MARANDA HIGH SCHOOL

FORM 4 MATHS PAPER 2 MOCK MARKING SCHEME DECEMBER TERM 2 2021

NO	WORKING	MARKS	COMMENTS
1.	a) $20,800+49,100+17,400 = Ksh\,87,300$	B1	Estimated sum
	b) . $\%\ error = \frac{87300-87217}{87217}\times 100\%$	M1	Correct expression For % error
	$= \frac{8300}{87217}\%\ or\ 0.09516\%$	A1	Accuracy
		03	
2.	$\log_5(3x-2)+\log_5(2x-1)=0$ $\log_5\left[(3x-2)(2x-1)\right]=\log_5 1$ $\Rightarrow 6x^2-7x+2=1$	M1	Expression into single logs on both sides
	$6x^2-7x+1=0$ $(6x+1)(x-1)=0$ $x=-\frac{1}{6}\ or\ x=1$	M1	attempt to solve the quadratic equation formed
	$\therefore x=1$	A1	Accuracy
		03	
3.	$\angle ABD = 42^0\,(alternate\ segment\ theorem)$	B1	For <ABD
	$\angle BDC = 42^0+36^0$ $= 78^0$	B1	Accuracy
		02	
4.	$\frac{L^2}{\pi^2}=\frac{x-PT}{Py}$	M1	Squaring both sides Correctly
	$L^2Py = x\pi^2 - PT\pi^2$	M1	Collecting terms in P
	$L^2Py + PT\pi^2 = x\pi^2$ $P=\frac{x\pi^2}{L^2y+T\pi^2}$	A1	P made subject
		03	

MARANDA HIGH SCHOOL

FORM 4 MATHS PAPER 2 MOCK MARKING SCHEME DECEMBER TERM 2 2021

5.	$\frac{1}{\tan 15^0} = \frac{1}{2-\sqrt{3}}$ $\frac{1(2+\sqrt{3})}{(2-\sqrt{3})(2+\sqrt{3})}$ $\frac{2+\sqrt{3}}{4-3}$ $2+\sqrt{3}$	M1 A1	Rationalizing the denominator accuracy
		02	
6.	$5\cos^2\theta + 2 = 3(1-\cos^2\theta) - 2\cos\theta$ $8\cos^2\theta + 2\cos\theta - 1 = 0$ $(4\cos\theta - 1)(2\cos\theta + 1) = 0$ $\cos\theta = \frac{1}{4}$ *or* $\cos\theta = -\frac{1}{2}$ $\theta = 75.52^0, 120^0, 240^0, 284.48^0.$	M1 M1 A1 B1	Expression into Same trigs Attempt to solve the Quadratic equation $\cos\theta$ accurate All θ values correct
		04	
7.	$x^2 - x(2x-3) = -4$ $x^2 - 2x^2 + 3x = -4$ $x^2 - 3x - 4 = 0$ $(x+1)(x-4) = 0$ $x = -1$ *or* $x = 4$ $y = -5$ *or* $y = 5$	M1 M1 A1 B1	Equation in one unknown attempt to solve accuracy (two values) Pairing values
		04	

