e** $2p^2$ **f** $6a^2b$ **3 a** $2x^5$ **b** $2a$ **c** $13ab$ **d** $-4m^6$ **e** $3p$ **f** $8 + 3n$

PAGE 6 **1 a** 8 **b** 45 **c** 24 **d** 15 **e** 15 **f** 135 **g** 2 **h** -1 **i** 24 **j** 81 **k** 36 **l** 75 **2 a** 60 **b** 12 **c** 17 **d** -4 **e** 22 **f** -50 **3 a** 255 **b** 80.5 **4 a** -4 **b** -1 **5 a** 455 **b** 43.3 **6 a** 25 **b** 23.5

PAGE 7 **1 a** $5x + 10$ **b** $7x - 21$ **c** $8x + 20$ **d** $15x - 9y$ **e** $12t - 6$ **f** $x^2 + 7x$ **g** $a^2 - a$ **h** $6x^2 - 15x$ **i** $12n^2 + 8n$ **j** $16a + 8b - 8c$ **k** $10a^2 + 8ab + 6a$ **l** $-6x - 8$ **m** $-10x + 15$ **n** $-4x + 8x^2$ **o** $-7a^2 - 28a$ **p** $-x + y$ **q** $-m - n$ **r** $-3p + 1$ **s** $2x^3 - 10x$ **t** $3a^3b + 15a^2$ **2 a** $14x + 15$ **b** $a - 3$ **c** $15 - x$ **d** $13x - 4y$ **e** $12x + 38$ **f** $12a - 15$ **g** 22 **h** $17m - 16$ **i** $2a + 27$ **j** $x^2 + 2x + 12$ **k** $-a$ **l** $x^2 + 2xy + 3y^2$

PAGE 8 **1 a** $x^2 + 5x + 6$ **b** $x^2 + 5x - 14$ **c** $x^2 + 4x - 21$ **d** $x^2 + 2x - 15$ **e** $2x^2 + 11x + 15$ **f** $3x^2 - 8x + 4$ **g** $2x^2 - 7x - 15$ **h** $3x^2 + x - 10$ **i** $6x^2 + 7x + 2$ **j** $6x^2 - 7x + 2$ **2 a** $x^2 + 5x + 6$ **b** $x^2 + 2x - 15$ **c** $2x^2 - 7x - 15$ **d** $6x^2 - 7x + 2$ **e** $2x^2 + 11x + 15$ **f** $x^2 + 5x - 14$ **g** $6x^2 + 7x + 2$ **h** $x^2 + 4x - 21$ **i** $3x^2 - 8x + 4$ **j** $3x^2 + x - 10$ **3 a** x^2, $5x$, $3x$, 15, $x^2 + 8x + 15$ **b** x^2, $7x$, $4x$, 28, $x^2 + 11x + 28$

PAGE 9 **1 a** $x^2 + 3x + 2$ **b** $x^2 + 5x + 6$ **c** $a^2 + 8a + 15$ **d** $m^2 + 7m + 6$ **e** $p^2 + 10p + 16$ **f** $y^2 + 10y + 21$ **g** $a^2 + 11a + 28$ **h** $d^2 + 12d + 27$ **i** $2a^2 + 13a + 15$ **j** $6a^2 + 20a + 6$ **k** $8a^2 + 24a + 18$ **l** $6x^2 + 17x + 5$ **2 a** $a^2 + a - 6$ **b** $x^2 - x - 6$ **c** $y^2 + 2y - 24$ **d** $y^2 + 2y - 15$ **e** $a^2 + 4a - 21$ **f** $x^2 + 4x - 12$ **g** $2y^2 - 3y - 2$ **h** $3x^2 - 7x - 6$ **i** $6x^2 + x - 1$ **j** $2x^2 + 13x - 7$ **k** $3x^2 + 19x - 40$ **l** $x^2 - 7x + 12$ **3 a** $a^2 + 7a + 12$ **b** $a^2 + 11a + 30$ **c** $-2a^2 + 5a + 3$ **d** $x^2 + 13x + 36$ **e** $-n^2 - 2n + 35$ **f** $-x^2 + 13x - 42$ **g** $3x^2 + 8x + 4$ **h** $-3n^2 + 14n + 5$ **i** $2a^2 + 8a - 42$ **j** $x^2 - y^2$ **k** $4m^2 - n^2$ **l** $a^2 - b^2$ **m** $4x^2 - 9y^2$ **n** $a^2 - 2ab + b^2$ **o** $4x^2 - 9$ **p** $6x^2 + 7x - 20$

PAGE 10 **1 a** $x^2 + 6x + 9$ **b** $y^2 + 4y + 4$ **c** $m^2 + 14m + 49$ **d** $x^2 - 8x + 16$ **e** $x^2 - 18x + 81$ **f** $x^2 - 6x + 9$ **g** $y^2 + 22y + 121$ **h** $x^2 - 10x + 25$ **i** $m^2 - 4m + 4$ **j** $x^2 + 2xy + y^2$ **k** $a^2 - 2ab + b^2$ **l** $m^2 + 2mn + n^2$ **2 a** $4x^2 + 12x + 9$ **b** $4m^2 + 4m + 1$ **c** $9y^2 - 6y + 1$ **d** $16a^2 + 8a + 1$ **e** $9x^2 - 24x + 16$ **f** $4x^2 - 12xy + 9y^2$ **g** $4a^2 + 4a + 1$ **h** $25m^2 - 10m + 1$ **i** $36y^2 + 12y + 1$ **j** $9n^2 + 12n + 4$ **k** $4x^2 + 20xy + 25y^2$ **l** $a^2 + 6ab + 9b^2$ **m** $4x^2 + 4xy + y^2$ **n** $x^2 - 6xy + 9y^2$ **3 a** $x^2 + 9x + 6$ **b** $4a^2 - 8a + 13$ **c** $2y^2 - 4y - 5$ **d** $2ab + 2b^2$ **e** $2a^2 + 2b^2$ **f** $2a^2 - 8b^2 + 2ab$ **g** $10x^2 - 15y^2 + 2xy$ **h** $2x^2 + 6x + 5$

PAGE 11 **1 a** $x^2 - 4$ **b** $x^2 - 9$ **c** $y^2 - 1$ **d** $m^2 - 25$ **e** $n^2 - 49$ **f** $p^2 - 16$ **g** $64 - x^2$ **h** $y^2 - 36$ **i** $a^2 - b^2$ **j** $x^2 - y^2$ **k** $m^2 - n^2$ **l** $l^2 - m^2$ **2 a** $9a^2 - 1$ **b** $4x^2 - 9$ **c** $16a^2 - 25$ **d** $49m^2 - n^2$ **e** $16q^2 - 9$ **f** $25x^2 - 49$ **g** $16a^2 - 9b^2$ **h** $4x^2 - y^2$ **i** $25x^2 - 16y^2$ **j** $x^2 - 81y^2$ **k** $4a^2 - 49b^2$ **l** $25m^2 - n^2$ **m** $81a^2 - 121b^2$ **n** $9a^2 - 64b^2$ **3 a** $25x^2 - 1$ **b** $49a^2 - 4$ **c** $64x^2 - 49$ **d** $4x^2 - 9y^2$ **e** $16x^2 - 81y^2$ **f** $36x^2 - 49y^2$ **g** $a^2 - 144$ **h** $4x^2 - 81$ **i** $9x^2 - 100$ **j** $4m^2 - n^2$ **k** $25 - 4q^2$ **l** $25x^2 - 121$ **m** $64a^2 - 121b^2$ **n** $9a^2 - 49b^2$

PAGE 12 **1 a** $\frac{4m}{5}$ **b** x **c** $\frac{5t}{7}$ **d** y **e** $\frac{6a + 3b}{11}$ **f** $\frac{33k}{8}$ **g** x **h** $2p$ **i** $\frac{9m}{19}$ **2 a** $\frac{3y}{7}$ **b** $\frac{2x}{11}$ **c** $\frac{a}{3}$ **d** $\frac{7a}{17}$ **e** $\frac{2m}{23}$ **f** $\frac{m}{6}$ **g** $\frac{4a}{7}$ **h** $\frac{x}{2}$ **i** $\frac{5a-2b}{11}$

3 a $\frac{5x}{6}$ **b** $\frac{a}{20}$ **c** $\frac{8m}{15}$ **d** $\frac{13x}{20}$ **e** $\frac{3a}{10}$ **f** $\frac{3y}{32}$ **g** $\frac{31y}{15}$ **h** $\frac{3p}{8}$ **i** $\frac{-x}{8}$ **j** $\frac{23y}{12}$ **k** $\frac{10m}{21}$ **l** $\frac{3a-4b}{8}$ **4 a** $\frac{x}{2}$ **b** $\frac{x}{2}$ **c** $\frac{t}{3}$

PAGE 13 **1 a** $\frac{ab}{35}$ **b** $\frac{mn}{12}$ **c** $\frac{xy}{24}$ **d** $\frac{20xy}{27}$ **e** $\frac{a^2}{33}$ **f** $\frac{6x^2}{35}$ **g** $\frac{a}{8}$ **h** $\frac{2n}{21}$ **i** $\frac{25x}{49}$ **2 a** $\frac{ab}{6}$ **b** $\frac{x^2}{2}$ **c** t^2 **d** $\frac{2cd}{15}$ **e** $\frac{2ab}{3}$ **f** $\frac{2xy}{3}$ **g** $\frac{4x^2}{5}$ **h** $\frac{3mn}{4}$ **i** $\frac{3t^2}{2}$

3 a $\frac{3a}{2b}$ **b** $\frac{27x}{14y}$ **c** $\frac{5m}{6n}$ **d** 3 **e** $\frac{6}{5}$ **f** 4 **g** $\frac{2}{m}$ **h** $\frac{x}{3}$ **i** $2p$ **j** $\frac{3b}{4a}$ **k** $\frac{20b}{3}$ **l** $\frac{9}{10}$

PAGE 14 **1 a** $\frac{17a}{5b}$ **b** $\frac{a}{7x}$ **c** $\frac{4}{a}$ **d** $\frac{1}{t}$ **e** $\frac{2}{x^2}$ **f** $\frac{2a}{x}$ **g** $\frac{39}{4x}$ **h** $\frac{a}{2b}$ **i** $\frac{29m}{20n}$ **2 a** $\frac{15}{ty}$ **b** $\frac{20}{ab}$ **c** $\frac{9}{5ab}$ **d** $\frac{16}{3t^2}$ **e** $\frac{x^2}{y^2}$ **f** $\frac{8a}{3mn}$ **g** $\frac{10b^2}{27c^2}$ **h** $\frac{1}{16}$ **i** $\frac{3}{4}$ **j** $2a^2$ **k** 3

l 1 **m** x **n** b **o** $\frac{12}{5y^2}$ **3 a** $\frac{12}{p}$ **b** $\frac{8}{5}$ **c** $\frac{5}{2}$ **d** $\frac{1}{5}$ **e** 1 **f** $\frac{x^2y^2}{z^2}$ **g** 21 **h** $\frac{9n}{8}$ **i** $\frac{10n}{m}$

PAGE 15 **1 a** $2a$ **b** x **c** $2m$ **d** $\frac{5a}{6}$ **e** $\frac{11a}{15}$ **f** $\frac{29a}{35}$ **g** $\frac{11}{2x}$ **h** $\frac{19}{9x}$ **i** $\frac{5m}{3n}$ **2 a** a **b** $\frac{x}{3}$ **c** $\frac{m}{3}$ **d** $\frac{x}{6}$ **e** $\frac{a}{10}$ **f** $\frac{11q}{15}$ **g** $\frac{1}{2x}$ **h** $\frac{-5}{9x}$ **i** $\frac{4m}{3n}$ **3 a** $\frac{xy}{20}$ **b** $\frac{a^2}{12}$

c $\frac{am}{bn}$ **d** $\frac{b}{2}$ **e** 1 **f** 2 **g** $3q$ **h** $\frac{8m^2}{3}$ **i** $2\frac{2}{3}$ **4 a** 3 **b** $1\frac{1}{3}$ **c** $\frac{2}{7}$ **d** 2 **e** $\frac{1}{4}$ **f** $\frac{1}{3}$ **g** 6 **h** a^2 **i** $16\frac{4}{5}$

PAGE 16 **1 a** $\frac{1}{2^5}$ **b** $\frac{1}{7^2}$ **c** $\frac{1}{3^4}$ **d** $\frac{1}{5^6}$ **e** $\frac{1}{8^3}$ **f** $\frac{1}{10^8}$ **g** $\frac{1}{x^4}$ **h** $\frac{1}{a^2}$ **i** $\frac{9}{m^4}$ **j** $\frac{1}{(-7)^3}$ **k** 2^4 **l** $(\frac{6}{5})^2$ **2 a** $\frac{1}{9}$ **b** $\frac{1}{8}$ **c** $\frac{1}{64}$ **d** $\frac{1}{125}$ **e** $\frac{1}{100\ 000}$ **f** $\frac{1}{27}$ **g** $2\frac{1}{4}$

h $\frac{8}{27}$ **i** 16 **j** 16 **k** 27 **l** $1\frac{11}{25}$ **3 a** 3^{-2} **b** 3^{-5} **c** a^{-1} **d** y^{-2} **e** $4x^{-3}$ **f** $8x^{-5}$ **g** $7y^{-1}$ **h** $6a^{-4}$ **i** $3^{-1}x^{-4}$ **j** $5^{-3}a$ **k** $5^{-1}m^{-2}$ **l** $3m^{-3}n$ **4 a** $\frac{1}{25}$ **b** $\frac{1}{216}$

c $\frac{1}{64}$ **d** $\frac{1}{18}$ **e** $\frac{7}{8}$ **f** $\frac{1}{8}$ **g** $\frac{1}{125}$ **h** $\frac{2}{25}$ **i** $\frac{1}{200}$ **j** $\frac{1}{24}$ **k** 25 **l** $\frac{1}{27}$ **5 a** $x = -3$ **b** $x = 3$ **c** $x = -1$ **d** $x = -4$ **e** $x = 11$ **f** $x = 4$ **g** $x = 4$ **h** $x = -9$ **i** $x = 3$ **j** $x = 2$ **k** $x = 3$ **l** $x = -5$ **6 a** 3^2 **b** 2^3 **c** 5^{-3} **d** 8^{-14} **e** 7^7 **f** 6^{-16} **g** 7^{-14} **h** 4^{-21} **i** 8^{-2} **j** 4^{-9} **k** x^{12} **l** a

Answers

Page 17 **1** C **2** D **3** B **4** A **5** A **6** D **7** B **8** D **9** C **10** B **11** D **12** D **13** D **14** A **15** A

