

OPENER EXAMINATION: TERM 2 2024

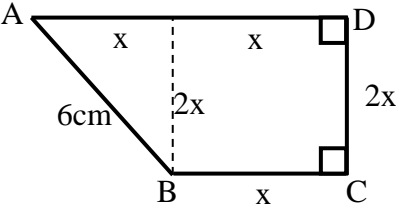
FORM 4

**MATHEMATICS
MARKING SCHEME**

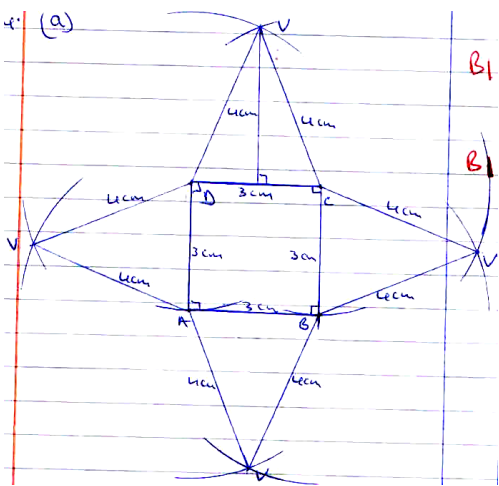
1.	$\frac{5}{6} \text{ of } \left(\frac{13}{3} - \frac{23}{6} \right)$ $\frac{5}{12} \times \frac{3}{25} + \frac{14}{9} \times \frac{3}{7}$ $= \frac{5}{6} \times \frac{3}{6}$ $= \frac{1}{20} + \frac{2}{3}$ $= \frac{5}{43}$ $= \frac{5}{12} \times \frac{60}{43}$ $= \frac{25}{43}$	<p>M1 M1 A1</p>	<p>For $\frac{5}{12}$ For $\frac{43}{60}$ for answer</p>
		03	
2.	$\sqrt{\frac{38 \times 504 \times 143 \times 910 \times 10}{28 \times 117 \times 286 \times 7}}$ $= \sqrt{\frac{9 \times 18 \times 130 \times 10}{117 \times 2 \times 7}}$ $= \sqrt{\frac{9 \times 13 \times 100}{117}}$ $= \sqrt{100}$ $= 10$	<p>M1 M1 A1</p>	<p>Simplify up to perfect square $\sqrt{100}$</p>
		03	
3.	$\left(\frac{3^3}{2^3} \right)^{x+7} = \left(\frac{2^2}{3^2} \right)^{-3x}$ $\left(\frac{3}{2} \right)^{3(x+7)} = \left(\frac{3}{2} \right)^{6x}$ $3(x+7) = 6x$ $3x+21 = 6x$ $x = 7$	<p>M1 M1 A1</p>	
		03	
4.	$30 = 2 \times 3 \times 5$ $50 = 2 \times 5^2$ $35 = 5 \times 7$ $\text{L.C.M} = 2 \times 3 \times 5^2 \times 7$ $= 1050 \text{ mins}$ $17 \text{ hrs } 30 \text{ mins}$ $\text{Time} = 7.18$	<p>B1</p>	

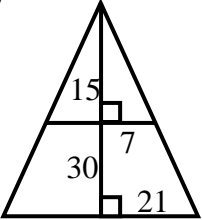
	$\begin{array}{r} +17.30 \\ 2448 \\ \hline \Rightarrow 12.48 \text{ a.m.} \\ \text{Tuesday} \end{array}$	M1 A1	For addition (Accept 0048h Tuesday)
		03	

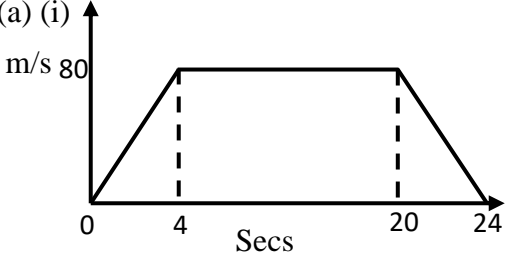
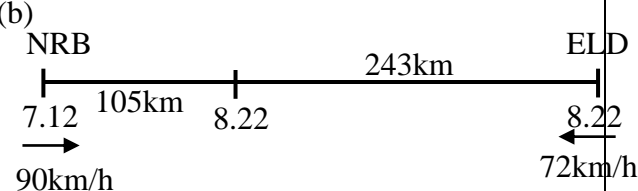


