LONDIANI JOINT MOCK – 2022

121/1

1

NUMERATOR $\frac{5}{6} \times \left(\frac{13}{5} - \frac{23}{6}\right) = \frac{5}{6} \times \frac{3}{2} = \frac{5}{12}$ ✓ M1

DENOMINATOR $\frac{5}{13} \times \frac{3}{25} + \frac{19}{9} \times \frac{3}{7}$

$\frac{1}{20} + \frac{2}{3} = \frac{43}{60}$ ✓ M1

$\frac{43}{60} \div \frac{5}{12} = \frac{43}{60} \times \frac{12}{5} = \frac{43}{25}$

$= 1\frac{18}{25}$ ✓ A1 03

2.

$x^2 - Kx + 49$

$\left(\frac{b}{2}\right)^2 = 49$ ✓ $\Rightarrow b^2 = 49 \times 4$ ✓ M1 M1

$b = \pm 7$

$x^2 - 14x + 49$ Hence $x = -7$ ✓ A1 03

3

$27^x \times 3^{(2x-2)} = 9^{(x+2)}$

$3^{3x} \times 3^{(2x-2)} = 3^{2(x+2)}$ ✓ M1 same base

$3x + (2x-2) = 2x + 4$ M1

$3x = 6$ ✓

$x = 2$ ✓ A1 03

4

3	9	15	21
3	3	5	7
5	1	5	7
7	1	1	7

LCM $= 9 \times 5 \times 7$

$= 315$ ✓

$= \frac{315}{60}$

$= 5\frac{1}{4}$ hours M1 LCM

2400 − 1745 = 655

10:00 − 6:15 = 16:15

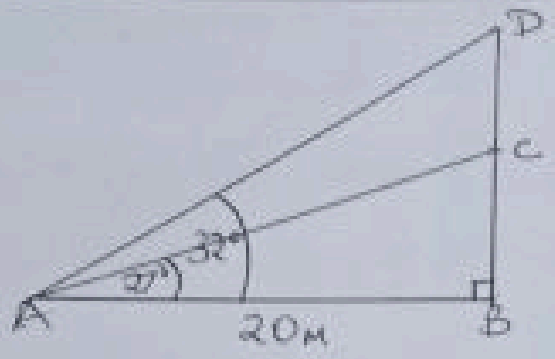
4 (Cont)

$16 \times 60 = 960 + 15$

$\frac{975}{315} \checkmark = 3\frac{2}{21}$ M_1

3 times. ✓ A_1 03

5.