Page 18 **1** **a** $4x^6y^4$ **b** $\frac{1}{2x}$ **c** $15x^2$ **d** $9n^8$ **e** $63x^5$ **2** $8x - 17$ **3** 16 **4** **a** $x^2 - 2x - 24$ **b** $6x^2 + 29x + 35$ **c** $9a^2 - 4$ **d** $x^2 + 6x + 9$ **5** **a** $\frac{x}{5}$ **b** $\frac{xy}{5}$ **c** $\frac{4a}{9}$ **d** $\frac{5x}{7}$

Chapter 2 – Financial maths

Page 19 **1** **a** \$480 **b** \$2100 **c** \$5040 **d** \$24 375 **2** **a** \$900 **b** \$3840 **c** \$3150 **d** \$21 000 **e** \$845 **f** \$1237.50 **g** \$1125 **h** \$3300 **3** **a** \$2250 **b** \$9750

Page 20 **1** **a** \$3600 **b** \$3600 **2** **a** \$25 000 **b** \$12 500 **3** **a** 1 **b** 3 **4** **a** 5% **b** 8% **5** **a** 6 **b** 4.8% **6** **a** \$14 000 **b** \$19 390

Page 21 **1** **a** \$900 **b** \$3600 **c** \$1008 **d** \$4608 **e** \$192 **2** **a** \$972 **b** \$152 **3** **a** \$4800 **b** \$27 200 **c** \$37 440 **d** \$5440 **e** 5% **4** **a** \$1 380 000 **b** \$25 200

Page 22 **1** **a** $0.\dot{6}\%$ **b** 2% **c** 4% **d** $2.\dot{6}\%$ **2** **a** $0.5416\dot{6}\%$ **b** $0.8\dot{3}\%$ **3** **a** 2.25% **b** 1.5% **4** **a** 72 **b** 16 **c** 16 **d** 6 **5** **a** 20 **b** 3% **6** **a** 14% **b** 9.6% **c** 15% **d** 12.775%

Page 23 **1** **a** **i** \$10 **ii** \$111 **iii** \$249 **b** The principal has yet to be compounded with the interest earned in the first year. **2** **a** \$1198.08 **b** \$652.05 **c** \$2674.22 **d** \$1414.06 **e** \$4316.13

Page 24 **1** **a** \$3438.29 **b** \$3149.72 **c** \$7724.67 **d** \$45 384.93 **e** \$41 720.78 **f** \$5720.65 **2** **a** \$15 861.08 **b** \$36 405.78 **c** \$199 476.01 **d** \$68 436.52 **e** \$177 133.43

Page 25 **1** **a** \$7129.86 **b** \$7424.70 **c** \$7811.98 **d** \$5504.50 **e** \$5224.69 **f** \$4371.09 **2** **a** \$23 309.70 **b** \$25 866.66 **c** \$12 966.59 **d** \$31 388.93 **e** \$41 847.56

Page 26 **1** **a** \$12 750.40 **b** \$22 076 **c** \$20 529 **2** \$31 046.26

Page 27 **1** **a** \$12 459.01 **b** \$3478.44 **c** \$1107.42 **d** \$12 282.50 **2** **a** \$46 080 **b** \$43 920 **3** **a** 14961 **b** \$29 524.50

Page 28 **1** **a** \$4200 **b** \$4830.62 **2** 7.7% **3** **a** \$5400 **b** \$5407.33 **c** compound interest by \$7.33 **4** \$25 000 **5** 9

Page 29 **1** C **2** D **3** A **4** C **5** B **6** B **7** D **8** A **9** C **10** B **11** D **12** A **13** B **14** B **15** B

Page 30 **1** **a** \$11 712.80 **b** \$3712.80 **c** 11.6025% **2** **a** \$5120 **b** \$1687.44 **3** **a** \$2025 **b** \$11 475 **c** \$3213 **d** \$14 688 **e** \$306 **4** \$712.50 **5** 5 years **6** \$3477.60 **7** \$1910.30 **8** \$988 000

Chapter 3 – Equations, inequalities and formulae

Page 31 **1** **a** $x = 4$ **b** $x = 11$ **c** $x = -3$ **d** $x = 6$ **e** $x = 16$ **f** $a = 36$ **g** $m = -10$ **h** $n = 6$ **i** $x = 9$ **j** $a = -7$ **k** $p = 8$ **l** $t = 9$ **m** $x = 16$ **n** $a = 9$ **o** $x = -10$ **p** $m = 80$ **2** **a** $x = 5$ **b** $a = 2$ **c** $m = 7$ **d** $n = 6$ **e** $p = -3$ **f** $k = 1$ **g** $p = 4$ **h** $x = 25$ **i** $a = -4$ **j** $x = 12$ **k** $a = 14$ **l** $t = 25$ **m** $x = 9$ **n** $a = 15$ **o** $b = -14$ **p** $x = 20$ **q** $a = 12$ **r** $n = -9$

Page 32 **1** **a** $x = 7$ **b** $x = 9$ **c** $x = -5$ **d** $x = 3$ **e** $x = 6$ **f** $x = 1$ **g** $a = 0$ **h** $p = 2$ **i** $e = 1$ **j** $k = -3$ **k** $m = 1.2$ **l** $k = -1$ **m** $x = 2$ **n** $n = 4$ **o** $y = 2$ **p** $n = 8$ **q** $q = 2$ **r** $m = 17$ **2** **a** $x = 11$ **b** $q = -2$ **c** $a = 6$

Page 33 **1** **a** $x = 2$ **b** $x = 7$ **c** $x = -2$ **d** $x = 6$ **e** $x = 2$ **f** $x = -4$ **g** $x = 26$ **h** $x = -13$ **i** $x = -5$ **j** $x = 6$ **k** $x = -3$ **l** $x = 1$

2 **a** $a = 1$ **b** $x = 23$ **c** $m = 10$ **d** $y = -5$ **e** $a = 11$ **f** $k = 3$ **g** $m = 4$ **h** $a = -30$ **i** $m = -4\frac{1}{4}$ **j** $x = -1$ **k** $x = 2$ **l** $k = -8$

Page 34 **1** **a** $x = 15$ **b** $a = 16$ **c** $n = 15$ **d** $m = 78$ **e** $x = 7$ **f** $a = 17$ **g** $x = 2$ **h** $t = -5$ **i** $x = 6$ **j** $x = 1$ **k** $k = 4$ **l** $p = -3\frac{1}{2}$ **m** $n = 10$ **n** $x = -3$ **o** $k = 2$ **p** $e = -8$ **2** **a** $x = 8$ **b** $a = 32$ **c** $m = -19$ **d** $c = 1$ **e** $b = 9$ **f** $h = -4$

Page 35 **1** **a** $y = 6$ **b** $t = 84$ **c** $p = 32$ **d** $x = 40$ **e** $x = 10$ **f** $n = 1\frac{1}{3}$ **g** $y = 5\frac{1}{2}$ **h** $x = 1\frac{1}{14}$ **i** $p = 4\frac{2}{13}$ **j** $y = -7\frac{13}{17}$ **k** $x = \frac{10}{11}$ **l** $x = \frac{2}{17}$

2 **a** $a = -13$ **b** $m = 21$ **c** $t = 10$ **d** $m = 1$ **e** $x = 3\frac{3}{7}$ **f** $x = 10$ **g** $p = 3\frac{2}{5}$ **h** $x = 7\frac{2}{5}$ **i** $m = -1\frac{3}{7}$

Page 36 **1** **a** 4 **b** 20 **c** 7 **d** –15 **e** 90 **f** 12 **g** 27 **h** 26 **i** 9 **2** **a** 30, 32, 34 **b** 36 years **c** 14 years, 42 years

Page 37 **1** **a** 42 years **b** 14 years, 18 years **c** 20 years, 40 years **d** 28 years **2** **a** 12 cm, 48 cm **b** 40°, 60°, 80° **c** 30°, 60°, 90° **d** $x = 46$ **3** **a** $x = 8$ **b** 16 cm

Page 38 **1** **a** $x = 60$ **b** $x = 90$ **c** $x = 40$ **d** $x = 54$ **e** $x = 60$ **f** $x = 45$ **g** $x = 35$ **h** $x = 47$ **i** $x = 40$ **2** **a** $x = 2$ **b** $x = 5$ **c** $x = 9$ **d** $m = 19$ **e** $x = 25$ **f** $x = 20, y = 30$ **g** $a = 12$ **h** $x = 50$ **i** $x = 20, y = 22$

Page 39 **1** **a** $A = 40$ **b** $P = 34$ **c** $S = 444$ **d** $S = 156$ **e** $V = 64$ **f** $A = 100$ **g** $C = 37.68$ **h** $P = 12$ **i** $F = 63$ **j** $E = 75$ **k** $V = 38$ **l** $C = 87.92$ **m** $A = 154$ **n** $V = 125$ **2** **a** $P = 52$ **b** $l = 8$ **c** $b = 15$ **3** **a** $V = 192$ **b** $l = 5$ **c** $b = 6$ **d** $h = 9$ **4** **a** $A = 192$ **b** $h = 4$ **c** $x = 10$ **d** $y = 12$

Page 40 **1** **a** $a = \frac{F}{m}$ **b** $h = \frac{V}{lb}$ **c** $d = \frac{C}{\pi}$ **d** $c = P - a - b$ **e** $M = DV$ **f** $T = \frac{D}{S}$ **g** $b = \frac{P}{2} - l$ **h** $h = \frac{2A}{x + y}$ **i** $a = \frac{v - u}{t}$ **j** $h = \frac{2A}{b}$

k $s = \frac{v^2 - u^2}{2a}$ **l** $T = \frac{100I}{PR}$ **m** $m = \frac{2E}{v^2}$ **n** $l = \frac{2S}{n} - a$ **o** $m = \frac{y - b}{x}$ **2** **a** $k = \frac{18M}{5}$ **b** $r = \frac{C}{2\pi}$ **c** $h = \frac{3V}{\pi r^2}$ **d** $d = \frac{C}{a}$ **e** $n = \frac{t - a}{d} + 1$ **f** $T = \frac{PV}{R}$

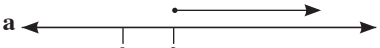
g $r = \sqrt[3]{\frac{3V}{4\pi}}$ **h** $P = A - I$ **i** $m = \frac{E}{c^2}$ **j** $A = \frac{3V}{h}$ **k** $a = S(1 - r)$ **l** $a = \frac{v^2 - u^2}{2s}$

Page 41 **1** **a** $S = 463.25$ **b** $S = 366.32$ **2** **a** $L = 42$ **b** $B = 45$ **3** **a** $h = 14$ **b** $h = 3.82$ **4** **a** $u = \pm 1$ **b** $a = 13.125$ **5** **a** $r = 57.3$ **b** $r = 8.7$ **6** **a** $u = 18$ **b** $t = 6$ **7** **a** $P = 6929.1$ **b** $P = 6753.4$

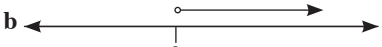
Page 42 **1** **a** $x < 3$ **b** $x \geq -7$ **c** $-1 \leq x \leq 5$ **d** $x \leq -4$ or $x \geq 2$ **e** $x \leq 0$ **f** $x > -4$

Answers

2 a



b



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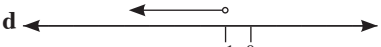

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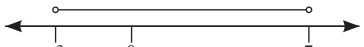
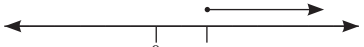


f



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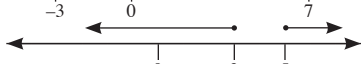
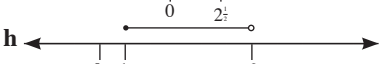
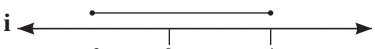


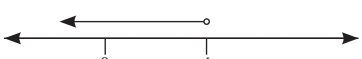
h



i



3 a $x < 4$



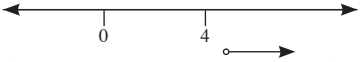
b $a > 8$

c $m > 4$

d $y \leq 4$

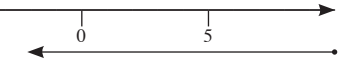
e $y < 7$

f $x > 5$



g $m \leq 9$

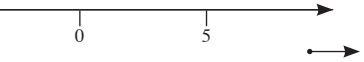
h $m \leq 11$



i $x \leq 5$

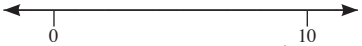
j $m \leq 14$

k $m \geq 10$

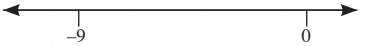


l $y < -9$

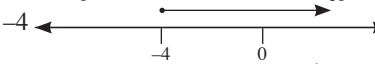
m $a \geq -4$



n $x \leq -4$



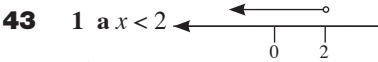
o $y > 2$



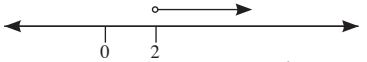
PAGE 43 **1 a** $x < 2$

b $m > 2$

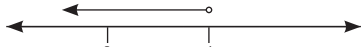
c $t < 4$



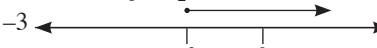
d $p \geq -3$



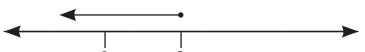
e $y \leq 3$



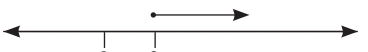
f $x \geq 2$



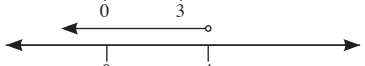
g $x < 4$



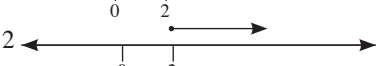
h $p \geq 2$



i $m < 2$

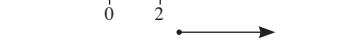


j $x \geq 3$



k $x < 6$

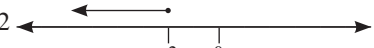
l $x \leq 8$



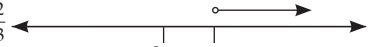
2 a $x < 4$ **b** $x < 4$ **c** $x \leq 2$ **d** $x \geq -1$ **e** $x \leq 4$ **f** $t \geq 2$ **g** $y < 2$ **h** $x \geq 2$ **i** $x \leq -1$ **j** $x \geq 5$ **k** $x < 5$ **l** $x \leq 2$ **m** $x < 6$ **n** $y > 5$ **o** $m \leq 1\frac{1}{5}$

PAGE 44 **1 a** True **b** False **c** True **d** False **e** True **f** False **g** True **h** False **2 a** $x > 4$ **b** $x < -4$ **c** $x < 4$ **d** $x > -4$ **e** $a \geq -3$ **f** $p < 2$ **g** $k \geq 2$ **h** $q > 14$ **i** $x > -7$ **j** $m \leq 2$ **k** $x \geq 18$ **l** $x < -4$ **3 a** $x \geq 1$ **b** $a < -2$ **c** $m > -6$ **d** $x \leq 2$ **e** $x > -10$ **f** $x \geq -7$ **g** $x \leq 8$ **h** $x \leq 1$ **i** $a > 70$ **j** $x \leq 9$ **k** $x \geq 17$ **l** $x < -13$

