MOKASA I JOINT EXAMINATIONS

121/1 — MATHEMATICS — Paper 1

ALT A

FORM FOUR

TERM 1

March. 2026 — $2\frac{1}{2}$ hours

MATHEMATICS (Alt. A)

PAPER 1

MARCH, 2026

121/1 MARKING SCHEME

MOKASA I JOINT EXAMINATIONS MARKING SCHEME

MATHEMATICS (Alt. A)

PAPER 1

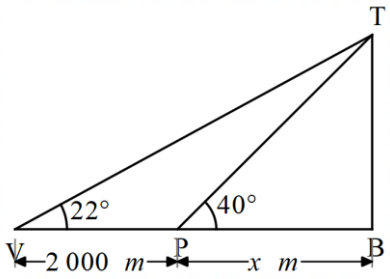
MARKING SCHEME

(CONFIDENTIAL)

NO.	WORKINGS	MKS	REMARKS
1.	Num. $\frac{1}{2}$ of $\frac{2}{5} \div \frac{3}{15} + \frac{7}{10} \times \frac{6}{7}\left(\frac{3}{2} \times \frac{1}{3}\right)$ BODMAS $\frac{3}{2} \times \frac{1}{3} = \frac{1}{2}$ $\frac{1}{2}$ of $\frac{2}{5} \div \frac{3}{15} + \frac{7}{10} \times \frac{6}{7}\left(\frac{1}{2}\right)$ $\frac{1}{2}$ of $\frac{2}{5} \div \frac{3}{15} + \frac{7}{10} \times \frac{3}{7}$ $\frac{1}{5} \div \frac{3}{15} + \frac{7}{10} \times \frac{3}{7}$ $\frac{1}{5} \div \frac{3}{15} = \frac{1}{5} \times \frac{15}{3} = 1$ $1 + \frac{7}{10} \times \frac{3}{7} = 1 + \frac{3}{10}$ $= \frac{13}{10}$ M1 Den. $\frac{5}{3} \times \frac{6}{10} \div \frac{5}{4} - \frac{1}{4}$ $\frac{6}{10} \div \frac{5}{4} = \frac{6}{10} \times \frac{4}{5}$ $= \frac{12}{25}$ $\frac{5}{3} \times \frac{12}{25} - \frac{1}{4} = \frac{4}{5} - \frac{1}{4}$ $= \frac{11}{20}$ Combined; $\frac{13}{10} \div \frac{11}{20} = \frac{13}{10} \times \frac{20}{11}$ $= 2\frac{4}{11}$.	M1 A1 03	
2.	Num. $4x^2 - 16y^2 = (2x - 4y)(2x + 4y) = 2(x - 2y)(2x + 4y)$ Den. $6x^2 - 8xy - 8y^2$ $P = -48$ $S = -8$ $f = -12$ and 4 $6x^2 - 12xy + 4xy - 8y^2$ $6x(x - 2y) + 4y(x - 2y) = (6x - 4y)(x - 2y)$ $= 2(3x - 2y)(x - 2y)$ Combined; $\frac{2(x - 2y)(2x + 4y)}{2(3x - 2y)(x - 2y)}$ $= \frac{2(x + 2y)}{(x - 2y)}$.	M1 M1 A1 03	
3.	Using FOKEBU $6000 \times 147.95 = \text{ksh. } 887700$ Balance $= 887700 - 300000$ $= \text{Ksh. } 587700$ Using KEFOSE; $\frac{587700}{131.50}$ $= 4469.201521$ Sterling pound.	M1 M1 A1 03	

