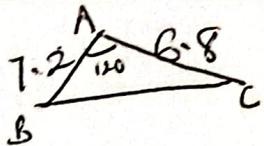


12/2 MARKING SCHEME
FORM 3 TERM 3 2024

NO	Workings		Comments
1	$p^2 = \frac{x+2w}{4x+3r} \checkmark$ $4p^2x + 3p^2r - x = 2w$ $x(4p^2 - 1) = 2w - 3p^2r \checkmark$ $x = \frac{2w - 3p^2r}{4p^2 - 1} \checkmark$	M1 M1 A1 3ms	Squaring both sides x on the L.H.S & Factorised Ans
2	$\frac{8(4+2\sqrt{3})}{4-2\sqrt{3}(4+2\sqrt{3})}$ $\frac{32+16\sqrt{3} \checkmark}{16-12\sqrt{3}}$ $8+2\sqrt{3} \checkmark$	M1 M1 3ms	Numerator simplified denominator rationalized
3	$p \propto c + \frac{1}{t^2} \quad b = c + \frac{b}{36}$ $p = c + \frac{b}{t^2} \quad 18 + c + \frac{b}{9}$ $\left. \begin{array}{l} 216 = 36c + b \\ 162 = 9c + b \end{array} \right\}$ $c = 2 \quad b = 144 \checkmark$ $11 = 2 + \frac{144}{t^2}$ $t^2 = 16 \quad t = \pm 4 \checkmark$	M1 B1 B1 3ms	two eqs formed both c & c the correct value of t

No	Workings		Comments
4	$\log\left(\frac{5x+15}{9}\right) = \log(x-9) \checkmark$ $13x = 15 \checkmark$ $x = 12 \checkmark$	M M A 3M/4	Single log both sides or on L.H.S
5		B1 B1 B1 3M/4	any 2 non parallel chords bisected Centre joined to X & bisected two chords drawn
6	$y^2 + 7y + 6 = 0$ $y^2 + 7y + 6 = 0 \Rightarrow y = \frac{-7 \pm \sqrt{49 - 4(2)(6)}}{2(2)}$ $y = \frac{-7 \pm 1}{2}$ <p>When $y = -1.5$ $x = 4$ } $y = -1.5, 2$ } \rightarrow A₁</p> <p>$y = -2$ $x = 3$ } $x = 4, 3$ } \rightarrow A₂</p> <p style="margin-left: 150px;">$x = 4$ $x = 3$</p>	M A ₁ A ₂ 3M/4	Correct attempt to solve both paired ans both paired ans
7	$x^2 + \frac{x}{2} + \left(\frac{1}{4}\right)^2 = 18 + \frac{1}{16} \checkmark$ $\left(x + \frac{1}{4}\right)^2 = \frac{289}{16} \checkmark$ $x = -\frac{1}{4} \pm \frac{17}{4}$ $x = 4 \quad x = -4\frac{1}{2} \checkmark$	M ₁ M ₁ A ₁ 3M/5	Correct value on R.H.S L.H.S factorised both

No	Workings		Comments
8	$1 + 7(2x) + 21(2x)^2 + 35(2x)^3$ $1 + 14x + 84x^2 + 280x^3 \checkmark$ $(1+2x) = (1.02)$ $x = 0.01$ $1 + 14(0.01) + 84(0.01)^2 + 280(0.01)^3 \checkmark$ $= 1.14868$ $\underline{1.1487} \checkmark$	<p>B₁</p> <p>M₁</p> <p>A₁</p>	<p>expansion simplified</p> <p>Correct substitution</p>
9	$18 - 4y = 0 \checkmark$ $y = 4.5 \checkmark$	<p>M₁</p> <p>A₁</p> <p>2 marks</p>	<p>equation principal - secondary</p>
10	$18000 \left(1 + \frac{r}{100}\right)^6 = 21000 \checkmark$ $r = 2.602\%$ $r = 2.6\% \checkmark$	<p>B₁</p> <p>M₁</p> <p>A₁</p> <p>3 marks</p>	<p>principal £ 18000</p> <p>Correct formula substitution</p>
11	<p>kota $\frac{1}{9} \times 360\,000 = 40,000 \checkmark$</p> <p>$\frac{3}{9} \times 360\,000 = 120,000 \checkmark$</p> <p>$\frac{5}{9} \times 360\,000 = 200,000 \checkmark$</p>	<p>B₁</p> <p>B₁</p> <p>A₁</p> <p>3 marks</p>	<p>Waktu</p> <p>Walaupun</p> <p>kategori</p>
12	$a = 1 \quad d = 3 \checkmark$ $S_{100} = \frac{100}{2} [2(1) + (100-1)3] \checkmark$ $= 14950 \checkmark$	<p>B₁</p> <p>M₁</p> <p>A₁</p> <p>3 marks</p>	<p>d = 3</p> <p>Correct substitution.</p>

