MATHEMATICS

FORM 3

TERM 3 2023

OPENER

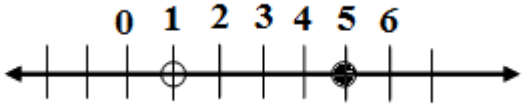
MARKING SCHEME

	WORKING	MARKS	GUIDELINES
1.	$\frac{1}{3}\text{of}\left(3\frac{3}{4}-4\frac{1}{2}\right)\times 2\frac{3}{5}\div 1\frac{4}{9}$ $\frac{1}{3}\text{of}-\frac{3}{4}\times\frac{13}{5}\div\frac{13}{9}$ $-\frac{1}{4}\times\frac{13}{5}\div\frac{13}{9}$ $-\frac{1}{4}\times\frac{9}{5}=-\frac{9}{20}$	M1 M1 A1	For removing the brackets
		3	
2.	$r=16.33333\ldots$ $10r=63.3333\ldots$ $10r-r=163.333\ldots-16.3333\ldots$ $9r=147$ $r=\frac{147}{9}$ $r=16\frac{1}{3}$	M1 M1 A1	
		3	
3.	$\frac{1}{0.325}=\frac{1}{3.25\times 10^{-1}}$ $=0.3077\times 10=3.077$ $\sqrt[3]{0.512}=0.8$ $\frac{\sqrt[3]{0.512}}{0.325}=0.8\times 3.077$ $=2.4616$	M1 M1 A1	
		3	
4.	$\frac{6900\,000}{115}=\$60\,000$	M1	

	$1us\ \$ = Kshs.75$ $\$60000 = 60000 \times 75$ $= Ksh\ 4500\ 000$ $custom\ duty = \frac{10}{100} \times 4\ 500\ 000$ $= kshs.450\ 000$	M1 A1	
		3	
5.	$1764 = 2^2 \times 3^2 \times 7^2$ $2744 = 2^3 \times 7^3$ $\frac{\sqrt{1764}}{\sqrt[3]{2744}} = \frac{\sqrt{2^2 \times 3^2 \times 7^2}}{\sqrt[3]{2^3 \times 7^3}}$ $= \frac{2 \times 3 \times 7}{2 \times 7} = 3$	M1 M1 A1	
		3	
6.	$VSF = \frac{27}{8} = 3.375$ $LSF = 1.5$ $ASF = (1.5)^2 = 2.25$ $Curved\ surface\ area\ of\ the\ larger\ cylinder$ $= \frac{1440}{2.25} = 640\ cm^2$	M1 M1 A1	
		3	
7.	$height\ h\ of\ the\ electric\ pole\ above\ the\ flag\ pole$ $= 7.5 \tan 30^0$	M1	

2	1764
2	882
3	441
3	147
7	49
7	7
	1

2	2744
2	1372
2	686
7	343
7	49
7	7
	1

	$= 4.3m$ *height of the electric pole* $= 4.3m + 2.8m$ $= 7.1\ m$	M1 A1	
		3	
8.	$2x - 2 > x - 1$ $x > 1$ $x - 1 \geq \frac{3x - 7}{2}$ $x \leq 5$  	M1 M1 A1	
		4	
9.	$\frac{3(-5 - -3)^2 + (-5 - 2)(-5 + 2) - 3(-3)}{2(-5 + 2)(-5 - -3)}$ $= \frac{42}{12}$ $= 3\frac{1}{2}\ or\ 3.5$	M1 M1 A1	
		3	
10.	$\frac{18n + 3}{n + 1} = 17$ $18n + 3 = 17n + 17$ $n = 14$	M1 M1 A1	
		3	