4.	$\frac{5-x}{2} \geq \frac{x+1}{3} \geq \frac{2x+4}{-3}$ $\frac{5-x}{2} \geq \frac{x+1}{3}$ $15-3x \geq 2x+2$ $-3x-2x \geq 2-15$ $-5x \geq -13$ $x \leq 2.6$ $\frac{x+1}{3} \geq \frac{2x+4}{-3}$ $-3x-3 \leq 6x+12$ $-3x-6x \leq 12+3$ $-9x \leq 15$ $x \geq -1\frac{2}{3}$ Combined; $-1\frac{2}{3} \leq x \leq 2.6$ Integrals; $-1, 0, 1$ and 2.	B1 B1 B1 03	
5.	LCM of 5 and 8 $= 40$ minutes Total client served in 40 minutes $= \frac{40}{8} + \frac{40}{5} = 13$ 13 client $= 40$ minutes 182 client $= \frac{182 \times 40}{13} = 560$ minutes $= 9$ hrs 20 minutes Time of the day $= \begin{array}{r} 0800 \\ 0920 \\ \hline 1720 \end{array} +$ $= 1720$h.	M1 M1 A1 03	Fracction of client served in 1 minute $= \frac{1}{5} + \frac{1}{8} = \frac{13}{40}$ $\frac{13}{40} = 1$ minute $\therefore 182$ clients $= 182 \times 1 \times \frac{40}{13}$ $= 9$ hrs 20 minutes Time of the day; $= \begin{array}{r} 0800 \\ 0920 \\ \hline 1720 \end{array} + \Rightarrow = 1720$h.
6.	$192 = 2^6 \times 3^1$ $48 = 2^4 \times 3^1$ $36 = 2^2 \times 3^2$ $(2^2 \times 3^2)^x \times (2^4 \times 3^1)^y = 2^6 \times 3^1$ $2^{2x} \times 3^{2x} \times 2^{4y} \times 3^y = 2^6 \times 3^1$ $2^{2x} \times 2^{4y} = 2^6 \Rightarrow 2^{2x+4y} = 2^6 \Rightarrow 2x+4y = 6$ $3^{2x} \times 3^y = 3^1 \Rightarrow 3^{2x+y} = 3^1 \Rightarrow 2x+y = 1$ $\begin{array}{r} 2x+4y = 6 \\ 2x+y = 1 \\ \hline 3y = 5 \end{array} -$ $y = \frac{5}{3} \Rightarrow y = 1\frac{2}{3}$ $2x + 4\left(\frac{5}{3}\right) = 6 \Rightarrow 6x + 20 = 18$ $6x = -2 \Rightarrow x = -\frac{1}{3}.$	M1 M1 A1 03	Forming the two simultaneous equations Attempting to solve the two equations simultaneously

7.	Let the number be xy; $10x + y = 4(x + y) + 3$ $10x + y = 4x + 4y + 3$ $10x - 4x + y - 4y = 3$ $6x - 3y = 3 \ldots . eq.1$ Reversing the number; $xy + 18 = yx$ $10x + y + 18 = 10y + x$ $10x - x + y - 10y = -18$ $9x - 9y = -18 \ldots \ldots . . eq.2$ $9(6x - 3y) = 9(3)$ $6(9x - 9y) = 6(-18)$ $54x - 27y = 27$ $54x - 54y = -108$ (−) $27y = 135$ $27y = 135$ $y = 5$ $6x - 3(5) = 3$ $6x - 15 = 3$ $6x = 18$ $x = 3$ The original number is 35.	M1 M1 A1 03	Forming the two simultaneous equations Attempting to solve the two equations simultaneously
8.	Distance covered by bus to the meeting; $400 - 180 = 220$ km Time in motion by bus $= \frac{220}{70} = \frac{22}{7}$ h Time in motion by car $= \frac{22}{7} - \frac{42}{60} = \frac{171}{70}$ Speed of the car $= 180 \div \frac{171}{70} = 180 \times \frac{70}{171}$ $= 73\frac{13}{19}$ km/h.	M1 M1 A1 03	
9.	(a) . $\text{Det} = (4 \times 5) - (3 \times 3) = 11$ $\text{Inverse} = \frac{1}{11}\begin{pmatrix} 5 & -3 \\ -3 & 4 \end{pmatrix} = \begin{pmatrix} \frac{5}{11} & -\frac{3}{11} \\ -\frac{3}{11} & \frac{4}{11} \end{pmatrix}$. (b) . $\begin{pmatrix} \frac{5}{11} & -\frac{3}{11} \\ -\frac{3}{11} & \frac{4}{11} \end{pmatrix}\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \frac{5}{11} & -\frac{3}{11} \\ -\frac{3}{11} & \frac{4}{11} \end{pmatrix}\begin{pmatrix} 6 \\ 5 \end{pmatrix}$ $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1\frac{4}{11} \\ \frac{2}{11} \end{pmatrix} \Rightarrow \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1\frac{4}{11} \\ \frac{2}{11} \end{pmatrix}$ $x = 1\frac{4}{11}$ and $y = \frac{2}{11}$.	B1 M1M1 A1 03	

