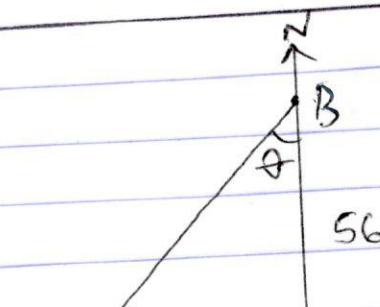
MARKING GUIDE FOR 456/2

MATHEMATICS MOCK EXAMINATIONS

PAPER TWO

SET TWO

SOLUTION	MARKS	COMMENTS
1. $\frac{1\frac{1}{2}\left(2\frac{2}{3}+3\frac{1}{5}\right)}{6\frac{3}{5}}$		
$= \frac{\frac{3}{2}\left(\frac{8}{3}+\frac{16}{5}\right)}{33/5}$ or equiv.	M1	for use of correct L.C.M. in bracket
$= \frac{\frac{3}{2}\left(\frac{40+48}{15}\right)}{33/5}$ or equiv.	M1	
$= \frac{3}{2} \times \frac{88}{15} \times \frac{5}{33}$	M1	
$= \frac{4}{3}$ or $1\frac{1}{3}$	A1	
	4	
2. $n^2+4n+2 = 7^2+(7\times1)+6$	M1	
$n^2+4n+2 = 49+7+6$		
$n^2+4n+2 = 62$		
$n^2+4n-60 = 0$ or equiv.	M1	
$n^2-6n+10n-60=0$		
$n(n-6)+10(n-6)=0$		
$(n+10)(n-6)=0$ or equiv.	M1	
$n+10=0$ or $n-6=0$		
$n=-10$ $\quad n=6$		
$\therefore n=6$	A1	
	04	
3. 		

	MARK	
$\theta = 36.9$	A1	
Bearing of A from B is $180° + 36.9°$	M1	M1 for his (36.9)
$= 216.9°$	A1	accept 216.87°
	4	

4. $\left(\sqrt[3]{0.3927}\right)^2$

$= 10^{\frac{\bar{1}.5941 \times 2}{3}}$ M1

$\frac{\bar{1}.5941}{3} = \frac{\bar{3} + 2.5941}{3}$

$= \bar{1}.8647$

$= 10^{\bar{1}.8647 \times 2}$ M1

$\bar{1}.8647 = \bar{1} + 0.8647$

$\times \quad 2$

$\bar{2} + 1.7294$

$\bar{1} + 0.7294$

$= 10^{\bar{1}.7294}$ A1

$= 0.5363$ A1

4

OR:

$10^{\frac{\bar{1}.5941 \times 2}{3}}$

$\bar{1}.5941 \times 2$

$= \bar{1} + 0.5941$

$\times \quad 2$

$\bar{2} + 1.1882$

$\bar{1}.1882$

$10^{\frac{\bar{1}.1882}{3}}$ M1

$\frac{\bar{1}.1882}{3}$

$= \frac{\bar{3} + 2.1882}{3}$

$= \bar{1}.7294$

$10^{\bar{1}.7294}$ A1

0.5363 A1

4

5. £0.75 = 1 $

£250 = $\frac{250}{0.75}$ $ M1

MARK

6. M – men, T – trees, D – days

$M \propto \frac{T}{D}$ or equivalent B_1 Accept: $T \propto MD$ or $D \propto TM$.

$M = \frac{kT}{D}$

$6 = \frac{k \times 480}{10}$

$k = \frac{60}{480} = \frac{1}{8}$ or equiv. B_1

$M = \frac{T}{8D}$

$\therefore T = 9 \times 8 \times 8$ M_1

$= 576$ trees A_1

Alt.

