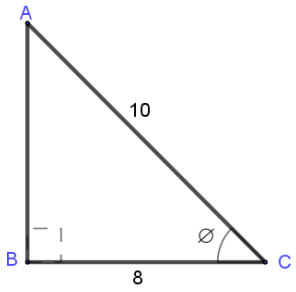
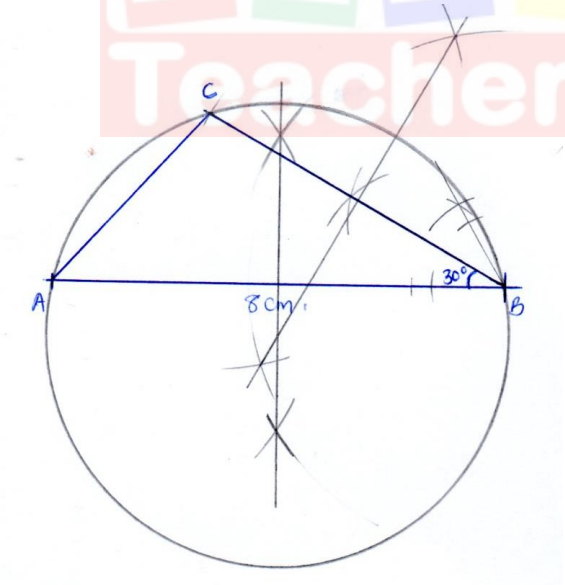
OPENER EXAMINATION: TERM 1 2024
FORM THREE

MARKING SCHEME

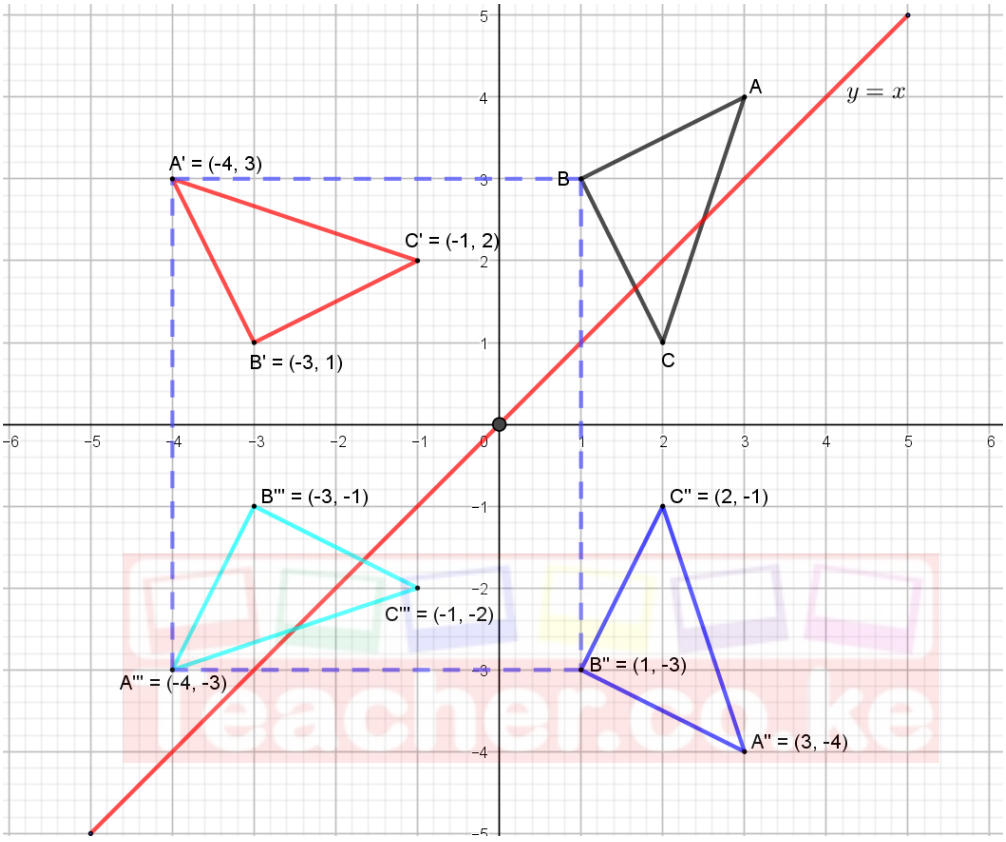
No	Working	Marks
1	**No** | **Std form** | **Log** 0.07432 | 7.432×10^{-2} | $\bar{2}.8711 \times 2$ $\bar{3}.7422$ 48.38 | 4.838×10^{1} | $\underline{1.6846 +}$ $\bar{1}.4268$ 8458 | 8.458×10^{3} | $\underline{3.9273 -}$ $\bar{5}.4995 \div 3$ **0.03161** | 3.161×10^{-2} | $\bar{2}.4998$	M1 all correct logs M1 addition, subtraction, cube root A1 answer
2	Volume $= \frac{40}{0.02} = 2\,000\ cm^3$ $2\,000 = 10 \times 5 \times h$ $h = \frac{2\,000}{10 \times 5} = 40\ cm$	M1 M1 A1
3	a) $Tan\ 75^0 = \frac{h}{60}$ $h = 60tan75$ 223.92m b) $\tan \emptyset = \frac{223.92}{200}$ $= 48.23^0$	M1 M1 A1
4	$\frac{27.72 \times 0.3876}{2.09 \times 0.4284} \times \frac{10^6}{10^6}$ $\frac{2772 \times 3876}{209 \times 4284}$ $= 12$	M1 M1 A1
5	$\sqrt[3]{27} = (3^3)^{\frac{1}{3}} = 3$ $\sqrt[3]{x^3} = x$ $\sqrt[3]{y^9} = (y^9)^{\frac{1}{3}} = y^3$ $\sqrt[3]{27x^3y^9} = 3xy^3$	M1 A1
6	$L.S.F = \frac{4}{12} = \frac{1}{3}, A.S.F = \frac{1}{9}$ $\frac{1}{9} = \frac{x}{x+36}$	M1 M1