10.	Exterior Angles for 3y sides; $= \frac{360}{3y} = \frac{120}{y}$ $\text{Interior} = 180 - \frac{120}{y}.$ Exterior Angles for y sides; $= \frac{360}{y}$ $\text{Interior} = 180 - \frac{360}{y}$ $\left(180 - \frac{120}{y}\right) - \left(180 - \frac{360}{y}\right) = 40$ $180 - \frac{120}{y} - 180 + \frac{360}{y} = 40$ $-\frac{120}{y} + \frac{360}{y} = 40$ $\frac{-120 + 360}{y} = 40$ $40y = 240$ $y = 6 \text{ sides}.$	M1 M1 A1 03	
11.	$\text{Area} = \frac{h}{2}\{(\text{Sum of ends}) + 2(\text{Sum of middles})\}$ $\frac{5}{2}\{(0 + 2.6) + 2(2.1 + 5.3 + 5.1 + 6.8 + 6.7 + 4.7)\}$ $= \frac{5}{2}\{2.6 + 61.4\}$ $= \frac{5}{2} \times 64$ $= 160 \text{ sq. unts}.$	M1M1 A1 03	
12.	$\tan 22 = \frac{h}{2000 + x} \Rightarrow h = (2000 + x)\tan 22$ $\tan 40 = \frac{h}{x} \Rightarrow h = x \tan 40$ $x \tan 40 = 2000 \tan 22 + x \tan 22 \Rightarrow x = \frac{2000 \tan 22}{(\tan 40 - \tan 22)}$ $= 1857.278431.$ $\sin 40 = \frac{h}{\text{hyp}}$ $\text{hyp} = \frac{1857.278431 \tan 40}{\sin 40}$ $= 2424.504802.$	M1 M1 A1 03	

13.	$y = x^2 - 3x - 4$ At $x = 3$; $y = (3)^2 - 3(3) - 4 = -4$ Coordinates $(3, -4)$ $\frac{dy}{dx} = 2x - 3$ At $x = 3$ $\frac{dy}{dx} = 2(3) - 3$ $= 3$ Gradient of the normal; $3m_2 = -1$ $m_2 = -\frac{1}{3}$ $-\frac{1}{3} = \frac{y+4}{x-3}$ $3y + 12 = -x + 3$ $3y = -x + 3 - 12$ $3y = -x - 9.$	M1 M1 A1 03	Accept an equation in any form
14.	Let the angle subtended by major sector be α Let the angle subtended by minor sector be θ Major arc length $= \frac{\alpha}{360} \times 2 \times \frac{22}{7} \times R = 154$ $\alpha = \frac{154 \times 360 \times 7}{2 \times 22R}$ $= \frac{8820}{R}$ Minor arc length $= \frac{\theta}{360} \times 2 \times \frac{22}{7} \times R = 110$ $\theta = \frac{110 \times 360 \times 7}{2 \times 22R}$ $= \frac{6300}{R}$ $\frac{8820}{R} + \frac{6300}{R} = 360$ $\frac{15120}{R} = 360$ $360R = 15120$ $R = \frac{15120}{360} = 42$ cm $\theta = \frac{6300}{42}$ $= 150°.$	M1 M1 M1 A1 04	

15.

(a) .

x	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
f	5	12	25	10	8
cf	5	17	32	42	50

B1

(b) .

$$\text{Median} = \frac{50}{2} = 25^{\text{th}} \text{ position}$$

M1

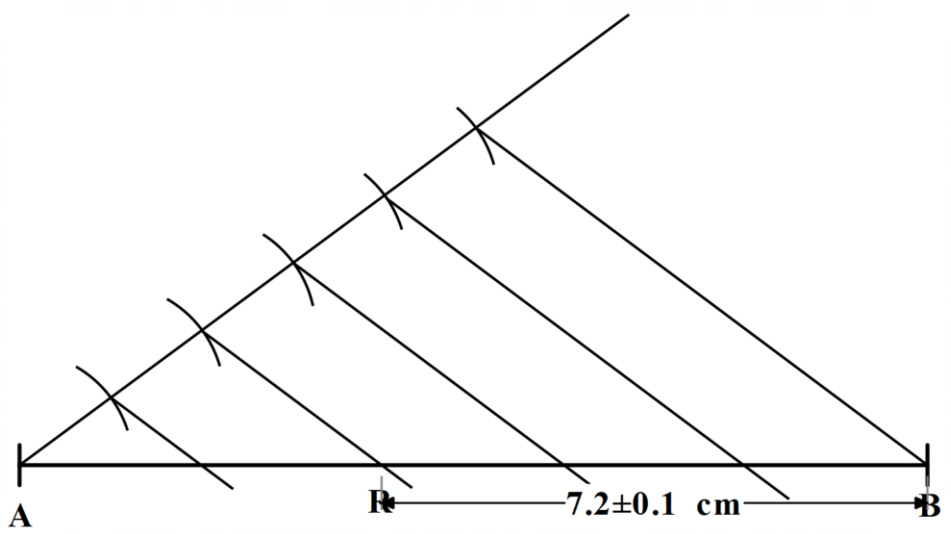
$$\text{Median} = 20 + \left(\frac{25 - 17}{25}\right) \times 10$$