6 men take 10 days for 480 trees

1 man takes 10 days for $\frac{480}{6}$ trees M_1

9 men take 10 days for $\frac{480}{6} \times 9$ trees

9 men take 1 day for $\frac{480}{6} \times \frac{9}{10}$ trees M_1

9 men take 8 days for $\frac{480}{6} \times \frac{9}{10} \times 8$ M_1

$= 576$ trees A_1

4

7. (i) $g[f(x)] = g(3x+5)$

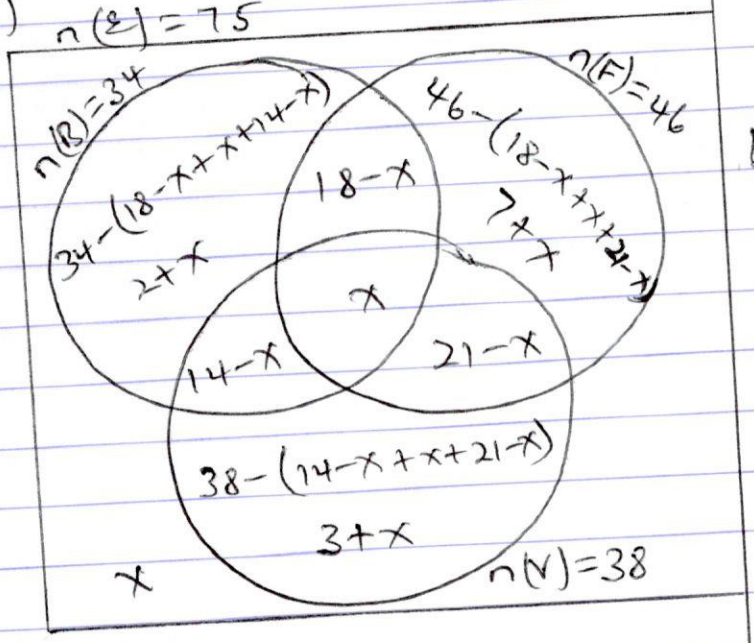
$= \frac{2}{(3x+5)-5}$ M_1

$= \frac{2}{3x}$ A_1

	MARK	
8. $2+3(x-1) < 4x+7$		
$2+3x-3 < 4x+7$	M1	
$-1+3x < 4x+7$		or
$-1-7 < 4x-3x$	M1	$3x-4x < 7+1$
$-8 < x$ or $x > -8$	A1	$-x < 8$
		$\frac{-x}{-1} > \frac{8}{-1}$
		$x > -8$
$\therefore$ least value is -7	B1	
	4	
9. Sarah : John : Mercy		Accept the ratios:
$6x : 2x : x$	M1	Sarah : John : Mercy
		$3x : x : \frac{1}{2}x$
$6x+2x+x = 220,500$	M1	$x : \frac{1}{3}x : \frac{1}{6}x$
$9x = 220,500$		
$x = 24,500$	A1	
Sarah gets $24,500 \times 6 = Sh.147,000$		
John gets $24,500 \times 2 = Sh.49,000$	A1	for all three correct.
Mercy gets $24,500 \times 1 = Sh.24,500$		
	4	
10.		
(a) $\overline{BV} = \sqrt{35^2+12^2}$	M1	
$= \sqrt{1369}$		
$= 37$ cm	A1	
(b) $\overline{XV} = \sqrt{35^2-28^2}$	M1	
$= \sqrt{1225-784}$		
$= \sqrt{441}$		

MARK

11. (a)



B8 B1 for every correct region.

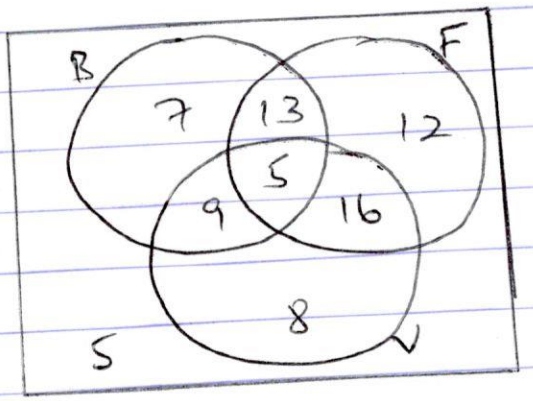
(b) $34 + 7 + x + 21 - x + 3 + x + x = 75$ M1 or equivalent

$65 + 2x = 75$

$2x = 10$

$x = 5$ A1

(c)



P two games $= \frac{9 + 13 + 16}{75}$ M1

$= \frac{38}{75}$ A1

12

12. (a) (i) $\overrightarrow{AB} = \underset{\sim}{b} - \underset{\sim}{a}$ B1

MARK

$= \underset{\sim}{a} + \frac{2}{5}\underset{\sim}{b} - \frac{2}{5}\underset{\sim}{a}$

