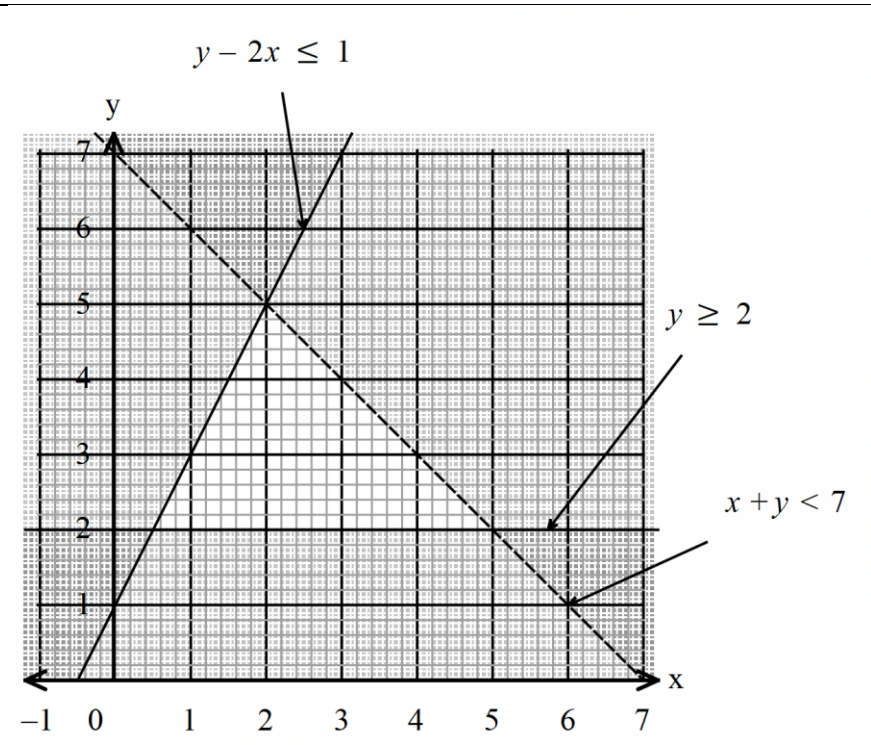
MARANDA HIGH SCHOOL

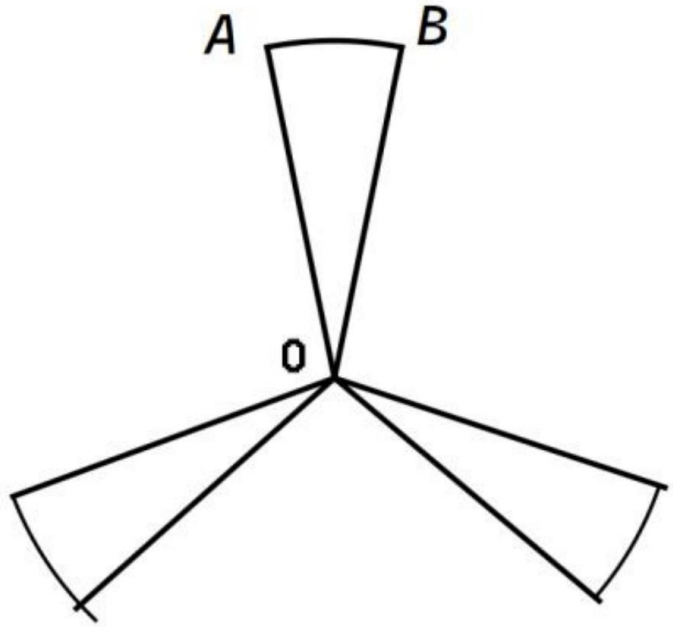
PAPER 121/1 MOCK 2024 MARKING GUIDE

	WORKINGS		REMARKS
1.	$\frac{15+a}{5}-\frac{80+a}{20}=2$ $20(15+a)-5(80+a)=200$ $300+20a-400-5a=200$ $15a=300$ $a=20$	M1 M1 A1	√Expression as improper fractions √Removal of the denominator √C.A.O
		03	
2.	Fraction of the boys absent $=\frac{1}{6}$ Fraction the students absent who are boys $\frac{1}{6}\text{x}\frac{3}{10}=\frac{1}{20}$ Fraction of students absent who are girls $\frac{2}{5}\text{x}\frac{7}{10}=\frac{7}{25}$ Fraction of students absent $=\frac{1}{20}+\frac{7}{25}$ $=\frac{33}{100}$ If $\frac{33}{100}=99$ $\therefore\frac{100}{100}=\frac{100}{100}\times 99\times\frac{100}{33}$ $=300$ students.	B1 M1 A1	√Both $\frac{1}{20}$ and $\frac{7}{25}$ seen √Fraction for absent students √C.A.O
		03	