$$= 23.2$$

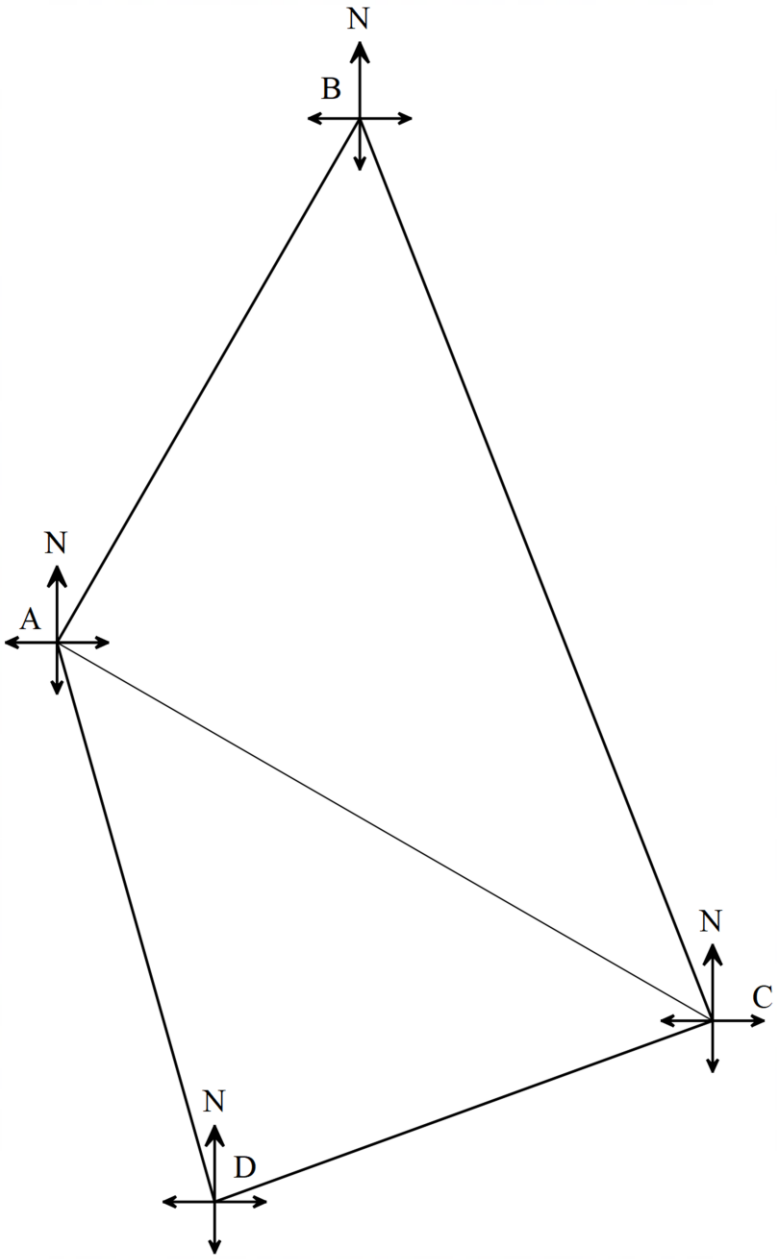
A1

03

16.

