



# MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education  
MOCK EXAMINATIONS 2021

121/1

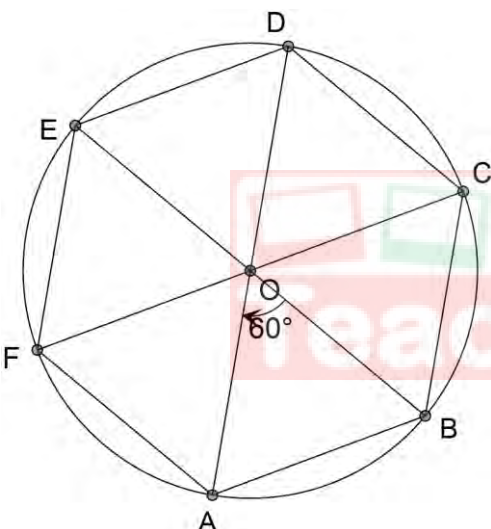
MATHEMATICS

Paper 1


SECTION I		
S/ N	WORKINGS	MARKS
1	$6 \times 0.1 = 0.6$ or $\frac{6}{10}$ Six tenths	B1 B1
		O2
2	LCM = $2 \times 3$ = 6 Doctor A will give jabs to 3 teachers in 6 minutes Doctor B will give jabs to 2 teachers in 6 minutes Both doctors will give jabs to 5 teachers in 6 minutes Shortest time = $\frac{300}{5} \times 6$ = 6 hrs or 360 mins	M1    M1 A1
		O3
3	Numerator $2\frac{1}{2}$ of $1\frac{3}{4} - 5\frac{1}{4}$ $= \frac{35}{8} - 5\frac{1}{4}$ $= -\frac{7}{8}$ Denominator $1\frac{2}{5} + 2\left(\frac{-3}{2}\right)$ $= 1\frac{2}{5} - 3$ $= \frac{-8}{5}$ $\therefore \frac{-7}{8} \times \frac{-5}{8}$ $= \frac{35}{64}$	M1         M1   A1
		O3

