

FORM 3 PAPER 1 MATHEMATICS

END OF YEAR 2025 EXAM (OCTOBER) TIME: 2 ½ HOURS

M/SCHEME

1.

No.	Log
38.32	1.5834
12.964	1.1127
2.6961	
86.37	1.9364
6.285	0.7783
2.7347	
1.9587	

$$\frac{-\bar{3} + 2.9587}{3} = 1.9866$$

$$\frac{-\bar{3} + 2.9587}{3} = 0.9695$$

2.

2	30	45	54
3	15	45	27
3	5	15	9
3	5	5	3
5	5	5	1
	1	1	1

Least volume of $x = 2 \times 33 \times 5 + 21$
 $= 270 + 21 = 291$

3.

$$2x \cdot 2^3 \times 8^x \times 8^2 = 128$$

$$2x \div 2^3 \times 2^3 \times 8^2 = 128$$

Let 2^x be y

$$y/8 \times y^3 \times 64 = 128$$

$$8y/8 = 128/8$$

$$y^4 = 16 \quad M1$$

$$y^4 = 24 \quad M1$$

$$\therefore y = 2 \quad A1$$

4.	$\left(\frac{10}{7} - \frac{5}{8}\right) \times \frac{2}{3}$ $\frac{3}{4} + \frac{12}{7} \times \frac{7}{4} \times \frac{7}{3}$ $\frac{45}{56} \times \frac{2}{3}$ $\frac{3}{4} + 1$ $\frac{15}{28}$ $\frac{7}{4}$ $\frac{15}{28} \times \frac{4}{7} = \frac{15}{49}$	M1 M1 A1	✓ Application of bodmas Simplification of both numerators and denominator
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5.	$\sqrt[3]{\frac{0.064}{0.512}}$ $\sqrt[3]{\frac{64}{512}}$ $\sqrt[3]{\frac{1}{8}}$ $\frac{1}{2}$	M1	
		M1	
		A1	

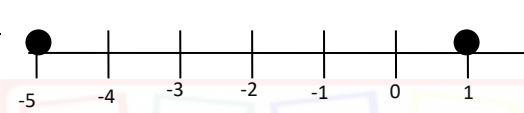
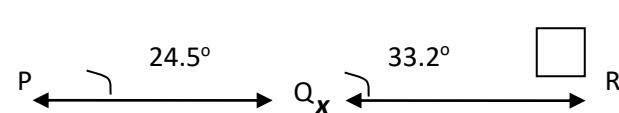
6. $3 \times \frac{1}{1.36 \times 10^{-2}} - 2 \times \frac{1}{13.84}$

$$\begin{aligned}
 & 3 \times 8.575 - 2 \times 0.07224 \\
 & = 25.725 - 0.14448 \\
 & = \underline{25.58052} \\
 & = \underline{25.58}
 \end{aligned}$$

7.	$\frac{3(x+y) - (x-y)}{x^2 - y^2}$ $= \frac{3x + 3y - x + y}{x^2 - y^2}$ $= \frac{2(x+2y)}{x^2 - y^2}$		
8	$S = \frac{5.7 + 4.2 + 6.3}{2} = 8.1$ $= \sqrt{8.1(8.1 - 5.7)(8.1 - 4.2)(8.1 - 6.3)}$ $= \sqrt{8.1 \times 2.4 \times 3.9 \times 1.8} = 11.68$ $\text{Shaded area} = 18.05 - 11.68$ $= 6.368 \text{ cm}^2$	B1 M1 A1 B1	
9.	$\frac{16}{X} = \frac{9}{7} = \frac{14}{12}$ $X = 16 \times \frac{9}{7} \times \frac{14}{12}$ $= 24 \text{ men}$ $\text{Extra men} = 24 - 6$ $= 8 \text{ men}$		

10	$9^{x+1} + 3^{2x+1} = 36$ $3^{2x+2} + 3^{2x+1} = 36$ $3^{2x(9+3)} = 36$ $3^{2x} = 3^1$ $2x = 1$ $x = \frac{1}{2}$		

11	(i) $k\left(\frac{3-7}{2}, \frac{4+2}{2}\right) = (-2, 3)$ $p\left(\frac{3+1}{2}, \frac{4-2}{2}\right) = (2, 1)$ (ii) $G_1 = \frac{3-2}{-2-2} = \frac{-1}{2}$ $G_2 = 2$ $\text{Mid } p + kp = \left(\frac{-2+2}{2}, \frac{3+1}{2}\right) = (0, 2)$ $\therefore$ equation $y = 2x + c$ when $x = 0, y = 2$, then $c = 2$ hence, $y = 2x + 2$	B_1 for both p and k ✓ B_1 for both G_1 and G_2 ✓ r identified B_1 3
12	Area scale factor = 12: 108	