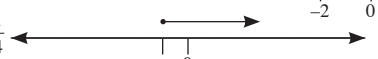
PAGE 45 **1 a** $y \leq -2$



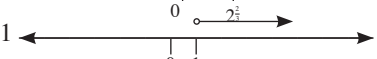
b $x > 2\frac{2}{3}$



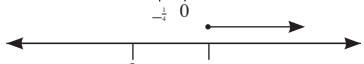
c $p \geq -\frac{1}{4}$



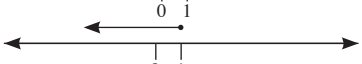
d $y > 1$



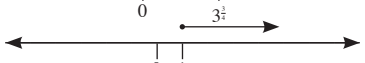
e $x \geq 3\frac{3}{4}$



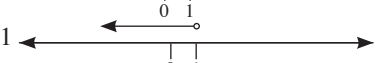
f $x \leq 1$



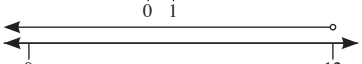
g $y \geq 1$



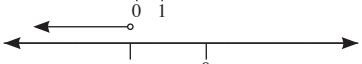
h $x < 1$



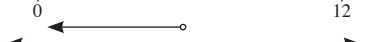
i $x < 12$



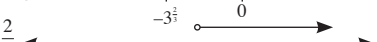
j $x < -3\frac{2}{3}$



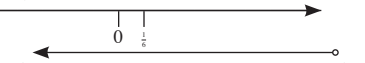
k $x \leq \frac{1}{6}$



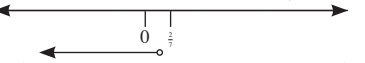
l $m > \frac{2}{7}$



2 a $a < 10$

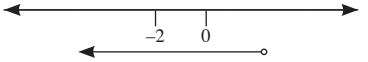


b $x < -2$



c $x \leq 3$

d $x < 4\frac{2}{17}$



Answers

e $p \leq -3\frac{1}{3}$ **f** $m < 36$ **g** $x \geq -1\frac{1}{4}$ **h** $t < 1$ **i** $x < 21$ **j** $x \leq 8\frac{1}{3}$ **k** $a \geq 14$ **l** $t \geq 15$

3 a $x > 5\frac{2}{3}$ **b** $y \leq 1\frac{1}{4}$ **c** $p \leq 4$ **d** $x \geq 5$ **e** $a > 1\frac{1}{2}$ **f** $x > -3\frac{1}{2}$ **g** $x < -12$ **h** $x \leq -1$ **i** $x > \frac{1}{2}$ **j** $x \leq 1$ **k** $x \leq 23$ **l** $y \geq -4$

PAGE 46 **1** A **2** C **3** A **4** C **5** A **6** C **7** D **8** D **9** B **10** A

PAGE 47 **1 a** $y = 5$ **b** $x = 1$ **c** $x = 4$ **d** $x = -3$ **e** $n = -9$ **f** $x = 12$ **2 a** $x > 5$ **b** $x \geq -1$ **3 a** 54 **b** 85.5 **4 a** $3x - 11 = 2x + 6$ **b** $x = 17$ **c** 40°

CHAPTER 4 – Simultaneous equations

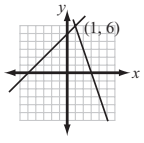
PAGE 48 **1** (other answers possible) **a** (0, 6), (1, 5), (2, 4), (3, 3) **b** (0, –4), (1, –3), (2, –2), (3, –1) **c** (0, 3), (1, 1), (2, –1), (3, –3) **d** (1, 2), (3, 1), (5, 0), (7, –1) **2 a** yes **b** yes **c** yes **d** no **e** no **f** no **3 a i** 0, 2, 4, 6 **ii** 6, 5, 4, 3 **b** $x = 2$ and $y = 4$ **4 a** 3, 4, 5, 6, 7; 15, 12, 9, 6, 3; (1, 6) **b** 1, 2, 3, 4, 5; 1, 3, 5, 7, 9; (–2, 1) **c** –6, –5, –4, –3, –2; –12, –9, –6, –3, 0; (1, –3)

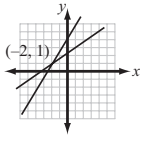
d 16, 14, 12, 10, 8; –12, –7, –2, 3, 8 (2, 8) **5 a** $x = 2, y = 3$ **b** $x = 1, y = 0$ **c** $x = 1, y = 1\frac{1}{3}$

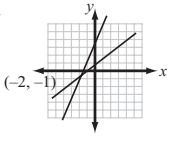
PAGE 49 **1** (other answers possible) **a** (0, 7), (1, 6), (2, 5) **b** (0, –9), (1, –8), (2, –7) **c** (0, 3), (2, 2), (4, 1)
d (0, 2), (3, 3), (6, 4) **e** (0, –2), (2, –1), (4, 0) **f** (0, 5), (1, 3), (2, 1) **g** (0, –8), (1, –5), (2, –2) **h** (0, 4), (3, 2), (6, 0)

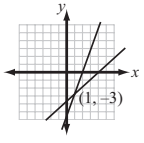
2 a yes **b** yes **c** no **d** no **e** no **f** no **3 a** $x = 6, y = 3$ **b** $x = 2$ and $y = 0$ **c** $x = 2, y = 2$ **d** $m = 4, n = 1$ **e** $x = 1, y = -\frac{2}{3}$ **f** $x = 1, y = 4$
g $x = 3, y = 1$ **h** $x = 1, y = 3$ **4 a** $x = 2, y = 4$ **b** $x = 3, y = 11$ **c** $x = 2, y = -2$ **d** $x = 2, y = 5$ **e** $x = 2, y = 1$ **f** $x = 2, y = 0$

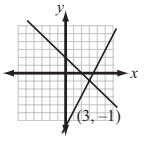
g $x = 1, y = -1\frac{1}{2}$ **h** $x = -1, y = -\frac{1}{3}$

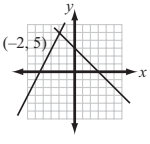
PAGE 50 **1 a** 

b 

2 a 

b 

3 a 

b 

PAGE 51 **1 a** $x = 9, y = 1$ **b** $p = 5, q = -2$ **c** $x = 3, y = 4$ **d** $x = 9, y = 3$ **e** $x = 0, y = 6$ **f** $x = 3, y = 1$ **2 a** $m = -3, n = 4\frac{2}{3}$
b $x = 3, y = 2$ **c** $x = \frac{1}{2}, y = -2$ **d** $x = 3, y = 7$

PAGE 52 **1 a** $a = 7, b = 4$ **b** $x = 6, y = 5$ **c** $m = 9, n = 5$ **d** $p = 4, q = 3$ **e** $x = 11, y = 9$ **f** $k = 5, d = -2$ **2 a** $x = 7, y = 2$
b $p = 8, q = 7$ **c** $a = 12, b = -2$ **d** $a = 7, b = 4$ **e** $m = 15, n = 6$ **f** $x = 9, y = 2$

PAGE 53 **1 a** $x = 5, y = 3$ **b** $x = 8, y = 3$ **c** $x = 1, y = 2$ **2 a** $a = 1, b = -1$ **b** $x = 3, y = 7$ **c** $x = -5, y = 7$ **d** $m = 4, n = -1$
e $a = -2, b = -5$ **f** $a = 8, b = 2$ **g** $x = 11, y = -3$ **h** $y = 10, z = 8$ **i** $m = -1, n = -4$

PAGE 54 **1 a** $x = 3, y = 2\frac{1}{2}$ **b** $x = 5, y = 1\frac{1}{3}$ **c** $x = 5, y = 1\frac{4}{5}$ **d** $x = 3, y = 4$ **e** $x = -2, y = 5$ **f** $x = -1, y = -5$

2 a $x = 4, y = 0$ **b** $x = 28, y = -18$ **c** $x = 1, y = 3$ **d** $x = 1\frac{1}{2}, y = -\frac{1}{2}$

PAGE 55 **1 a** $a = 5, b = 4\frac{1}{2}$ **b** $x = -19, y = 46$ **c** $x = 3\frac{1}{2}, y = 1\frac{1}{2}$ **2 a** $x = 3, y = -3$ **b** $x = -1\frac{1}{3}, y = 1$ **c** $m = 4, n = 0$
3 a $x = 6, y = 4$ **b** $x = 0, y = 3$ **c** $x = -4, y = 0$ **d** $x = 1, y = 4$ **e** $x = 5, y = 2$ **f** $x = -6, y = -5$

PAGE 56 **1 a** 15, 8 **b** 61, 19 **c** 27, 29 **d** 12, 24 **e** 17, 2 **f** apple 30c, orange 40c **2 a** 270 boys, 350 girls
b length 14 m, width 10 m **c** $m = 3, b = -2$ **d** Maths 75, English 55

PAGE 57 **1 a** $x = 4, y = 2$ **b** $x = 5, y = 1$ **c** $x = 26, y = 39$ **d** $x = 15, y = 15$ **e** $x = 12, y = 2$ **f** $x = 30, y = 60$ **2 a** $x = 80, y = 20$ **b** 120°

PAGE 58 **1** C **2** C **3** C **4** C **5** A **6** C **7** D **8** B **9** D **10** B

PAGE 59 **1 a** (3, 2) **b** (2, 0) **c** (4, 1) **2 a** $x = 2, y = 8$ **b** $x = 8, y = 1$ **c** x 6, $y = -\frac{1}{3}$ **d** $x = 4, y = -10$ **e** $p = 7, q = -1$
f $a = 9, b = -5$

CHAPTER 5 – Right-angled triangles and trigonometry

PAGE 60 **1 a** 25 m **b** 15.3 m **c** 85 cm **2 a** 15.6 m **b** 228 mm **c** 14.3 m **3 a** 11.4 m **b** 9.4 km **c** 14.5 m **d** 22.0 m **e** 23.0 m
f 68.5 cm

PAGE 61 **1 a** a = adj, b = opp, c = hyp **b** a = adj, b = hyp, c = opp **c** a = opp, b = adj, c = hyp **2 a** BC **b** EF **c** HI

3 a $\sin\theta = \frac{y}{z}, \cos\theta = \frac{x}{z}, \tan\theta = \frac{y}{x}$ **b** $\sin\theta = \frac{p}{r}, \cos\theta = \frac{q}{r}, \tan\theta = \frac{p}{q}$ **c** $\sin\theta = \frac{b}{c}, \cos\theta = \frac{a}{c}, \tan\theta = \frac{b}{a}$ **4 a** $\sin\theta = \frac{7}{25}, \cos\theta = \frac{24}{25}, \tan\theta = \frac{7}{24}$
b $\sin\theta = \frac{3}{5}, \cos\theta = \frac{4}{5}, \tan\theta = \frac{3}{4}$ **c** $\sin\theta = \frac{15}{17}, \cos\theta = \frac{8}{17}, \tan\theta = \frac{15}{8}$ **5 a** tan **b** cos **c** sin

Answers

Page 62 **1 a** 27° **b** 46° **c** 30° **d** 78° **e** 78° **f** 83° **g** 22° **h** 55° **i** 65° **2 a** 83°25' **b** 89°34' **c** 63°28' **d** 27°16' **e** 41°45' **f** 30°46' **g** 24°46' **h** 57°21' **i** 54°28' **3 a** 0.848 **b** 0.839 **c** 0.788 **d** 0.139 **e** 0.866 **f** 1.376 **4 a** 0.882 **b** 2.53 **c** 0.770 **d** 6.34 **e** 0.958 **f** 1.26 **g** 40.8 **h** 51.5 **i** 15.3 **5 a** 0.100 **b** 0.049 **c** 65.670 **d** 0.149 **e** 0.183 **f** 15.749 **g** 0.627 **h** 0.814 **i** 55.210 **6 a** 35° **b** 56° **c** 74° **d** 34° **e** 70° **f** 46° **g** 54° **h** 20° **i** 56° **7 a** 59°18' **b** 18°23' **c** 55°26' **d** 20°14' **e** 62°50' **f** 39°55' **g** 30°27' **h** 70°33' **i** 32°37'

Page 63 **1 a** 2.8 cm **b** 4.0 cm **c** 11.0 cm **d** 5.9 cm **e** 5.0 cm **f** 1.0 m **2 a** 38.83 mm **b** 20.38 mm **c** 62.93 mm **d** 4.75 cm **e** 4.80 cm **f** 7.35 cm

Page 64 **1 a** 11.40 cm **b** 8.75 cm **c** 15.40 cm **d** 10.64 cm **e** 23.60 cm **f** 12.91 cm **2 a** 85.2 mm **b** 201.8 mm **c** 38.9 mm **d** 278.1 mm **e** 26.2 mm **f** 538.3 mm **3 a** 10.10 cm **b** 7.98 cm **c** 17.36 cm

Page 65 **1 a** 53° **b** 46° **c** 30° **2 a** $\alpha = 30°10'$ **b** $\beta = 65°43'$ **c** $\theta = 23°41'$ **d** $\theta = 60°31'$ **e** $\alpha = 27°32'$ **f** $\beta = 67°4'$ **3 a** $\alpha = 57°9'$ **b** $\beta = 36°36'$ **c** $\theta = 58°50'$ **4 a** $\alpha = 35°25'$ **b** $\beta = 39°35'$ **c** $\theta = 60°56'$

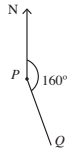
Page 66 **1** 11.4 cm **2** 2.14 m **3** $\theta = 42°43'$ **4** 8.40 cm **5** 12 m **6** 17.4 cm

Page 67 **1** 564 m **2** 81.04 m **3** 2° **4** 27 m **5** 54° **6** 55°

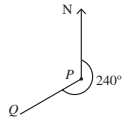
Page 68 **1** 41 m **2** 1°14' **3** 11°39' **4** 196 m **5** 44° **6** 119 m

Page 69 **1 a** 90° **b** 180° **c** 45° **d** $67\frac{1}{2}°$ **e** 45° **f** $67\frac{1}{2}°$ **2 a** ENE **b** SSE **c** WNW **d** SSW **e** NNW **f** ESE **3** 7.07 n miles **4 a** $\angle PRQ = 90°$, $\angle PQR = 45°$ so ΔPQR is isosceles **b** 113 km **5 a** 90° **b i** 23 km **ii** 30 km

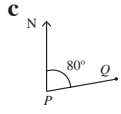
Page 70 **1 a** 125° **b** 067° **c** 235° **d** 290° **e** 140° **f** 210° **g** 125° **h** 248° **2 a**