No	Working	marks	Comments																												
13	<p>Working</p> $3 \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} - 2 \begin{pmatrix} 4 \\ -4 \\ 5 \end{pmatrix} + \begin{pmatrix} 1 \\ 0 \\ -5 \end{pmatrix} \checkmark$ $\begin{pmatrix} 3 \\ 6 \\ 9 \end{pmatrix} - \begin{pmatrix} 8 \\ -8 \\ 10 \end{pmatrix} + \begin{pmatrix} 1 \\ 0 \\ -5 \end{pmatrix} = \begin{pmatrix} -4 \\ 14 \\ -6 \end{pmatrix} \checkmark$ <p>$-4i + 14j - 6k \checkmark$</p>	<p>M₁</p> <p>M₁</p> <p>A₁</p> <p>3 marks</p>	<p>Correct substitution</p> <p>Column vector.</p> <p>Correct value</p>																												
14	$\left(\frac{0.5}{12} + \frac{0.5}{8} \right) \% = 10.42 \% \checkmark \checkmark \checkmark$ <p>CV max vol 531.25 Working 480 Min vol 431.25 } \checkmark</p> <p>A.E $\frac{1}{2} 531.25 - 431.25 = 50 \checkmark$</p> <p>% $\frac{50}{480} \times 100 = 10.42 \% \checkmark$</p>	<p>M₁</p> <p>M₁</p> <p>A₁</p> <p>3 marks</p>	<p>Correct max or min value</p> <p>A.E</p> <p>%</p>																												
15	 $BC^2 = 7.2^2 + 6.8^2 - 2(7.2)(6.8) \cos 120^\circ \checkmark$ $BC = 12.1 \checkmark$ $\frac{12.1}{\sin 120} = 2R \checkmark$ $R = 7.0 \text{ cm } \checkmark$	<p>M₁</p> <p>A₁</p> <p>M₁</p> <p>A₁</p> <p>3 marks</p>	<p>Correct cosine rule substitution</p> <p>Correct sin rule substitution</p>																												
16	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">No</th> <th style="width: 50%;">Logs</th> </tr> </thead> <tbody> <tr> <td>75.4</td> <td>1.8774</td> </tr> <tr> <td>4.83</td> <td>0.68391</td> </tr> <tr> <td></td> <td>$\times 2$</td> </tr> <tr> <td></td> <td>1.3678</td> </tr> <tr> <td></td> <td><hr/></td> </tr> <tr> <td></td> <td>3.2452</td> </tr> <tr> <td></td> <td><hr/></td> </tr> <tr> <td></td> <td>3.7168</td> </tr> <tr> <td></td> <td><hr/></td> </tr> <tr> <td></td> <td>5.5284</td> </tr> <tr> <td></td> <td><hr/></td> </tr> <tr> <td></td> <td>5</td> </tr> <tr> <td></td> <td>1.10568</td> </tr> </tbody> </table> <p>0.00571</p> <p>$(.2755 \times 10^1) \leftarrow 1.10568$</p> <p>$12.755$</p>	No	Logs	75.4	1.8774	4.83	0.68391		$\times 2$		1.3678		<hr/>		3.2452		<hr/>		3.7168		<hr/>		5.5284		<hr/>		5		1.10568	<p>M₁</p> <p>M₁</p> <p>M₁</p> <p>A₁</p> <p>4 marks</p>	<p>all logs correct</p> <p>+ & - of logs</p> <p>Correct $\frac{\circ}{\circ}$</p> <p>Ans</p>
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SECTION B: ANSWER 5 QUESTIONS ONLY IN THIS SECTION.