3.	$\sqrt{a} = \sqrt{64x3}$ $a = 64x3$ $9a = 9x64x3$ $= 3^3x4^3$ $\sqrt[3]{m} = \sqrt[3]{3^3x4^3}$ $m = 3x4$ =12	M1 M1 A1	√9a √Cube root by factorization √C.A.O
		03	
4.	$AB = 30\,tan\ 60^0$ $\tan 42^0 = \frac{30 + x}{30tan60^0}$ $x = 11328mm\ or$ $x = 11.328m$	M1 M1 A1	√Expression for the base √Expression for the height above the tower √C.A.O
		03	
5.		B1 B1 B1	√$y - 2x \leq 1$ drawn and shaded √ $x + y < 7$ drawn and shaded √$y \geq 1$ drawn and shaded
		03	

6.	$\text{J}:\text{K} = 4:5$ $\frac{\text{J}}{\text{K}} = \frac{4}{5}$ $5\text{J} - 4\text{K} = 0 \ldots\ldots (\text{i})$ $\frac{\text{J}-5}{\text{K}-5} = \frac{7}{9}$ $9\text{J} - 7\text{K} = 10 \ldots\ldots (\text{ii})$ $-\text{J} = -40$ $\text{J} = 40$ $\text{K} = 50$	M1 M1 A1	√Formation of two simultaneous equations from the ratios √ attempt to solve for one of the unknowns √C.A.O
		03	
7.	$\frac{36+x}{x} = \frac{32}{16}$ $32x - 16x = 576$ $x = 36$ $H = \sqrt{72^2 - 16^2}$ $h = \sqrt{36^2 - 8^2}$ $V = \frac{80}{100} X \frac{1}{3} X \frac{22}{7} (16^2\sqrt{72^2 - 16^2} - 8^2\sqrt{36^2 - 8^2})\text{cm}^3$ $= 13.2\ l$	M1 M1 M1 A1	√Use of LSF √Expressions of the heights √Substitution into V √C.A.O
		04	
8.	$\left(\frac{5}{3}\right)^{7k-5} = \left(\frac{9}{25}\right)^{k-1}$ $\frac{5^{7k-5}}{3^{7k-5}} = \frac{3^{2k-2}}{5^{2k-2}}$ $\frac{5^{7k-5}}{3^{7k-5}} = \frac{5^{-2k+2}}{3^{-2k+2}}$ $7k - 5 = -2k + 2$ $k = \frac{7}{9}$	M1 M1 A1	√Expression of both sides to base 3 & 5 √Application of the inverse law of indices on any side of the = √C.A.O
		03	
9.	$x - 20 + 3x - 50 = 90^0$ $x = 40^0$	M1 A1	√Equation √C.A.O

		02	
10.	$4y = -3x + 12$ $y = -\frac{3}{4}x + 3$ $m_{QR} = \frac{4}{3}$ $\tan(180 - \alpha^0) = \frac{4}{3}$ $180 - \alpha^0 = 53.1^0$ $\alpha^0 = 126.9°$	B1 M1 A1	√Gradient of QR √Equation of gradient to tangent √C.A.O
		03	
11.	$\overrightarrow{PQ} = -\begin{pmatrix}-6\\-3\end{pmatrix} + \begin{pmatrix}-2\\-1\end{pmatrix}$ $= \begin{pmatrix}4\\2\end{pmatrix}$ $\overrightarrow{QR} = -\begin{pmatrix}-2\\-1\end{pmatrix} + \begin{pmatrix}6\\-t\end{pmatrix}$ $= \begin{pmatrix}8\\1-t\end{pmatrix}$ then $\overrightarrow{PQ} // \overrightarrow{QR}$ $\begin{pmatrix}4\\2\end{pmatrix} = k\begin{pmatrix}8\\1-t\end{pmatrix}$ $4 = 8k$ $k = \frac{1}{2}$ $\frac{3}{2} = -\frac{1}{2}t$ $t = -3$	B1 B1 M1 A1	$\overrightarrow{PQ}$ $\overrightarrow{QR}$ √Attempt to solve for the scalar √C.A.O
		04	

