MATHEMATICS

PAPER 1

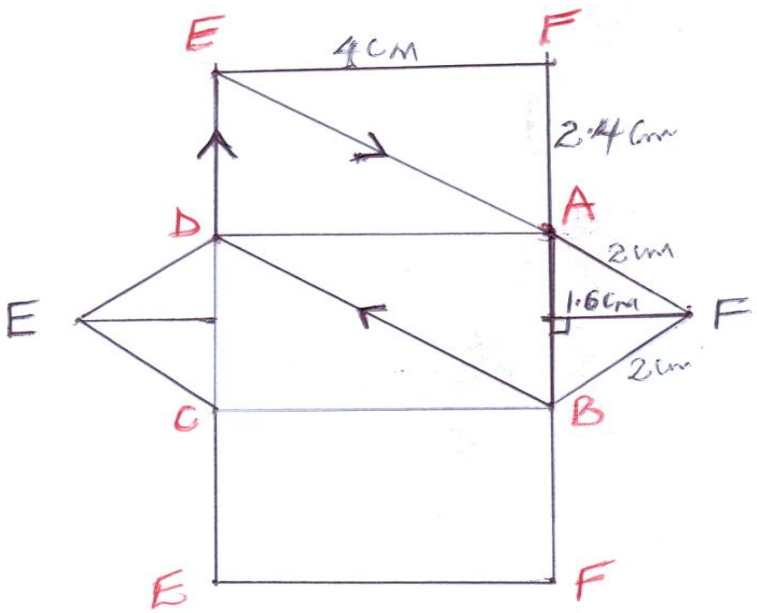
JUNE 2022

MARKING SCHEME

SECTION 1

METHOD	MARKS	COMMENTS
1. $\sqrt{\frac{45}{0.05}} \times \frac{2.04 \times 2.04}{2.89}$ $\sqrt{\frac{4500}{5}} \times \frac{204 \times 204}{28900}$ $\sqrt{900} \times \frac{144}{100}$ 30×1.44 43.2	M1 M1 A1	
2. $\frac{1}{2} + \frac{1}{8} = \frac{5}{8}$ $\frac{2}{3} \times \frac{3}{8} = \frac{6}{24}$ $\frac{24}{6} \times 3200 = Sh.12{,}800$ February salary $\frac{1}{2} \times 12800 = Sh.6{,}400$ School fees	M1 A1 B1	
3. L.CM $2^2 \times 3^2 \times 7 \times 11 = 2772$ $\frac{2772}{60}$ =46 Minutes 12 seconds 9.03+46.12= 9:46:12 a.m	B1 M1 A1	
4. $9.272 + \frac{1}{7.0171}$ $9.272 + 0.1426$ 9.4146	M1 M1 A1	