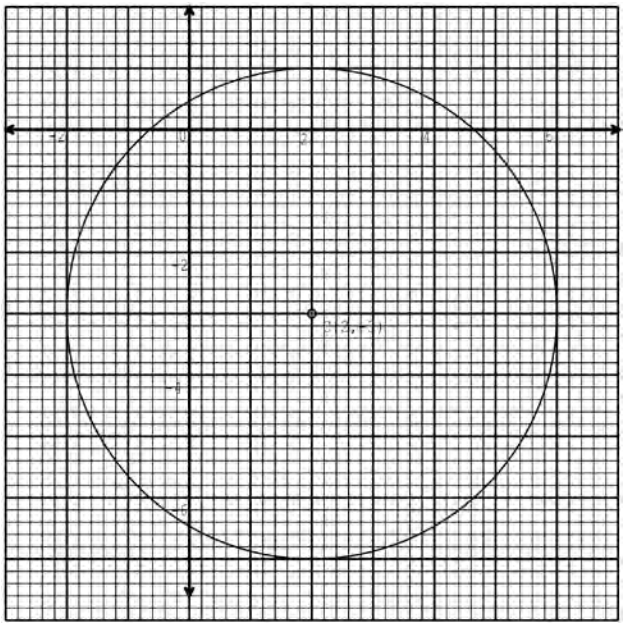
MARANDA HIGH SCHOOL

FORM 4 MATHS PAPER 2 MOCK MARKING SCHEME DECEMBER TERM 2 2021

8.	$\left(\sqrt{2}+\sqrt{5}\right)^4-\left(\sqrt{2}-\sqrt{5}\right)^4$ $\left(\sqrt{2}+\sqrt{5}\right)^4=\left(\sqrt{2}\right)^4+4\left(\sqrt{2}\right)^3\left(\sqrt{5}\right)+6\left(\sqrt{2}\right)^2\left(\sqrt{5}\right)^2+4\left(\sqrt{2}\right)\left(\sqrt{5}\right)^3+\left(\sqrt{5}\right)^4$ $=4+8\sqrt{10}+60+20\sqrt{10}+25=89+28\sqrt{10}$ $\left(\sqrt{2}-\sqrt{5}\right)^4=4-8\sqrt{10}+60-20\sqrt{10}+25=89-28\sqrt{10}$ $\left(\sqrt{2}+\sqrt{5}\right)^4-\left(\sqrt{2}-\sqrt{5}\right)^4=\left(89+28\sqrt{10}\right)-\left(89-28\sqrt{10}\right)$ $=56\sqrt{10}$	M1 M1 M1 A1	Correct expansion Of $\left(\sqrt{2}+\sqrt{5}\right)^4$ Correct expansion of $\left(\sqrt{2}-\sqrt{5}\right)^4$ subtracting the two expansions Accuracy
		04	
9.			
	Cumulative frequency | 3 | 13 | 25 | 34 | 38 | 40	B1	Cumulative Frequency
	$Q_1=94.5+\left(\frac{10-3}{10}\right)\times 5=98.0$ $Q_3=104.5+\left(\frac{30-25}{9}\right)\times 5=107.28$	B1	Either Q_1 or Q_3
	$quartile\ deviation=\frac{107.28-98.0}{2}$ $=4.639$	M1 A1	Finding quartile dev. accuracy
		04	
10.	$y=\frac{k}{x^n}\Rightarrow 4\frac{1}{2}=\frac{k}{2^n}\ and\ 1\frac{1}{3}=\frac{k}{3^n}$ $4\frac{1}{2}\times 2^n=1\frac{1}{3}\times 3^n$ $\left(\frac{2}{3}\right)^n=\left(\frac{2}{3}\right)^3$ $n=3$ $k=\frac{4}{3}\times 27=36$	M1 M1 A1 B1	Correct substitution Equation in one Unknown Accuracy Value of k
		04	

MARANDA HIGH SCHOOL

FORM 4 MATHS PAPER 2 MOCK MARKING SCHEME DECEMBER TERM 2 2021

11.	$P(\text{contracted disease}) = \left(\frac{640}{700}\times\frac{15}{100}\right)+\left(\frac{60}{700}\times\frac{70}{100}\right)$ $=\frac{24}{175}+\frac{3}{50}$ $=\frac{69}{350}$	M1 M1 A1	Probabilities Correct Addition of correct probabilities Accuracy
		03	
12.	$60\theta\cos 60^0 = 1260$ $\theta = 42^0$ $U(60^0 S, 27^0 E)$	M1 A1 B1	Equating to distance Accuracy Position of U
		03	
13.	$\frac{1}{3}x^2+\frac{1}{3}y^2-1\frac{1}{3}x+2y-1=0$ $x^2-4x+4+y^2+6y+9=3+4+9$ $(x-2)^2+(y+3)^2=4^2$ $centre(2,-3)\ \ radius = 4 units$ 	M1 M1 A1 B1	Completing the Square. Writing in the form $(x-a)^2+(y-b)^2=r^2$ Accuracy centre and radius correct circle drawn.
		04	