12.	$h = \sqrt{l^2 - \frac{1}{4}l^2}$ $h = \frac{\sqrt{3}}{2}l$ $Area = \frac{1}{2} \times l \times \frac{\sqrt{3}}{2}l$ $\frac{\sqrt{3}}{4}l^2 = 81$ $l^2 = \frac{81x4}{\sqrt{3}}$ $l^2 = 108\sqrt{3}\ cm$	M1 M1 A1	√Expression for perpendicular height √Substitution into formula for Area of an equilateral triangle √C.A.O
		03	
13.		B1 B1 B1	120° measured or calculated √2nd order drawn √Diagram with three orders completed
		03	

<table>
<tr><td>14.</td><td>$(r-6)^2 + (r-3)^2 = r^2$
$r^2 - 18r + 45 = 0$
$= \frac{18 \pm 12}{2}$
$= 15 \text{ or } 3$
$r = 15$
shaded region $= 9 \times 12$
$= 108\text{cm}^2$</td><td>M1

M1

A1

B1</td><td>√Substitution into the Pythagorean
√Resolution of discriminant

√Discrimination of r

√C.A.O</td></tr>
<tr><td></td><td></td><td>04</td><td></td></tr>
<tr><td>15.</td><td>$< BPQ = 90^0$
$< PBQ = 180^0 - 90^0 - 25^0$
$= 65^0$
$< PBR = 180^0 - 65^0$
$= 115^0$</td><td>M1

M1

A1</td><td>√Expression for PBQ

√Expression for PBR

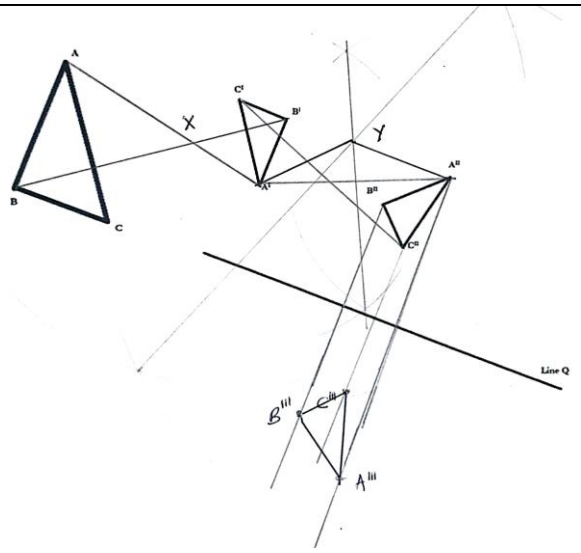
√C.A.O</td></tr>
<tr><td></td><td></td><td>03</td><td></td></tr>
<tr><td>16.</td><td><table><tr><td>x</td><td>0</td><td>2</td><td>4</td><td>6</td><td>8</td></tr><tr><td>y</td><td>-6</td><td>0</td><td>14</td><td>36</td><td>66</td></tr></table>Area $= \frac{1}{2} \times 2\big((6+66) + 2(0+14+36)\big)$
$= 172 \text{ sq units}$</td><td>B1

M1

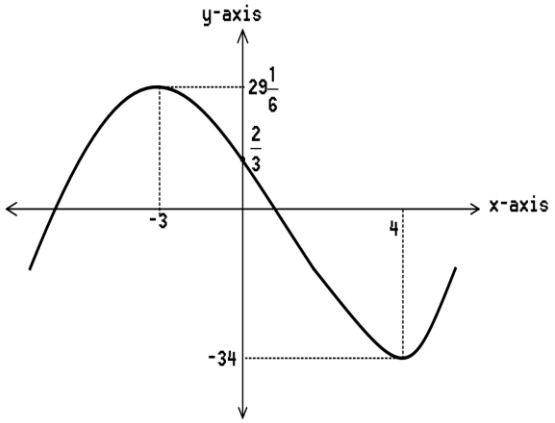
A1</td><td>√ ys (all of them)