$\tan 27^\circ = \frac{BC}{20}$; $\Rightarrow BC = 10.19$ M

$\tan 32^\circ = \frac{BD}{20}$ $\Rightarrow BD = 12.50$M. } ✓ M_1

$DC = 12.50 - 10.19$ ✓ M_1 – Difference

$= 2.31$ M. ✓ A_1

6. ~~1Us $ = Ksh 72.23~~

1Us $ = Ksh 72.23

5000 Us $ = $\frac{72.23 \times 5000}{1}$ ✓ M_1

$= Ksh. 361\,150$

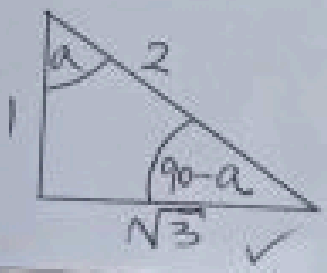
$361,150 - 214,500 = Ksh. 146,650$

1 £ = 135.97

? = Ksh. 146,650

$\frac{146,650 \times 1}{135.97} = £1078.55$ ✓ M_1 – Dividing by Ksh. A_1

03



i) $\cos a = \frac{1}{2}$ ✓

ii) $\tan(90-a) = \frac{1}{\sqrt{3}}$

M_1 for $\sqrt{3}$

M_1

$M_1 A_1$

04

8 $S_n = (2n-4)90$

$1260 = (2n-4)90$ ✓

$14 = 2n-4$

$n = 9$ ✓ B1 Nonagon ✓

M1 – Substitution

A1, B1 03

9 $2x+3 > 5x-3 > -8$

$6 > 3x$; $\Rightarrow$ $x < 2$ ✓

$5x > -5$; $\Rightarrow$ $x > -1$ ✓

$-1 < x < 2$

0, 1 ✓

M1

M1

A1 03

10 $\log 42 = \log 2 + \log 3 + \log 7$ ✓

$= 0.3010 + 0.4771 + 0.8451$ ✓

$= 1.6232$ ✓

M1

M1

A1 03

11 $15n$

$\frac{15n+20}{n+1} = 16$ ✓

$n = 4$

M1 M1

A1

03

12 $0.4766^2 = (4.766 \times 10^{-1})^2$

$= 4.766^2 \times 10^{-2}$

$= 22.715 \times 10^{-2}$

$= 0.22715$ ✓

$\frac{1}{2754} = \frac{1}{2.754 \times 10^3}$

$= 0.3641 \times 10^{-3}$

M1

$= 0.22715 + 0.0003641$ ✓ — M1

$= 0.2275141$ ✓

$= 0.2275$ ✓ — A1 03

13 Discounted price

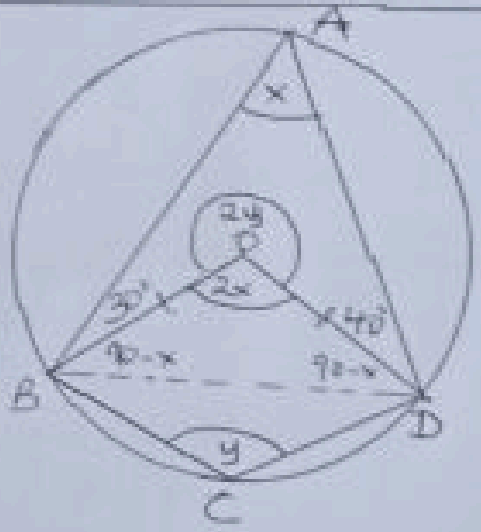
$\frac{87}{100} \times 800 = 696$ ✓ — M1