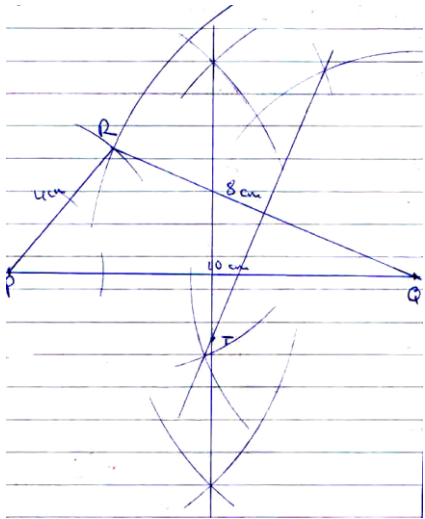
5.	$x + y = 10$ $(10y + x) - (10x + y) = 54$ $9y - 9x = 54$ $y - x = 6$ $x + y = 10$ $\underline{-x + y = 6}$ $2y = 16$ $y = 8$ $x = 2$ <p>Number is 28</p>	M1 M1 A1	
		03	
6.	 $(2x)^2 + x^2 = 6^2$ $5x^2 = 36$ $x = 2.683$ $\text{Area} = \frac{1}{2}(x + 2x)(2x)$ $= \frac{1}{2}(3 \times 2.683)(2 \times 2.683)$ $= 21.595467$ $\approx 21.60 \text{ units}$	M1 A1 M1 A1	✓ Expression for height ✓ Expression for area Accept
		04	
7.	Inter. $\angle = x$ Exter. $\angle = y$ $x + y = 180^{\circ}$ $\underline{x - y = 108^{\circ}}$ $2x = 288$ $x = 144^{\circ}$ $\therefore \text{ext. } \angle 36^{\circ}$ $\text{No. of sides} = \frac{360}{36}$ $= 10 \text{ sides}$	B1 M1 A1	For the inter. \angle and ext. \angle
		03	
8.	Let the commission be $x\%$ $\frac{x}{100}(500000 - 100000)$ $= 4000x$ $4000x + 10000 = 56000$ $x = 12.5\%$	M1 M1 A1	✓ Expression of interest
		03	
9.	Vol. cylinder $\Rightarrow \pi(14^2)h$ }	M1	For ✓ vol. expression for the

	$\text{Vol. cone} \Rightarrow \frac{1}{3}\pi(7^2) \times 18$ $\pi(14^2)h = \frac{1}{3}\pi(7^2) \times 18$ $h = \frac{1}{3} \times 7^2 \times 18 \times \frac{1}{14^2}$ $h = 1.5\text{cm}$	M1 A1	cylinder & cone For equating to determine change in height									
		03										
10.	$\frac{2x-4}{12-3x^2} - \frac{1}{3x+6}$ $\frac{2(x-2)}{3(2-x)(2+x)} - \frac{1}{3(x+2)}$ $- \frac{2}{3(2+x)} - \frac{1}{3(x+2)}$ $= - \frac{1}{x+2}$	M1 M1 A1	For \checkmark factorization									
		03										
11.	<table style="width: 100%; border: none;"> <tr> <td style="width: 30%;"></td> <td style="text-align: center;">Present</td> <td style="text-align: center;">4 yrs ago</td> </tr> <tr> <td>Daughter \Rightarrow</td> <td style="text-align: center;">x</td> <td style="text-align: center;">$x - 4$</td> </tr> <tr> <td>Mother \Rightarrow</td> <td style="text-align: center;">$2.5x$</td> <td style="text-align: center;">$2.5x - 4$</td> </tr> </table> $\frac{x-4}{2.5x-4} = \frac{1}{3}$ $3x - 12 = 2.5x - 4$ $0.5x = 8$ $x = 16$ <p>Mother = 2.5×16 = 40 years</p>		Present	4 yrs ago	Daughter \Rightarrow	x	$x - 4$	Mother \Rightarrow	$2.5x$	$2.5x - 4$	M1 A1 B1	
	Present	4 yrs ago										
Daughter \Rightarrow	x	$x - 4$										
Mother \Rightarrow	$2.5x$	$2.5x - 4$										
		3										
12.	$5y + 2x - 7 = 0$ $y = -\frac{2}{5}x + \frac{7}{5}$ <p>Gr. Line = $-\frac{2}{5}$</p> $\frac{k-5}{3- -2} = \frac{-2}{5}$ $k - 5 = -2$ $k = 3$	B1 B1 A1										
		03										
13.	20000×147.86 $= 2,957,200$ $\frac{2957200 - 2512000}{74.50}$ $= 5975.84$	M1 M1 A1										
		03										