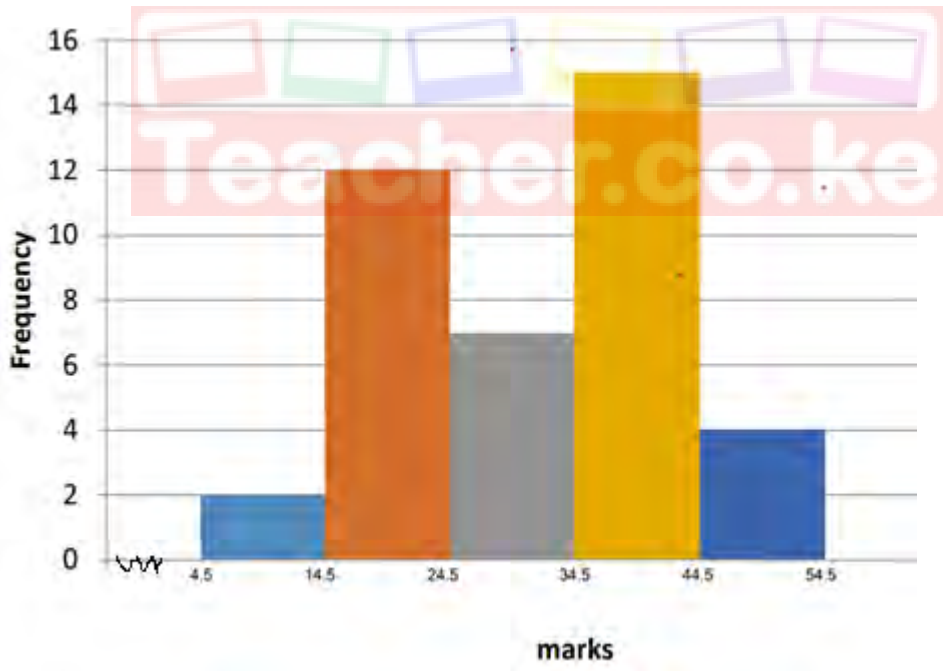
4	$\frac{2}{3}x = \frac{1}{2}$ $x = \frac{1}{2} \times \frac{3}{2}$ $= \frac{3}{4}$ $\frac{3}{4}y = \frac{3}{2}$ $y = 2$ $\therefore \frac{\frac{3}{4} + 2}{2 \times \frac{3}{4}}$ $= \frac{\frac{11}{4} \times \frac{2}{3}}{\frac{3}{2}}$ $= \frac{11}{6}$ $= 1\frac{5}{6}$	<p>M1 For both <math>x = \frac{3}{4}</math> and <math>y = 2</math> M1 correct substitution</p> <p>A1</p>																								
		O3																								
5	<p>If 10% = 27500</p> $\therefore 100\% = \frac{100 \times 27500}{10}$ $= 275000$ <p>Amount received = <math>\frac{85 \times 275000}{100}</math></p> $= 233750$	<p>M1</p> <p>M1</p> <p>A1</p>																								
		O3																								
6	$3 + 3x < 5x - 14$ $8.5 < x$ $5x - 14 < x + 46$ $x < 15$ $8.5 < x < 15$ $x = \{9, 10, 11, 12, 13, 14\}$	<p>B1</p> <p>B1</p> <p>B1</p>																								
		O3																								
7	<table border="1" data-bbox="162 1564 1331 1923"> <thead> <tr> <th>Number</th> <th>Std Form</th> <th>Logs</th> </tr> </thead> <tbody> <tr> <td>0.921</td> <td><math>9.21 \times 10^{-1}</math></td> <td><math>\bar{1}.9643</math></td> </tr> <tr> <td>0.00739</td> <td><math>7.39 \times 10^{-3}</math></td> <td><math>\bar{3}.8686+</math></td> </tr> <tr> <td>0.023</td> <td><math>2.3 \times 10^{-2}</math></td> <td><math>\bar{3}.8329</math></td> </tr> <tr> <td>0.6664</td> <td><math>6.664 \times 10^{-1}</math></td> <td><math>\bar{2}.3617-</math></td> </tr> <tr> <td></td> <td></td> <td><math>\bar{1}.4712</math></td> </tr> <tr> <td></td> <td></td> <td>3</td> </tr> <tr> <td></td> <td></td> <td><math>\bar{1}.8237</math></td> </tr> </tbody> </table>	Number	Std Form	Logs	0.921	$9.21 \times 10^{-1}$	$\bar{1}.9643$	0.00739	$7.39 \times 10^{-3}$	$\bar{3}.8686+$	0.023	$2.3 \times 10^{-2}$	$\bar{3}.8329$	0.6664	$6.664 \times 10^{-1}$	$\bar{2}.3617-$			$\bar{1}.4712$			3			$\bar{1}.8237$	<p>M1 all logs correct</p> <p>M1 correct + and -</p> <p>M1 correct division by 3 <math>\bar{1}.8237</math></p> <p>A1 0.6664</p>
Number	Std Form	Logs																								
0.921	$9.21 \times 10^{-1}$	$\bar{1}.9643$																								
0.00739	$7.39 \times 10^{-3}$	$\bar{3}.8686+$																								
0.023	$2.3 \times 10^{-2}$	$\bar{3}.8329$																								
0.6664	$6.664 \times 10^{-1}$	$\bar{2}.3617-$																								
		$\bar{1}.4712$																								
		3																								
		$\bar{1}.8237$																								

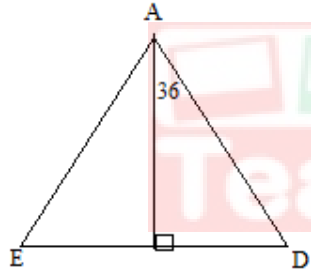
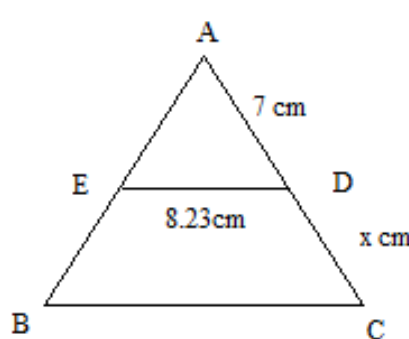
		O4
8	$(3p - 20)^\circ + (p + 30)^\circ = 90^\circ$ $p = 20^\circ$	M1 A1
		O2
9	$l = \sqrt{8^2 + 6^2}$ $= 10$ $P = 4 \times 10$ $= 40$	M1  M1 A1
		O3
10	$2 + 2^{c-4} = 130$ $2^{c-4} = 128$ $2^{c-4} = 2^7$ $c - 4 = 7$ $c = 11$	M1  M1 A1
		O3
11	$\frac{3k + 2 + 4k + 1}{2} = 2k - 1$ $7k + 3 = 4k - 2$ $3k = -5$ $k = -1\frac{2}{3}$	M1 M1 correct collecting like terms A1 C.A.O
		O3
12	$PQ = -\begin{pmatrix} 6 \\ 5 \end{pmatrix} + \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $= \begin{pmatrix} -4 \\ -2 \end{pmatrix}$ $2PQ = \begin{pmatrix} -8 \\ -4 \end{pmatrix}$ $ 2PQ  = \sqrt{(-8)^2 + (-4)^2}$ $= 8.9 \text{ units}$	M1  M1 A1
		O3
13	$\angle ADC + 90^\circ + 22^\circ + 33^\circ = 360^\circ$ $\angle ADC = 215^\circ$ $\angle X = 360^\circ - 215^\circ$ $= 145^\circ$	M1  M1 A1
		O3
14	$\frac{810}{x-3} - \frac{810}{x} = 9$ $9x^2 - 27x - 2430 = 0$ $x = \frac{3 \pm 33}{2}$ $x = 18 \text{ or } -15$	M1  M1 M1