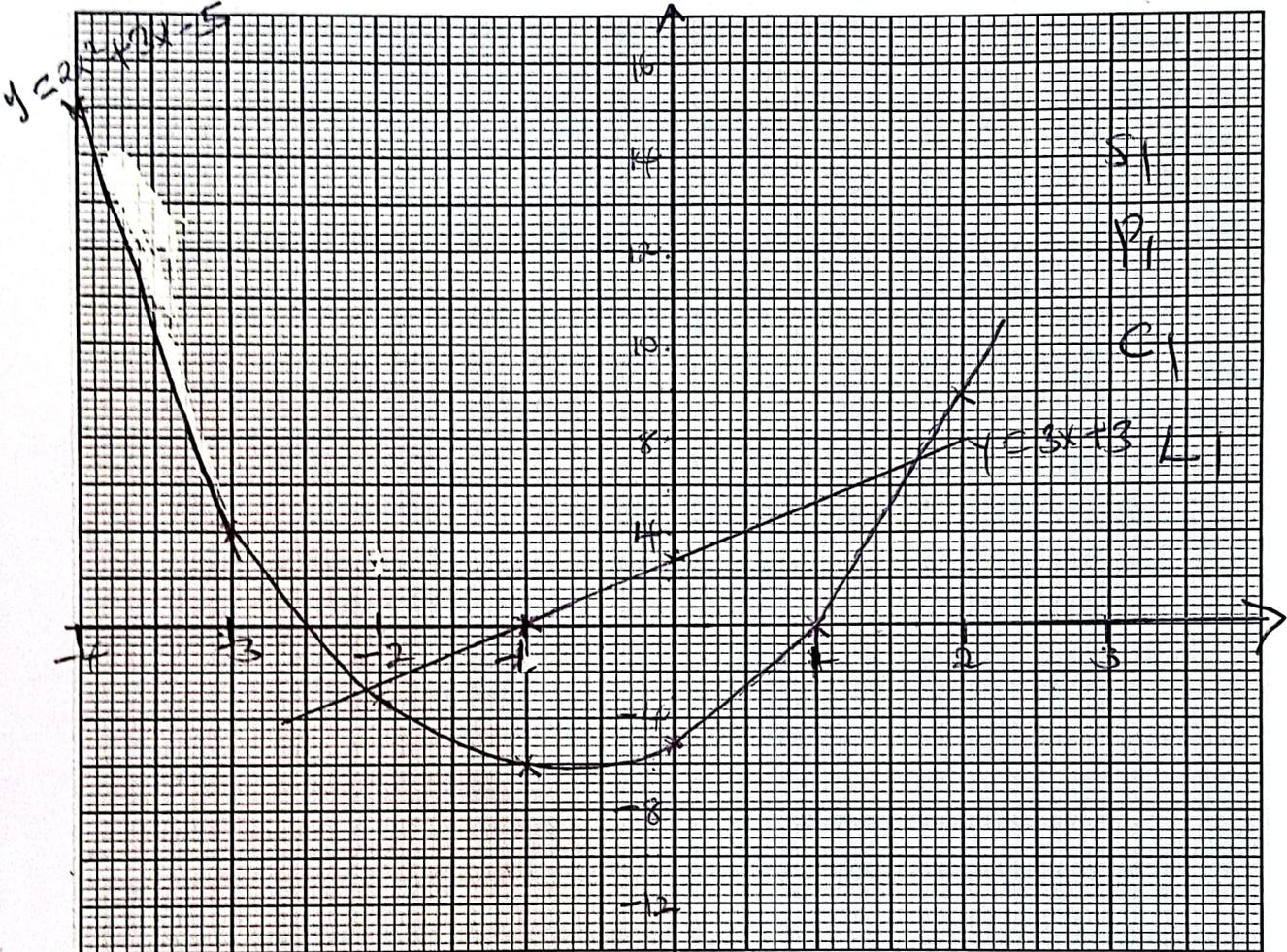
17a) Complete the table below for the function $y=2x^2+3x-5$