14.	<p>(a)</p>  <p>(c) Height = 3.7cm</p>		<p>B1 ✓ Lines & angles drawn (allow ± 0.1cm) B1 ✓ Labelling</p> <p>B1 (Allow ± 0.1 cm)</p>																		
			3																		
15.	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">No.</th> <th style="width: 20%;">Log</th> </tr> </thead> <tbody> <tr> <td>849.6</td> <td>2.9292</td> </tr> <tr> <td>2.41</td> <td>0.3820+</td> </tr> <tr> <td>3941</td> <td>3.3112</td> </tr> <tr> <td></td> <td>3.5956-</td> </tr> <tr> <td></td> <td>1.7156</td> </tr> <tr> <td></td> <td>÷ 3</td> </tr> <tr> <td>8.039×10^{-1}</td> <td>1.9052</td> </tr> <tr> <td></td> <td>= 0.8039</td> </tr> </tbody> </table>	No.	Log	849.6	2.9292	2.41	0.3820+	3941	3.3112		3.5956-		1.7156		÷ 3	8.039×10^{-1}	1.9052		= 0.8039	<p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p>	<p>✓ 3 Logs</p> <p>For addition and subtraction</p> <p>For ✓ ÷ 3</p>
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16.	$\left. \begin{array}{l} \frac{1}{0.3654} - 4.151^2 \\ \frac{1}{0.3654} \Rightarrow 2.737 \\ 4.151^2 \Rightarrow 17.231 \end{array} \right\}$ $2.737 - 17.231 = -14.494$	<p>B1</p> <p>M1</p> <p>A1</p>	<p>For both</p>																		
		03																			
17.	<p>(a) Original members = x</p> <p>Original each = $\frac{180000}{x}$</p> <p>Later each = $\frac{180,000}{x-3}$</p> $\frac{180,000}{x-3} - \frac{18000}{x} = 3000$ $\frac{60}{x-3} - \frac{60}{x} = 1$ $60x - 60x + 180 = x^2 - 3x$ $x^2 - 3x - 180 = 0$ $(x - 15)(x + 12) = 0$ $x = 15$	<p>B1</p> <p>B1</p> <p>M1</p> <p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p>	<p>✓ Factorization</p>																		

	(b) $\frac{180,000}{15} = 12000$ (c) Increase = 3000 $\frac{3000}{12000} \times 100 = 25\%$	M1 A1 M1 A1	
		10	
18.	(a) $r : R = 1:3$ (b) $\frac{r}{R} = \frac{1}{3}$ $R = 21\text{cm}$ (c)  Vol. Big cone = $\frac{1}{3} \times \frac{22}{7} \times 21^2 \times 45 = 20790\text{cm}^3$ Vol. Small cone = $\frac{1}{3} \times \frac{22}{7} \times 7^2 \times 15 = 770\text{cm}^3$ Vol. of frustum = $20790 - 770 = 20020\text{cm}^3$ (d) Vol. tank = $150 \times 120 \times 180$ Buckets = $\frac{150 \times 120 \times 80}{20020} = 71.93 \cong 72 \text{ full buckets}$	B1 M1 A1 M1 M1 M1 M1 A1 B1	Alternative method: L.S.F = 1:3 V.S.F = 1:27 V.S.F frustum = 26 $\therefore \text{Vol.} = 26 \times 770 = 20020$ For subtraction
		10	