	$\therefore x = 18$ Hence number of students who paid were 15	A1
		O4
15	$\text{Volume of the sphere} = \frac{22}{7} \times 5^2 \times 4$ $= 314 \frac{2}{7}$ $\frac{4}{3} \times \frac{22}{7} \times r^3 = 314 \frac{2}{7}$ $r = \sqrt[3]{\frac{314 \frac{2}{7} \times 3 \times 7}{4 \times 22}}$ $r = 4.2\text{cm}$	M1  M1  A1
		O4
16	 $6 \times \frac{1}{2} \times 3^2 x \sin 60^\circ = 23.3826859021798 \text{ cm}^2$	B1 60° calculated or constructed B1 correct location of the vertices B1 completion and labelling of the correct hexagon B1 Area of the hexagon
		O4
<b>SECTION II</b>		
<b>S/ N</b>	<b>WORKINGS</b>	<b>MARKS</b>
17	a) $95 + 95 + 50 + 95 \times 2$ $= 430$ b) % of children $= \frac{190}{430} \times 100\%$ $= 44.2\%$ c) i. Number of benches occupied by children $= \frac{190}{10}$	M1 A1 M1 A1  M1

	$= 19$ ii. Number of benches filled by adults $= \frac{240}{7}$ $= 34.2857142857$ $= 34$ benches iii. $7 - (240 - 34 \times 7)$ $= 5$	A1  M1 A1 M1 A1
		10
18	a) i) $\mathbf{AB} = \mathbf{AO} + \mathbf{OB}$ $= \mathbf{b} - \mathbf{a}$ ii) $\mathbf{ON} = \mathbf{OA} + \mathbf{AN}$ $= \mathbf{a} + \frac{2}{5}(\mathbf{b} - \mathbf{a})$ $= \frac{3}{5}\mathbf{a} + \frac{2}{5}\mathbf{b}$ iii) $\mathbf{AM} = \mathbf{AO} + \mathbf{OM}$ $= -\mathbf{a} + \frac{1}{3}\mathbf{b}$ b) $\mathbf{AP} = \mathbf{AO} + \mathbf{OP}$ $= -\mathbf{a} + \frac{5}{9}\left(\frac{3}{5}\mathbf{a} + \frac{2}{5}\mathbf{b}\right)$ $= -\mathbf{a} + \left(\frac{1}{3}\mathbf{a} + \frac{2}{9}\mathbf{b}\right)$ $= -\frac{2}{3}\mathbf{a} + \frac{2}{9}\mathbf{b}$ $\mathbf{PM} = \mathbf{PO} + \mathbf{OM}$ $= -\left(\frac{1}{3}\mathbf{a} + \frac{2}{9}\mathbf{b}\right) + \frac{1}{3}\mathbf{b}$ $= -\frac{1}{3}\mathbf{a} + \frac{1}{9}\mathbf{b}$ $\mathbf{AP} = 2\mathbf{PM}$ hence $\mathbf{AP}$ is parallel to $\mathbf{PM}$ Since $\mathbf{AP}$ is parallel to $\mathbf{PM}$ has a common point P then the points A, P and M are collinear c) $\mathbf{AP} : \mathbf{PM} = 2 : 1$	B1  M1 A1  B1  M1  A1  B1 B1  B1 B1
		10
19	a) $v = 3t^2 - 12t + 8$ $v(5) = 3(5)^2 - 12(5) + 8$ $= 23\text{ms}^{-1}$ b) $a = 6t - 12$ $a(5) = 6(5) - 12$ $= 18\text{ms}^{-2}$ c) At constant velocity $a = 0$ $6t - 12 = 0$ $t = 2\text{s}$ d) At rest $v = 0$	M1 M1 A1  M1  A1  M1 A1