$120\% = 696$

$100\% = 696 \times \frac{100}{120}$ ✓ — M1

$= Ksh.\ 580$ ✓ — A1 03

14



i) $\angle BAD = 90-x+30+x+40+90-x = 180°$ ✓ — M1

$= x = 70°$ ✓ — A1

ii) $\angle BCD$ = Reflex $\angle BOD = 360-140$ ✓ — M1

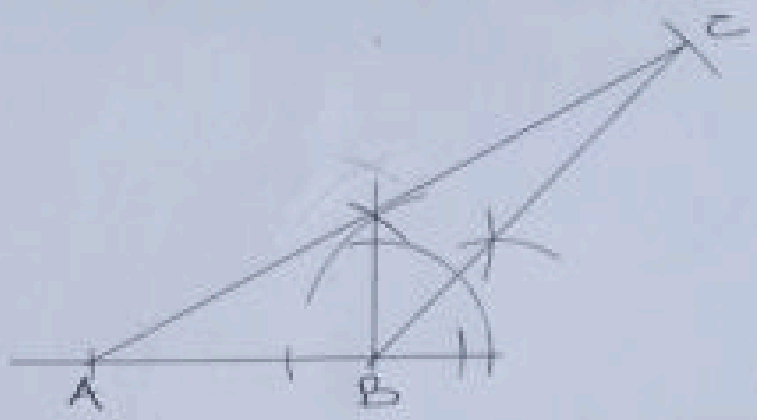
$= 220°$

$y = \frac{220}{2}$

$y = 110°$ ✓ — A1

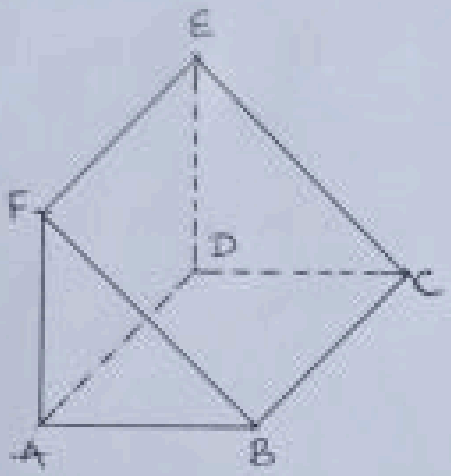
04

15



B_1 ✓ $\angle 135°$
B_1 ✓ Location of C
B_1 ✓ $\triangle ABC$

16



B_1 – Correct prism
B_1 – ✓ Hidden detail
B_1 – ✓ Naming of triangle

17

a) $x + y = 110$
$y - x = \sqrt{64}$

$x + x + 8 = 110$
$2x = 102$
$x = 51$ ✓
$y = 59$ ✓

B_1
B_1

b)

CLASS	TALLY	FREQ(f)	x	fx	cf	
40–44	III	3	42	126	3	
45–49	𝍸 𝍸 III	13	47	611	16	
50–54	𝍸 𝍸 II	12	52	624	**28**	Median class
55–59	𝍸 III	8	57	456	36	
60–64	III	3	62	186	39	
65–69	I	1	67	67	40	
		$\sum f = 40$		$\sum fx = 2070$		

B_1 – ✓ classes
B_1 – ✓ frequency

17 (Cont.)

c) i) Modal class 45 – 49 ✓ B1

ii) Mean $\bar{x} = \frac{\Sigma fx}{\Sigma f}$ M1

$= \frac{2070}{40}$ ✓

$\bar{x} = 51.75$ ✓ A1

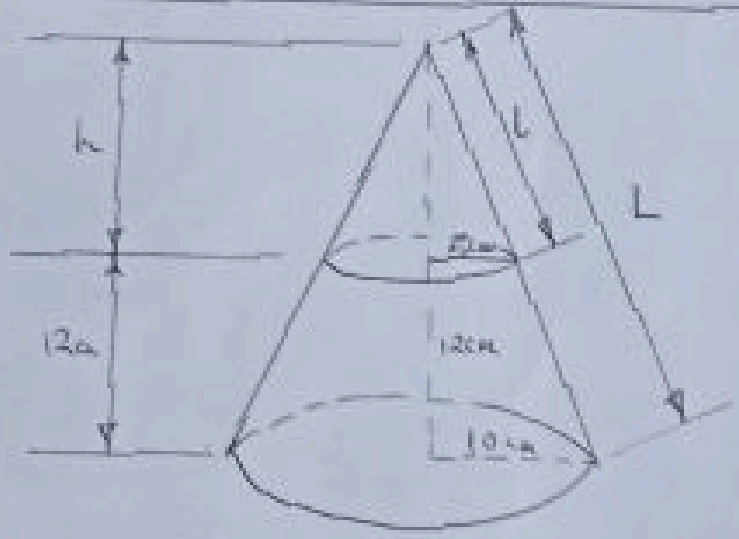
iii) Median $M = L_c + \left(\frac{\frac{N}{2} - cf}{f_m}\right) \times i$ B1 – ✓ cf

$= 49.5 + \left(\frac{20 - 16}{12}\right) \times 5$

$= 49.5 + 1.6667$ ✓ M1

$= 51.17$ ✓ A1 10

18



a) $\frac{10}{5} = \frac{12+h}{h}$

$10h = 60 + 5h$

$h = 12$ ✓

$L^2 = 24^2 + 10^2$

$= 576 + 100$

$= 676$

$L = \sqrt{676}$ $= 26$ cm. ✓

M1 – either height obtained or slant height obtained

$L^2 = 12^2 + 5^2$

$= 169$

$= 13\text{ cm}$

Hence slant height of frustum

$26 - 13$ ✓ $= 13\text{cm}$. ✓

M1 – difference to obtain slant height

A1 – slant height

b) $\pi RL - \pi rL$

$= \frac{22}{7} \times 10 \times 26 - \frac{22}{7} \times 5 \times 13$ ✓

$= 817\frac{1}{7} - 204\frac{2}{7}$ ✓

$= 612\frac{6}{7}\text{cm}^2$ or 612.2857 cm^2 ✓

M1 – ✓ substitution in formula for curved part of cone

M1 – difference

A1

c) $V = \frac{1}{3}\pi R^2 H - \frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times 10^2 \times 26 -$