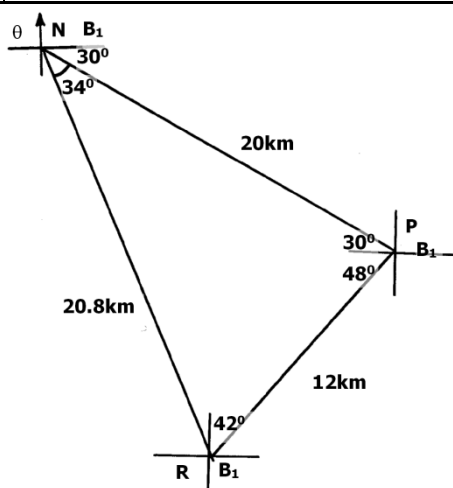
	$= 1 : 9$ $\text{Linear scale factor} = \sqrt[3]{1} : \sqrt[3]{9}$ $= 1 : 3$ $\text{Volume scale factor} = 1^3 : 3^3$ $= 1 : 27$ $\text{Volume of the smaller cone} = \frac{810\text{cm}^3 \times 1}{27}$ $= 30\text{cm}^3$	
13	$\log \frac{2x - 11}{2} = \frac{\log 3}{x}$ $(2x - 11) = \frac{3}{x}$ $2x^2 - 11x - 6 = 0$ $(2x + 1)(x - 6) = 0$ $x = -\frac{1}{2} \text{ or } 6$ $x = 6$	
14		
15	$x > 3 - 2x$ $x \leq \frac{2x + 5}{3}$  $3 - 2x < x$ $-2x < x - 3$ $-3x < -3$ $x < 1$ $2x + 5 \geq 3x$ $-x \geq -5$ $x \leq -5$ $-5 \leq x < 1$	
16	 From $\triangle PTR$, $\tan 24.5^\circ = \frac{h}{x} \implies x = \frac{h}{\tan 24.5^\circ}$ From $\triangle QTR$, $\tan 33.2^\circ = \frac{h}{x-5} \implies x = \frac{h}{\tan 33.2^\circ} + 5$ $\therefore \frac{h}{\tan 24.5^\circ} = \frac{h}{\tan 33.2^\circ} + 5 \implies \frac{h}{\tan 24.5^\circ} - \frac{h}{\tan 33.2^\circ} = 5$ $h \left[\frac{1}{0.4557} - \frac{1}{0.6544} \right] = 5$ $h = (2.194 - 1.528) = 5$ $h = \frac{5}{0.666} = 7.508$ $\therefore \text{height} = 7.5\text{m}$	

	$\tan 30^\circ = \frac{x}{100+y}$ $x = (100 + y) \tan 30^\circ$ $(100 + y) \tan 30^\circ = y \tan 60^\circ$ $\tan 60^\circ = \frac{x}{y} = x = y \tan 60^\circ$ $(100 + y) 0.5774 = 1.1732y$ $57.74 = 1.155y$ $y = \frac{57.74}{1.155}$ $y = 49.99 \approx 50m$ $\therefore x = 50 \tan 60$ $x = 86.6m$	
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17.	(a)	Senjeni = 120000x 3years = 360000 Mkimwa = 150000 x 3years = 450000 Kuku = 90000 x 2 years = 180000 Ratio of Constribution Mkimwa Senjeni Kuku 450000 : 360000 : 180000 5 : 4 : 2	M1 <
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18	$Row = \frac{960}{x}, Column = \frac{960}{110 - x}$ $\frac{960}{x} = \frac{960}{110 - x} + 20$ $(110 - x)960 = 960x + 20x(110 - x)$ $x^2 - 206x + 5380 = 0$ $x^2 - 30x - 176x + 5380 = 0$ $x(x - 30) - 176(x - 30) = 0$ $(x - 30)(x - 176) = 0$ $x = 176$ or $x = 30$ Dimensions 30 by 80 cm No of tiles = $\frac{960 \times 960}{30 \times 30}$ $= 384$ Cost = $\frac{364}{12} \times 1500 + 3000$ $= sh.483000$		
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19