	$9x - x = 36$ $x = 4.5cm^2$	 A1
7	a) $AB = \sqrt{10^2 - 8^2} = 6$ $\sin\theta = \frac{6}{10}$  b) $\tan(90 - \theta) = \frac{8}{6}$	 M1 A1 B1
8	a) $\bar{P} = 5\begin{pmatrix}3\\2\end{pmatrix} - 2\begin{pmatrix}4\\1\end{pmatrix}$ $= \begin{pmatrix}7\\8\end{pmatrix}$ b) $\begin{pmatrix}7\\8\end{pmatrix} + \begin{pmatrix}-6\\4\end{pmatrix} = \begin{pmatrix}1\\12\end{pmatrix}$	M1 A1 B1
9	$N = 3x^2 - 3xy - xy + y^2$ $(3x - y)(x - y)$ $D = (3x - y)(3x + y)$ $\frac{(3x - y)(x - y)}{(3x - y)(3x + y)}$ $\frac{x - y}{3x + y}$	 B1 B1 A1
10	a) Angle DAC = $90 - 70 = 20°$ b) Angle BFC = $180 - (20 + 34)$ $= 126°$	B1 M1 A1
11	$\frac{81^x \times 9^{2x}}{3} = 243$ $3^{4x} \times 3^{4x} = 729$ $3^{8x} = 3^6$ $8x = 6$ $x = \frac{3}{4}$	M1 M1 A1
12	$L = \sqrt{6^2 + 8^2} = 10\ cm$	B1