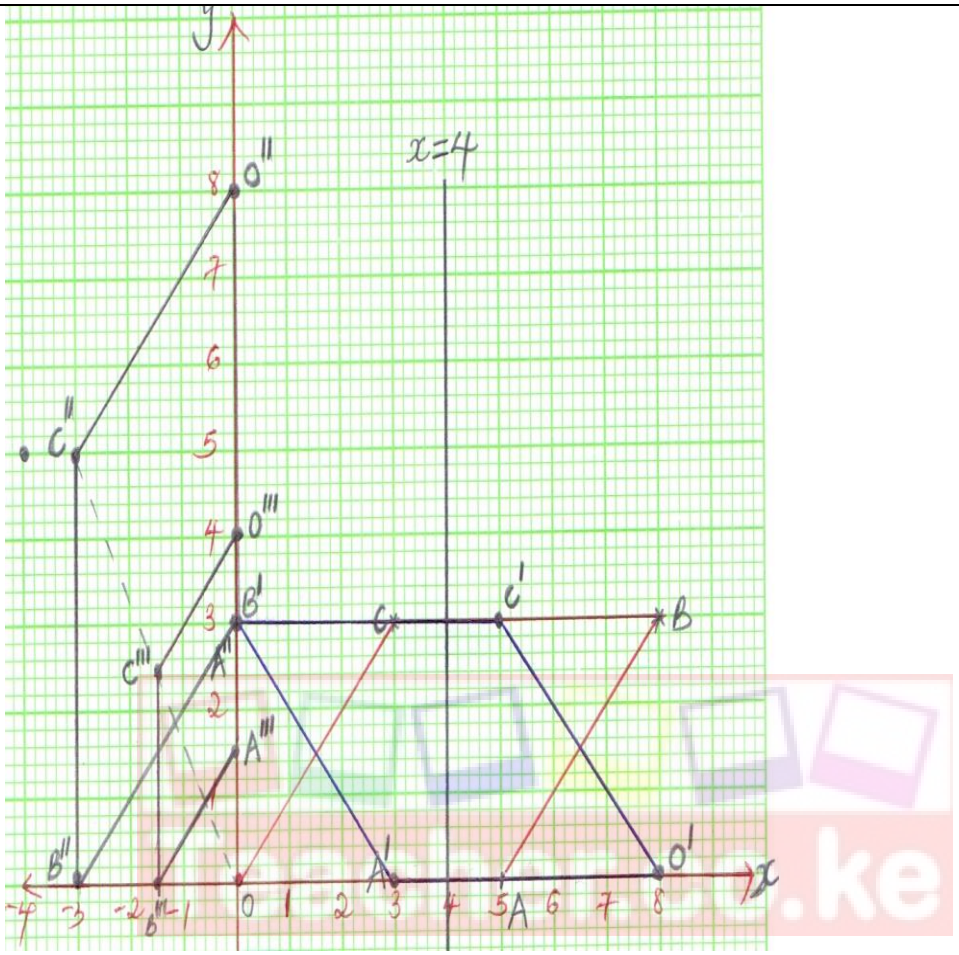
5.	$\frac{(3t-5a)(3t+5a)}{6t^2+10at+9at+15a^2}$ $\frac{(3t-5a)(3t+5a)}{(2t+3a)(3t+5a)}$ $\frac{(3t-5a)}{(2t+3a)}$	M1 M1 A1	
6.	$V=\frac{1050}{8.4}$ $=125cm^3$ $0.2\times h^2=125cm^3$ $h=\sqrt{625}$ $=25cm$	M1 M1 A1	
7.	5000×72.23 $=361{,}150$ $361{,}150-214{,}500$ $=146{,}650$ $\frac{146{,}650\times 1}{135.97}$ $=1078.55$	M1 M1 A1	

8.	 – Correct Net B1 (Means dimensions) – Correct Labelling B1 – Correct direction of rope B1 03		
9.	$\frac{100}{98}\times 12500$ 12755.10 $\frac{100}{120}\times 12755.10$ $= Sh.10{,}629.25$	M1 M1 A1	
10.	$\frac{2^{2X}}{3^{2X}}\times 2^{3-3X} = 2\times 3^5$ $2^{2-X} = 3^{5+2X}$ $\frac{2-X}{5+2X} = \frac{\log 3}{\log 2}$ $\frac{2-x}{5+2x} = 1.5849$ $4.1698x = -5.9245$ $x = -1.4028$	M1 M1 M1 A1	

11. $\left(\frac{-2+4}{2}, \frac{6+-2}{2}\right)$ $(1,2)$ Gradient of PQ= $\frac{-2-6}{4--2}=\frac{-4}{3}$ Gradient of perpendicular line $=\frac{3}{4}$ (x, y) $(1,2)$ $\frac{2-y}{1-x}=\frac{3}{4}$ $y=\frac{3}{4}x+\frac{5}{4}$	M1 B1 M1 A1	
12. -B1 for any one correct shaded region -B2 for all correct shaded regions		
13. L.S.F= $\sqrt[3]{\frac{27}{125}}$ $\frac{H}{12}=\frac{25}{3}$ H=100cm or 1m	M1 M1 A1	
14. $\frac{\frac{\sqrt{3}}{2}-\frac{1}{\sqrt{2}}}{\frac{1}{4}+1}$ $\frac{\sqrt{3}}{2}-\frac{1}{\sqrt{2}}=\frac{\sqrt{6}-2}{2\sqrt{2}}\times\frac{4}{5}$ $\frac{2\sqrt{6}-4}{5\sqrt{2}}\times\frac{5\sqrt{2}}{5\sqrt{2}}$ $\frac{2}{5}\left(\sqrt{3}-\sqrt{2}\right)$	M1 M1 M1 A1	
15. $y>2$ $x\geq 0$ $y\leq -x+8$	B1 B1 B1	

16. R.S=110-80=3OKmh^{-1} $\frac{30\times1000}{60\times60}=\frac{25}{3}m/s$ $time\cdots taken=\frac{(5+495)}{\frac{25}{3}}$ $500\div\frac{25}{3}$ $500\times\frac{3}{25}$ 60 seconds or 1 minute	B1 M1 A1	

