

MID- TERM 2 EXAM-2024 FORM 3 MARKING SCHEME

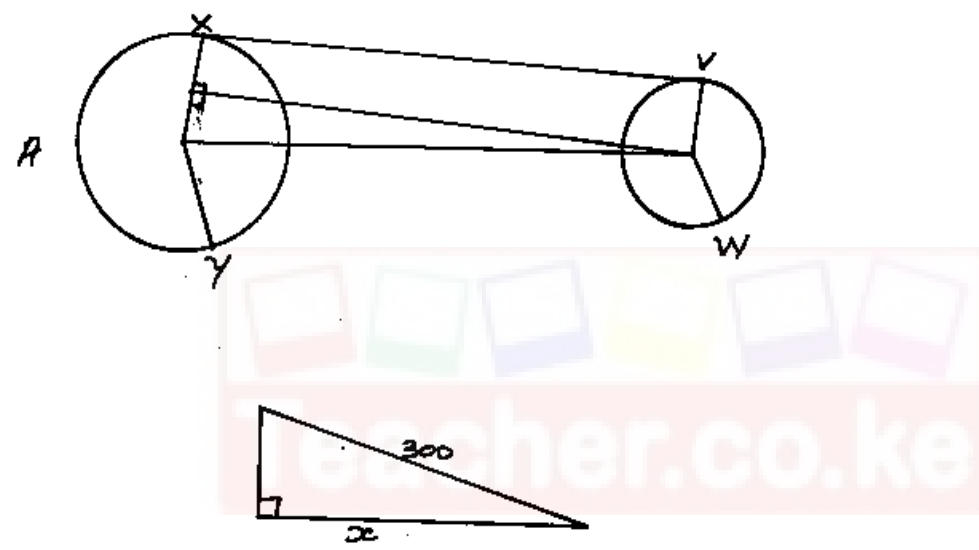
1.	$\frac{5.246 \times \log 0.2349}{0.06364^{\frac{1}{2}}}$ $= \frac{5.246 \times \bar{1}.3708}{0.6364^{\frac{1}{2}}}$ $= -\frac{5.246 \times 0.6292}{0.063664^{\frac{1}{2}}}$ <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">No</td> <td style="width: 20%;">Log</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> <tr> <td>5.246</td> <td>0.7198</td> <td></td> <td></td> </tr> <tr> <td>0.6292</td> <td>$\bar{1}.7988$</td> <td></td> <td></td> </tr> <tr> <td></td> <td>0.5186</td> <td></td> <td>0.5186 -</td> </tr> <tr> <td>0.06364^{1/2}</td> <td>$\frac{1}{2} \times \bar{2}.8038$</td> <td></td> <td>$\bar{1}.4019$</td> </tr> <tr> <td></td> <td></td> <td></td> <td>1.1167</td> </tr> <tr> <td></td> <td>$10^{-1} \times 1.309$</td> <td></td> <td></td> </tr> <tr> <td></td> <td>= -0.1309</td> <td></td> <td></td> </tr> </table>	No	Log			5.246	0.7198			0.6292	$\bar{1}.7988$				0.5186		0.5186 -	0.06364 ^{1/2}	$\frac{1}{2} \times \bar{2}.8038$		$\bar{1}.4019$				1.1167		$10^{-1} \times 1.309$				= -0.1309			M1 M1 M1 A1	for - 0.6292 All logs including 0.06364 ^{1/2} ✓ attempt to add and subtract
No	Log																																		
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2.	$t^2 = \frac{4m^2}{n^2} \left(\frac{4m^2}{3k} \right)$ $t^2 = \frac{4m^2 l - 4m^2 A}{3n^2 k}$ $3n^2 t^2 k = 4m^2 l - 4m^2 A$ $4m^2 A = 4m^2 l - 3n^2 t^2 k$ $A = \frac{4m^2 l - 3n^2 t^2 k}{4m^2}$	M1 M1 A1																																	
		03																																	
3.	<p>let $x = 4.37272$</p> $10x = 43.72$ $100x = 437.2$ $1000x = 4372.72$ $1000x - 10x = 4372.72 - 43.72$ $990x = 4329$ $x \frac{4329}{990} = \frac{481}{110}$	M1 A1																																	
		02																																	