	$TSA = \left(\frac{22}{7} \times 6 \times 6\right) + \left(\frac{22}{7} \times 6 \times 10\right)$ $= 113.14 + 188.57 = 301.71cm^2$	M1 A1
13	LCM of 20, 30 and 50 = 300 Time taken = 300 minutes = 5 hours Next time of ringing = 8.20 a.m + 5 hrs = 1.20 p.m same day	M1 A1 B1
14	a) $y = \frac{1}{5}x + 2$ Gradient = $\frac{1}{5}$ b) $\frac{-5}{1} = \frac{y-2}{x-1}$ $-5(x-1) = y - 2$ $y = -5x + 7$	 B1 M1 A1
15	$A = \frac{1}{2} \times product\ of\ diagnols$ $60 = \frac{1}{2} \times 8 \times x$ $x = 15cm$ $4^2 + 7.5^2 = l^2$ $\sqrt{75.25 = l}$ $8.5cm$ $p = 8.5 \times 4 = 34\ cm$	 B1 M1 A1
16	$2x - 3 \leq 3x + 5$ $x \geq -8$ $3x + 5 \geq 7x + 6$ $x \leq -0.25$ Integral values are $\Longrightarrow -8, -7, -6, -5, -4, -3, -2\ and\ -1$	M1 M1 A1
17	a) $\tan 11.3 = \frac{20}{SP}$ $SP = \frac{20}{\tan 11.3} = 100.1\ m$ b) PQ = $5 \times 10 = 50\ m$ $\tan\theta = \frac{20}{150.1}$ $\theta = \tan^{-1}\left(\frac{20}{150.1}\right) = 7.6°$ c) (i) $QU = 200 - 150.1 = 49.9\ m$ $TU = (50.9^2 - 49.9^2)^{\frac{1}{2}}$	M1 A1 M1 M1 A1 M1

	$TU = 10.0\ m$	A1
	(ii) $\tan\beta = \frac{10}{200}$	M1
	$\beta = \tan^{-1}\left(\frac{10}{200}\right) = 3°$	M1 A1
18	a) Volume $= \frac{1}{3} \times \frac{22}{7} \times 21^2 \times 30 =$ $13860cm^3$	M1B1 A1
	b) (i) $\frac{30}{36} = \frac{21}{R} = \frac{21\times36}{30}$	M1
	$= 25.2cm$	A1
	(ii) $new\ volume = \frac{1}{3} \times \frac{22}{7} \times 25.2^2 \times 36 = 23950.08cm^3$	B1
	$volume\ of\ sphere = 23950.08 - 13860$ $10090.08cm^3$	M1 A1
	(iii) $10090.08 = \frac{4}{3} \times \frac{22}{7} \times r^3$	M1
	$r^3 = 10090.08 \times \frac{7}{22} \times \frac{3}{4}$	
	$r = \sqrt[3]{2407.86}$	B1
	$r = 13.40cm$	A1
19	a) 	B1 – lines AB,BC B1 - $\angle ABC$ B1 – complete triangle
	b) AC = $4.1 \pm 0.1\ cm$	B1
	c) On the diagram	B2
	d) Radius = $4.1 \pm 0.1\ cm$	B1
	e) Area of circle = $\frac{22}{7} \times 4.1 \times 4.1 = 52.83\ cm^2$	M1

	Area of $\Delta ABC = 0.5 \times 8 \times 6 \times \sin 30° = 12\ cm^2$ Difference = $52.83 - 12 = 40.83\ cm^2$	M1 A1
20		



20	(e) $y = 0\ and\ x = -1.5$	B1 B1
21	a)	

Marks	frequency	Midpoint(x)	fx	cf
35-39	2	37	74	2
40-44	3	42	126	5
45-49	4	47	188	9
50-54	5	52	260	14
55-59	6	57	342	20
60-64	4	62	248	24
65-69	6	67	201	27
70-74	2	72	144	29
75-79	1	77	77	30
	∑f=30		∑fx=1660	

B1 for fx
B1 for f
B1 for classes
Correct ∑fx B1

b) $55 - 59$

B1

	c) $mean = \frac{1660}{30} = 55.33$	M1 A1
	d) $median = 54.5 + \left(\frac{15-14}{6}\right) \times 5$	M1
	$= 54.5 + 0.8333$ $= 55.33$	M1 A1