(2 mks)

x	-4	-3	-2	-1	0	1	2
$2x^2$	32	18	8	2	0	2	8
$3x$	-12	-9	-6	-3	0	3	6
-5	-5	-5	-5	-5	-5	-5	-5
y	15	4	-3	-6	-5	0	9

b) On the grid provided draw the graph of $y=2x^2+3x-5$ for $-4 \leq x \leq 2$.

(3 mks)



c) Use your graph to state the roots of

i. $2x^2+3x-5=0$

$$\frac{2x^2+3x-5=y}{y=0}$$

$$\left. \begin{array}{l} x = -2.5 \checkmark \\ x = 1 \checkmark \end{array} \right\}$$

B
B
(2mk)

ii. $2x^2+0x-8=0$

$$\begin{array}{l} y = 2x^2 + 3x - 5 \\ 0 = 2x^2 + 0x - 8 \\ \hline y = +3x + 3 \checkmark \end{array}$$

$$\left. \begin{array}{l} x = -2.1 \} \\ x = 1.7 \} \end{array} \right\}$$

M
A
(3mks)
Correct substitution
both.

x	0	-1
y	+3	0

(3 mks)

	Klarkings	Mark	Comments
18	a) $8c + 12g = 294\,000$ $9c + 15g = 337\,500$ Simplify to $4c + 6g = 147\,000$ $3c + 5g = 112\,500$	B1 B1	
	b) $\begin{pmatrix} 4 & 6 \\ 3 & 5 \end{pmatrix} \begin{pmatrix} c \\ g \end{pmatrix} = \begin{pmatrix} 147\,000 \\ 112\,500 \end{pmatrix} \checkmark$	M1	correct matrix eqn
	del 2 $\frac{1}{2} \begin{pmatrix} 5 & -6 \\ -3 & 4 \end{pmatrix} \begin{pmatrix} 4 & 6 \\ 3 & 5 \end{pmatrix} \begin{pmatrix} c \\ g \end{pmatrix} = \frac{1}{2} \begin{pmatrix} 5 & -6 \\ -3 & 4 \end{pmatrix} \begin{pmatrix} 147\,000 \\ 112\,500 \end{pmatrix}$	M	Correct R.H.S multiplier
	$\begin{pmatrix} c \\ g \end{pmatrix} = \begin{bmatrix} \frac{5}{2} \times 147\,000 - 3 \times 112\,500 \\ -\frac{3}{2} \times 147\,000 + 2(112\,500) \end{bmatrix} \checkmark$	A1	both values correct.
	$cork = 30\,000 \quad gort = 4,500$		
	c) (i) $40\% \times 30\,000 = 12,000$ $\frac{45}{100} \times 4500 = 2025$	M1 M1	
	$(42000 \times 8) + 12(6525) = 414,300$	A1	
	ii) $414,300 - 294\,000 = 120\,300$	M1 A1	
		60MKS	