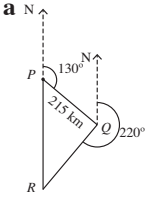
b



c



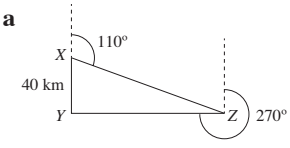
3 301° **4 a**

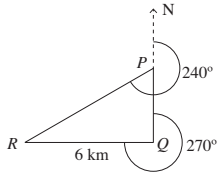


b 90° **c** 50° **d** 256 km

Page 71 **1** B **2** C **3** B **4** C **5** D **6** B **7** B **8** D **9** D **10** A

Page 72 **1** 19.5 m **2 a i** 045° **ii** 225° **b** 99 m **3 a**





b i 90° **ii** 60° **c** 6.9 km **4 a** 433 m **b** 516 m **c** 266 m **5 a**

b i 90° **ii** 70° **c** 117 km

Chapter 6 – Surface area and volume

Page 73 **1 a** $A = \frac{1}{2}bh$ **b** $A = s^2$ **c** $A = lb$ **d** $A = bh$ **e** $A = \frac{1}{2}h(a + b)$ **f** $A = \frac{1}{2}xy$ **g** $A = \frac{1}{2}xy$ **h** $A = \pi r^2$ **2 a** 10.32 cm^2 **b** 56 cm^2 **c** 40.74 cm^2 **d** 27.52 cm^2 **e** 1385.44 cm^2 **f** 106 cm^2 **g** 288.3 cm^2 **h** 96 cm^2 **i** 49 cm^2

Page 74 **1 a** 520 cm^2 **b** 1947 cm^2 **c** 24 cm^2 **2 a** 348 m^2 **b** 600 m^2 **c** 1028.3 cm^2 **d** 235.6 cm^2 **e** 1764 m^2 **f** 850 cm^2

Page 75 **1 a** 325.58 m^2 **b** 447.6 m^2 **c** 168.2 cm^2 **d** 308.5 cm^2 **e** 50.3 cm^2 **f** 100.5 m^2 **g** 88.2 cm^2 **h** 34.4 cm^2 **i** 222.5 cm^2

Page 76 **1 a** 164.4 cm^2 **b** 27 500 cm^2 **c** 13.1 m^2 **d** 25.2 cm^2 **e** 508.9 cm^2 **f** 19.3 cm^2

Page 77 **1 a** 1032 cm^2 **b** 2649.92 cm^2 **c** 138.24 m^2 **2 a** 81.72 m^2 **b** 2408.98 mm^2 **3 a** 267.2 cm^2 **b** 589.8 cm^2 **c** 863.6 cm^2

Page 78 **1 a** 336 cm^2 **b** 720 cm^2 **c** 1195.8 cm^2 **d** 4697.4 cm^2

Page 79 **1 a** 864 m^2 **b** 5212 cm^2 **c** 8999.5 m^2 **d** 4602.8 cm^2

Page 80 **1 a i** 78.54 cm^2 **ii** 439.82 cm^2 **b i** 415.48 cm^2 **ii** 2456.73 cm^2 **c i** 4.52 m^2 **ii** 27.90 m^2 **d i** 47.78 mm^2 **ii** 480.29 mm^2 **2 a** 26.88π cm^2 **b** 2.97π m^2 **c** 96π m^2 **d** 702π mm^2

Page 81 **1 a i** 20.4 cm^2 **ii** 29.4 cm^2 **iii** 49.8 cm^2 **b i** 42.5 m^2 **ii** 35.9 m^2 **iii** 78.4 m^2 **c i** 14.1 m^2 **ii** 70.7 m^2 **iii** 84.8 m^2 **d i** 3620 mm^2 **ii** 14 600 mm^2 **iii** 18 200 mm^2 **2** 60.3 m^2 **3** 3.8 m^2

Page 82 **1 a** 1600 cm^2 **b** 510 cm^2 **c** 38 m^2 **d** 2200 cm^2

Page 83 **1 a** 1944 cm^3 **b** 26.9 m^3 **c** 14 000 cm^3 **d** 1892.4 m^3 **2 a** 110 cm^3 **b** 2.3 m^3 **c** 13 000 cm^3 **3 a** 270 cm^3 **b** 11 074 cm^3 **c** 4560 cm^3 **4 a** 39 m^3 **b** 2520 cm^3 **c** 175 m^3

Page 84 **1 a** 1600 cm^3 **b** 410 cm^3 **c** 17 m^3 **2 a** 9052 cm^3 **b** 1472 cm^3 **c** 764.7 m^3 **d** 132.7 cm^3

Page 85 **1 a** 750 cm^3 **b** 1200 cm^3 **c** 9.2 m^3 **d** 13 m^3 **e** 1.1 m^3 **f** 49 m^3 **2 a** 19.09 cm^3 **b** 1272.79 cm^3 **c** 4.07 m^3 **d** 2.24 m^3 = 2 237 751 cm^3 **3 a i** $V = 6283$ cm^3 **ii** $V = 12\,566$ cm^3 (has the larger volume) **b** No; the surface area of the first cylinder is 600π cm^2 while for the second cylinder it is 1200π cm^2. **4 a** 2 times **b** 4 times

Page 86 **1 a** 40π cm^3 **b** 40π cm^3 **c** 40π cm^3 **d** 40π cm^3 **2 a** 2460 m^3 **b** 2150 cm^3 **c** 1.53 m^3 **d** 21.3 m^3 **e** 452 cm^3 **f** 15 000 cm^3

Answers

Page 87 **1 a** 1.98 m^3 **b** 1980 L **c** 28 cm **2 a** 22.75 m^2 **b** 120.5 m^2 **c** 115.1 m^2 **d** 18 L **3 a** 0.08 m^3 **b** 94
Page 88 **1** C **2** C **3** B **4** B **5** D **6** B **7** C **8** B **9** A **10** C
Page 89 **1 a** 260 cm^3 **b** 250 cm^2 **2 a** 1885 cm^3 **b** 1.885 L **c** 911 cm^2 **3 a** 2.4 m **b** 2.4 m^2 **c** 7.68 m^3 **d** 27.84 m^2
Page 90 **4 a** 1809 cm^2 **b** 86 830 cm^3 **5** 6.72 m^2 **6 a** 16.9 cm **b** 183.6 cm^2 **c** 660.8 cm^3

Chapter 7 – Further algebra

Page 91 **1 a** $5(x + 2)$ **b** $3(x + 2)$ **c** $8(y + 2)$ **d** $m(m + 1)$ **e** $2x(x + 2)$ **f** $3x(y + 2)$ **g** $3a(2a - 1)$ **h** $3(m + 5)$ **i** $x(9 + y)$ **j** $4(x + 4)$
k $5b(b + 2a)$ **l** $3(m + 7)$ **m** $3m(2 - n)$ **n** $5(x + 3)$ **o** $y(a - 1)$ **p** $7m(n - 2p)$ **q** $xy(xy - z)$ **r** $8m^2n(n - 2)$ **2 a** $-3(x + 2)$ **b** $-4(a + 2)$
c $-5(y + 3)$ **d** $-m(m - 1)$ **e** $-x(x - 5)$ **f** $-l(l - 2m)$ **g** $-x(1 - 4x)$ **h** $-m(4 - m)$ **i** $-x(3 + 2x)$ **j** $-6a(1 + 3a)$ **k** $-7(y - 3)$ **l** $-8x(1 - 2y)$
m $-3(a + 3)$ **n** $-5xy(1 - 3xy)$ **o** $-ay(ay - 1)$ **3 a** $a(b + c + d)$ **b** $p(x + y + z)$ **c** $ab(2a + 3ab - 5c)$ **d** $5m(m^2 + 2m + 3)$
e $2(a + 2b + 3c)$ **f** $3x(4x + 5y + 6z)$ **g** $xy(xy + y + x)$ **h** $3a^2b(3 - 4b)$ **i** $5(a^2 - b^2 - 2c^2)$ **j** $6mp(1 + 2m - 3mp)$ **k** $3a(b - 2c - 3d)$
l $12x^2y^2(1 - 3xy)$ **4 a** $2a^2b^3(4 - 5ab^2)$ **b** $2x(8y + 3x^2)$ **c** $3pq^2(3p^2 + 4q^3)$ **d** $3abc^2(2ac - 3)$ **e** $3x^2y^4(4x - 5y^2)$ **f** $2ab^2c(ab - 4)$
g $5p^2q^5(2 - 5p)$ **h** $14x^4y(2y^6 + 3)$ **i** $2a^4b^2c^6(1 - 6abc)$ **j** $3tu^3(3t - 2u)$ **k** $5xy(3xy - 2x^2 + 4y^2)$ **l** $8pq^2(3q^2 + 2pq + 1)$
Page 92 **1 a** $(x + 2)(y + z)$ **b** $(b + 3)(a + 7)$ **c** $(2x + 3)(m + 5)$ **d** $(7 + x^2)(y^2 + 8)$ **e** $(p - 3)(p - 2)$ **f** $(a + 7)(t - 5)$
g $(x - 1)(y - 2)$ **h** $(m - n)(a - b)$ **i** $(x + y)(6 + z)$ **j** $(m - n)(x - y)$ **k** $(3x - 5)(2a - 1)$ **l** $(3a - 2)(p - q)$ **2 a** $(a + b)(x + y)$
b $(2 + y)(a + b)$ **c** $(x + 7)(a + b)$ **d** $(x^2 + z^2)(1 - y)$ **e** $(x + 1)(x^2 + 1)$ **f** $(b + 1)(a + 1)$ **3 a** $(a + d)(b + c)$ **b** $(a - b)(a + 7)$
c $(a - 1)(a^2 + 5)$ **d** $(m + n)(a - b)$ **e** $(pq - 1)(pq + a)$ **f** $(x - 3y)(3x + 8)$ **4 a** $(x - 1)(x^2 + 3)$ **b** $(y^2 + 1)(y + 1)$ **c** $(9 + 4a)(a - b)$
d $(q - p)(pq + 7)$ **e** $(a - 2)(m - 5)$ **f** $(3x + 2)(y + z)$
Page 93 **1 a** $(x + 2)(x - 2)$ **b** $(x + 3)(x - 3)$ **c** $(x + 4)(x - 4)$ **d** $(x + 1)(x - 1)$ **e** $(x + 5)(x - 5)$ **f** $(x + 6)(x - 6)$ **g** $(a + b)(a - b)$
h $(x + y)(x - y)$ **i** $(m + n)(m - n)$ **j** $(a + 7)(a - 7)$ **k** $(y + 8)(y - 8)$ **l** $(t - 9)(t + 9)$ **m** $(p + 2q)(p - 2q)$ **n** $(x - 3y)(x + 3y)$
o $(m + 5n)(m - 5n)$ **p** $(5a - b)(5a + b)$ **q** $(7x + y)(7x - y)$ **r** $(8p - q)(8p + q)$ **s** $(2x + 3y)(2x - 3y)$ **t** $(3m + 4n)(3m - 4n)$
u $(4x + 5y)(4x - 5y)$ **2 a** $(x + 11)(x - 11)$ **b** $(5y + 4)(5y - 4)$ **c** $(1 + 2y)(1 - 2y)$ **d** $(10x + 7y)(10x - 7y)$ **e** $(y + 2z)(y - 2z)$
f $(1 + 5m)(1 - 5m)$ **g** $(7m + 10n)(7m - 10n)$ **h** $(4a + 7)(4a - 7)$ **i** $(3x + 5y)(3x - 5y)$ **j** $(3x + 4y)(3x - 4y)$ **k** $(a + bc)(a - bc)$
l $(ab + c)(ab - c)$ **m** $(6x + 7y)(6x - 7y)$ **n** $(p + 8q)(p - 8q)$ **o** $(5 + 8a)(5 - 8a)$ **3 a** $(12 + 5a)(12 - 5a)$ **b** $(a + x)(a - x)$
c $(4x + 3y)(4x - 3y)$ **d** $(2x + 5)(2x - 5)$ **e** $(9a + 11b)(9a - 11b)$ **f** $(2x + 1)(2x - 1)$ **g** $(9 + z)(9 - z)$ **h** $(4a + 7)(4a - 7)$
i $(3y + 10)(3y - 10)$ **j** $(2a + 7)(2a - 7)$ **k** $(6y + x)(6y - x)$ **l** $(4x + 9y)(4x - 9y)$ **m** $(1 + 10x)(1 - 10x)$ **n** $(m + 13)(m - 13)$
o $(5x + 11y)(5x - 11y)$ **4 a** $(x + 2)(x - 2)(x^2 + 4)$ **b** $(1 - x)(1 + x)(1 + x^2)$ **c** $(x + 5)(x - 1)$ **d** $(y + 6)(y - 4)$ **e** $(x + 1)(x - 7)$ **f** $4(x + 4)$
Page 94 **1 a** $(x + 3)(x + 4)$ **b** $(x - 2)(x - 3)$ **c** $(x + 1)(x + 2)$ **d** $(x + 2)^2$ **e** $(y - 3)(y - 4)$ **f** $(m + 2)(m + 6)$ **g** $(a + 3)^2$
h $(x + 4)(x + 7)$ **i** $(n + 3)(n - 1)$ **j** $(x + 2)(x + 7)$ **2 a** $(x - 3)(x - 5)$ **b** $(y - 6)(y + 2)$ **c** $(x + 6)(x - 1)$ **d** $(x + 9)(x + 10)$
e $(x + 6)(x - 2)$ **f** $(m - 8)(m + 7)$ **g** $(x - 4)(x + 1)$ **h** $(y - 7)(y + 1)$ **3 a** $x(x - 8)$ **b** $(m + 5)(m + 1)$ **c** $(t - 3)(t + 2)$ **d** $(y - 4)(y - 5)$
e $(a - 9)(a + 2)$ **f** $(x + 4)^2$ **g** $x(x - 12)$ **h** $(y - 3)(y - 8)$
Page 95 **1 a** $2(a + 2)(a + 3)$ **b** $3(x + 4)(x - 1)$ **c** $4(x + 4)(x + 5)$ **d** $2(x - 1)(x - 3)$ **e** $3(m - 4)(m - 5)$ **f** $3(t + 9)(t - 1)$
g $2(x + 2)(x + 9)$ **h** $4(a - 2)(a - 6)$ **i** $5(y - 1)(y - 2)$ **j** $6(n - 1)(n - 6)$ **2 a** $3(x - 3)(x - 6)$ **b** $2(y - 4)(y - 6)$ **c** $(a - 5)(a - 6)$
d $5(m + 7)(m - 2)$ **e** $3(n + 7)(n - 3)$ **f** $6(p + 7)(p - 4)$ **g** $4(y + 7)(y - 5)$ **h** $2(n - 7)(n + 6)$ **3 a** $a(m + 5)(m - 4)$ **b** $2(t + 2)(t + 5)$
c $2(y - 3)(y - 6)$ **d** $3(x - 3)(x - 7)$ **e** $p(n - 3)(n - 9)$ **f** $2(x - 3)(x - 10)$ **g** $b(a + 7)(a - 1)$ **h** $2(y + 1)(y + 7)$
Page 96 **1 a** $3(x + 3)(x - 3)$ **b** $5(a + 2)(a - 2)$ **c** $3(x - 2)(x - 3)$ **d** $14a(1 - 3a)$ **e** $(a^2 + 4b^2)(a + 2b)(a - 2b)$
f $(4a + 9b)(4a - 9b)$ **g** $3(x - 3)(x - 4)$ **h** $12t(1 - 4t)$ **i** $(a + 5b)(a - 5b + 4)$ **j** $(2m - 3n + 5p)(2m - 3n - 5p)$ **k** $(1 + 7t)(1 - 7t)$
l $(a + 2)(3a - 4b)$ **2 a** $4y(2 - 3y)$ **b** $x(x + 1)(x - 1)$ **c** $4a(a - 2)$ **d** $4(x + 3)(x - 1)$ **e** $9(x - 1)$ **f** $5(t + 2)(t + 5)$
g $(8 + abc)(8 - abc)$ **h** $(a + 1)(b + c)$ **i** $(ab + c)(ab - c)$ **j** $(x + 6)(x - 4)$ **k** $3(x + 1)(x + 2)$ **l** $(x - 3)(x - 13)$ **m** $(mn + 1)(mn - 1)$
n $4a(a - x)$ **o** $(a - 1)(m + n)$
Page 97 **1 a** $7(x - 1)$ **b** $(x + 3)(x - 3)$ **c** $(m + 5)(m - 5)$ **d** $x(x - 2y)$ **e** $-5(m + n)$ **f** $a(y + b)$ **g** $4a(a - 2)$ **h** $(x + y)(2 + m)$
i $(x + 11)(x - 11)$ **j** $a^2(a - 3b)$ **k** $n(n - 9)$ **l** $(3x + 4y)(3x - 4y)$ **m** $3(x - 2)$ **n** $-a(a + 2 + y)$ **2 a** $6y(3 - 2y)$ **b** $4a(a - x)$
c $(a + 1)(b + c)$ **d** $(mn + 1)(mn - 1)$ **e** $(ab + c)(ab - c)$ **f** $(x - y + z)(x - y - z)$ **g** $x(x + 1)(x - 1)$ **h** $(m^2 + 1)(m + 1)$ **i** $(y - 7)(x + m)$
j $(m + n)(a - 1)$ **3 a** $(x + 6)(x - 4)$ **b** $(x - 9)(x + 3)$ **c** $(t - 4)(t + 2)$ **d** $(x - 3)(x - 7)$ **e** $(a - 2)(a - 3)$ **f** $(x - 2)(x + 1)$ **g** $(m + 5)^2$
h $(y - 4)(y - 5)$ **4 a** $4(x + 3)(x - 1)$ **b** $2(x - 2)(x - 3)$ **c** $3(x + 2)(x + 1)$ **d** $2(x + 1)(x + 2)$ **e** $9(x - 2)(x + 1)$ **f** $3(x - 5)(x + 2)$
Page 98 **1 a** $x = \pm 3$ **b** $x = \pm 4$ **c** $x = \pm 5$ **d** $x = \pm 1$ **e** $x = \pm 2$ **f** $x = \pm 8$ **g** $x = \pm 6$ **h** $x = \pm 7$ **i** $x = \pm 11$ **j** $x = \pm 20$ **k** $x = \pm 25$
l $x = \pm 37$ **m** $x = \pm 10$ **n** $x = \pm 9$ **o** $x = \pm 13$ **p** $x = \pm 30$ **q** $x = \pm 6$ **r** $x = \pm 3$ **s** $x = \pm 5$ **t** $x = \pm 12$ **2 a** $x = \pm 4.80$ **b** $m = \pm 7.28$
c $y = \pm 2.41$ **d** $k = \pm 4.36$ **3 a** $x = 2\frac{1}{2}$ or $-2\frac{1}{2}$ **b** $x = \frac{4}{3}$ or $-\frac{4}{3}$ **c** $x = \frac{5}{4}$ or $-\frac{5}{4}$ **d** $x = \frac{3}{2}$ or $-\frac{3}{2}$ **e** $x = \frac{1}{3}$ or $-\frac{1}{3}$ **f** $x = 1$ or -1 **g** $x = 3$ or -3
h $x = 3$ or -3 **i** $x = \frac{3}{2}$ or $-\frac{3}{2}$ **j** $x = \frac{6}{5}$ or $-\frac{6}{5}$ **k** $x = 2$ or -2 **l** $x = -3$ or -7
Page 99 **1 a** $x = 1$ or 2 **b** $x = 2$ or -3 **c** $x = 1$ or 3 **d** $x = 0$ or -5 **e** $x = 0$ or 4 **f** $x = 3$ or 7 **g** $x = 3$ or 5 **h** $x = -1$ or 3
i $x = -2$ or 4 **j** $x = -3$ or 3 **k** $x = -2$ or 2 **l** $x = -5$ or 5 **m** $x = -1$ or 6 **n** $x = -3$ or -2 **o** $x = 0$ or -8 **2 a** $x = 0$ or $\frac{1}{2}$
b $x = -6$ or $\frac{1}{2}$ **c** $x = -1$ or $\frac{2}{3}$ **d** $x = 2$ or $\frac{1}{3}$ **e** $x = 0$ or $\frac{1}{2}$ **f** $x = 0$ or 2 **g** $x = -3$ or $\frac{1}{3}$ **h** $x = 0$ or $2\frac{1}{2}$ **i** $x = 0$ or 1 **j** $x = 0$ or $-\frac{1}{3}$
k $x = 3$ **l** $x = 0$ or 3 **3 a** $x = 4$ or 5 **b** $x = 8$ or -8 **c** $x = 0$ or 3 **d** $x = 0$ or 2 **e** $x = 7$ or 9 **f** $x = -1$ or 5 **g** $x = -4$ or $\frac{1}{2}$
h $x = -1\frac{1}{2}$ or $1\frac{1}{2}$ **i** $x = -\frac{5}{4}$ or $\frac{4}{5}$