$= \frac{3}{5}\underset{\sim}{a} + \frac{2}{5}\underset{\sim}{b}$ or $\frac{1}{5}(3\underset{\sim}{a} + 2\underset{\sim}{b})$ A1

(iii) $\overrightarrow{AM} = \overrightarrow{AO} + \overrightarrow{OM}$

$= -\underset{\sim}{a} + \frac{1}{3}\underset{\sim}{b}$ B1

(iv) $\overrightarrow{AP} = \overrightarrow{AO} + \overrightarrow{OP}$

$= \overrightarrow{AO} + \frac{5}{9}\overrightarrow{ON}$

$= -\underset{\sim}{a} + \frac{5}{9} \times \frac{1}{5}(3\underset{\sim}{a} + 2\underset{\sim}{b})$ M1

$= -\underset{\sim}{a} + \frac{1}{9}(3\underset{\sim}{a} + 2\underset{\sim}{b})$

$= -\underset{\sim}{a} + \frac{3}{9}\underset{\sim}{a} + \frac{2}{9}\underset{\sim}{b}$

$= \frac{-6}{9}\underset{\sim}{a} + \frac{2}{9}\underset{\sim}{b}$ or $\frac{2}{9}(-3\underset{\sim}{a} + \underset{\sim}{b})$ A1

(v) $\overrightarrow{PM} = \overrightarrow{PO} + \overrightarrow{OM}$

$= -\overrightarrow{OP} + \overrightarrow{OM}$

$= -\frac{1}{9}(3\underset{\sim}{a} + 2\underset{\sim}{b}) + \frac{1}{3}\underset{\sim}{b}$ M1

$= -\frac{3}{9}\underset{\sim}{a} + \frac{-2}{9}\underset{\sim}{b} + \frac{1}{3}\underset{\sim}{b}$

$= -\frac{3}{9}\underset{\sim}{a} + \frac{1}{9}\underset{\sim}{b}$ or $\frac{1}{9}(-3\underset{\sim}{a} + \underset{\sim}{b})$ A1

(b) $\overrightarrow{AP} = \frac{2}{9}(-3\underset{\sim}{a} + \underset{\sim}{b})$

$\overrightarrow{PM} = \frac{1}{9}(-3\underset{\sim}{a} + \underset{\sim}{b})$

	MARK	
13 (a)		
Correct labelling of the horizontal axis.	B1	
Correct labelling of the vertical axis.	B1	
Correct scale used on the horizontal axis	M1	
Correct scale used on the vertical axis	M1	
Correct drawing of graph of cyclist	M1	
Correct drawing of graph of lorry driver	M1	
(b) (i) Time of first overtaking is 8:00 a.m. ± 3 mins	A1	(7:57 to 8:03) a.m.
Distance from Soroti of first overtaking is 20 Km ± 1 Km	A1	(19 to 21) Km
Time of second overtaking is 11:30 a.m. ± 3 mins	A1	(11:27 to 11:33) a.m.
Distance from Soroti of second overtaking is 90 Km ± 1 Km	A1	(89 to 91) Km
(ii) Time the lorry driver had to wait for cyclist is		
11:54 ± 3mins	M1	for subtraction
− 11:45 ± 3mins		
:09		