11.	$Volume\ of\ the\ hemishere = \frac{1}{2} \times \frac{4}{3} \times \frac{22}{7} \times 7.7^2$ $= 956.55cm^3$ $Density\ of\ the\ hemisphere = \frac{2500g}{956.55cm^3}$ $= 2.614g/cm^3$ $volume\ of\ the\ sphere\ cm^3 = \frac{4}{3} \times \frac{22}{7} \times 8.4^2$ $= 2483.7cm^3$ $mass\ of\ the\ sphere\ cm^3$ $= 2483.7cm^3 \times 2.614g/cm^3$ $= 6492.4g$	M1 M1 A1	
		03	
12.	$\frac{x-1}{x} - \frac{2x+1}{4x} = \frac{4(x-1)-1(2x+1)}{3x}$ $= \frac{4x-4-2x-1}{3x}$ $= \frac{2x-5}{4x}$	M1 M1 A1	
		3 marks	
13.	$3x + 3y = 360^0 \quad (i)$ $sum\ of\ interior\ angles\ of\ a\ pentagon$ $= 2(5-2)90 = 540^0$ $12y - 6x = 540^0 \quad (ii)$ $solving\ (i) and\ (ii) simulatneously\ yields$ $x = 70,$ $y = 50$	M1 M1 A1	
		3 marks	

14.	$Buying\ price = \frac{100}{90} \times 27000$ $= sh.30\ 000$ $\%\boldsymbol{profit} = \frac{\mathbf{37\ 500 - 30\ \ 000}}{\mathbf{30\ 000}} \times \mathbf{100}$ $= 25\%$	M1 M1 A1	
		3 marks	
15.	$circumference = \frac{1320}{3} = 420m$ $\frac{22}{7} \times d = 440$ $d = 420 \times \frac{7}{22}$ $= 140$ $r = \frac{140}{2} = 70\ m$ $A = \frac{22}{7} \times 70 \times 70$ $= 15\ 400\text{m}^2$	M1 M1 A1	
		3 marks	
16.	$Line\ x - 4y = -5\ drawn$ $Line\ -x + 2y = 1\ drawn$ $Point\ of\ intersection\ of\ the\ lines\ is\ (3, 2)$ $x = 3\ y = 2$	B1 B1 B1	
		3 marks	

		10 marks	
17.	**(a)** $M^{-1} = \frac{1}{12}\begin{pmatrix} 10 & -18 \\ -6 & 12 \end{pmatrix}$	M1	
	$= \begin{pmatrix} \frac{5}{6} & -\frac{3}{2} \\ -\frac{1}{2} & 1 \end{pmatrix}$	A1	
	(b)		
	(i) $60x + 90y = 14\,100$ $30x + 50y = 7\,600$		
	$\begin{pmatrix} 60 & 90 \\ 30 & 50 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 14\,100 \\ 7\,600 \end{pmatrix}$	B1	
	(ii)		
	$12x + 18y = 2\,820$ $6x + 10y = 1\,520$		
	$\begin{pmatrix} 12 & 18 \\ 6 & 10 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2\,820 \\ 1\,520 \end{pmatrix}$	M1	
	$\frac{1}{12}\begin{pmatrix} 10 & -18 \\ -6 & 12 \end{pmatrix}\begin{pmatrix} 12 & 18 \\ 6 & 10 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix}$	M1	
	$= \frac{1}{12}\begin{pmatrix} 10 & -18 \\ -6 & 12 \end{pmatrix}\begin{pmatrix} 2\,820 \\ 1\,520 \end{pmatrix}$	M1	
	$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{12}\begin{pmatrix} 840 \\ 1320 \end{pmatrix}$ $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 70 \\ 110 \end{pmatrix}$	A1	
	Girls' socks = sh. 70 Boys socks = sh. 110		
	(iii) Price without discount $= (25 \times 70) + (40 \times 110)$ $= 6150$		
	Girls'socks after discount $= \frac{90}{100} \times 70 = \text{sh. } 63$	M1	
	Boys'socks after discount $= \frac{80}{100} \times 110 = \text{sh. } 88$		
	Price after discount $= (25 \times 63) + (40 \times 88)$ $= 5095$	M1	
	% discount $= \frac{6150 - 5095}{6150} \times 100$ $= 17.15\%$	A1	
		10 marks