$\frac{1}{3} \times \frac{22}{7} \times 5^2 \times 13$ ✓

$2723\frac{17}{21} - 340\frac{10}{21}$ ✓

$V = 2383\frac{1}{3}\text{ cm}^3$ 2383.33 cm^3

M1 – ✓ substitution in formula for volume

M1 M1

A1

10

19 b) $\begin{pmatrix}3\\1\end{pmatrix}^{A} + \begin{pmatrix}2\\-5\end{pmatrix}^{T} = \begin{pmatrix}4\\-4\end{pmatrix}^{A'}$ ✓

$\begin{pmatrix}5\\2\end{pmatrix}^{B} + \begin{pmatrix}2\\-5\end{pmatrix}^{T} = \begin{pmatrix}7\\-3\end{pmatrix}^{B'}$ ✓

$\begin{pmatrix}0\\4\end{pmatrix}^{C} + \begin{pmatrix}2\\-5\end{pmatrix}^{T} = \begin{pmatrix}2\\-1\end{pmatrix}^{C'}$ ✓

$A'(4,-4)$; $B'(7,-3)$; $C'(2,-1)$ ✓

c) $A''(-4,-4)$; $B''(-3,-7)$; $C''(-1,-2)$

S_1 – ✓ scale

B_1 – ✓ ΔABC

B_1 – ✓ Image ΔABC

B_1 – ✓ coordinates