SECTION 1I



i) **B1** for Plotting object

B1 for Correct reflection using the line $x = 4$

B2 for Correct image

17. (ii) $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}\begin{pmatrix} 8 & 3 & 0 & 5 \\ 0 & 0 & 3 & 3 \end{pmatrix} = \begin{pmatrix} 0 & 0 & -3 & -3 \\ 8 & 3 & 0 & 5 \end{pmatrix}$

M1B1

Positive quarter turn about the origin

B1 Correct image
B1

(iii) Multiplication by the scale factor

M1

Correct image

B1

18. a) $AX = \sqrt{8^2 - 6^2}$ M1
5.292×2 M1
10.583
10.58 A1

b) $\cos\theta = \frac{6}{8}$ M1
$\theta = 41.41$
$41.41 \times 2 = 82.82^0$ M1
$360 - 82.82 = 277.18^0$ A1

c) Area of sector= $\frac{82.82}{360} \times 3.142 \times 8 \times 8 = 46.26$
Area of triangle AOB $\frac{1}{2} \times 8 \times 8 \sin 82.82 = 31.75$ M1
$46.26 - 31.75 = 14.51$ M1
Common region $14.51 \times 2 = 29.02$
Shaded region= $46.26 - 29.02 = 17.24$
$17.24 \times 2 = 34.48$ M1
A1

19.(B1 For @correct answer and B1 For the correct reason(s))

(a) $\angle CBD = 50^0$ - Angles in alternate segments are equal.

(b) $\angle EBG = 90^0$ - Diameter of a circle subtends right angles at any point on the circumference.

(c) The reflex angle $BOD = 260^0$ - Angles at a point add up to 360^0

(d) $\angle EBA = 65^0$ - Angles in alternate segments are equal
- The radius and tangent of a circle are perpendicular at the point of contact.

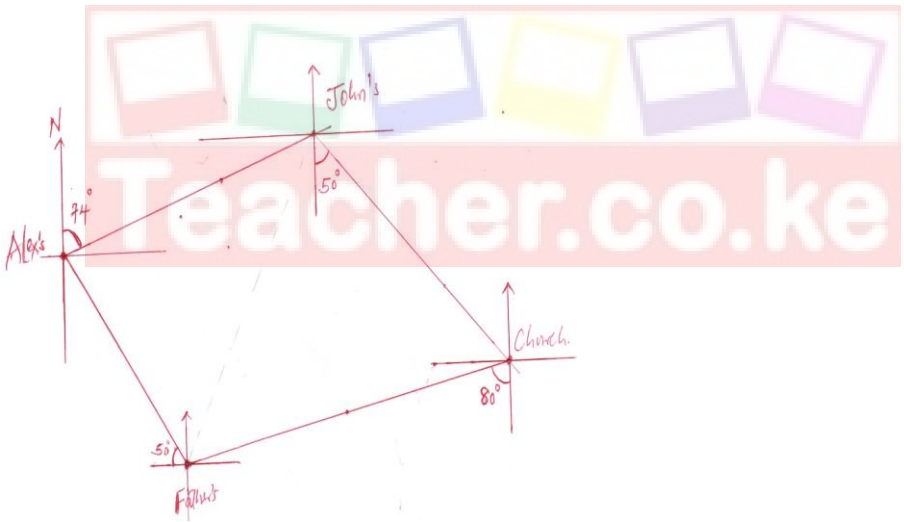
(e) $\angle BGD = 130^0$ Opposite angles in cyclic quadrilateral are supplementary.

20. a) i) **AB** = **b**-**a** B1

ii) **ON** = $\frac{1}{2}$**a** + $\frac{1}{2}$**b** B1

iii) **BM** = $\frac{2}{3}$**a** – **b** B1

b) $OX = \frac{1}{2}$**a**k + $\frac{1}{2}$**b**h B1

also, $OX = \frac{2}{3}\mathbf{a}h + (1-h)\mathbf{b}h$ Comparing the above equations $\frac{1}{2}\mathbf{a}k = \frac{2}{3}\mathbf{a}h$ $k = \frac{4}{3}h$ $\frac{1}{2}\mathbf{b}k = (1-h)\mathbf{b}$ $2-2h = \frac{4}{3}h$ Therefore $h = \frac{3}{5}$ and $k = \frac{4}{5}$ c) 4:1	B1 M1 M1 M1 A1 for correct h and k B1
21. a)  b) i) True bearing N40^{0}W (ii) 212^0 (ii) 7.7 cm x 10= 77km (iii) 80+75+100+77+80=412 km	B1 for @ correct position. Total =4marks B1 B1 M1A1 M1A1

22.