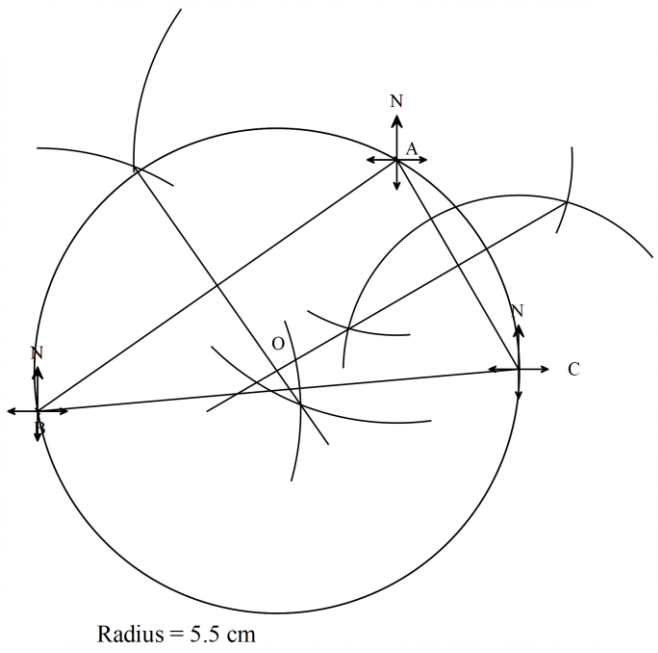
√Substitution into the rule
√C.A.O</td></tr>
<tr><td></td><td></td><td>03</td><td></td></tr>
</table>

17.	a) Discount $= \frac{5}{100} \times 1250 \times 10 + \frac{8}{100} \times 1250 \times 2$ $= 825$ profit $= 1250 \times 62 - 62 \times 1078 - 825$ $=9839$ %profit $= \frac{9839}{66836} \times 100\%$ $= 14.7\%$ b) Amount paid for the $1^{st}50$ rods $= 1250 \times 50$ $= 62500$ Amount paid for 10 rods under 5% discount $= 12500 - 625$ $= 11875$ Amount of money used to purchase rods above 60 $= 168675 - 62500 - 11875$ $= 94300$ Number of rods bought under 8% discount $= 94300 \div (0.92 \times 1250)$ $= 82$ rods Total Number of rods $= 82 + 10 + 50$ $= 142$ rods	M1 M1 M1 M1 A1 M1 M1 M1 M1 A1	√Expression for 5% √Expression for 8% √Expression for profit √Expression for % Profit √C.A.O √Expression for payments on 1st 50 √Expression when discount is given √Expression for payments above 60 √Expression for number of rods bought at 8% discount √C.A.O
		10	
18.	a) Linear scale factor $= \frac{BIX}{BX} = \frac{-2.3}{4.6} = -\frac{1}{2}$ b) $-130° \pm 1°$	B1 B1 M1 A1	√Location of X by connecting any pair AA^I BB^I or CC^I √Measurement where one must be negative √Substitution into the formula for scale factor √Follow through

		B1 B1 B1 B1 B1	√Dropping of any pair of perpendicular bisectors on A^IA^{II} B^IB^{II} or C^IC^{II} √Location of Y at the intersection of the perpendicular bisectors √Follow through √Location of A^{III} √Location of B^{III} and C^{III} √Completion of A^{III} B^{III} C^{III}
		10	
19.	a) $A = \frac{56°}{360°} \times \frac{22}{7} \times 10^2$ $= 48.89\text{cm}^2$ $A = \frac{80°}{360°} \times \frac{22}{7} \times 7^2$ $= 34.22\text{cm}^2$ b) Area of $\Delta RPS = \frac{1}{2} \times 10^2 \times sin56°$ $= 41.45\text{cm}^2$ Area of $\Delta RQS = \frac{1}{2} \times 7^2 \times sin80°$ $= 24.13\text{cm}^2$ c) Area $= 48.89 + 34.22 - 41.45 - 24.13$ $= 17.53\text{cm}^2$	M1 A1 M1 A1 M1 A1 M1 A1 M1 A1	√ area of sector RSP √C.A.O √ area of sector RSQ √C.A.O √Area of ΔRPS C.A.O √ Area of ΔRQS √C.A.O √Area of shaded region √C.A.O
		10	
20.	a)(i) $\frac{3000}{x}$	B1	√Expression for the price before increase