B1 $\Delta A'B'C'$

B1 ✓ – rotation $\Delta A'B'C'$

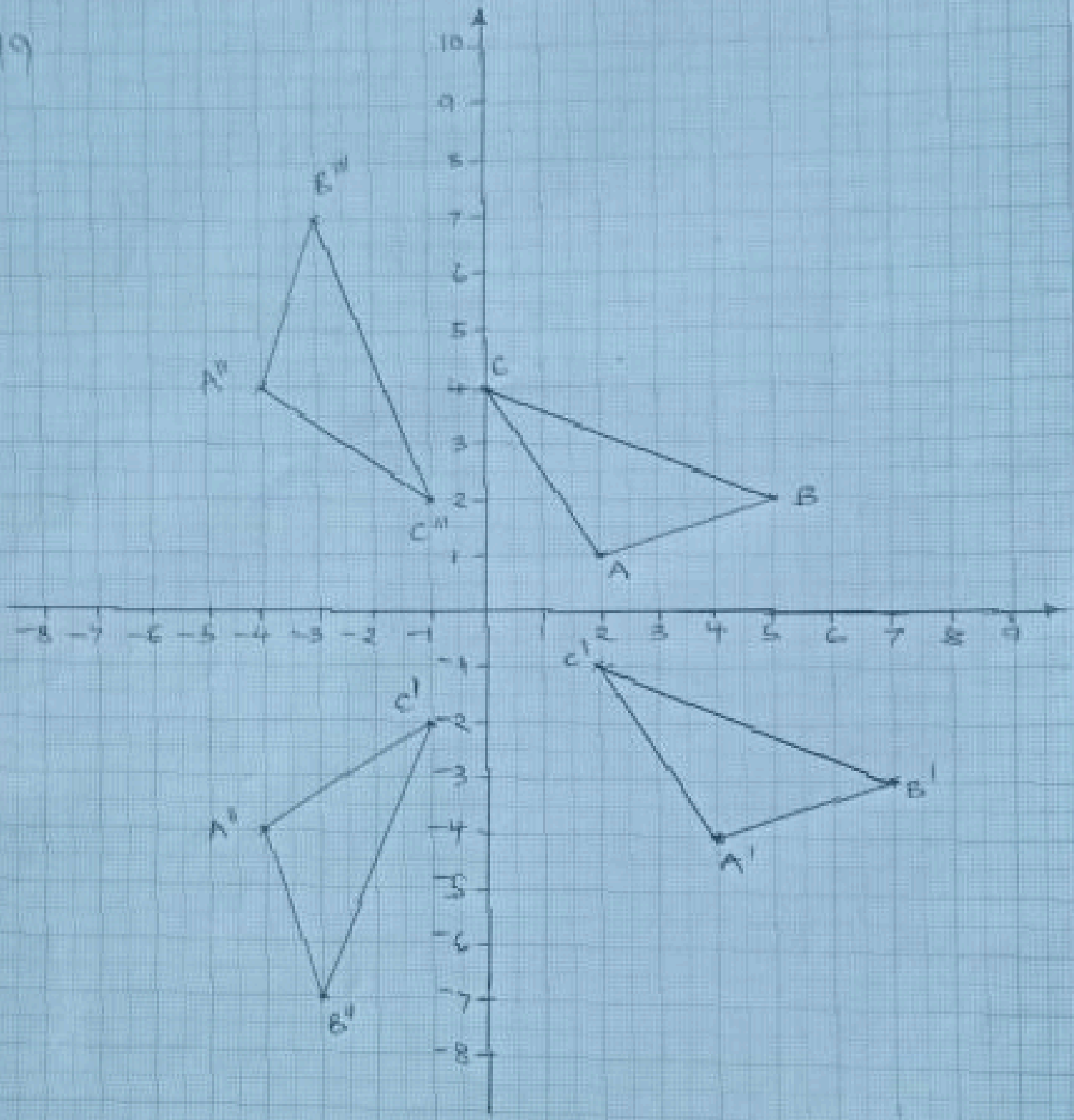
B_1 ✓ $\Delta A''B''C''$

B_1 ✓ $\Delta A'''B'''C'''$

B_1 ✓ Coordinates $\Delta A''B''C''$

B_1 ✓ Coordinates $\Delta A'''B'''C'''$

19



d) $A''(-4,4)$; $B''(-3,7)$; $C''(-1,2)$ — B_1 ✓ reflection on $y=0$

10

20 a) Let original number of Member be x

$$\frac{2,000,000}{x-40} - \frac{2,000,000}{x} = 2,500 \checkmark$$ — M_1 – forming ✓ equation.

$$2,000,000x - 2000,00(x-40) = 2500(x^2-40x)$$

$$800x - 800(x-40) = x^2-40x$$

$$32,000 = x^2-40x$$

$$x^2-40x-32,000 = 0 \checkmark$$ — M_1 – obtaining quadratic eqn.

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$= \frac{40 \pm \sqrt{1600-4(-32,000)}}{2.1}$$ — M_1 – ✓ Substitution