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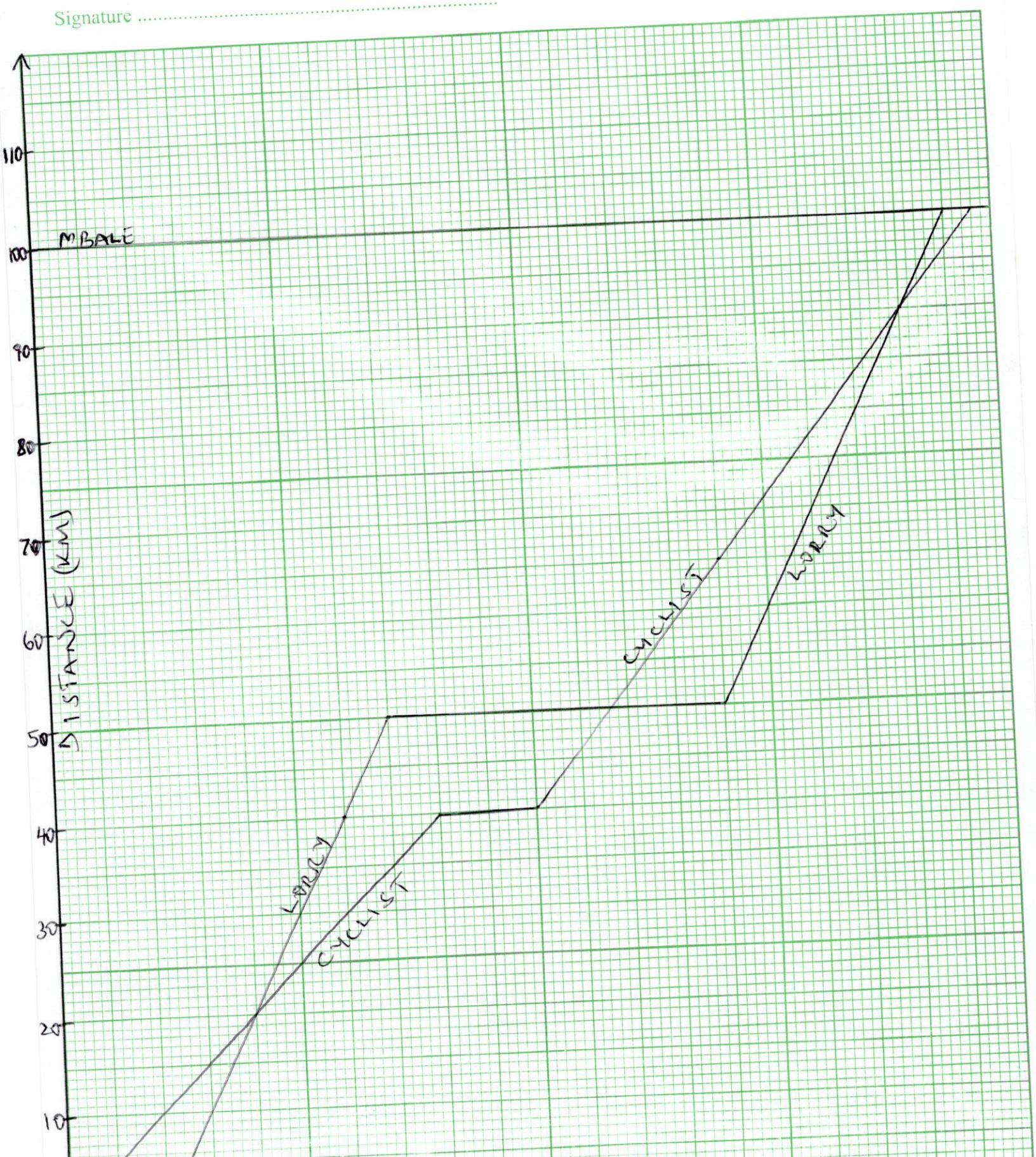
(To be fastened together with other answers to paper) Pg 8

Name ..... Qn. 13 (a) ..... Index Number .....