Workings

Marks

Comments

$$1) \tan 35 = \frac{h}{x} \checkmark$$

$$h = x \tan 35$$

$$2) \tan 28 = \frac{2h}{100-x} \checkmark$$

$$\frac{(100-x) \tan 28}{2} = h$$

$$\frac{100 \tan 28 - x \tan 28}{2} = x \tan 35 \checkmark$$

$$100 \tan 28 - x \tan 28 = 2x \tan 35$$

$$2x \tan 35 + x \tan 28 = 100 \tan 28$$

$$x = \frac{100 \tan 28}{2 \tan 35 + \tan 28} \checkmark$$

$$x = 71.41 \checkmark$$

$$h = 71.41 \tan 35$$

$$h = 50 \checkmark$$

$$2h = 100 \checkmark$$

$$\tan 75 = \frac{100}{t} \checkmark$$

$$t = 26.79$$

$$PQ = 100 - (71.41 + 26.79) = 1.8M \checkmark$$

B

Correct expression for tan 35

B

Correct expression for tan 28

any correct h expressions

M

M

the two h equated

A

x value correct

B

$$h = 50$$

B

$$2h = 100$$

M

Correct tan 75 expression

M

A

10M

No	Klunfrings	Comments	Comments
20	i) $\frac{10.5}{28} = \frac{h}{45+h}$ $h = 27$ ✓ $H = 45 + 27 = 72$ ✓	B) B)	small height big height
	ii) Slant height of the frustum $L = \sqrt{72^2 + 28^2} = 77.25$ ✓ $l = \sqrt{27^2 + 10.5^2} = 28.97$ ✓ $77.25 - 28.97 = 48.28$ ✓	B) B)	Both slant height.
	iii) $\frac{2}{3} \times 3.142 \times 28^2 \neq 4926.66$ ✓ $3.142 \times 10.5^2 \neq 346.41$ ✓ $(3.142 \times 28 \times 77.25 - 3.142 \times 10.5 \times 28.97) =$ $= 5840.40$ ✓ $4926.66 + 346.41 + 5840.40 =$ $= 11113.47$ ✓	M) M) M) A)	Correct hemisphere area Correct base area Correct curved S.A.
	iv) $\frac{2}{3} \times 3.142 \times 28^3 \neq 45982.12$ $(\frac{1}{3} \times 3.142 \times 28^2 \times 72 - \frac{1}{3} \times 3.142 \times 10.5^2 \times 27)$ $= (59119.872 - 3117.64)$ $= 56,002.22$ $45982.12 + 56,002.22$ $= 101,984.34 \text{ cm}^3$ ✓	M) M) A) 10Mks	

Workings

	marks	Comments
taxable Income	M1	
a) $46250 + 1500 + 3500 = 64750$	A1	
b) $0.1 \times 9680 = 968$	M1	1 st 3 correct slabs
$0.15 \times 9120 = 1368$	M	last 2 correct slabs,
$0.2 \times 9120 = 1824$	M	value 27710
$0.25 \times 9120 = 2280$	B7	
$0.2 \times 27710 = 5542$	M	Subtract
tax due <u>14753</u>	A1	PAYE
less relief <u>1056</u>	M1	(correct gross income
tax payable (PAYE) 13697	M1	total deductions
c) $64750 - (13697 + 1500 + 2500)$	A1	net income
$= 47053$		

a) $3, 8, 13$	B1	
b) $ar^2 = 18$	M1	two correct eqns
$ar^5 = 486$	M1	attempt to solve
$\frac{ar^5}{ar^2} = \frac{486}{18} \Rightarrow r^3 = 27$	A1	
$r = 3$	B1	correct d
c) $-190 = 8 + 33d$	M1	correct substitution
$d = -6$	A1	
$S_{34} = \frac{34}{2} [2(8) + 33(-6)]$	M1	eqns with 2 substituted
$= -3094$	M1	correct attempt to solve
d) $2^{nd} = 2 + d$	A1	
$4^{th} = 2 + 3d$	M1	
$7^{th} = 2 + 6d$	M1	
$\frac{2+6d}{2+3d} = \frac{2+3d}{2+d}$	M1	
$4 + 12d + 2d + 6d^2 = 4 + 12d + 9d^2$	M1	
$2d = 3d^2$	M1	
$d = 2/3$	A1	
$r = \frac{2+4}{2+2} = 1.5$	A1	

(10MIS)