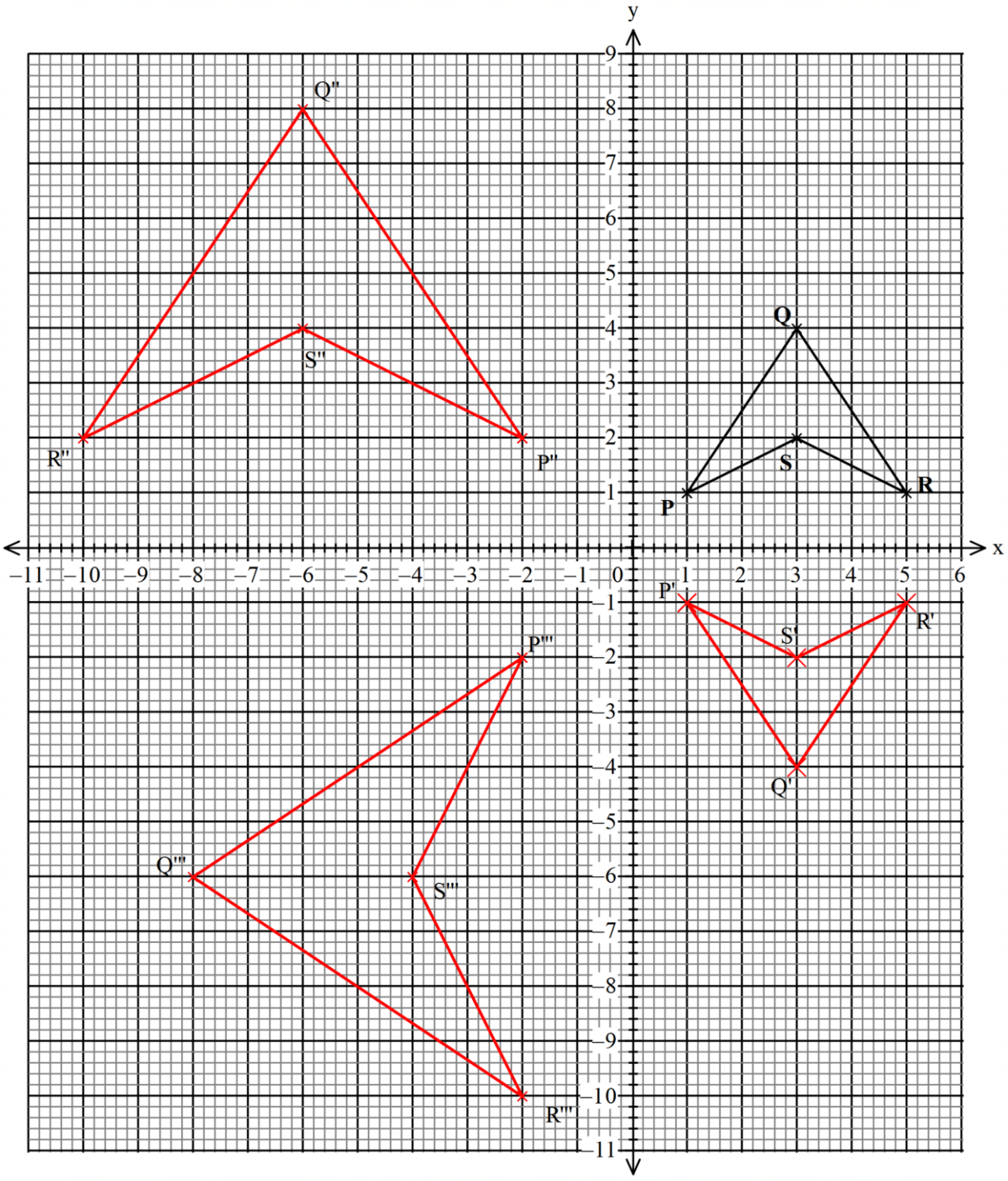


03

17.	**(a) .**  	**B1** **B1** **B1** **B1**	**Location of B** **Location of C** **Location of D** **Completion of the diagram**
	(b) . **(i)** . $(7.6 \pm 0.1) \times 5 = 38 \pm 0.5$ **km** **(ii)** . $= 164° \pm 1°$ **(iii)** . $P = (8 + 12.8 + 7 + 7.6) \times 5$ $= 177 \pm 0.5$ **km.**	**M1A1** **B1** **M1M1** **A1** **10**	

18.	**(a) .** $$\frac{h+30}{h}=\frac{15}{12}$$ $$15h=12h+360$$ $$3h=360$$ $$h=120\text{ cm}$$ **Volume of frustum;** $$\left(\frac{1}{3}\times 3.142\times 15\times 15\times 150\right)$$ $$-\left(\frac{1}{3}\times 3.142\times 12\times 12\times 120\right)$$ $$=17249.58$$ **Capacity;** $$=\frac{17249.58}{1000}$$ $$=17.24758\text{ litres.}$$ **(b) .** **(i) .** **Volume of the cylinder;** $$=3.142\times 0.7\times 0.7\times 1.2$$ $$=1.847496\text{ m}^3$$ **Capacity of the tank;** $$=1.847496\times 1000$$ $$=1847.496\text{ litres.}$$ **(ii) .** $$=\frac{1847.496}{17.24758}$$ $$=107.1162447$$ $$\cong 108\text{ buckets.}$$	**M1** **M1M1** **M1** **A1** **M1** **M1** **A1** **M1** **A1** **10**	