$$1 \text{ cm} = 2 \text{ km}$$

$$20 \text{ km} = 10 \text{ cm}$$

$$12 \text{ km} = 6 \text{ cm}$$

$$i) 10.4 \text{ cm} \times 2 = 20.8 \text{ km}$$

$$ii) 042^\circ$$

$$iii) 154^\circ$$

$$c) \text{Area of } PQR = \frac{1}{2} ab \sin C$$

$$= \frac{1}{2} \times 20 \times 12 \sin 78^\circ$$

$$= 120 \times 78^\circ$$

$$= 117.38 \text{ km}^2$$

B1

Locating Q

B1

Locating P

B1

Locating R

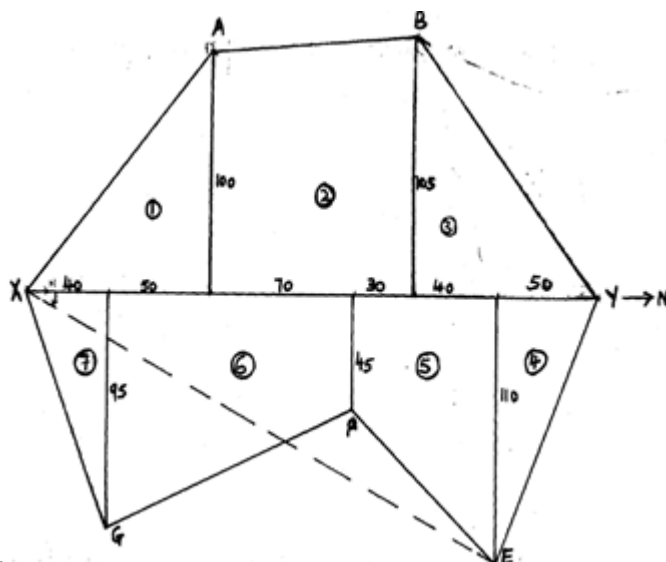
M1A1

B1

B2

M1

A1



20.

(b) Total area = area (1) + (2) + (3) + (4) + (5) + (6) + (7)

$$\text{Area (1)} = \frac{1}{2} \times 90 \times 100 = 4500\text{m}^2$$

$$(2) = \frac{(100 + 105)10}{2} = 10250\text{m}^2$$

$$(3) = \frac{1}{2} \times 90 \times 105 = 4725\text{m}^2$$

$$(4) = \frac{1}{2} \times 50 \times 110 = 2750\text{m}^2$$

$$(5) = \frac{1}{2} \times (110 + 45)70 = 5425\text{m}^2$$

$$(6) = \frac{(45 + 95)120}{2} = 8400\text{m}^2$$

2

$$(7) = \frac{1}{2} \times 40 \times 95 = 1900\text{m}^2$$

$$\text{Total area} = 37,950\text{m}^2$$

$$\text{In hectares} = \frac{(37950)}{10,000} \text{ ha} = 3.795\text{ha}$$

22.

$$4 + 6 + 10 + 14 + x + 24 + 14 + 6 = 100$$

$$78 + x = 100$$

(i) $x = 22$

(ii) Modal class = 55 -59

Marks	X	f	fx	cf
30-34	32	4	128	4
35-39	37	6	222	10
40-44	42	10	420	20
45-49	47	14	659	34
50-54	52	22	1144	56
55-59	57	24	1368	80
60-64	62	14	868	94
65-69	67	6	462	100
B_1		$\Sigma f = 100$ B_1	$\Sigma fx = 5210$	B_1

$$\Sigma fx = 5210$$

(i) Mean = $\frac{5210}{100}$

$$\frac{100}{2} = 52.10$$

$$(ii) \text{ Median} = 49.5 + \left(\frac{50-34}{22} \right) \times 5$$

$$= 53.14$$

23.	$\angle QRO = 30^\circ$ Base angles of isosc. Triangle $\angle ROT = 100-120 = 60^\circ$ on straight line $\angle ROT = 60^\circ$ $\angle ORP = 60^\circ$ Base angles of Isoc triangle $\angle QRS = 90^\circ$ diameter subtended right angle at the circumference (a) $\angle SRQ = 90^\circ - 30 - 30^\circ$ $= 30^\circ$ $\angle QRO + ORP + SRP = 90^\circ$ Diam. Subt 90° at circumference (b) $ORP = 60^\circ$ Base angle of isosceles triangle (c) OP to MPT $\angle OPT = 90^\circ$ Radius meets tangent at 90° $\angle RTP = 90^\circ - \angle OPR$ $= 90^\circ - 30^\circ$ $= 60^\circ$ (d) $\angle STP = 180^\circ - \angle OPT 90^\circ - \angle POT 60^\circ$ Angle sum of triangle $= 30^\circ$ (e) $\angle QPM = \angle QRP = 60^\circ$ Angles in alternate segment	B1 B1 B1 B1 B1 B1 B1 B1 B1	
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24 (a) Nairobi 400km Kisumu

Speed = 120km/h
Distance = 400km
Time taken = $\frac{400}{120} = 10 = 3\text{hrs } 20\text{min}$
8.30 + 3hrs 20min = 11:50a.m

(b) at 8.30a.m distance covered by bus = $\frac{1}{2} \times 80 = 40\text{km}$

Dist. Left = 360km speed = 200km/h

Time taken = $\frac{360}{200} = 1\text{hr } 48\text{mins}$
They met at 8:30+ 1hr 48mins

= 10:18a.m

(c) 8 – 10.18a.m is 2hrs 18mins distance = $2 \times 80 + \frac{18}{60} \times 80$

= 160 + 24km = 184 from Nairobi

(d) car arrived in Nairobi after 3hrs 20mins

Bus traveled a time of 3hrs 20mins + 30mins
3hrs 50mins

Dist. = $3 \times 80 + 50 \times 80 = 240 + 66 \frac{2}{3}$
60

Distance from Kisumu = $93 \frac{1}{3} \text{ km}$