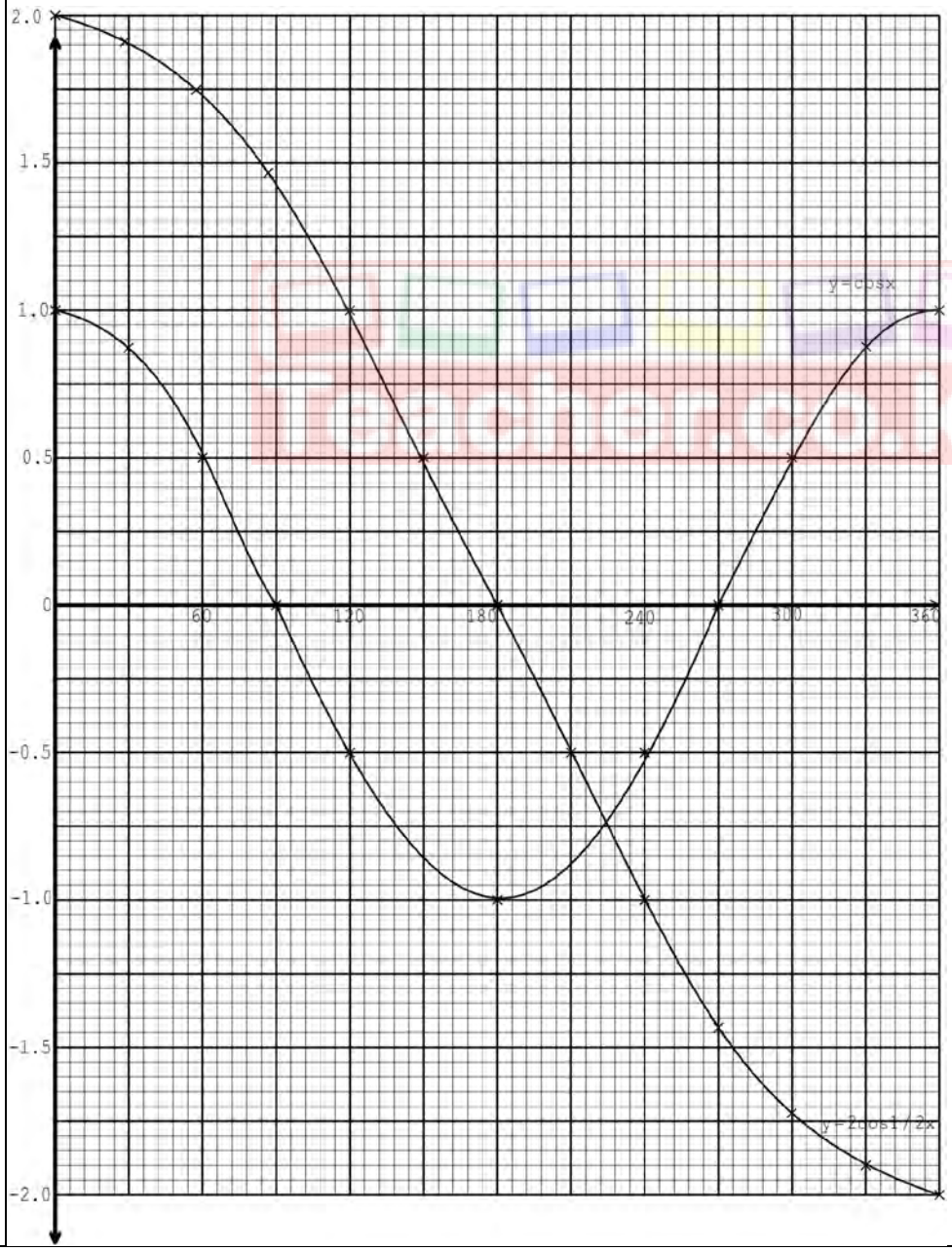
MARANDA HIGH SCHOOL

FORM 4 MATHS PAPER 2 MOCK MARKING SCHEME DECEMBER TERM 2 2021

14.	$In\ 1h\ \frac{1}{2}+\frac{1}{3}-\frac{1}{4}=\frac{7}{12}\ is\ filled$ $time\ taken\ to\ fill\ \tan k=\frac{12}{7}$ $=1\frac{5}{7}h$	M1 A1	Fraction filled in 1 Hr Accuracy
		02	
15.	$1^{st}\ slab: 4200\times 2=Ksh\ 8,400$ $2^{nd}\ slab: 4200\times 3=Ksh\ 12,600$ $3^{rd}\ slab: y\times 4=(37000-21000)$ $y=4000$ $annual\ income=4200+4200+4000$ $=12,400$	M1 M1 A1	Expression for 1st And 2nd slabs Expression for tax In 3rd slab Annual income
		03	
16.	$\overrightarrow{OC}=\frac{5}{3}b+\frac{-2}{3}a$ $\overrightarrow{OC}=\frac{5}{3}b-\frac{2}{3}a$	M1 A1	Use of ratio theorem Accuracy
		02	

17.	a) (i) $\frac{448000-112000}{24}$	M1	Expression
		A1	Accuracy
	$Ksh\,14,000$		
	(ii)		
	$\frac{85}{100}\times 448000$	M1	Expression
	$Ksh\,380,800$	A1	Accuracy
	b)		
	$\frac{92}{100}\times 380800$	M1	Expression
	$350336=\left(1+\frac{4}{100}\right)^{10}$	M1	Expression
	$Ksh\,518,582.86$	A1	Accuracy
	c) $\frac{518582.86-448000}{448000}\times 100\%$	M1	Difference
	$\frac{70582.86}{448000}\times 100\%$	M1	Getting %
	15.76%	A1	Accuracy
		10	

18. a) .



B2		8-10 values correct
B1		6-7 values correct
B0		Below 6 values
S1		Given scale used
P1		Plotting all points For $\cos\theta$
C1		Smooth curve
P1		Plotting all points For $2\cos\frac{1}{2}\theta$
C1		Smooth curve
B1		
B1		
B1		

b)

x^0	60	90	120	210	270	330
$\cos x$	0.5	1	–0.5	–0.87	0	0.87
$2\cos\frac{1}{2}x^0$	1.73	1.41	1	–0.52	–1.41	–1.93

B1

c) .

(i) $period = 720^0$

B1

(ii) *stretch along* $y-axis$, *stretch factor* 2 *followed by stretch along* $x-axis$, *stretch factor* 2