	$3t^2 - 12t + 8 = 0$ $t = \frac{12 \pm 6.92820323027557}{6}$ $= 3.15 \text{ or } 0.85\text{s}$	M1 M1 A1
		10
20	a) Scale diagram   b) i) $020^\circ$ or $N20^\circ W$ ii) $2.6 \pm 0.1 \text{ km}$ iii) $5.5 \pm 0.1 \text{ km}$ c) $\text{speed} = \frac{3.6 + 2.6}{\frac{50}{60}}$ $= 7.4 \text{ km/h}$	B1 correct scale used  B1 correct location of B from A  B1 correct location of C from B  B1 correct location of D from both A and C B1 B1 B1 B1 3.6km M1 A1
		10
21	a) $6(-3) + 2(-1) + 5k = 0$ $k = 4$ $6x + 2y + 20 = 0$ $y = -3x - 10$ $m_1 = -3$ $m_2 = \frac{1}{3}$ $2px + 9y = 10$ $y = -\frac{2}{9}px + \frac{10}{9}$ $-\frac{2}{9}p = \frac{1}{3}$	M1 A1          M1 A1

	$p = -1\frac{1}{2}$ <p>b) <math>\frac{y+2}{x-3} = \frac{1}{3}</math>  <math>3y + 6 = x - 3</math>  <math>x - 3y = 9</math></p> <p>c) <math>\tan \theta = \frac{1}{3}</math>  <math>\theta = 18.434948822922^\circ</math>  the obtuse angle = <math>180^\circ - 18.434948822922^\circ</math>  = <math>161.6^\circ</math></p>	M1 M1 A1  M1  M1 A1
		10
22	<p>a) <math>x = 40 - (2 + 12 + 7 + 15)</math>  <math>x = 4</math></p> <p>b) <math>\frac{40}{2} = 20</math>  Median = <math>24.5 + \left(\frac{20 - 14}{7}\right) 10</math>  = <math>33\frac{1}{14}</math></p> <p>c) </p> <p>d) <math>4 + \frac{4.5}{10} \times 15</math>  = 10.75  = 10 students</p>	M1 A1 B1  M1  A1 B1 Both x and y axes scales correct  B1 First three bars correctly drawn  B1 The other two bars drawn correctly M1 A1
		10

23	<p>a) <math>\angle RST = \frac{1}{2}(360^\circ - (180^\circ - 36^\circ)) = 108^\circ</math>  <b>Reason:</b> The reflex angle subtended by the same chord on to the centre of the circle is always twice the angle subtended by the same chord in the minor segment</p> <p>b) <math>\angle SUT = 180^\circ - 72^\circ - (180^\circ - (42^\circ + 18^\circ + 43^\circ)) = 21^\circ</math>  <b>Reason:</b> Sum of interior angles of a triangle is <math>180^\circ</math></p> <p>c) <math>\angle PST = \angle PQT = 90^\circ - 42^\circ = 48^\circ</math>  <b>Reason:</b> Angles subtended by the same chord, PT, on similar segment are equal.</p> <p>d) Obtuse <math>\angle ROT = 180^\circ - 2(90^\circ - 72^\circ) = 144^\circ</math>  <b>Reason:</b> Angles on a straight line add up to <math>180^\circ</math></p> <p>e) <math>\angle SQT = 39^\circ</math>  <b>Reason:</b> Angles subtended by the same chord, TS, on similar segment are equal.</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>
		10
24	<p>a)</p>  <p><math>\sin 36^\circ = \frac{\frac{1}{2}ED}{7}</math>  <math>ED = 8.23\text{cm}</math></p> <p>b)</p>  <p><math>\frac{x+7}{7} = \frac{12}{8.23}</math>  <math>x = 3.20656136087485</math>  Area of <math>\triangle ABC = \frac{1}{2} \times 3.20656136087485^2 \times \sin 72^\circ</math></p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>M1</p>



$= 10.206561366087485$ <p>Area of the shaded part</p> $= \frac{1}{2} \times 10.206561366087485^2 \sin 72^\circ - \frac{72^\circ}{360^\circ} \times \frac{22}{7} \times 7^2$ $= 18.74 \text{ cm}^2$ <p>c) Volume of one emblem = <math>2.5 \times 18.74</math></p> $= 46.85 \text{ cm}^3$ <p>Volume of 100 emblems = <math>100 \times 46.85</math></p> $= 4685$ <p>Mass = <math>1.025 \times 4685</math></p> $= 4802.125$ $= 4802.13 \text{ g}$	<p>M1</p> <p>A1</p> <p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p>
	10