Class	x	f	fx	fd	cf
1 - 5	3	4	12	0.8	4
6 - 10	8	12	96	2.4	16
11 - 20	15.5	9	139.5	0.9	25
21 - 30	25.5	6	153	0.6	31
31 - 50	40.5	18	729	0.9	49
51 - 55	53	4	106	0.8	53
56 - 65	60.5	2	121	0.2	55
			$\sum fx$ 1356.5		

B1 for correct column of *FX*

B1 for correct column of *Fd(frequency density)*

B1 for correct column of cumulative frequency

(a) (i) $\dfrac{1356.5}{55}$

$= 24.66$

M1

A1

(ii). $20.5 + \dfrac{(28-25)}{6} \times 10$

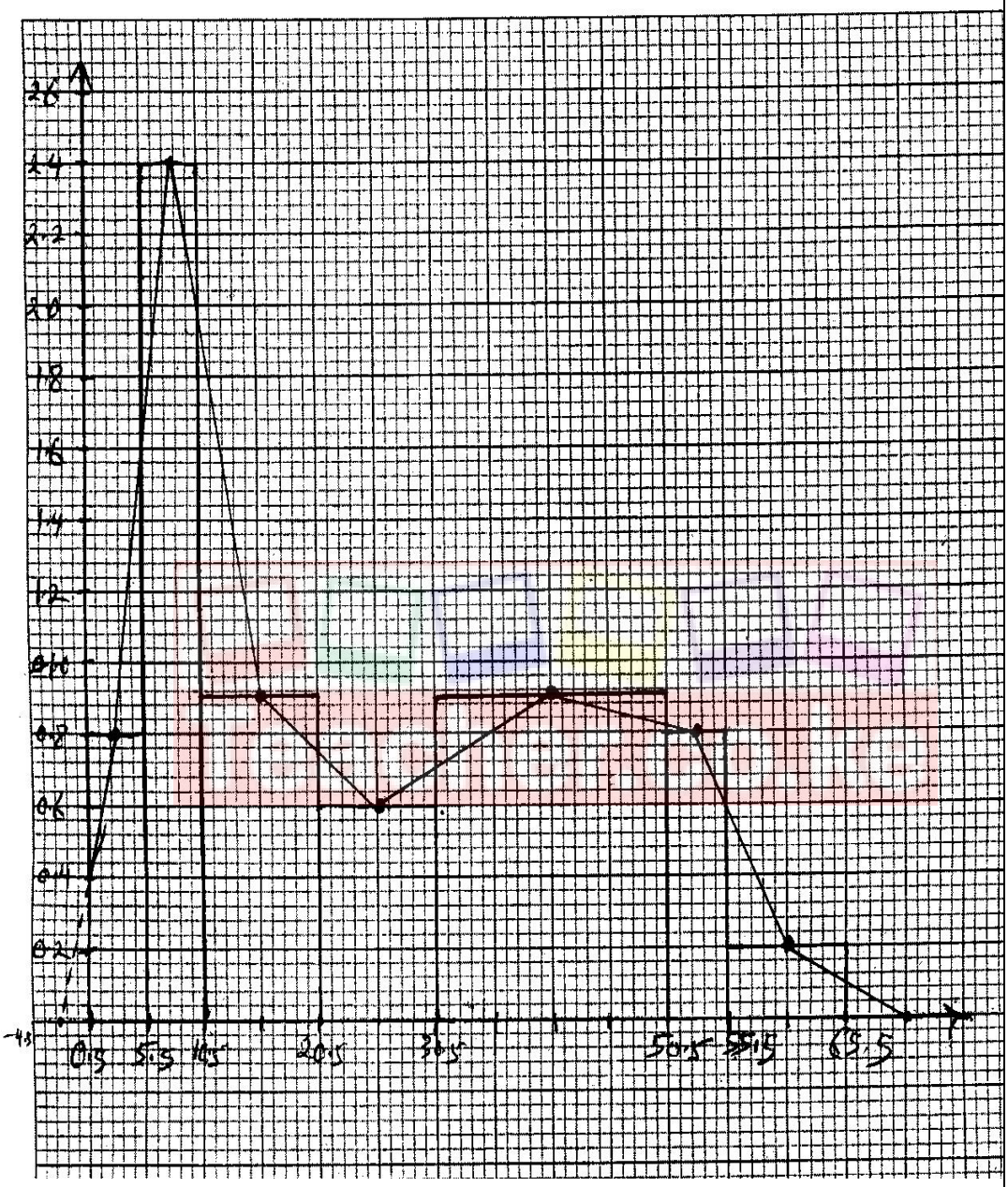
$20.5 + 5$

$= 25.5$

M1

A1

b.)