Answers

Page 100 **1** **a** $x = 0$ or 5 **b** $x = 0$ or 4 **c** $x = 0$ or 2 **d** $x = 0$ or -7 **e** $x = 0$ or -5 **f** $x = 0$ or -9 **g** $x = 0$ or 4 **h** $x = 0$ or 9 **i** $x = 0$ or 12 **j** $x = 0$ or 2 **k** $x = 0$ or -8 **l** $x = 0$ or 10 **m** $x = 0$ or -7 **n** $x = 0$ or $\frac{1}{5}$ **o** $x = 0$ or -3 **2** **a** $x = 0$ or 4 **b** $x = 0$ or -5 **c** $x = 0$ or 1 **d** $x = 0$ or 2 **e** $x = 0$ or 1 **f** $x = 0$ or 1 **g** $x = 0$ or $-\frac{1}{3}$ **h** $x = 0$ or $\frac{7}{3}$ **i** $x = 0$ or $\frac{3}{5}$ **j** $x = 0$ or 3 **k** $x = 0$ or 3 **l** $x = 0$ or $\frac{1}{2}$

Page 101 **1** **a** $x = -3$ or -2 **b** $x = 7$ or -5 **c** $x = 6$ or -1 **d** $x = -3$ or -4 **e** $x = 2$ or 3 **f** $x = -8$ or 6 **g** $x = 4$ **h** $x = 3$ or -5 **i** $x = -4$ or -5 **j** $x = 3$ or 5 **k** $x = 2$ or -6 **l** $x = 5$ or -2 **m** $x = -5$ or -6 **n** $x = 2$ or 7 **o** $x = 4$ or -7 **p** $x = 11$ or -9 **q** $x = -2$ or -4 **r** $x = 1$ or -7 **s** $x = 1$ or 5 **t** $x = -4$ **u** $x = 10$ or -6 **2** **a** $x = 6$ or -3 **b** $x = 5$ or 8 **c** $x = -9$ or 4 **d** $x = 6$ or 9 **e** $x = 6$ or -4 **f** $x = 3$ or -8

Page 102 **1** **a** 9 **b** 25 **c** $\frac{81}{4}$ **d** 16 **e** $6\frac{1}{4}$ **f** 49 **g** 36 **h** 49 **i** 81 **j** $12\frac{1}{4}$ **k** $2\frac{1}{4}$ **l** $30\frac{1}{4}$ **2** **a** 9, 3 **b** 4, 2 **c** 1, 1 **d** 25, 5 **e** $\frac{9}{4}, \frac{3}{2}$ **f** $\frac{49}{4}, \frac{7}{2}$ **3** **a** $x = -1$ or -4 **b** $x = -3 \pm \sqrt{5}$ **c** $x = 4 \pm \sqrt{15}$ **d** $x = \frac{-9 \pm \sqrt{97}}{2}$ **e** $x = -1$ or -6 **f** $x = -1$ or 9 **g** $x = -1$ or 6 **h** $x = -5 \pm \sqrt{30}$ **i** $x = -4$ or 1 **j** $x = -2$ **k** $x = -6 \pm 2\sqrt{11}$ **l** $x = 5 \pm 2\sqrt{7}$

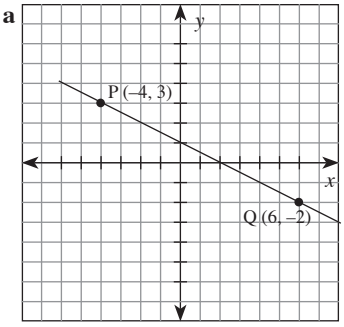
Page 103 **1** **a** $x = 1$ **b** $x = 3$ **2** **a** $x = -4$ or 3 **b** $W = 3$ cm and $L = 5$ cm **3** **a** -5 or 6 **b** 0 or 9 **c** 3 and 4

Page 104 **1** D **2** C **3** D **4** B **5** C **6** D **7** C **8** A **9** C **10** A

Page 105 **1** **a** $3(a + 2b - 4)$ **b** $(m + 6)(m - 6)$ **c** $6ab^3c(a - 2bc)$ **d** $(a - b)(x + y)$ **e** $(x + 3)(x + 4)$ **f** $(a - 3)(a - 6)$ **g** $(m - 10)(m + 8)$ **h** $(p + 9)(p - 4)$ **i** $2(n + 3)(n + 5)$ **j** $4(1 - x)(1 + x)$ **2** **a** $x = \pm 12$ **b** $x = \pm 4$ **c** $x = 0$ or 5 **d** $x = 4$ or 7 **e** $x = \pm 2$ **f** $x = 0$ or 15 **g** $x = 3$ or 9 **h** $x = -4$ or -9 **i** $x = 9$ or -10 **j** $x = 4$ or -1

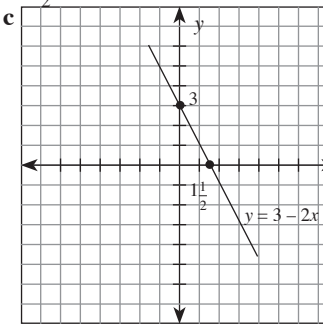
Chapter 8 – Linear and non-linear relationships

Page 106 **1** **a** $\frac{3}{4}$ **b** (2, 4) **c** 10 units **2** **a**



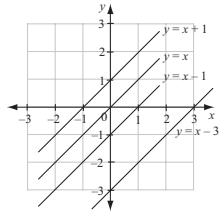
b $-\frac{1}{2}$ **c** 1 **d** $y = -\frac{1}{2}x + 1$

3 **a** -2 **b** 3 **c**

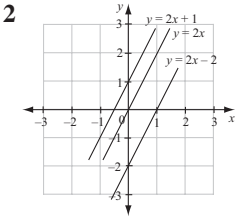


4 **a** (–1, 3) **b** $\frac{3}{4}$ **c** 20 units

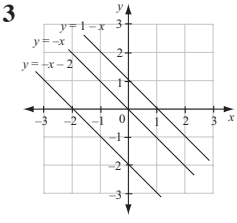
Page 107 **1**



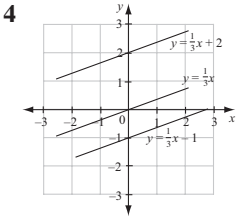
2



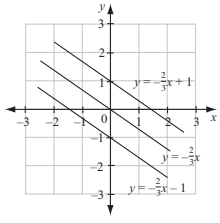
3



4



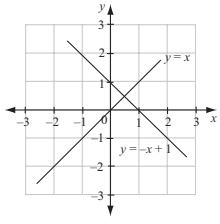
5



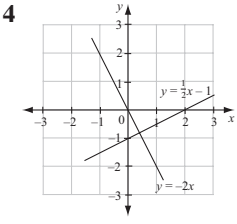
6 parallel

Page 108 **1** **a** -1 **b** -1 **c** -1 **d** -1 **e** -1 **f** -1 **g** -1 **h** -1 **2** negative one

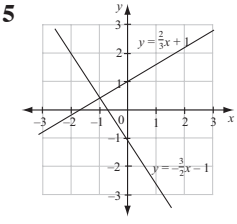
3



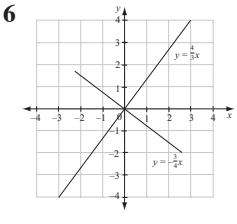
4



5



6



7 perpendicular

Page 109 **1** **a** the same **b** negative reciprocal **2** **a** parallel **b** neither **c** perpendicular **d** perpendicular **e** parallel **f** perpendicular **g** neither **h** perpendicular **3** **a** $y = 3x + 2$ **b** $y = -2x + 2$ **c** $y = \frac{1}{2}x + 2$ **d** $y = -\frac{5}{3}x + 2$ **4** **a** $y = -\frac{1}{4}x$ **b** $y = 3x$

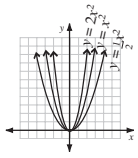
Answers

c $y = \frac{1}{2}x$ **d** $y = -\frac{2}{3}x$ **5** **a** $\frac{2}{3}$ **b** $\frac{2}{3}$ **c** $-\frac{3}{2}$ **d** 90°

PAGE 110 **1** **a** yes **b** no **c** yes **d** yes **e** yes **f** yes **g** yes **h** no **2** **a** no **b** yes **c** no **d** yes **e** no **f** yes **g** no **h** yes
3 **a** parallel **b** parallel **c** neither **d** perpendicular **e** perpendicular **f** neither **g** parallel **h** perpendicular **4** **a** $3x - y - 1 = 0$
b $4x - 5y = 0$ **c** $x - 2y + 8 = 0$ **d** $x + y + 1 = 0$

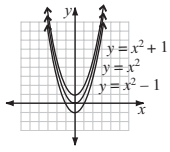
PAGE 111 **1**

x	–3	–2	–1	0	1	2	3
$y = x^2$	9	4	1	0	1	4	9
$y = 2x^2$	18	8	2	0	2	8	18
$y = \frac{1}{2}x^2$	$4\frac{1}{2}$	2	$\frac{1}{2}$	0	$\frac{1}{2}$	2	$4\frac{1}{2}$



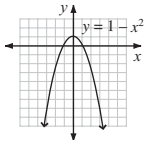
2

x	–3	–2	–1	0	1	2	3
$y = x^2$	9	4	1	0	1	4	9
$y = x^2 + 1$	10	5	2	1	2	5	10
$y = x^2 - 1$	8	3	0	–1	0	3	8

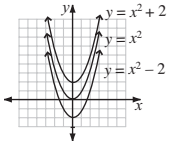


3

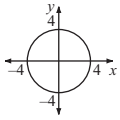
x	–3	–2	–1	0	1	2	3
$1 - x^2$	–8	–3	0	1	0	–3	–8

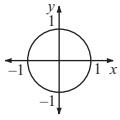


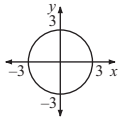
a $x = 0$ **b** (0, 1) **c** $y = 1$ **d** $x = -1, x = 1$ **e** $y = 1$

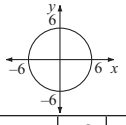
4 

d While sketching $y = x^2 + 2$, move the parabola $y = x^2$ 2 units vertically upwards and for the parabola $y = x^2 - 2$ move 2 units vertically downwards.