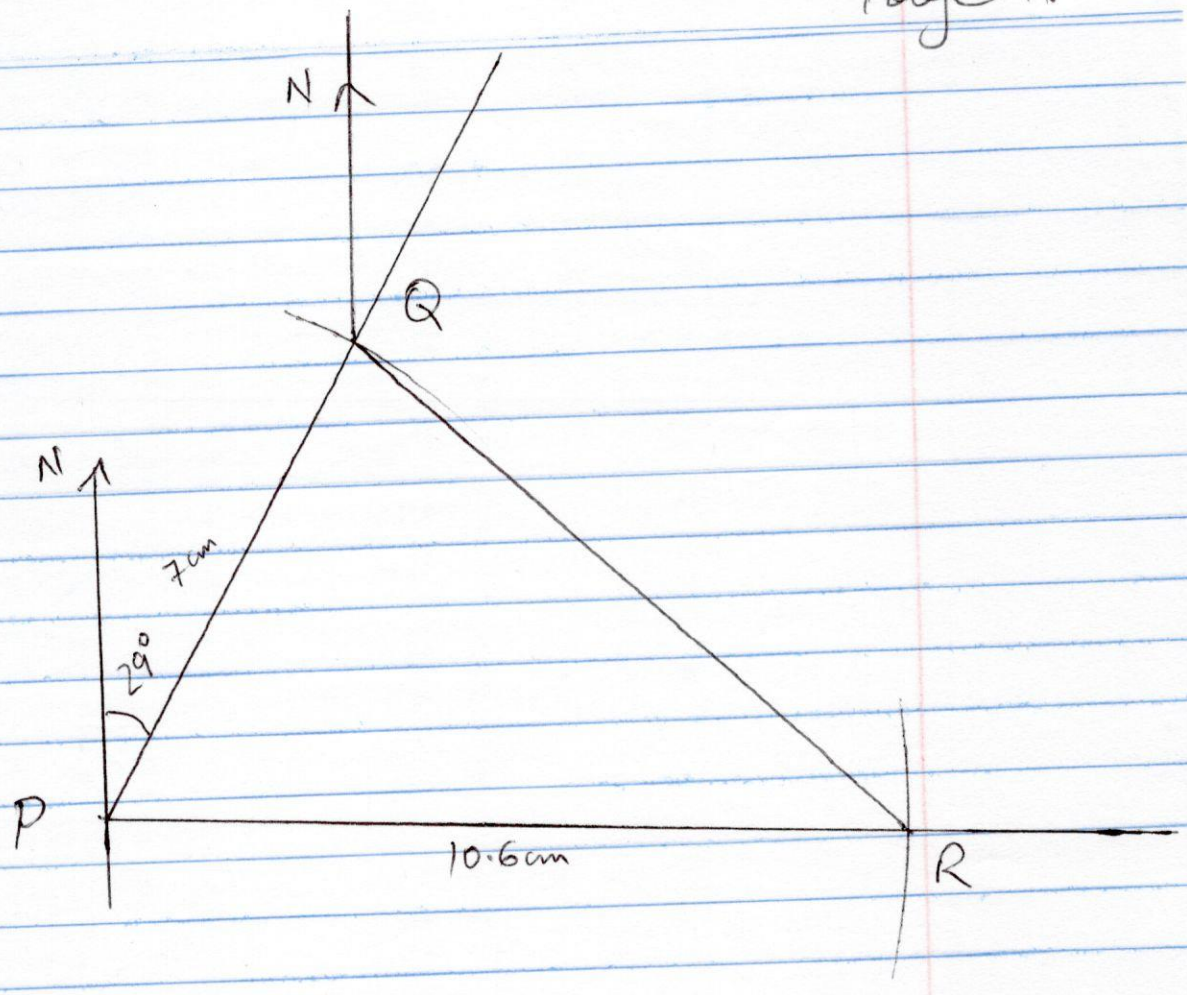
Signature .....



	MARKS	
14 (a) 29° measured at point P	B1	
$\overline{PQ}$ = 7.0 cm ± 0.2 cm	M1	(6.8 to 7.2) cm
North line correctly drawn at Q	B1	
92° measured at point P	B1	
$\overline{PR}$ = 10.6 cm ± 0.2 cm	M1	(10.4 to 10.8) cm
(b) (i) Distance of Q from R is 9.7 × 50 Km ± 0.2 × 50 Km	M1	
= 485 Km ± 10 Km	A1	(475 to 495) Km
(ii) Bearing the plane should set off from Q to fly directly to R is 132°	A1	
(iii) Time taken to move through Q = $\frac{350}{250} + \frac{485}{250} + \frac{15}{60}$ hrs ± 0.04 hrs	M1	
= 3.59 hours ± 0.04 hrs		
Time taken to move directly to = $\frac{530}{250}$ hours	M1	
= 2.12 hours		
Time wasted is equal to 3.59 − 2.12 hours ± 0.04 hrs	M1	

Q.14.

(a)



(b) (i) QR = 9.7 cm.
Q from R is 9.7×50 km
= 485 km.

(ii) Bearing the plane should set off from Q to fly directly to R is 132°.