19. **(a) .**



	(i) . $P^1(1,-1), Q^1(3,-4), R^1(5,-1)$ and $S^1(3,-2)$	B1 B1	For the mirror line For correctly drawn image
	(ii) . $P^{11}(-2.2), Q^{11}(-6,8), R^{11}(-10,2)$ and $S^{11}(-6,4)$	B1 B2	For the centre of enlargement For correctly drawn image
	(iii) . $P^{111}(-2,-2), Q^{111}(-8,-6), R^{111}(-2,-10)$ and $S^{111}(-4,-6)$	B1 B1	For the centre For correctly drawn image
	(b) . It is enlargement scale factor -2 about origin followed by rotation at an angle $90°$ about origin	B3	For fully description
		10	

20.

(a) .

$$x^2 = 10^2 + 13^2 - 2(10 \times 13)\cos 72$$ **M1**

$$x^2 = 188.6555815$$

$$x = \sqrt{188.6555815}$$ **M1**

$$= 13.73519499$$

$$\cong 13.74.$$ **A1**

(b) .

$$\frac{13.73519499}{\sin 72} = \frac{10}{\sin\theta}$$ **M1**

$$\sin\theta = \frac{10 \times \sin 72}{13.73519499}$$

$$\sin\theta = 0.6924230176$$

$$\theta = \sin^{-1}(0.6924230176)$$

$$= 43.82221907$$

$$\cong 43.82°.$$ **A1**

(c) .

(i) .

$$\frac{13.73519499}{\sin 115} = \frac{7}{\sin\theta}$$ **M1**

$$\sin\theta = \frac{7 \times \sin 115}{13.73519499}$$

$$\sin\theta = 0.4618903855$$

$$\theta = \sin^{-1}(0.4618903855)$$

$$= 27.50915805$$

$$\angle QPR = 180 - (115 + 27.50915805)$$

$$= 37.49084195$$

$$\frac{13.73519499}{\sin 115} = \frac{x}{\sin 37.49084195}$$ **M1**

$$x = \frac{13.73519499 \times \sin 37.49084195}{\sin 115}$$

$$= 9.223925038$$

$$\cong 9.2$$ **A1**

13.73519499^2

$= 7^2 + x^2 - 2(7 \times x)\cos 115$

$139.6555814 = x^2 + 5.916655664x$

$x^2 + 5.916655664x - 139.6555814 = 0$

$$x = \frac{-5.916656 \pm \sqrt{593.629}}{2}$$

$x = 9.223925037$

$\cong 9.2$ cm.

(ii) .

$$\frac{13.73519499}{\sin 115} = D$$ **M1**

$$\text{Diameter} = 15.15511086$$

$$\cong 15.2$$ **A1**

10

21.	**(a) .** **(i) .** **Equation of line AB;** $\frac{2}{3}=\frac{y+4}{x+2}\Rightarrow 3y+12=2x+4$ $3y=2x-8$ **Equation of line BC;** $\frac{3}{2}=\frac{y-1}{x-3}\Rightarrow 2y-2=3x-9$ $2y=3x-7$ **Solving the equation simultaneously;** $2x-3y=8$ $3x-2y=7$ $\Rightarrow$ $\begin{array}{r} 6x-9y=24 \\ 6x-4y=14\ \ - \\ \hline -5y=10 \end{array}$ $-5y=10\Rightarrow y=-2$ $3(-2)=2x-8$ $2x=2\Rightarrow x=1$ $B(1,-2).$ **(ii) .** **Equation of AD;** $\frac{3}{2}=\frac{y+4}{x+2}\Rightarrow 2y+8=3x+6$ $2y=3x-2$ **Equation of line DC;** $\frac{2}{3}=\frac{y-1}{x-3}\Rightarrow 3y-3=2x-6$ $3y=2x-3$ **Solving the equation simultaneously;** $3x-2y=2$ $2x-3y=3$ $\Rightarrow$ $\begin{array}{r} 6x-4y=4 \\ 6x-9y=9\ \ - \\ \hline 5y=-5 \end{array}$ $5y=-5\Rightarrow y=-1$ $2(-1)=3x-2$ $3x=0\Rightarrow x=0$ $D(0,-1).$ **(b) .** $M\left(\frac{1+0}{2},\frac{-2-1}{2}\right)\Rightarrow M\left(\frac{1}{2},-1\frac{1}{2}\right).$ **(c) .** $F\left(\frac{-2+0}{2},\frac{-4-1}{2}\right)\Rightarrow M\left(-1,-5\frac{1}{2}\right)$ $\lvert FM\rvert=\sqrt{\left(\frac{1}{2}+1\right)^2+\left(-\frac{3}{2}+\frac{5}{2}\right)^2}$ $=1.802775638$ $\cong 1.8.$	**M1** **M1** **A1** **M1** **M1** **A1** **M1A1** **M1** **A1** **10**	**Formation of the two simultaneous equations** **Attempting to solve simultaneous equations** **Formation of the two simultaneous equations** **Attempting to solve simultaneous equations**

