Marking Guide P II Maths 456/2

UCE 2022

ATK

DATE __/__/__

1. $(3^3)^{2/3} \div ((2^3)^{-2/3} \times (2^3)^{4/3})$	M1	for base 3&2
$3^2 \div (2^{-2} \times 2^4)$	M1	Simplification
$3^2 \div 2^2$	M1	
$9 \div 4 = 9/4$	A1	
2. $\begin{pmatrix}4\\-8\end{pmatrix} = \begin{pmatrix}2\\0\end{pmatrix} - 3\underline{b}$	M1	Correct substitution
$3\underline{b} = \begin{pmatrix}2\\0\end{pmatrix} - \begin{pmatrix}4\\-8\end{pmatrix}$		
$3\underline{b} = \begin{pmatrix}-2\\8\end{pmatrix}$	M1	Subject of the formula
$\underline{b} = \frac{1}{3}\begin{pmatrix}-2\\8\end{pmatrix}$	M1	simplification
~~$= \begin{pmatrix}-1\\4\end{pmatrix}$~~ $\begin{pmatrix}-2/3\\8/3\end{pmatrix}$	A1	dividing by 3
$80 \times 2000 \times \frac{5}{100} + 120 \times 2000 \times \frac{2.5}{100}$	M1M1	M1 for 80x2000, M1 for 120x2000
$8000 + 6000 = 14000$	M1A1	

ALT.

Commission

$\frac{5}{100} \times 2000 = 100$

$\frac{2.5}{100} \times 2000 = 50$

$= 80(100)$ M1 $+ 120(50)$ M1

$= 8000 + 6000$ M1

$= 14000$ A1

$A = \{1, 2, 3, 5\}$		
$B' = \{1, 3, 7\}$	B1	
$A \cap B' = \{1, 3\}$		
$n(A \cap B') = 2$.	B1	
(ii) $B = \{2, 5, 6\}$		
$A' = \{6, 7\}$	B1	for A'
$A' \cup B = \{2, 5, 6, 7\}$.	B1	

DATE / /

5 (i) $f(6) = \frac{a}{6+2} = 6$ — M1 — Correct Substitution

$a = 6 \times 8 = 48$ — A1

(ii) $f(-8) = \frac{48}{-8+2} = \frac{48}{-6} = -8$ — M1A1

6. $d = 18 \times 3 = 54$ — M1A1 cs multiplication

$\text{time} = \frac{54}{15} = 3.6\text{hrs}$ — M1A1 cs division

7. $2y = -3x + 8$ — M1 Making y the subject

$y = -\frac{3}{2}x + 4$ — A1

$\text{grad.} = -3/2$ — M1

when $x = 0$, $y = k$

$k = 0 + 4$ — A1

$k = 4$

8. $\frac{216}{360} \times 3.142 \times 5 \times 5 = 47.13\text{cm}^2$ — M1M1M1A1 M1 identifying area; M1 correct substitution; A1 accept 47.12

~47.12

9. $\frac{4.2 \times 300000 \times 300000}{100000 \times 100000} = 37.8\text{km}^2$ — M1M1M1M1A1 M1 cs $300,000^2$; M1 cs 100000^2; A1 correct substitution

follow cs other method

10 $-6(3x+7) + 10x = 5(x-2)$ — M1 cs LCM

$-18x + 42 + 10x = 5x - 10$ — M1 cross multiplication

$\frac{-13x}{-13} = \frac{-32}{-13}$ — A1 simplification

$x = \frac{-32}{-13} = 2.461$ — A1

2.46

SECTION B.

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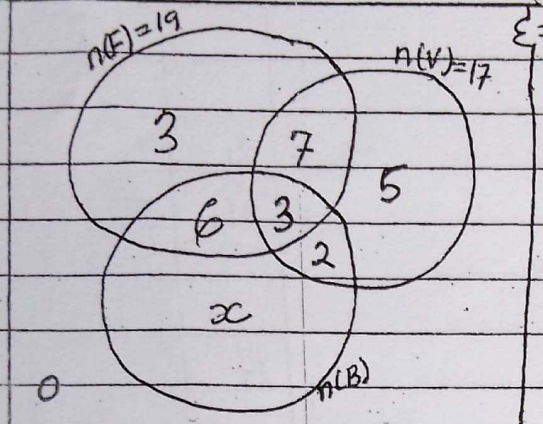
(i)



B1 for 3 (FnVnB)
B1 for 7
B1 for 5
B1 for 6
B1 for 3
B1 for 2.