$$= \frac{40 \pm \sqrt{1600+128,000}}{2}$$

$$= 20 \pm \sqrt{129,600} \checkmark$$ — M_1 or equivalent $(x+160)(x-200)=0$

$$= 20 \pm \frac{360}{2}$$

$$= 20 \pm 180$$

Either $x = 200$ or -160

Hence $x = 200$ member ✓ — A_1

b) 45% CDF

$$\frac{55}{100} \times 2,000,000 \checkmark = 1,100,000 \checkmark$$ — M_1

$$\frac{1,100,000 \checkmark}{160} = 6,875 \checkmark$$ — M_1 A_1

c) L : M = 6 : 9

$\frac{9}{15} \times 6875$ ✓ $= 4125$ /=

$4125 \times 160 = Rs\ 660{,}000$ ✓

M1 – Multiplies by ratio

A1 10

21 a) L_1 : $M = \frac{7-3}{5-3} = \frac{4}{2}$

$= 2$ ✓

$\frac{y-3}{x-3} = 2$ ✓

$y - 3 = 2x - 6$

$y = 2x - 3$ ✓

M1 – Gradient

M1 – equating to gradient

A1

b) $M_1 M_2 = -1$

i) $2M_2 = -1 \Rightarrow M_2 = -\frac{1}{2}$ ✓

$\frac{y-3}{x-2} = -\frac{1}{2}$ ✓

$2y - 6 = -x - 2$

L_2 : $2y = -x + 4$ or $2y + x = 4$

or $y = -\frac{1}{2}x + 2$ ✓

M1 – Gradient of M_2

M1 – equating to gradient

A1 ✓ equation or its equivalent

ii) $y = -\frac{1}{2}x + 2$; $y = 0$; $x = 4$

B1 ✓ intercept

c) L_1 : $y = 2x - 3$

L_2 : $2y = -x + 4$

$4x - 6 = -x + 4$ ✓

$5x = 10$ ✓

$x = 2$

$y = 4 - 3 = 1$

Hence point of intersection $(2, 1)$ ✓

M1 – Equating two equations

M1

A1 ✓ point of intersection

10

22. a) $A^{-1} = \frac{1}{\text{Det}}\begin{pmatrix} 9 & -6 \\ -7 & 5 \end{pmatrix}$ Det

$\text{Det} = 45 - 42$ ✓

$= 3$

$A^{-1} = \frac{1}{3}\begin{pmatrix} 9 & -6 \\ -7 & 5 \end{pmatrix}$ ✓

M_1 – Determinant

A_1 – Inverse.

b) $56b + 6c = 2,440$

$76b + 9c = 3,560$

$\begin{pmatrix} 5 & 6 \\ 7 & 9 \end{pmatrix}\begin{pmatrix} b \\ c \end{pmatrix} = \begin{pmatrix} 2440 \\ 3,560 \end{pmatrix}$ ✓

M_1 – Matrix equation

$\frac{1}{3}\begin{pmatrix} 9 & -6 \\ -7 & 5 \end{pmatrix}\begin{pmatrix} 5 & 6 \\ 7 & 9 \end{pmatrix}\begin{pmatrix} b \\ c \end{pmatrix} = \frac{1}{3}\begin{pmatrix} 9 & -6 \\ -7 & 5 \end{pmatrix}\begin{pmatrix} 2440 \\ 3560 \end{pmatrix}$ ✓

M_1 – Premultiply by Inverse

$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}\begin{pmatrix} b \\ c \end{pmatrix} = \frac{1}{3}\begin{pmatrix} 600 \\ 720 \end{pmatrix}$ ✓

M_1 – remaing with identity.

$\begin{pmatrix} b \\ c \end{pmatrix} = \begin{pmatrix} 200 \\ 240 \end{pmatrix}$ ✓

M_1 – remaing with $\begin{pmatrix} b \\ c \end{pmatrix}$

A_1 – Solution.

Biology = 200 k

Chemistry = 240 k

c) $\frac{95}{100} \times 200 \times 36 + \frac{92}{100} \times 240 \times 50$

$6,840 + 11,040 = 17,880$ k ✓

$200 \times 36 + 240 \times 50 = 7,200 + 12000$

$= 19,200$ ✓

M_1 – both correct values

$\%\ \text{Discount} = \frac{19,200 - 17880}{19,200} \times 100$ ✓

M_1 $\%$ Discount

$= \frac{1320}{192}$

$= 6.875\%$ ✓

A_1

10

23 a) $s = t(t-2)(t-1) = t(t^2-3t+2)$

$s = t^3 - 3t^2 + 2t$ ✓

$v = \frac{ds}{dt} = 3t^2 - 6t + 2$; $t = 2$ ✓

$= 12 - 12 + 2$

$v = 2 m/s$ ✓

M1 – ✓ eqn of displacement

M1 – ✓ eqn of velocity

A1

b) Max velocity attained when

$a = zero$

$a = \frac{dv}{dt} = 0$

$a = 6t - 6$ ✓ ; $a = 0$

$\underline{t = 1}$ ✓

$v = 3(1^2) - 6(1) + 2$

$\underline{v = -1 m/s}$

M1 – ✓ eqn of acc.