<p>4.</p> $Q = \begin{pmatrix} 6 \\ 3 \end{pmatrix}; R = \begin{pmatrix} -4 \\ 2 \end{pmatrix}; U = \begin{pmatrix} 8 \\ -4 \end{pmatrix}$ $S \xrightarrow{Q} T$ $T \xrightarrow{R} U$ \sim <p><i>Object + Translation vector = image vector</i></p> $T = \begin{pmatrix} 8 \\ -4 \end{pmatrix} - \begin{pmatrix} -4 \\ 2 \end{pmatrix} = \begin{pmatrix} 12 \\ -9 \end{pmatrix}$ $S = \begin{pmatrix} 12 \\ -6 \end{pmatrix} - \begin{pmatrix} 6 \\ 3 \end{pmatrix} = \begin{pmatrix} 6 \\ -9 \end{pmatrix}$ <p><i>co-ordinator of S = (6, -9)</i></p>		<p>B1</p> <p>B1</p> <p>B1</p>	<p>Column vector for T</p> <p>Column vector for S</p> <p>Co-ordinate</p>
		03	
<p>5.</p> $\frac{3(3 - \sqrt{5}) + 3\sqrt{5}(3 + \sqrt{5})}{9 - 5}$ $= \frac{9 - 3\sqrt{5} + 9\sqrt{5} + 15}{4}$ $= \frac{24 + 6\sqrt{5}}{4}$ $= 6 + \frac{3}{2}\sqrt{5}$ <p>$\therefore a = 6$ and $b = \frac{2}{3}$</p>		<p>M1</p> <p>M1</p> <p>A1</p>	
		04	
<p>6.</p> $\frac{30}{360} \times \frac{22}{7} \times r^2 - \frac{1}{2} r^2 \sin 30^\circ = 5.25$ $\frac{1}{42} r^2 - \frac{1}{4} r^2 = 5.25$ $\frac{1}{84} r^2 = 441$ <p>$r = \pm 21\text{cm}$</p> <p>$r = 21\text{cm}$</p>		<p>M1</p> <p>B1</p> <p>A1</p>	
		03	
<p>7.</p> $AB = \begin{pmatrix} 4 \\ -7 \\ 3 \end{pmatrix} - \begin{pmatrix} 2 \\ 5 \\ 3 \end{pmatrix} = \begin{pmatrix} 2 \\ -12 \\ 0 \end{pmatrix}$ <p>$AB = 2i - 12j + 0k$</p>		<p>M1</p> <p>M1</p>	

	$ AB = \sqrt{2^2 + (-12)^2 + 0^2}$ $= \sqrt{4 + 144}$ $= 148$ $= 12.17$	A1	
		03	
8.	$4(5 - x) - 6x = 0$ $20 - 4x - 6x = 0$ $10x = 20$ $x = 2$	M1 A1	
		02	
9.	$FE \times ED = GE \times EB$ $7.8x = 4.1 \times 6.9$ $7.8x = 28.29$ $x = 3.627$ $= 253.4224cm$ $BC^2 = CD \times CF$ $y^2 = 11.2 \times 22.627$ $= 253.4224$ $y = \sqrt{253.4224} = 15.92cm$	M1 B1 M1 A1	
		04	
10.	$A = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$ $\begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix} + B$ $\begin{bmatrix} 7 & 6 \\ 18 & 19 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix} + B$ $B = \begin{bmatrix} 7 & 6 \\ 18 & 19 \end{bmatrix} - \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$ $B = \begin{bmatrix} 5 & 5 \\ 15 & 15 \end{bmatrix}$	M1 M1 B1	r
		03	

13.	<p style="text-align: center;"> $AO = 4.8$ $A = \frac{1}{2} \times 6 \times 4.8 = 14.4 \text{ cm}^2$ </p>	M1 A1 M1 A1	$\triangle ABC$ Perpendicular Area												
		04													
14.	<table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Men</td> <td style="width: 25%;">hours</td> <td style="width: 25%;">days</td> <td style="width: 25%;"></td> </tr> <tr> <td>5</td> <td>8</td> <td>3</td> <td></td> </tr> <tr> <td>12</td> <td>5</td> <td>x</td> <td></td> </tr> </table> $x = \frac{5 \times 8 \times 3}{12 \times 5}$ $= 2 \text{ days}$	Men	hours	days		5	8	3		12	5	x		M1 A1	
Men	hours	days													
5	8	3													
12	5	x													
		04													
15.	<p>Area Scale Factor = Determinant of the matrix</p> $\frac{60}{10} = x(x+3) - 12$ $6 = x^2 + 3x - 12$ $(x^2 - 3x) + (6x - 18) = 0$ $(x+6)(x-3) = 0$ <p>X = -6 or 3 X = 3</p>	M1 A1 B1													
		03													