PAGE 112 **1** **a** (0, 0), 2 units **b** (0, 0), 7 units **c** (0, 0), $\frac{2}{3}$ units **d** (0, 0), 9 units **2** **a** $x^2 + y^2 = 9$ **b** $x^2 + y^2 = 49$ **c** $x^2 + y^2 = 4$
d $x^2 + y^2 = 100$ **3** **a** $x^2 + y^2 = 4$ **b** $x^2 + y^2 = 25$ **c** $x^2 + y^2 = 64$
4 **a** $r = 4$, centre (0, 0) 

b $r = 1$, centre (0, 0) 

c $r = 3$, centre (0, 0) 

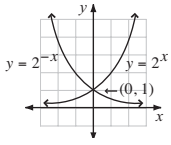
d $r = 6$, centre (0, 0) 

PAGE 113 **1** **a**

x	–2	–1	0	1	2	3
$y = 2^x$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

b

x	–3	–2	–1	0	1	2	3
$y = 2^{-x}$	8	4	2	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$



2 a

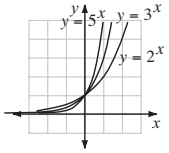
x	–2	–1	0	1	2	3
$y = 2^x$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

b

x	–1	0	1	2	3
$y = 3^x$	$\frac{1}{3}$	1	3	9	27

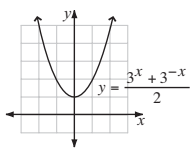
c

x	–2	$-1\frac{1}{2}$	–1	$-\frac{1}{2}$	0	$\frac{1}{2}$	1	2
$y = 5^x$	0.04	0.1	0.2	0.5	1	2.2	5	25



3

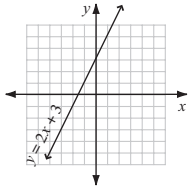
x	–1	0	1	2	3
3^x	$\frac{1}{3}$	1	3	9	27
3^{-x}	3	1	$\frac{1}{3}$	$\frac{1}{9}$	$\frac{1}{27}$
$\frac{3^x + 3^{-x}}{2}$	1.7	1	1.7	4.6	13.5



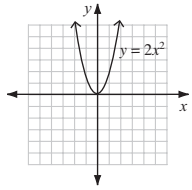
Answers

Page 114 **1** **a** straight line **b** parabola **c** straight line **d** parabola **e** parabola **f** straight line **g** parabola **h** exponential **i** none of these **j** circle **k** exponential **l** circle **2** **a** D **b** H **c** F **d** G **e** I **f** C **g** A **h** B **i** E **j** L **k** J **l** K

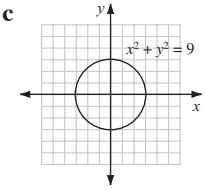
3 **a**



b



c



Page 115 **1** A **2** D **3** C **4** A **5** A **6** B **7** C **8** A **9** D **10** D

Page 116 **1** **a** $y = 2x - 3$ **b** 2 **c** -3 **d** yes **2** **a** -1 **b** 1 **c** yes, gradients multiply to -1 **d** $(1\frac{1}{2}, 1\frac{1}{2})$ **e** yes, both have gradient 1 **f** $x^2 + y^2 = 9$ **g** inside **3** **a** parabola **b** -2 **c** $\frac{1}{2}$ **d** 16

Chapter 9 – Geometric reasoning

Page 117 **1** **a** 138 (a revolution) **b** 40 (straight angle) **c** 35 (vertically opposite) **d** $a = 70$ (straight angle) **e** $x = 55$ (complementary angles) **f** $x = 70$ (straight angle) **g** $x = 120$ (corresponding angles) **h** $x = 70$ (co-interior angles) **i** $x = 40$ (alternate angles) **j** $x = 50$ (angle sum of triangle) **k** $x = 60$ (equilateral triangle) **l** $x = 139$ (exterior angle of a triangle) **m** $x = 80$ (a quadrilateral) **n** $x = 230$ (a quadrilateral) **o** $x = 36$ (a quadrilateral)

Page 118 **1** **a** $x = 45$ (vertically opposite angles) **b** $x = 56$ (co-interior angles, vert opp angles, parallel line) **c** $x = 70$ (angle sum of isosceles Δ) **d** $x = 155$ (exterior angle Δ) **e** $a = 105$ (exterior angle, isosceles Δ) **f** $x = 110$ (co-interior angles, parallel line; rhombus is a parallelogram) **2** **a** $x = 123$, $y = 57$ **b** $a = 115$, $b = 65$ **c** $x = 55$ **d** $x = 135$, $y = 80$ **e** $x = 95$, $y = 85$ **f** $x = 150$, $y = 50$ **g** $x = 70$, $y = 110$ **h** $x = 65$, $y = 115$ **i** $x = 69$

Page 119 **1** **a** 4 **b** 720° **c** 120° **2** **a** 540° **b** 1080° **c** 1800° **3** **a** 108° **b** 135° **c** 150° **4** 360° **5** **a** 36° **b** 144° **6** **a** 130 **b** 30 **c** 51° (nearest degree)

Page 120 **1** 35° **2** 45° **3** 30°, 60° **4** 30°, 60°, 90° **5** 13 cm **6** 55° **7** 60° **8** 44° **9** 47° **10** 60°

Page 121 **1** 50° **2** 127° **3** 38° **4** **a** $x° + y°$ **b** $x° + y°$ **c** yes, sides opposite equal angles **5** teacher

Page 122 teacher

Page 123 **1** **a** shape, size **b** equal, equal **c** $\angle A$, $\angle B$, $\angle C$ **d** $\equiv$ **e** 3 sides **f** two angles and a corresponding side **g** two sides and the included angle **h** hypotenuse and one side **2** **a** AAS **b** RHS **c** SSS **d** SAS **3** **a** $\angle F = \angle H$; $\angle FEG = \angle HGE$; $\angle FGE = \angle HEG$ **b** $EF = HG$; $FG = EH$; EG is common **4** **a** KLM **b** LJK

Page 124 **1** **a** $AD = CD$ (given); $AB = CB$ (given); $DB = DB$ (common); SSS = SSS; Δs are congruent **b** $EF = GH$ (given); $EH = GF$ (given); $FH = HF$ (common); SSS = SSS; Δs are congruent **2** $AB = AC$ (given); $BD = CD$ (given); $AD = AD$ (common); SSS = SSS; Δs are congruent **3** **a** $AB = DC$ (given); $AO = DO$ (radius); $BO = CO$ (radius); SSS = SSS; Δs are congruent **b** $\angle AOB = \angle DOC$ (corresponding; angles of congruent triangles); **4** $BE = CE$ (given); $AB = DC$ (given); $AE = DE$ (given); SSS = SSS; Δs are congruent

Page 125 **1** **a** $BC = EF$ (given); $\angle C = \angle F$ (given); $AC = DF$ (given); SAS = SAS; Δs are congruent **b** $PQ = RS$ (given); $\angle PQS = \angle RSQ$ (given); $QS = SQ$ (common); SAS = SAS; Δs are congruent **2** **a** $AD = CB$ (given); $\angle ADB = \angle CBD$ (given); $BD = DB$ (common); SAS = SAS; Δs are congruent **b** $EI = GI$ (given); $\angle EIF = \angle GIH$ (vert. opp $\angle$s); $FI = HI$ (given); SAS = SAS; Δs are congruent **3** $AD = BC$ (opp sides of a square); $\angle D = \angle B$ (each is 90°); $DF = BE$ (halves of opp sides of a square); SAS = SAS; Δs are congruent **4** $BM = CN$ (given); $\angle MBC = \angle NCB$ (given); $BC = BC$ (common); SAS = SAS; Δs are congruent; hence $BN = CM$ (corresponding sides of congruent triangles)

Page 126 **1** **a** $\angle DAC = \angle BCA$ (alt $\angle$s); $\angle DCA = \angle BAC$ (alt $\angle$s); $AC = AC$ (common); AAS = AAS; Δs are congruent **b** $\angle A = \angle D$ (given); $\angle AEB = \angle DEC$ (vert opp $\angle$s); $AE = DE$ (given); AAS = AAS; Δs are congruent **2** $\angle M = \angle N$ (each is 90°); $\angle MOP = \angle NOQ$ (vert opp $\angle$s); $OP = OQ$ (radius); AAS = AAS; Δs are congruent **3** $\angle DAE = \angle BCF$ (halves of the opp $\angle$s of a $\parallel$ gm); $\angle D = \angle B$ (opp $\angle$s of a $\parallel$ gm); $AD = CB$ (opp sides of a $\parallel$ gm); AAS = AAS; Δs are congruent **4** $\angle AED = \angle BDC$ (corresponding $\angle$s); $\angle ADE = \angle BCD$ (corresponding $\angle$s); $ED = CD$ (given); AAS = AAS; Δs are congruent

Page 127 **1** **a** $\angle ADB = \angle ADC$ (each is 90°); Hyp AB = Hyp AC (given); $AD = AD$ (common); RHS = RHS; Δs are congruent **b** $\angle D = \angle C$ (each is 90°); Hyp AE = Hyp BE (given); $AD = BC$ (given); RHS = RHS; Δs are congruent **2** $\angle ODA = \angle ODB$ (each is 90°); Hyp OA = Hyp OB (radius); $OD = OD$ (common); RHS = RHS; Δs are congruent **3** **a** $\angle A = \angle C$ (each is 90°); Hyp BD = Hyp BD (common); $AB = CD$ (given); RHS = RHS; Δs are congruent **b** $\angle PTQ = \angle RTS$ (each is 90°); Hyp PQ = Hyp RS (given); $PT = RT$ (given); RHS = RHS; Δs are congruent **4** $\angle B = \angle D$ (each is 90°); Hyp AE = Hyp CE (given); $AB = CD$ (given); RHS = RHS; Δs are congruent

Page 128 **1** **a** $AB = CD$ (given); $OA = OC$ (radius); $OB = OD$ (radius); SSS = SSS; Δs are congruent **b** $\angle PQS = \angle RSQ$ (each is 90°); $\angle P = \angle R$ (given); $QS = QS$ (common); AAS = AAS; Δs are congruent **c** $\angle BAC = \angle DEC$ (alt $\angle$s); $\angle ACB = \angle ECD$ (vert opp $\angle$s); $AB = DE$ (given); AAS = AAS; Δs are congruent **2** **a** $\angle C = \angle F$ (each is 90°); Hyp AB = Hyp DE (given); $AC = DF$ (given); RHS = RHS; Δs are congruent **b** $GH = JK$ (given); $\angle G = \angle J$ (given); $GI = JL$ (given); SAS = SAS; Δs are congruent **c** $AB = CD$ (given); $AD = CB$ (given); $BD = BD$ (common); SSS = SSS; Δs are congruent **d** $AB = AD$ (given); $BC = DC$ (given); $AC = AC$ (common); SSS = SSS; Δs are congruent

Answers

3 $\angle A = \angle C$ (each is 90°); Hyp BD = Hyp BD (common); $AB = CB$ (given); RHS = RHS; Δs are congruent

Page 129 **1** $\angle ADN = \angle BAM$ (each is 90°); Hyp AN = Hyp BM (given); $DN = AM$ (halves of opp sides of a square); RHS = RHS; Δs are congruent; $\angle DNA = \angle AMB$ (corresponding $\angle$s of congruent Δs) **2** $OA = OC$ (radius); $\angle AOB = \angle COD$ (vert opp $\angle$s); $OB = OD$ (radius); SAS = SAS; Δs are congruent **3** $AB = CD$ (given); $AD = CB$ (given); $AC = AC$ (common); SSS = SSS; Δs are congruent **4** $AE = CE$ (given); $\angle BEA = \angle DEC$ (vert opp $\angle$s); $BE = DE$ (given); SAS = SAS; Δs are congruent **5** $\angle D = \angle C$ (each is 90°); $DA = CB$ (given); Hyp AB = Hyp AB (common); RHS = RHS; Δs are congruent

Page 130 **1** $\angle ADB = \angle ADC$ (each is 90°); Hyp AB = Hyp AC (given); $AD = AD$ (common); RHS = RHS; Δs are congruent **2** $\angle B = \angle C$ (given); $\angle BAD = \angle CAD$ (given); $AD = AD$ (common); AAS = AAS; Δs are congruent; hence $AB = AC$ (corresponding sides of congruent Δs) **3** $\angle ADB = \angle ADC$ (each is 90°); Hyp AB = Hyp AC (given); $AD = AD$ (common); RHS = RHS; Δs are congruent; $BD = CD$ (corresponding sides of congruent Δs) and $\angle BAD = \angle CAD$ (corresponding $\angle$s of congruent Δs) **4** $AB = AC$ (given); $\angle B = \angle C$ ($\angle$s opposite to equal sides); $DE \parallel BC$ (given); $\angle ADE = \angle B$ (corresponding $\angle$s); $\angle AED = \angle C$ (corresponding $\angle$s); but $\angle B = \angle C$ $\angle ADE = \angle AED = \angle C = 65°$