	(ii) $\frac{3000}{x-10}$ b) (i) $\frac{3000}{x-10}-\frac{3000}{x}=10$ $x^2-100x-30000=0$ $(x-60)(x+50)=0$ $x=60 \text{ or } -50$ $\therefore\ x=60$ bottles (ii) New price $=\frac{3000}{50}=60$ Old price $=\frac{3000}{50}=50$ % Increase $=\frac{10}{50}\times 100\%$ $=20\%$ (iii) $\frac{60}{2}$ $=30$	B1 M1 M1 M1 A1 B1 M1 A1 B1	√Expression for the price after increase √Formation of equation √Quadratic equation √Resolving of discriminant/factorization √C.A.O √Both 50&60 seen √Substitution √C.A.O √C.A.O
		10	
21.	$\frac{dy}{dx}=x^2-x-12$ a)i) $at\ x=-1, grad\ of\ \tan gent=-10, y=11\frac{5}{6}$ $eqn: \frac{y-11\frac{5}{6}}{x--1}=\frac{1}{10}$ $y=\frac{1}{10}x+12\frac{5}{6}$ $\frac{dy}{dx}=x^2-x-12=0$ $(x+3)(x-4)=0$ ii) $x=-3\ and\ x=4$ $y=29\frac{1}{6}\ and\ y=-34$ $coordinates\ (-3,29\frac{1}{6})\ and\ (4,-34)$	M1 M1 A1 M1 A1 B1	√Gradient function √Expression for the equation of the normal √Equation of the normal √Gradient function equated to zero √Roots of quadratic equation √Coordinates of the stationary points

	iii) x | -4 | -3 | -2 $\frac{dy}{dx}$ | 8 | 0 | -6 | ↗ | → | ↘ $\left(-3,29\frac{1}{6}\right)$ is a maximum point x | 3 | 4 | 5 $\frac{dy}{dx}$ | -6 | 0 | 8 | ↘ | → | ↗ (4,-34) is a minimum point  b)	B1 B1 B1	Investigation and conclusion of the maximum point √Investigation and conclusion of the minimum point √y intercepts sketched √Turning points sketched
		10	
22.	a) time taken to reach Nairobi $= \frac{400}{120}$ $= 3\frac{1}{3}$hours time of arrival $= 3$hrs20 min $+ 8{:}30$ am $= 11{:}50$ am b) Relative speed $= 120 + 80 = 200$km/h Relative distance $= 400 - \frac{1}{2}$X $80 = 360$km Time $= \frac{360}{200}$ $= 1$h 48min c) Distance $= 1\frac{4}{5} \times 80$ $= 144$km Total distance $= 40 + 144$km	M1 A1 B1 M1 A1 M1	√Expression for time taken √C.A.O √RS and RD √Expression for time √C.A.O √Expression for distance covered in 1h 48 min

	$= 184\text{km}$ d) time taken by aeroplane to reach Nairobi $= \frac{400}{300}$ $= 1\text{h } 20\text{min}$ Time taken by taxi $= (11{:}50\text{am} - 10{:}10\text{am} - 1\text{h } 30\text{min})$ $= 10\text{min}$ speed $= \frac{10}{\frac{10}{60}}$ $= 60\text{km/h}$	A1 M1 M1 A1	√C,A,O √Expression for time taken by plane √Expression for time taken by taxi √C.A.O
		10	
23.	a) $\text{N}55^0\text{E}$ $1{:}800{,}000$  Radius = 5.5 cm b) c) H d) Distance $= \frac{22}{7} \times 2 \times 44$	B1 B1 B1 B1 B1 B1 B1 M1	√compass bearing √Scale √Location of C from A √Location of C from B √Distance between B and C Bisection of any two sides of triangle ABC Location of K Drawing of the circumcircle to triangle ABC Expression for the circumference