16.	$men = \frac{7}{9} \times 45 = 35$ $women = \frac{2}{9} \times 45 = 10$ <p>let the additional number of women be x</p> $\frac{35}{10+x} = \frac{5}{4}$ $50 + 5x = 140$ $5x = 90$ $x = 18 \text{ women}$	B1 M1 A1	
		03	
17.a)	$IF = 38000 + 14000 + 8500$ $+ 3300.$ $= \text{Ksh. } 63,800 \text{ pm}$ $IF = \left(\frac{63800 \times 12}{20} \right) = \text{K} \int 38280$	M ₁ A ₁	
b)	$1^{\text{st}} 6000 \times 2 = 12000$ $2^{\text{nd}} 6000 \times 3 = 18000$ $3^{\text{rd}} 6000 \times 4 = 24000$ $4^{\text{th}} 6000 \times 5 = 30000$ $5^{\text{th}} 6000 \times 6 = 36000$ $6^{\text{th}} 6000 \times 7 = 42000$ $7^{\text{th}} 2280 \times 8 = \underline{1842}$ <p>Tax due = Ksh. 180,240 pa</p> <p>Less relief <u>18,000</u></p> <p>Tax payable 162,240</p> <p>PAYE = 13,520</p>	M ₁ M ₁ M ₁ M ₁	For the 1 st 3 slabs
c)	<p>Total deduction</p> $= 13520 + 320 + 1000 + 2000 + 5000 + 500$ $= \text{Ksh. } 22,340$	M ₁ A ₁	For 18,240 Process of - relief CAO
d)	$38280 - 22340$ $= \text{Ksh. } 15,940$	A ₁ 10	addition

18.a)	a) i) Reflection in the line PR or ER ii) Enlargement centre E Scale factor -1 iii) Rotation about point R Through 90° clockwise b) i) R - S C - A ii) R' - Q C' - E	B1 B1 B1 B1 B1 B1 Accept -90 or 270 B1 - quarter tum B2 B1 + quarter turn 32 B1 B1 10		
19.a)			M1 A1	
	a) length $XV = 300 \text{ cm}$ 70° M1 = 281.9cm A1 b) Arc length VBW = $\frac{140}{360} \times 2\pi r = \frac{140}{360} \times 2 \times \frac{22}{7} \times 180$ $= 439.88 \text{ cm}$ c) Length XAY $C = \frac{\theta}{360} 2\pi r = \frac{220}{360} \times 2 \times \frac{22}{7} \times 180$ $= 691.24$ d) Length of the conveyor belt $= 691.2 + 439 + (2 \times 281.9)$ $= 1694.88$		M1 M1 A1 M1 M1 A1 M1 A1	

20.a)		B1 B1 B1 B1	
b)	<p>i) $7 \times 30 = 210m$ ii) $9.2 \times 30 = 276m$ iii) $13.7 \times 30 = 411m$ bearing = $310^\circ \pm 1^\circ$ iv) $7.5 \times 30 = 225m$ Bearing = $110^\circ \pm 1^\circ$</p>	B1 B1 B1 B1 B1 B1	10

21.	<p>(a) $P \propto \frac{V}{\sqrt{R}}$ $P = K \frac{V}{\sqrt{R}}$</p> $180 = K \frac{9}{\sqrt{25}} \quad K = \frac{180 \times 5}{9}$ $K = 100$ $180 = \frac{100V}{\sqrt{R}}$ $P = \frac{100 \times 6}{\sqrt{26}} = 117.67$ <p>(b) $P = \frac{100V}{\sqrt{R}} \quad 360 = \frac{100V}{\sqrt{0.64}}$</p>	M1 M1 A1 M1	
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$$360 = \frac{100V}{0.8}$$