Page 131 **1** In ΔADB and ΔCBD; $AB = CD$ (given); $AD = CB$ (given); $BD = BD$ (common); SSS = SSS; Δs are congruent; $\angle A = \angle C$ (corresponding $\angle$s of congruent Δs). Similarly by joining AC, it can be proved $\angle B = \angle D$ **2** $PQ = RQ$ (given); $PS = RS$ (given); $QS = QS$ (common); SSS = SSS; Δs are congruent; $\angle P = \angle R$ (corresponding $\angle$s of congruent Δs)
3 In ΔAEB and ΔCED; $AE = CE$ – (given); $\angle AEB = \angle CED$ (vertically opposite $\angle$s); $BE = DE$ (given); SAS = SAS; Δs are congruent; $\angle ABE = \angle CDE$; but these are alt $\angle$s; $AB \parallel DC$ and $AB = DC$ (corresponding sides of congruent Δs); $ABCD$ is a parallelogram

4 E is the midpoint of AB and F is the midpoint of BC; $EF \parallel AC$ and $EF = \frac{1}{2}AC$; Similarly $HG \parallel AC$ and $HG = \frac{1}{2}AC$; $EF \parallel HG$ and $EF = HG$, hence $EFGH$ is a parallelogram

Page 132 **1 a** $a = 65$ and $b = 25$ (corresponding $\angle$s of congruent Δs) **b** $x = 20$, $y = 70$ (corresponding $\angle$s of congruent Δs) **c** $x = 12$ cm (corresponding sides of congruent Δs) $y = 93$ (corresponding $\angle$s of congruent Δs) **2 a** $x = 90$ **b** $x = 90$, $y = 45$ **c** $x = 75$, $y = 40$, $z = 65$ **3 a** $x = 42$, $y = 48$ **b** $y = 15$, $m = 63$

Page 133 **1 a** $\parallel\parallel\parallel$ **b** two angles **c** same ratio **d** one angle, in the same ratio **e** hypotenuse, side, right-angled **2 a** alternate angles, parallel lines **b** vertically opposite **c** DEC **d** equiangular **e** 2 **3 a** common angle **b** corresponding angles, parallel lines **c** ABC **d** equiangular **4 a** $\frac{2}{3}$ **b** $\frac{2}{3}$ **c** 2 sides in proportion, included angle **d** 1.5 **e** $\angle A = \angle D$, $\angle B = \angle E$, $\angle C = \angle F$, **f** $AC = DF$, $BC = EF$, $AB = DE$

Page 134 **1 a** True **b** False **c** False **d** False **e** False **f** False **g** False **h** True
2 a $\angle A = \angle A$ (common); $\angle D = \angle B$ (corresponding $\angle$s); $\angle E = \angle C$ (corresponding $\angle$s); Δs are similar

b $\angle M = \angle Q$ (each is 90°); $\angle MNL = \angle QNP$ (vertically opposite $\angle$s); $\angle L = \angle P$; Δs are similar **c** $\frac{EF}{BC} = \frac{ED}{BA} = \frac{DF}{AC} = \frac{1}{2}$ Δs are similar

3 a $\frac{AC}{DC} = \frac{BC}{EC} = \frac{1}{4}$ $\angle ACB = \angle DCE$ (vertically opposite $\angle$s) **b** $\angle P = \angle P$ (common); $\angle PST = \angle PQR$ (corresponding $\angle$s); $\angle PTS = \angle PRQ$ (corresponding $\angle$s); Δs are similar **c** $\frac{AO}{CO} = \frac{BO}{DO}$ and $\angle$AOB = $\angle$COD (vertically opposite $\angle$s)

Page 135 **1 a** $x = 6\frac{2}{3}$, $y = 6$ **b** $x = 60°$, $y = 60°$, $z = 60°$ **c** $x = 8$, $y = 20$ **d** $x = 16$, $y = 12.5$ **2 a** $x = 15$, $y = 61$ **b** $x = 26$, $y = 5$ **c** $y = 9$ **d** $x = 4$

Page 136 **1** B **2** D **3** D **4** C **5** B **6** A **7** C **8** D **9** B **10** A

Page 137 **1 a** $\Delta OCA \equiv \Delta OCB$ **b** RHS **c** $OA = OB$, $AC = BC$, $OC = OC$ **d** $\angle OCA = \angle OCB$, $\angle OAC = \angle OBC$, $\angle AOC = \angle BOC$ **2 a** opposite sides of the rectangle are equal **b** both 90°, angles of a rectangle **c** opposite sides of a rectangle are equal **d** SAS **e** corresponding sides of congruent triangles **3 a** $BC = DA$ (given); $\angle BCA = \angle DAC$ (given); $AC = AC$ (common); SAS = SAS and hence Δs are congruent **b** $\angle BAC = \angle DCA$ (corresponding $\angle$s of congruent Δs). But these are alternate $\angle$s $AB \parallel DC$ **c** They are corresponding angles of congruent triangles. **d** $ABCD$ is a parallelogram because both pairs of opposite sides are parallel. The result shows that opposite angles of a parallelogram are equal. **4 a** equiangular $\angle ABC = \angle ADE$ (corresponding $\angle$s); $\angle ACB = \angle AED$ (corresponding $\angle$s); $\angle A = \angle A$ – (common); $\Delta ABC \parallel\parallel\parallel \Delta ADE$ **b** 4 cm

Chapter 10 – Probability

Page 138 **1 a** 1 **b** 4 **c** unlikely **d** impossible **e** likely **f** certain **2 a** $\frac{1}{6}$ **b** $\frac{1}{2}$ **c** $\frac{2}{3}$ **3 a** $\frac{3}{10}$ **b** $\frac{1}{5}$ **c** $\frac{1}{2}$ **d** 0 **e** $\frac{7}{10}$ **f** $\frac{4}{5}$ **4 a** $\frac{1}{52}$ **b** $\frac{1}{13}$ **c** $\frac{1}{2}$ **d** $\frac{1}{4}$ **e** $\frac{1}{26}$ **f** $\frac{3}{4}$ **5 a** $\frac{2}{5}$ **b** $\frac{1}{4}$ **c** $\frac{3}{4}$ **d** $\frac{13}{20}$ **e** $\frac{13}{20}$ **f** $\frac{1}{4}$ **6 a** $\frac{1}{26}$ **b** $\frac{1}{13}$ **c** $\frac{25}{26}$ **d** $\frac{3}{26}$ **e** $\frac{5}{26}$ **f** $\frac{21}{26}$

Page 139 **1 a** $\frac{1}{8}$ **b** $\frac{3}{8}$ **c** $\frac{7}{8}$ **2 a** 12 **b** $\frac{2}{3}$ **c** $\frac{1}{3}$ **d** $\frac{1}{2}$ **3 a** $\frac{3}{10}$ **b** $\frac{1}{10}$ **c** $\frac{3}{5}$ **4 a** $\frac{1}{8}$ **b** $\frac{3}{8}$ **c** $\frac{3}{8}$ **d** $\frac{1}{2}$ **e** $\frac{1}{2}$ **f** $\frac{1}{8}$

Page 140 **1 a**

–	1	2	3	4	5	6
1	0	1	2	3	4	5
2	1	0	1	2	3	4
3	2	1	0	1	2	3
4	3	2	1	0	1	2
5	4	3	2	1	0	1
6	5	4	3	2	1	0

b $\frac{1}{6}$ **c** 0 **d** $\frac{5}{6}$ **2 a** 90 **b** 58 **c** 36 **d** $\frac{7}{30}$ **e** $\frac{73}{90}$ **3 a** 123, 132, 213, 231, 312, 321 **b** $\frac{1}{6}$ **c** $\frac{1}{3}$ **d** $\frac{1}{3}$ **e** $\frac{2}{3}$ **f** $\frac{1}{2}$ **4 a** men 110; women 100; drivers 128; passengers 82; total 210 **b** 44 **c** 110 **d** $\frac{36}{55}$ **e** $\frac{9}{16}$ **f** $\frac{11}{25}$ **g** $\frac{22}{41}$ **h** $\frac{12}{35}$ **i** $\frac{22}{105}$

Answers

Page 141 **1** not affect **2** **a** independent **b** independent **c** dependent **d** independent **e** dependent **3** **a** $\frac{1}{2}$ **b** $\frac{1}{6}$ **c** $\frac{1}{12}$ **4** **a** $\frac{1}{2}$ **b** $\frac{1}{2}$ **c** $\frac{1}{2}$ **d** $\frac{1}{8}$ **5** **a** $\frac{1}{2}$ **b** $\frac{1}{2}$ **c** $\frac{1}{4}$ **d** $\frac{9}{100}$ **e** $\frac{1}{25}$ **f** $\frac{3}{10}$ **g** $\frac{16}{25}$ **h** $\frac{9}{25}$ **6** **a** $\frac{1}{8}$ **b** $\frac{1}{27}$ **c** $\frac{1}{216}$ **d** $\frac{8}{27}$ **e** $\frac{19}{27}$ **f** $\frac{91}{216}$

Page 142 **1** **a** affects **2** **a** independent **b** independent **c** dependent **d** dependent **e** independent **3** **a** $\frac{1}{200}$ **b** $\frac{5}{999}$ **c** $\frac{4}{999}$ **d** $\frac{1}{49\,950}$ **4** **a** $\frac{1}{2}$ **b** $\frac{4}{9}$ **c** $\frac{2}{9}$ **d** $\frac{1}{15}$ **e** $\frac{1}{45}$ **f** $\frac{1}{3}$ **g** $\frac{28}{45}$ **h** $\frac{17}{45}$ **5** **a** $\frac{1}{11}$ **b** $\frac{1}{55}$ **c** 0 **d** $\frac{14}{55}$ **e** $\frac{41}{55}$ **f** $\frac{5}{11}$

Page 143 **1** **a** $\frac{1}{12}$ **b** $\frac{7}{12}$ **c** $\frac{1}{3}$ **d** $\frac{1}{4}$ **2** **a** $\frac{1}{12}$ **b** $\frac{1}{2}$ **c** $\frac{1}{2}$ **d** $\frac{5}{12}$ **e** $\frac{7}{36}$ **f** $\frac{1}{6}$ **3** $\frac{1}{2}$ **4** **a** 6 **b** $\frac{1}{2}$ **c** $\frac{1}{3}$ **5** **a** $\frac{1}{8}$ **b** $\frac{3}{8}$ **c** $\frac{1}{2}$ **d** $\frac{1}{2}$

Page 144 **1** **a** 12 possible outcomes **b** $\frac{1}{2}$ **2** **a** $\frac{1}{3}$ **b** $\frac{1}{27}$ **c** $\frac{4}{27}$ **d** $\frac{4}{9}$ **3** **a** $\frac{1}{8}$ **b** $\frac{1}{8}$ **c** $\frac{1}{4}$ **d** $\frac{3}{8}$ **4** 0.08 **5** $\frac{1}{256}$ **6** 0.343 **7** **a** $\frac{3}{20}$ **b** $\frac{51}{380}$ **c** $\frac{3}{190}$ **d** $\frac{68}{95}$ **e** $\frac{27}{95}$ **f** $\frac{51}{190}$

Page 145 **1** **a** $\frac{1}{6}$ **b** $\frac{1}{3}$ **c** $\frac{1}{2}$ **d** 1 **2** **a** $\frac{1}{3}$ **b** $\frac{1}{12}$ **c** $\frac{1}{6}$ **3** **a** $\frac{2}{3}$ **b** $\frac{1}{3}$ **c** $\frac{2}{3}$ **d** $\frac{1}{2}$ **e** $\frac{1}{2}$ **f** $\frac{1}{2}$ **4** **a** $\frac{25}{144}$ **b** $\frac{1}{16}$ **c** $\frac{7}{16}$ **d** $\frac{5}{33}$ **e** $\frac{1}{22}$ **f** $\frac{5}{11}$ **g** $\frac{20}{99}$ **h** 0 **i** $\frac{3}{11}$ **5** $\frac{1}{18}$

Page 146 **1** **a** no **b** The events are not equally likely **2** **a** no **b** The events are independent **3** **a** yes **b** There are 26 letter and x is 1 of those letters and each letter is equally likely to be drawn. **4** **a** no **b** Each letter of the alphabet will not appear the same number of times on the page so the events are not equally likely **5** **a** no **b** The events are independent and the die is fair. **6** **a** 27.1% **b** Bill found the probability of rain on every day.

Page 147 **1** C **2** B **3** D **4** C **5** D **6** A **7** C **8** C **9** C **10** B

Page 148 **1** **a** $\frac{1}{26}$ **b** $\frac{1}{104}$ **2** **a** $\frac{7}{30}$ **b** $\frac{7}{30}$ **c** $\frac{1}{15}$ **d** $\frac{7}{15}$ **e** $\frac{7}{15}$ **f** $\frac{14}{15}$ **3** **a** $\frac{1}{8}$ **b** $\frac{7}{8}$ **c** $\frac{1}{4}$ **d** $\frac{3}{4}$ **4** **a** $\frac{1}{216}$ **b** $\frac{1}{27}$ **c** At each toss the probability of getting a 6 is twice what it was before, but when these are multiplied together it is 8 times greater.