<table>
<tr><td></td><td>$= 251.4$km</td><td>A1</td><td>Circumference(Follow through)</td></tr>
<tr><td></td><td></td><td>10</td><td></td></tr>
<tr><td>24</td><td>a) The median class is 41-50

$40.5 + \left\{\frac{30-(12+q)}{14}\right\} \times 10 = 45.5$

$\left\{\frac{30-(12+q)}{14}\right\} = 0.5$

$18 - q = 7$

$q = 11$

$r = 60 - 55 = 5$

b)

<table>
<tr><th>Marks</th><th>f</th><th>x</th><th>fx</th><th>cf</th></tr>
<tr><td>11-20</td><td>3</td><td>15.5</td><td>46.5</td><td>3</td></tr>
<tr><td>21-30</td><td>9</td><td>25.5</td><td>229.5</td><td>12</td></tr>
<tr><td>31-40</td><td>11</td><td>35.5</td><td>390.5</td><td>23</td></tr>
<tr><td>41-50</td><td>14</td><td>45.5</td><td>637.0</td><td>37</td></tr>
<tr><td>51-60</td><td>10</td><td>55.5</td><td>555.0</td><td>47</td></tr>
<tr><td>61-70</td><td>6</td><td>65.5</td><td>393.0</td><td>53</td></tr>
<tr><td>71-80</td><td>5</td><td>75.5</td><td>377.5</td><td>58</td></tr>
<tr><td>81-90</td><td>2</td><td>85.5</td><td>171.0</td><td>60</td></tr>
<tr><td></td><td>$\sum fx = 60$</td><td></td><td>$\sum fx = 2800$</td><td></td></tr>
</table>
$\text{Mean} = \frac{2800}{60}$

$= 46.67$</td><td>M1

A1

B1

M1

A1</td><td>√Subtitution into the formula for median

√Breaking of the brackets

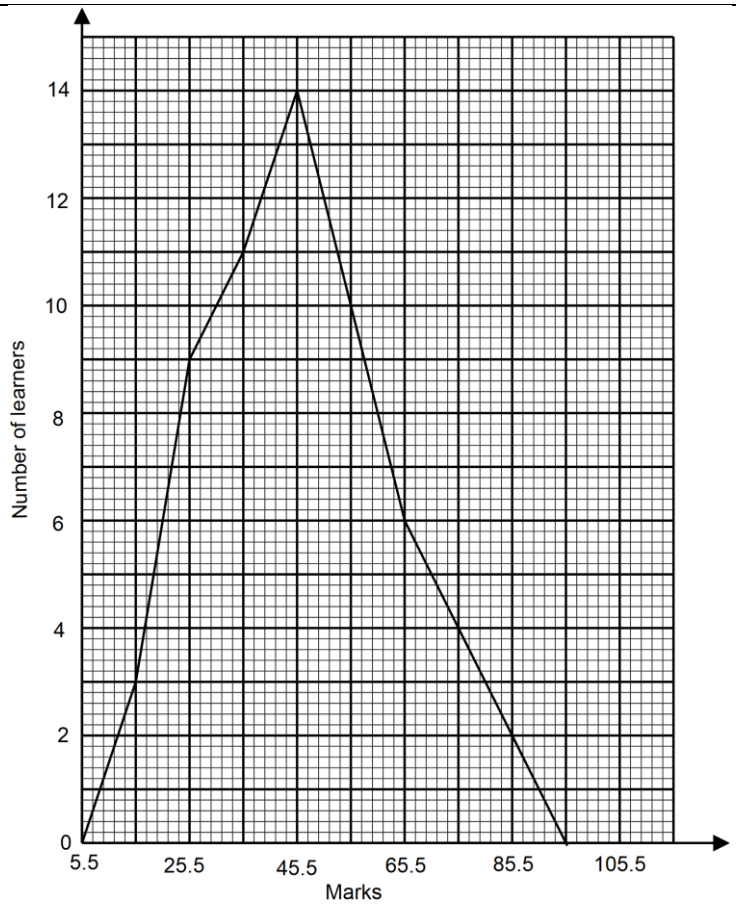
√C.A.0

√2nd unknown

√fxs

√Substitution into the formula for mean

√C.A.O</td></tr>
</table>

	c) 	B1 B1 B1	√Midpoints accommodated on the x axis √Plotting of all the points √Frequency polygon joined
		10	