19.	<p>(a) (i) </p> <p>Distance = $\frac{1}{2} (16 + 24) \times 80$ $= 1600\text{m}$</p> <p>(ii) $-\frac{80}{4}$ $= -20\text{m/s}^2$</p> <p>(b) </p> <p>Relative distance = $348 - (90 \times \frac{7}{6})$ $= 243\text{km}$</p> <p>Relative speed = 162km/hr</p> <p>Time taken = $\frac{243}{162}\text{hrs}$ $= 1.5\text{ hrs}$</p> <p>Time = $8.22 + 1\text{hr } 30\text{ mins}$ $= 9.52\text{ a.m.}$</p> <p>(c) $90 \times 2\frac{2}{3}\text{km}$ $= 240\text{km}$</p>	<p>M1 A1</p> <p>M1 A1</p> <p>B1</p> <p>M1</p> <p>M1 A1 M1 A1</p>	<p>Accept decel. = $\frac{80}{4} = 20\text{m/s}^2$</p> <p>For both R.D & R.S</p> <p>OR $348 - (1.5 \times 72)$ $= 240\text{km}$</p>																																													
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20.	<p>(a) (i) Modal class = 30 – 39</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th>Marks</th> <th>x</th> <th>f</th> <th>fx</th> <th>cf</th> </tr> </thead> <tbody> <tr> <td>20-29</td> <td>24.5</td> <td>3</td> <td>73.5</td> <td>3</td> </tr> <tr> <td>30-39</td> <td>34.5</td> <td>18</td> <td>621</td> <td>21</td> </tr> <tr> <td>40-49</td> <td>44.5</td> <td>13</td> <td>578.5</td> <td>34</td> </tr> <tr> <td>50-59</td> <td>54.5</td> <td>14</td> <td>763</td> <td>48</td> </tr> <tr> <td>60-69</td> <td>64.5</td> <td>17</td> <td>1096.5</td> <td>65</td> </tr> <tr> <td>70-79</td> <td>74.5</td> <td>12</td> <td>894</td> <td>77</td> </tr> <tr> <td>80-89</td> <td>84.5</td> <td>5</td> <td>422.5</td> <td>82</td> </tr> <tr> <td></td> <td></td> <td></td> <td>4449</td> <td></td> </tr> </tbody> </table> <p>Mean = $\frac{4449}{82}$ $= 54.2561$ $\cong 54.26$</p> <p>(ii) Median = $49.5 + \frac{41-34}{14} \times 10$</p>	Marks	x	f	fx	cf	20-29	24.5	3	73.5	3	30-39	34.5	18	621	21	40-49	44.5	13	578.5	34	50-59	54.5	14	763	48	60-69	64.5	17	1096.5	65	70-79	74.5	12	894	77	80-89	84.5	5	422.5	82				4449		<p>B1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>B1</p>	<p>= For \checkmark x column</p> <p>For \checkmark fx column</p> <p>Correct to 2 d.p</p> <p>For cumulative freq.</p>
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23.	<p>(a) </p> <p>(b) Construction of any 2 \perp side bisectors \checkmark Location of T Distance RT = 5.2km</p> <p>(c) Drop \perp from T to PQ Distance = 1.5km</p> <p>(d) $S = \frac{10+8+4}{2}$ = 11km $A = \sqrt{11(11-10)(11-8)(11-4)}$ = 15.19868km² $\cong 15.20\text{km}^2$</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p>	<p>For \checkmark measurement with the given scale (1cm = 1km)</p> <p>For \checkmark triangle labelled.</p> <p>Allow $\pm 0.1\text{km}$</p> <p>Allow $\pm 0.1\text{km}$</p> <p>* Allow any other alternative method by calculate only.</p>
		10	
24.	<p>(a) (i) \checkmark PQR drawn \checkmark P^IQ^IR^I drawn (ii) Reflection on the line y – axis (or x = 0)</p> <p>(b) (i) $\left. \begin{matrix} P^{II}(-3,-2) \\ Q^{II}(-2,-1) \\ R^{II}(-1,-4) \end{matrix} \right\}$ $\checkmark \Delta P^{II}Q^{II}R^{II}$ drawn (ii) Negative quarter turn about (0,0) OR (270^o) turn about (0,0) OR – 90^o turn about (0,0)</p> <p>(c) $\left. \begin{matrix} P^{III}(3,-2) \\ Q^{III}(2,-1) \\ R^{III}(1,-4) \end{matrix} \right\}$ $\checkmark \Delta P^{III}Q^{III}R^{III}$ drawn</p> <p>(d) PQR and P^IQ^IR^I</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B2</p>	<p>Coordinates can be implied on the diagram</p> <p>Coordinates can be implied on the diagram</p>

	PQR and $P^{\text{II}}Q^{\text{II}}R^{\text{II}}$ $P^{\text{I}}Q^{\text{I}}R^{\text{I}}$ and $P^{\text{III}}Q^{\text{III}}R^{\text{III}}$ $P^{\text{II}}Q^{\text{II}}R^{\text{II}}$ and $P^{\text{III}}Q^{\text{III}}R^{\text{III}}$		<ul style="list-style-type: none">- for 4 pairs- Allow B1 for at least 2 pairs
		10	