$$\frac{360 \times 0.8}{100} = V$$

$$V = 2.88$$

(c) $V = 116\%$ $R = 75\%$

$$P = \frac{100 \times 1.16}{\sqrt{0.75}}$$

$$P = 133.945 - \text{After change}$$

$$133.945 - 100 = 33.945\%$$

M1

A1

B1

M1

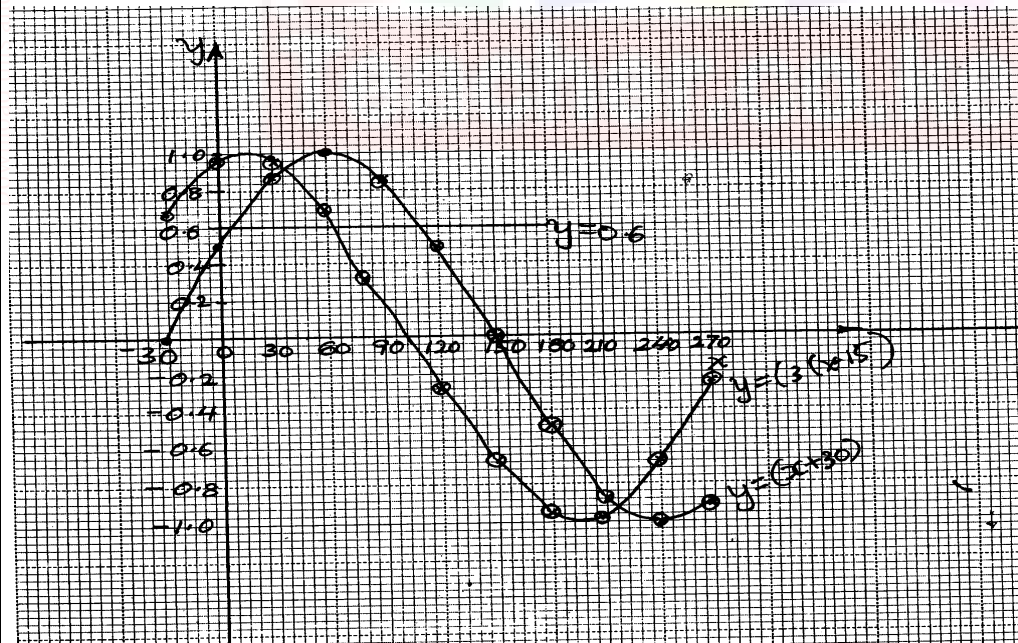
M1

A1

22.a)

x	-30	0	30	60	90	120	150	180	210	240	270
Sin (x - 30)			0.87			0.5	0.00		0.87	-1.00	
Cos (x - 15)		0.97		0.71		-0.26	-0.71				

b)



	<p>i) $\cos(x - 15) - \sin(x - 30) = 0$ $\cos(x - 15) = \sin(x + 30)$ $x = 36 \pm 2$ or $x = 216 \pm 2$</p> <p>ii) co-ordinates of the turning point of $y = \cos(x - 15)$ on the negative section (198; -1)</p> <p>iii) $\cos(x - 15) = 0.6$</p> <p>iv) $X - 15 = 66^0$</p>		
23.a)	<p>i) $\frac{57600}{x}$</p> <p>ii) $\frac{57600}{x+4}$</p>	B1	
b)	$\frac{57600}{x} - \frac{57600}{x+4} = 480$ $X^2 + 4x - 480 = 0$ $X^2 + 24x - 20x - 480 = 0$ $X(x+24) - 20(x+24) = 0$ $(x+24)(x-20) = 0$ $X = 20$	M1 M1 M1	
c)	<p>price per suit $\frac{57600}{20}$</p> <p>= sh 2880</p> <p>% profit $\frac{720}{2880} \times 100$</p> <p>= 25%</p>	M1 A1 M1 A1 10	
24.	$S_n = \frac{A}{2} \{2a + (n-1)d\}$ <p>$a = 2, n = 8$ and $S_n = 156, d$</p> $\frac{8}{2} \{2 \times 2 + (8-1)d\} = 156$ $4(4 + 7d) = 156$ $16 + 28d = 156$ $\Rightarrow 28d = 156 - 16$ $28d = 140$ $d = 5$		

$\frac{n}{2}\{2 \times 2 + (n-1)5\} = 416$ $\frac{n}{2}(4 + 5n - 5) = 416$ $4n + 5n^2 - 5n = 416 \times 2 \Rightarrow 4n - 5n + 5n^2 = 832$ $5n^2 - n - 832 = 0$ $n = n \frac{1 \pm \sqrt{(1) - 4 \times 5 - 832}}{10} = \frac{1 \pm 129}{129}$ $n = \frac{1 \pm 129}{10} = \frac{130}{10} = 13$ $n = \frac{1 - 129}{10} = \frac{-128}{10} = n = 12.8$ <p>ignore $n = 12.8$</p> <p>$\therefore n = 13$</p>		
<p>$\therefore a + 2d, a + 4d, a + 7d$</p> $\frac{a + 4d}{a + 2d} = \frac{a + 7d}{a + 4d}$ $(a + 4d)(a + 4d) = (a + 2d)(a + 7d)$ $a^2 + 4ad + 4ad + 16d^2 = a^2 + 2ad + 14d^2$ $8ad + 16d^2 = 9ad$ $16d^2 = 9ad - 8ad$ $\frac{16d^2}{9} = \frac{ad}{d}$ $a = 16d$ <p>but $d = 3$</p> $\Rightarrow a = 16 \times 3$ $= 48$ $r = \frac{a + 4d}{a + 2d} = \frac{48 + 4 \times 3}{48 + (2 \times 3)} = \frac{60}{54} = \frac{10}{9}$ $S_n = \frac{a(r^n - 1)}{r - 1}$ $= \frac{48\left(\frac{10}{9}\right)^n - 48}{\frac{10}{9} - 1}$ $= 683.067$		