Chapter 11 – Data representation and interpretation

Page 149 **1** **a** data **b** frequency **c** distribution **d** frequency distribution table **e** frequency histogram **f** cumulative **g** relative
2 **a** 7 **b** 8 **c** 7.54 **d** 7 **3** **a** 2 **b** 5 **c** 5 **d** 7 **4** **a** **b** 7.8 **c** 8 **d** 8 **e** 5 **5** **a** 43.45 **b** 58 **c** 45.5 **d** 42 **e** negatively skewed

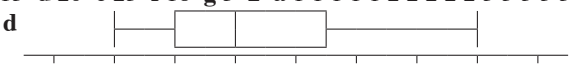
Score (x)	Frequency (f)	$f \times x$	Cumulative frequency
5	2	10	2
6	6	36	8
7	8	56	16
8	9	72	25
9	7	63	32
10	5	50	37
Total	37	287	

Page 150 **1** **a** 1 **b** 9 **c** 8 **d** 5 **e** 3 **f** 7 **2** **a** 10 **b** 25 **c** 17.5 **d** 13 **e** 20 **f** 7 **3** **a** 171 **b** 164 **c** 176 **d** 12
4 **a** 1, 2, 4, 5, 7, 7, 9, 9, 9, 12, 13, 14, 16 **b** 9 **c** 4.5 **d** 12.5 **e** 8 **5** **a** 23, 24, 29, 30, 31, 31, 32, 34, 35, 38, 38, 40 **b** 29.5 **c** 36.5
6 **a** 11 **b** 9.5 **c** 3 **d** 5

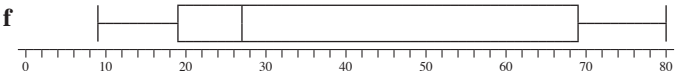
Page 151 **1** **a** 27.5 **b** 23 **c** 29 **d** 6 **2** **a** 100% **b** 50% **c** 25% **d** 75% **e** 25% **f** 50% **g** 75% **h** 25% **i** 25% **j** 50% **3** **a** 46 **b** 69 **c** 58 **d** 78 **e** 20 **f** 50 **g** 70.5 **h** 59 **i** 78 **j** 19 **k** 10M by 4 **l** 10F by 1 **m** 10M **4** **a** 18 **b** 4 **c** interquartile range; the range is affected by the outlier (2)

Page 152 **1** **a** **i** 8 **ii** 3 **b** **i** 14 **ii** 9 **c** **i** 1.0 **ii** 0.6 **d** **i** 0.9 **ii** 0.55 **2** **a** **i** 16 **ii** 11 **iii** 19 **iv** 8 **b** **i** 37 **ii** 36 **iii** 39 **iv** 3 **c** **i** 65 **ii** 52.5 **iii** 72 **iv** 19.5 **d** **i** 11 **ii** 10 **iii** 13 **iv** 3 **3** **a** **i** 6 **ii** 4.5 **iii** 7 **iv** 2.5 **b** **i** 18 **ii** 18 **iii** 20 **iv** 2.0

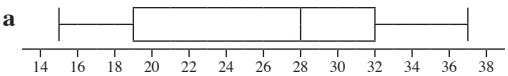
Page 153 **1** **a** 14 **b** 27 **c** 13 **d** 20 **e** 23 **f** 18 **g** 5 **2** **a** 1 1 1 1 1 2 2 2 2 2 3 3 3 3 3 3 4 4 4 4 4 5 5 6 6 7 7 7 **b** **i** 1 **ii** 7 **iii** 3 **iv** 4.5 **v** 2 **c** [1, 2, 3, 4.5, 7] **d**



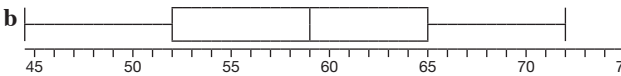
3 **a** 9 **b** 80 **c** 27.5 **d** 19 **e** 69 **f**



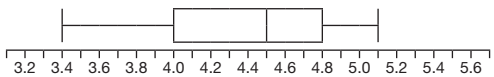
Page 154 **1** **a**



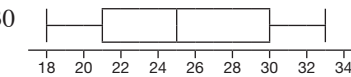
b



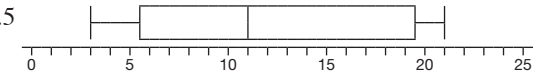
c

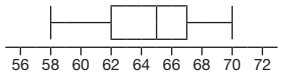


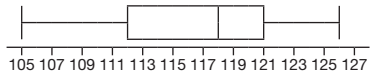
2 **a** $Q_1 = 21$, $Q_2 = 25$, $Q_3 = 30$



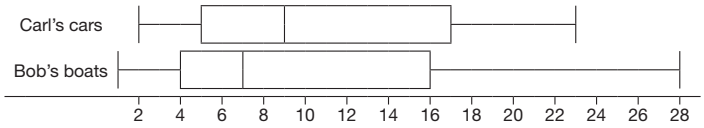
b $Q_1 = 5.5$, $Q_2 = 11$, $Q_3 = 19.5$



c $Q_1 = 62$, $Q_2 = 65.5$, $Q_3 = 67$ 

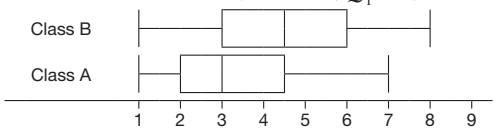
d $Q_1 = 112$, $Q_2 = 118$, $Q_3 = 121$ 

PAGE 155 **1 a** McDonald's; 16 **b** lower quartile **c** McDonald□s, positive **d** 45 **2 a i** [1, 4, 7, 16, 28] **ii** [2, 5, 9, 17, 23]

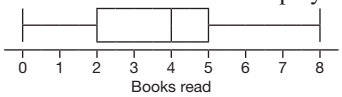
b 

c Interquartile range is the same for both. Bob□s boats has greater range. Both data sets are slightly positively skewed. Median is high for Carl's cars.

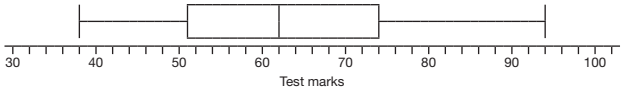
PAGE 156 **1 a** Class A; Min = 1, $Q_1 = 2$, Med = 3, $Q_3 = 4.5$, Max = 7, Class B; Min = 1, $Q_1 = 3$, Med = 4.5, $Q_3 = 6$, Max = 8

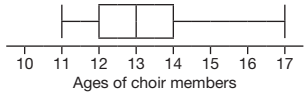
b 

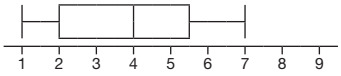
c Class B; this has a median time of 4.5 hours compared with 3 hours for class A. **d** The data for class A is positively skewed so more students in this class spent less time playing sport. The data for class B is symmetrical so there was an even spread of time. 75% of class A spent less than or equal to 4.5 hours playing sport while only 50% of class B fitted into that time category.

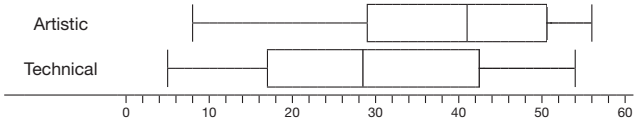
PAGE 157 **1 a** 4 **b** 2 **c** 5 **d** 

2 a 62 **b** 51 **c** 74

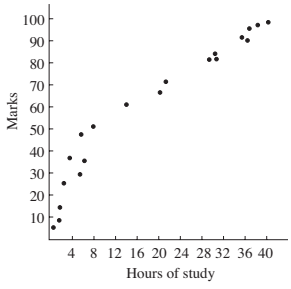
d 

3 

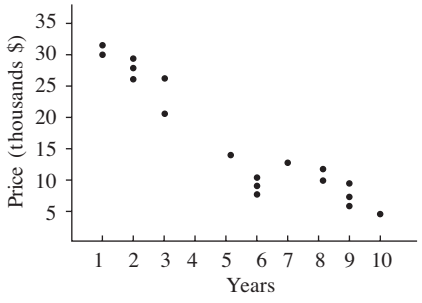
PAGE 158 **1 a** 57 **b** 28 **c** 4 **d** 2 **e** 5.5 **f** 

g From the box plot we can immediately see the median and other quartiles, but not the individual scores which can be seen on histogram. **2 a** positively skewed **b** the box plot will be positively skewed, the median will be closer to the lower quartile than upper and closer to the lower extreme than upper extreme. **3 a** technical **b** negatively skewed **c i** [8, 29, 41.5, 50.5, 56] **ii** [5, 17, 28.5, 42.5, 54] **d** 

e Stem-and-leaf plot shows all the scores and shape. Shape can also be seen with the box plot as well as measures of spread.

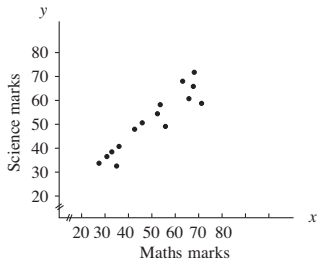
PAGE 159 **1 a** 

b As the hours of study increase the marks also increase. The relationship is not linear.

2 a 

b Around $18 000. Using the pattern from the scatter plot.

PAGE 160 **1 a** No relationship **b** strong positive **c** strong negative **d** weak negative **e** weak positive **f** no relationship

2 a 

b 65. Most students have science marks that are close to their maths marks.

PAGE 161 **1 a** The line connects the price at points in time. **b** The mean is affected by outliers and is not a true picture of the 'average' **c** $510 000 **d** In around October/November of 2009. **e** About $30 000 **f** Global financial crises

Answers

2 a

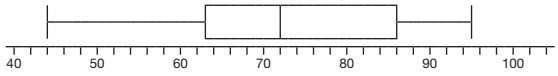
b The peaks in gold price graph occurred when house prices dropped. Both graphs have a pattern of rising and falling over consecutive months.

PAGE 162 **1 a** The scale on the vertical axis is not even. It goes up by 5 at first and then by 2. **b** The scale on the vertical axis does not begin at 0 (or a gap shown to exist). **c** The dots are not the same size **2 a** No. Babies don't drink alcohol **b** 'On average, Australians each drink ...' **c** You need to consider the source of the information and whether statements can be verified **d** It immediately suggested that the statement could not be true. **3 a** not important **b** How much information did the viewers have? Was it a biased report? How many people responded to the survey? Was it a good sample of the population? **4 a** Trying to establish the credibility of the product **b** Yes. If the chemists were biased, for example, were all employed by the company that produced the product.

PAGE 163 **1** B **2** B **3** A **4** B **5** B **6** A **7** D **8** C **9** C **10** C

PAGE 164 **1 a** 18 **b** 18 **c** 13 **d** 40 **2 a** \$25 000 **b** \$9000 **c** 4 years **d** \$3000 **e** about 13 years **3 a** 51 **b** 72 **c** 23

d



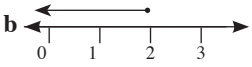
e The individual scores; the mode and mean. **f** Spread of scores, the five number summary, the shape of the distribution.

Exam Papers

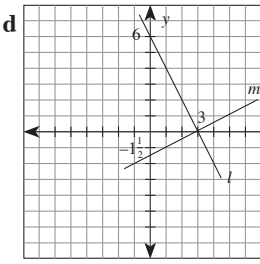
SECTION A **1** D **2** A **3** D **4** B **5** A **6** C **7** D **8** D **9** C **10** D **11** D **12** A **13** B **14** A **15** B **16** D **17** C **18** D **19** C **20** C **21** C **22** D **23** D **24** D **25** A **26** B **27** A **28** D **29** B **30** A **31** D **32** B **33** D **34** C **35** A **36** D **37** D **38** C **39** A **40** A **41** D **42** D **43** B **44** C **45** C **46** A **47** B **48** C **49** D **50** D

SECTION B **1 a** \$1260 **b** \$8337 **c** \$77 **2 a** $\frac{1}{22}$ **b** $\frac{1}{16}$ **3 a** $\frac{5x}{6}$ **b** $\frac{-a}{15}$ **4 a** 10 240 **b** 40 000 **5 a** 67.2 cm **b** 92.8 cm **c** 12 812.8 cm^2 **6 a** $2x^3y^2(y^2 - 3x)$ **b** $(x - 3)(x - 1)$ **c** $(a + 9)(a - 2)$ **d** $(x + 6)(x - 6)$ **e** $(m + 5)(m - n)$ **7 a** 244° **b** 90° **c** 29° **d** 215° **e** 64 km

8 a $x = 1$ **b** $x = \pm 5$ **9** $x = 5$, $y = -2$ **10 a** $x \leq 2$ **b**



11 a –2 **b** –2 **c** $\frac{1}{2}$ **d**

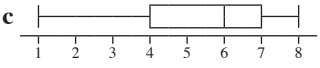


e $y = \frac{1}{2}x - \frac{3}{2}$ **f** 11.25 units^2

12 a $a^2 + 9a + 20$ **b** $6x^2 + 7x - 5$

13 a 0.06 m^2 **b** 160 L **14 a** $AB = AD$ (side of a square) and $AP = RD$ (given) **b** SAS **c** 90° **d** ΔPRQ is isosceles ($RP = PQ$ corresponding sides of congruent triangles) and right-angled **15 a** 12 million **b** 1975 **c** 7.2 million **d** about 21 million **e** exponential

16 a 6 **b** 3 **c**

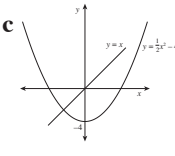


d both negatively skewed

SECTION A **1** B **2** C **3** B **4** B **5** A **6** B **7** D **8** D **9** B **10** A **11** A **12** B **13** B **14** A **15** C **16** C **17** C **18** C **19** A **20** B **21** C **22** D **23** B **24** A **25** C **26** D **27** B **28** D **29** C **30** A **31** D **32** B **33** C **34** A **35** C **36** C **37** B **38** D **39** B **40** C **41** A **42** A **43** D **44** D **45** C **46** C **47** D **48** C **49** B **50** D

SECTION B **1 a** ΔPST and ΔPQR **b** equiangular **c** 21 **2 a** 15 cm **b** trapezuim **c** 162 cm^2 **d** 1296 cm^3 **e** 804 cm^2

3 a 4, $\frac{1}{2}$, –2, $-3\frac{1}{2}$, –4, $-3\frac{1}{2}$, –2, $\frac{1}{2}$, 4 **b and c**



d 2 **e** –2 and 4 **4 a** $\frac{19x}{24}$ **b** $\frac{x^2}{10}$ **5 a** $2x^2 + 8x - 2$ **b** $12x^3y^5 + 15x^5y^4$ **6 a** $2a^2b^3(3ab - 1)$ **b** $(x + 10)(x - 2)$ **c** $(p + q)(p + r)$ **d** $6(x + 1)(x - 1)$ **7 a** \$490.91 **b** \$10.91 **8 a** $a = -19$ **b** $x = 180$ **c** $x \geq -2$ **d** $x > 1$ **e** $x = \pm 9$ **f** $x = 2$ or 4 **9 a** $a = 4$, $b = 3$ **b** $x = 3$, $y = 1$ **10 a** SSS **b** corresponding angles of congruent triangles **c** SAS **d** 90° **e** The diagonals of a kite meet at right-angles **11 a i** positive **ii** strong **b** 7 **c** 9 **d** 7, average of marks of others who scored 7 in arithmetic **12 a** 3 in arithmetic **b** median **c** both plots are fairly symmetrical. Both the range and interquartile range are greater for arithmetic **13 a** 9 cm **b** 729 cm^3 **14 a** 0.64 **b** 0.32 **15 a** 16.3 m **b** 51.3 m

Topic Test Feedback Chart

Chapter	Topic Test	Your Score (Part A + Part B)	Percentage Score ($\frac{\text{Your score}}{\text{Marks available}}$ x 100%)
1	Algebraic techniques	+ =	____/30 x 100% = %
2	Financial maths	+ =	____/30 x 100% = %
3	Equations, inequalities and formulae	+ =	____/25 x 100% = %
4	Simultaneous equations	+ =	____/25 x 100% = %
5	Right-angled triangles and trigonometry	+ =	____/25 x 100% = %
6	Surface area and volume	+ =	____/25 x 100% = %
7	Further algebra	+ =	____/30 x 100% = %
8	Linear and non-linear relationships	+ =	____/25 x 100% = %
9	Geometric reasoning	+ =	____/25 x 100% = %
10	Probability	+ =	____/25 x 100% = %
11	Data representation and interpretation	+ =	____/25 x 100% = %

Exam Paper Feedback Chart

Exam Paper	Your Score (Part A + Part B)	Percentage Score ($\frac{\text{Your score}}{\text{Marks available}}$ x 100%)
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2	+ =	____/100 x 100% = %

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