(iii) Time taken to move through Q is

$$\frac{350 + 485}{250} + \frac{15}{60} = 3.59 \text{ hours}$$

Time taken to move directly to R is

$$\frac{530}{250} = 2.12 \text{ hours}$$

Time wasted is 3.59 − 2.12 hours
= 1.47 hours.

MARK

15. Housing allowance $= \frac{12}{100} \times 1,250,000$

$= \text{sh. } 150,000$ B1

Total allowance is

sh. 150,000 + 135,000 + 96,000 + 109,000

$= \text{sh. } 490,000$ B1

Taxable income is equal to

sh. 1,250,000 − 490,000 M1

$= \text{sh. } 760,000$ A1

(b) Income tax paid:

First sh. 100,000

$\text{Tax} = \frac{7}{100} \times 100,000 = \text{sh. } 7000$ M1

Next sh. 100,000

$\text{Tax} = \frac{15}{100} \times 100,000 = \text{sh. } 15,000$ M1

Next sh. 200,000

$\text{Tax} = \frac{22}{100} \times 200,000 = \text{sh. } 44,000$ M1

Next sh. 300,000

$\text{Tax} = \frac{35}{100} \times 300,000 = \text{sh. } 105,000$ M1

Next sh. 60,000 (Above 700,000)

$\text{Tax} = \frac{45}{100} \times 60,000 = \text{sh. } 27,000$ M1

Total tax paid is

sh. 7000 + 15,000 + 44,000 + 105,000 + 27,000

$= \text{sh. } 198,000$ B1

760,000
− 100,000

660,000
− 100,000

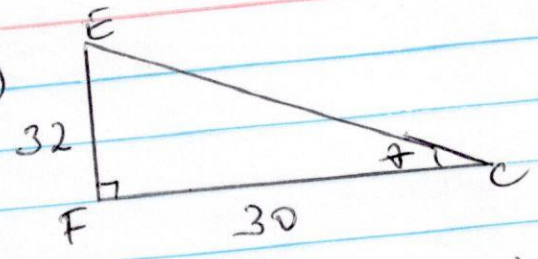
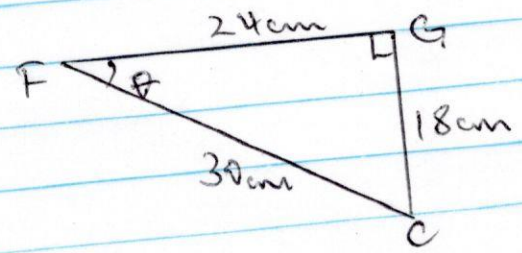
560,000
− 200,000

360,000
− 300,000

60,000

(c) % of gross salary paid as tax

	MARK
16. (a) (i) $h(x) = px + 3$	
$h(4) = 4p + 3 = 23$	M1
$4p = 23 - 3$	M1
$4p = 20$	A1
$p = 5$.	
(ii) $h(x) = 5x + 3$	
$h(0) = (5 \times 0) + 3$	M1
$= 0 + 3$	
$= 3$.	A1
(iii) $h(-5) = (5x - 5) + 3$	M1
$= -25 + 3$	
$= -22$	A1
(b)(i) let $y = 5x + 3$	M1 Accept alternative.
$y - 3 = 5x$	M1
$\frac{y-3}{5} = x$	
$h^{-1}(x) = \frac{x-3}{5}$	A1
(ii) $h^{-1}(13) = \frac{13-3}{5}$	M1
$= \frac{10}{5}$	
$= 2$	A1
	12
17. (a) $FC = \sqrt{24^2 + 18^2}$	M1
$= \sqrt{576 + 324}$	
$= \sqrt{900}$	

	MARK	
(c) 	B_1	for identifying the correct angle θ.
$\tan\theta = \frac{32}{30}$ or equiv.	M_1	
$\tan\theta = 1.0667$	M_1	
$\theta = 46.8°$	A_1	
(d) 	B_1	for identifying the correct angle θ.
$\tan\theta = \frac{18}{24}$	M_1	$\cos\theta = \frac{24}{30}$, $\sin\theta = \frac{18}{30}$
$\tan\theta = 0.75$	A_1	$\cos\theta = 0.8$, $\sin\theta = 0.6$
$\theta = 36.9°$	A_1	
	12	