A1

c) $v = 0$

$3t^2 - 6t + 2 = 0$ ✓

$s = -6$, $p = 6$; $t = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$t = \frac{6 \pm \sqrt{36-24}}{6} = \frac{6}{6} \pm \frac{\sqrt{12}}{6}$ ✓

Either $\underline{t = 1.577}$ or $\underline{t = 0.4226}$ ✓

M1 – equating $v = 0$

M1

A1

d) $a = 6t - 6$; $t = 3$

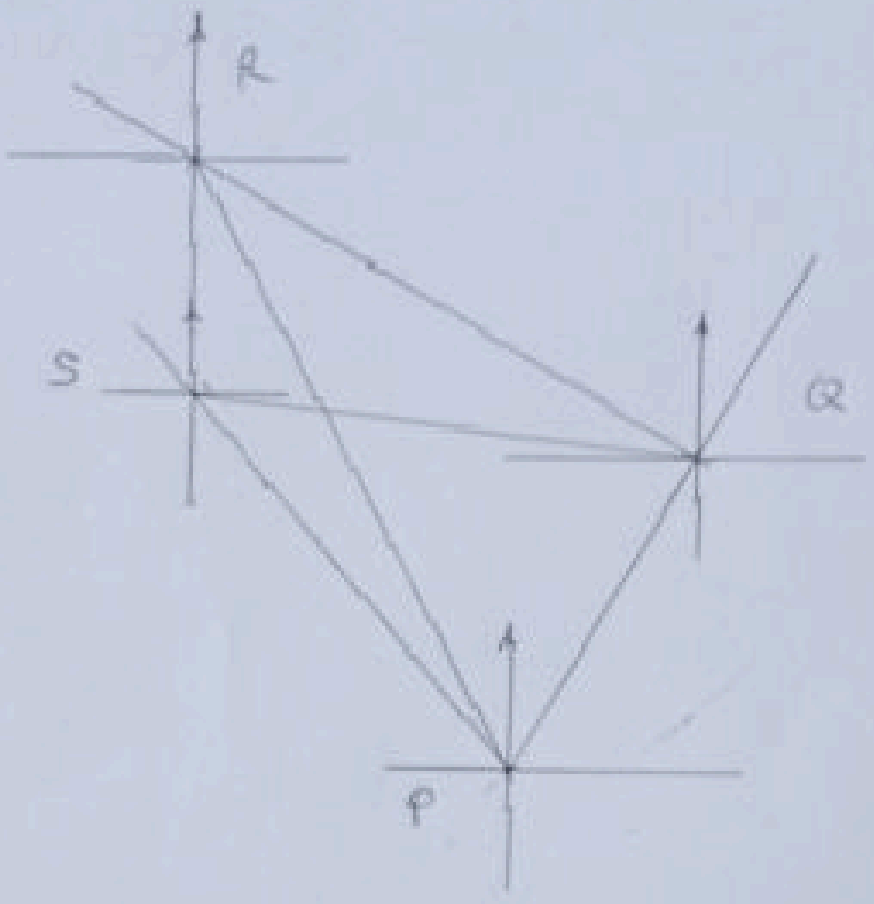
$= 18 - 6$ ✓

$= 12 m/s^2$ ✓

M1

A1 (10)

24 a)



B1 ✓ scale
B1 ✓ Location of Q
B1 ✓ Location of R
B1 ✓ Location of S
B1

b) i) $9.9 \pm 0.1 \simeq 99\text{m}$
$322°$

B1
B1

c) ii) $6.9 \pm 0.1 \simeq 69\text{m}$
$277°$

B1
B1

iii) $6.8 \pm 0.1 \simeq 68\text{m}$

B1

iv) $3.3 \pm 0.1 \simeq 33\text{m}$

B1

10