$3+7+6+3+2+5+x = 30$ M1

$26+x = 30$

$x = 4$ A1

$6+3+7+2 = 18$ M1A1

$\frac{3+4+5}{30} = \frac{12}{30} = \frac{2}{5}$. M1 A1

$3y - x = 4$

$3y = x+4$

$y = \frac{1}{3}x + 4$

d. $AB = 1/3$. B1

$\frac{1}{3} = 1/3$ M1

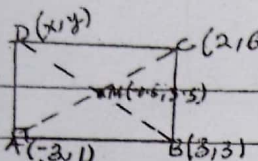
$y = x+3$

$y = x+6$. A1

$AB = 3y = x+6$.

DATE / /

(b)



AD ⊥ AB.

grad AD = −3. B1

$\frac{y-1}{x+3} = -3$ M1

$y - 1 = -3x - 9$

$y = -3x - 8$. A1

(c). Eqn of BC

$\frac{y-6}{x-2} = -3$ M1

$y - 6 = -3x + 6$

3| $y = -3x + 12$.

| $3y = x + 6$ M1

$3y = -9x + 36$

$3y = x + 6$

$0 = -10x + 30$

$10x = 30$

$x = 3$.

$3y = 3 + 6 = 9$

$y = 3$. A1

B(3,3). A1ft 3

$\frac{x+3}{2} = -1/2$ M1

$2x + 6 = -2$

$2x = -8$

$x = -4$

$\frac{y+3}{2} = 7$ M1

$2y + 6 = 14$

$2y = 14 - 6 = 8$

$y = 4$ A1

$D(-4, 4)$. A1

13(a) $f(x) = \frac{2x}{x-3}$

(i) $f(-1) = \frac{2x-1}{-1-3} = \frac{-2}{-4} = \frac{1}{2}$. M1A1

(ii) $f(0) = \frac{2 \times 0}{0-3} = \frac{0}{-3} = 0$ M1A1

(iii) Let $y = \frac{2x}{x-3}$ M1

$yx - 3y = 2x$

$yx - 2x = 3y$.

$x(y-2) = 3y$

$x = \frac{3y}{y-2}$ A1

$f^{-1}(x) = \frac{3x}{x-2}$. B1

(iv) $f^{-1}(1) = \frac{3}{1-2} = \frac{3}{-1} = -3$ B1 M1A1

DATE __/__/__

(b) $g(x) = 2x+5$

$h(x) = 3x^2$

(i) $g(3x^2) = 2(3x^2)-5$ M1

$= 6x^2-5$

$gh(x) = 6x^2-5$ A1

(ii) $gh(x) = 0$

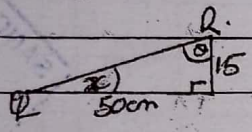
$6x^2-5=0$ M1

$x^2 = 5/6$

$x = \pm 0.3727 \cdot 0.9129$ A1

14 See graph.

15 (a)



$QR = \sqrt{50^2+15^2}$ M1

$= \sqrt{2500+225}$

$= \sqrt{2725}$

$= 52.20\,cm$ A1 Accept 52.20

(b) $\tan\theta = \frac{50}{15} = 3.\overline{3}$ M1

~~$\theta = \tan^{-1}(3.\overline{3})$~~

$\theta = 73.30^\circ$ A1

Q.14

UGANDA NATIONAL EXAMINATIONS BOARD

(To be fastened together with other answers to paper)

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Signature .....