22.	**(a) .** **(i) .** $\overrightarrow{EH} = \begin{pmatrix}10\\2\end{pmatrix} - \begin{pmatrix}3\\5\end{pmatrix}$ $= \begin{pmatrix}7\\-3\end{pmatrix}.$ **(ii) .** $\left\|\overrightarrow{EH}\right\| = \sqrt{(7)^2 + (-3)^2}$ $= 7.615773106$ $\cong 7.62.$ **(b) .** **(i) .** $T = \begin{pmatrix}10\\10\end{pmatrix} - \begin{pmatrix}-2\\3\end{pmatrix}$ $= \begin{pmatrix}12\\7\end{pmatrix}.$ **(ii) .** $OQ^1 = \begin{pmatrix}1\\3\end{pmatrix} + \begin{pmatrix}12\\7\end{pmatrix}$ $= \begin{pmatrix}13\\10\end{pmatrix}$ $Q^1(13, 10).$ **(iii) .** $m\begin{pmatrix}-2\\3\end{pmatrix} - n\begin{pmatrix}1\\3\end{pmatrix} = \begin{pmatrix}-12\\9\end{pmatrix}$ $-2m - n = -12$ $2m + n = 12$ $3m - 3n = 9$ $6m + 3n = 36$ _ $6m - 6n = 18$ $9n = 18$ $9n = 18$ $n = 2$ $2m + 2 = 12$ $2m = 10$ $m = 5.$	M1 A1 M1 A1 M1 A1 B1 M1 M1 A1 10	Penalize vector instead of coordinates For all correct values of m and n

23.

(a) .

(i) .