B1 -Good scale

B1 -x-axis upper class boundaries well labeled and y-axis, cf well labeled.

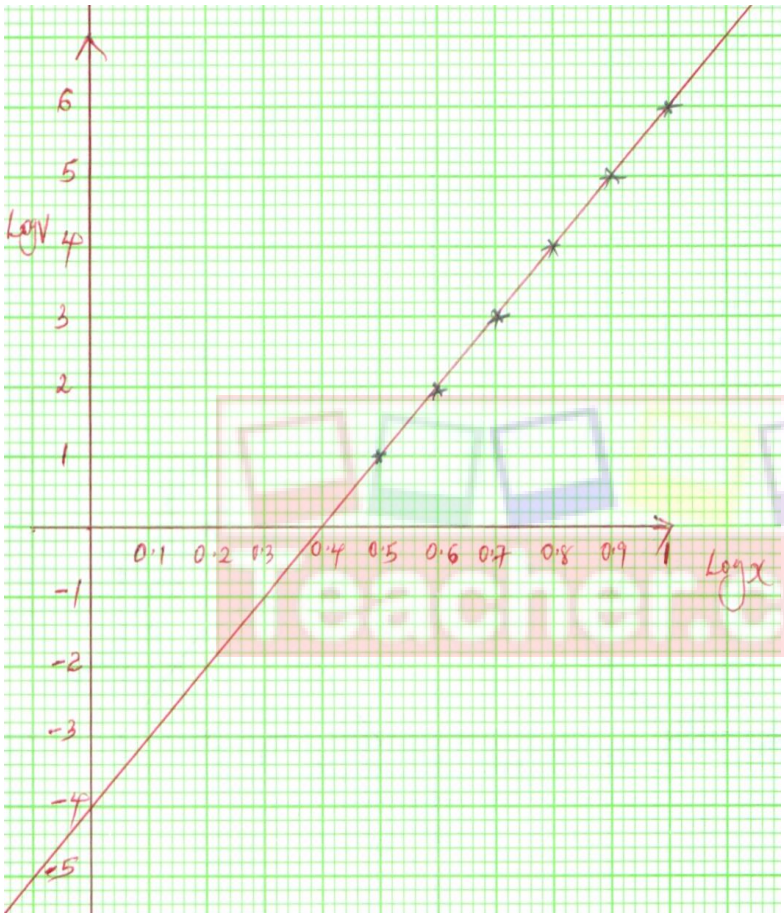
B1-Correct frequency polygon

23. a) $\log V = n\log x + \log k$ — B1

Log x	0.5	0.6	0.7	0.8	0.9	1.0
Log V	1	2	3	4	5	6

B2

b.)



Plotting **P1**

Scale **S1**

Straight line **L1**

c) *n is the gradient of the line* $= \dfrac{4-0}{0.8-0.4} = 10$ — **M1A1**

$Logk = -4$ *i.e the y –intercept*

$Log_{10}k = -4$ — M1

$10^{-4} = k$

$k = 0.0001$ — A1

24. (a) $v = \int \frac{dv}{dt} = \int (10t+1)dt$	M1
$v = 5t^2 + t + c$ when $t = 0$, $v = -4$	M1
Therefore,	
$v = 5t^2 + t - 4$	A1
(b) $v = 5(3)^2 + 3 - 4 = 44m/s$	B1
(c) The particle is at rest when $v = 0$,	
$5t^2 + t - 4 = 0$	M1
$5t^2 + 5t - 4t - 4 = 0$	M1
$(5t - 4)(t+1) = 0$	
$t = -1$ or $t = 0.8s$	
Therefore $t = 0.8s$	A1
(d) $s = \int_2^4 (5t^2 + t - 4)dt$	
$\left[\frac{5t^3}{3} + \frac{t^2}{2} - 4t\right]_2^4$	M1
$\left(\frac{5}{3}(4)^3 + \frac{4^2}{2} - 4(4)\right) - \left(\frac{5}{3}(2)^3 + \frac{2^2}{2} - 8\right)$	M1
$98.67 - 0.67 = 98m$	A1