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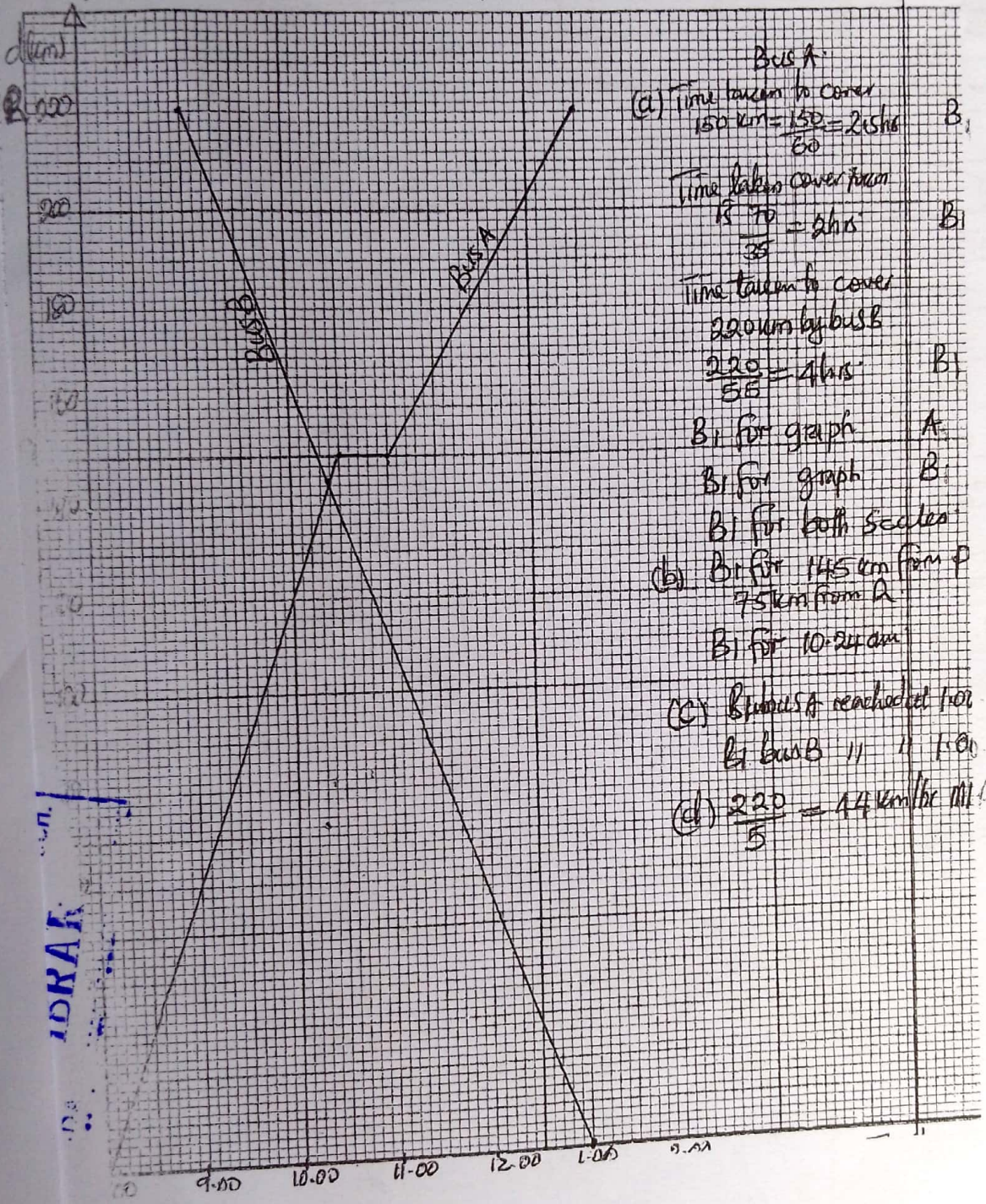