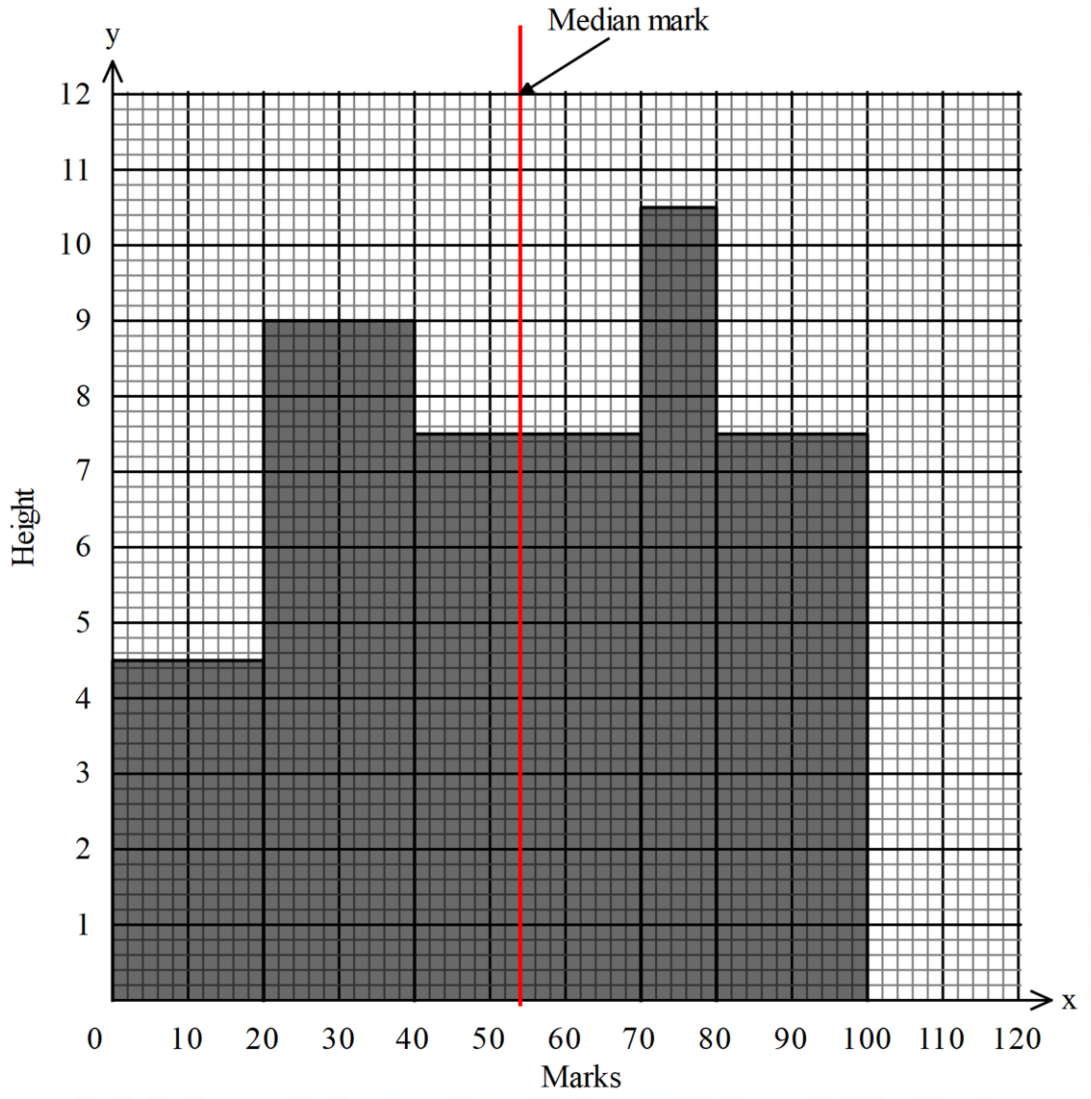
$$h = \frac{f}{i} \times k$$

$$k = \frac{hi}{f} = \frac{7.5 \times 30}{45} = 5$$

m	0 – 20	20 – 40	40 – 70	70 – 80	80 – 100
f	18	36	45	21	30
Area	90	180	225	105	150
height	4.5	9	7.5	10.5	7.5
cf	90	270	495	600	750

B2 Correct areas
B2 Correct heights

(ii) .



	(b) . **(i) .** $\text{Median} = \frac{750}{2} = 375^{\text{th}}$ position Median group is $40 - 70$. **(ii) .** $270 + 7.5x = 375$ $7.5x = 105$ $x = 14$ Median mark $= 40 + 14$ $= 54$ mark	B1 M1 A1 10	

24.	**(a) .** $$s = 3t^3 - 15t^2 + 16t - 2$$ $$\text{At } t = 2;$$ $$s = 3(2)^3 - 15(2)^2 + 16(2) - 2$$ $$= -6 \text{ m}.$$	**M1** **A1**	**Substitutions** **Reject with wrong SI units**
	(b) . $$s = 3t^3 - 15t^2 + 16t - 2$$ $$v = \frac{ds}{dt} = 9t^2 - 30t + 16$$ $$\text{At } t = 2;$$ $$v = 9(2)^2 - 30(2) + 16$$ $$= -8 \text{ m/s}.$$	**M1** **M1** **A1**	**Differentiations** **Substitutions** **Reject with wrong SI units**
	(c) . $$\text{At rest}, v = 0$$ $$9t^2 - 30t + 16 = 0$$ $$t = \frac{30 \pm \sqrt{900 - 576}}{18} = \frac{30 \pm 18}{18}$$ $$t_1 = \frac{30 + 18}{18} = 2\frac{2}{3} \text{ hours}$$ $$t_2 = \frac{30 - 18}{18} = \frac{2}{3} \text{ hours}.$$	**M1** **M1** **A1**	**Formation of quad. Equation** **Attempting to solve quadratic** **For the both correct values of time**
	(d) . $$a = \frac{dv}{dt} = 18t - 30$$ $$\text{At } t = 3;$$ $$a = 18(3) - 30$$ $$= 24 \text{ m/s}^2.$$	**M1** **A1**	**Differentiations** **Reject with wrong SI units**
		10	