Bus A

(a) Time taken to cover 150 km = $\frac{150}{60}$ = 2½hrs B1

Time taken cover from R 70 = $\frac{70}{35}$ = 2hrs B1

Time taken to cover 220 km by bus B $\frac{220}{55}$ = 4hrs B1

B1 for graph A1

B1 for graph B1

B1 for both scales

(b) B1 for 145 km from P
75 km from Q

B1 for 10.24 am

(c) B1 bus A reached 1st B1
B1 bus B " " 1:00

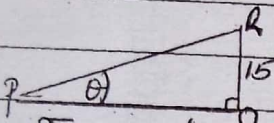
(d) $\frac{220}{5}$ = 44 km/hr M1A1

IDRAR

(iii) $\tan x = \frac{15}{50} = 0.3$ — B1 M1 — B1 for angle identification

$x = \tan^{-1}(0.3)$

$x = 16.70$ — A1



(iv) $PO = AC = \sqrt{80^2 + 50^2}$ — M1

$= \sqrt{6400 + 2500}$

$= \sqrt{8900}$

$= \pm 94.34$

$= 94.34$ — A1

$\tan\theta = \frac{15}{9434} = 0.1590$ — B1 M1 — B1 for angle identification

$\theta = \tan^{-1}(0.1590)$

$\theta = 9.03°$. — A1

(iv) $\underset{\sim}{OA} = 6\underset{\sim}{p} - 4\underset{\sim}{q}$, $\underset{\sim}{OB} = 2\underset{\sim}{p} + 4\underset{\sim}{q}$

$\underset{\sim}{AB} = 4m\underset{\sim}{p} + (2m-n)\underset{\sim}{q}$

$\underset{\sim}{AB} = \underset{\sim}{AO} + \underset{\sim}{OB} = -6\underset{\sim}{p} + 4\underset{\sim}{q} + 2\underset{\sim}{p} + 4\underset{\sim}{q} = 4m\underset{\sim}{p} + (2m-n)\underset{\sim}{q}$ — M_1

$-4\underset{\sim}{p} + 8\underset{\sim}{q} = 4m\underset{\sim}{p} + (2m-n)\underset{\sim}{q}$ — M_1

$4m = -4$; $2m - n = 8$ — M_1

$m = -1$; $2(-1) - n = 8$ — A_1

$m = -1$; $-2 - n = 8$

$m = -1$; $-n = 10$ — M_1

$m = -1$; $n = -10$ — A_1

DATE M / /

7 (a) $72000 \times 12 = 864000$ M1

$18000 \times 12 = 216000$

Annual taxable income is

$864000 - 216000 = 648000$ M1A1

(b) $\frac{90240 \times 10}{100} + \frac{90240 \times 15}{100} + \frac{90240 \times 20}{100} +$ B1B1 M1M1 for all Correct

$\frac{90240 \times 25}{100} + \frac{90240 \times 30}{100} + \frac{196800 \times 32.5}{100}$ B1B1 M1M1

$9024 + 13536 + 18048 + 22560 + 27072 + 63960 =$ M1

154200 A1

(c) $864000 - 154200 = 709800$ M1A1

$4 = 2x - 3 - n$

$4 = -3 - n$

$7 = -n$

$n = -7$

(b) $\underline{SR} = 2\underline{a}$.

$\underline{SP} = \underline{SR} + \underline{RP}$

$= 2\underline{a} - \underline{b}$.

$\underline{SQ} = \underline{SP} + \underline{PQ}$

$= 2\underline{a} - \underline{b} + \underline{a}$

$= 3\underline{a} - \underline{b}$.

(c) $\underline{AC} = \begin{pmatrix} 6 \\ 7 \end{pmatrix} - \begin{pmatrix} 2 \\ -1 \end{pmatrix} = \begin{pmatrix} 4 \\ 8 \end{pmatrix}$.

$\underline{AB} = \frac{3}{4}\begin{pmatrix} 4 \\ 8 \end{pmatrix} = \begin{pmatrix} 3 \\ 6 \end{pmatrix}$

$\begin{pmatrix} x \\ y \end{pmatrix} - \begin{pmatrix} 2 \\ -1 \end{pmatrix} = \begin{pmatrix} 3 \\ 6 \end{pmatrix}$

$x - 2 = 3$

$x = 5$

$y + 1 = 6$

$y = 5$

$B(5, 5)$.