B1

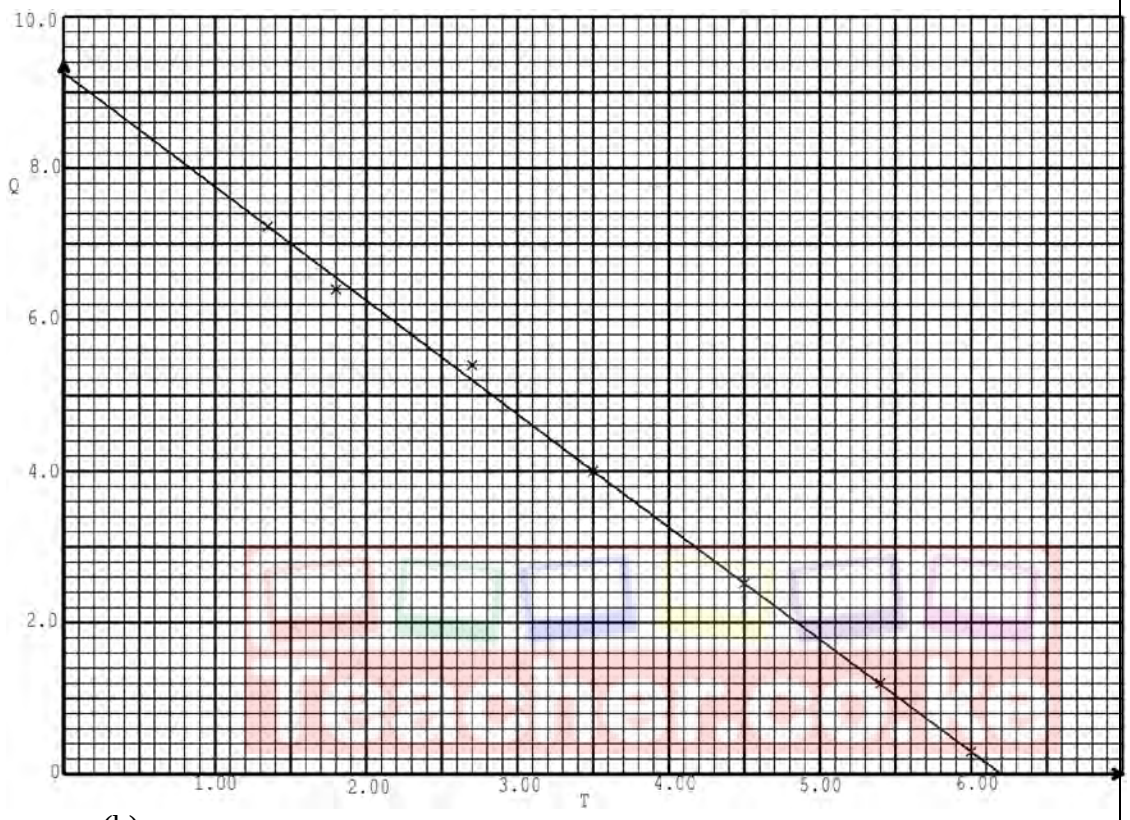
(iii) $225^0 \pm 2^0$

10

19.	a) $height\ of\ triangle = \sqrt{7.5^2 = 4.5^2} = 6m$	B1	For 6m
	$vertical\ height = \sqrt{6^2 - 2^2}$	M1	Expression for Vertical height
	$= 5.657m$	A1	Accuracy
	b). (i)		
	$\cos\theta = \frac{2}{6}$	M1	Expression for Finding angle
	$\theta = 70.53^0$	A1	Accuracy
	(ii)		
	$\sin\alpha = \frac{5.657}{7.5}$	M1	Expression for Finding angle
	$\alpha = 48.96^0$	A1	Accuracy
	(iii)		
	$slant\ length = \sqrt{7.5^2 - 2^2}$		
	$= 7.228m$	B1	For the slant length
	$\sin\frac{1}{2}\beta = \frac{4.5}{7.228}$	M1	Expression for Finding the angle
	$\beta = 2 \times 38.50$	A1	Accuracy.
	$\beta = 77.00^0$		
		10	

MARANDA HIGH SCHOOL

FORM 4 MATHS PAPER 2 MOCK MARKING SCHEME DECEMBER TERM 2 2021

20.	a)  	S1 P2 P1 L1	Simple, Linear and Accommodative scale 7-8 points correctly Plotted. **5-6 points Correctly plotted Otherwise P** Line of best fit
	(b) (i) $a = gradient = \frac{7.0-4.0}{1.5-3.5}$ $a = -1.5$ $b = y - \text{int}\,ercept = 9.2 \pm 0.1$ (ii) $Q = -1.5T + 9.2$ (iii) $0 = -1.5T + 9.2$ *or when* $Q = 0$ $1.5T = 9.2$ $T = x - \text{int}\,ercept$ $T = 6.133$ $T = 6.15 \pm 0.04$	M1 A1 B1 B1 M1 A1	Expression for Finding gradient Accuracy y-intercept correctly read Correct substitution Of *a and b* values
		10	

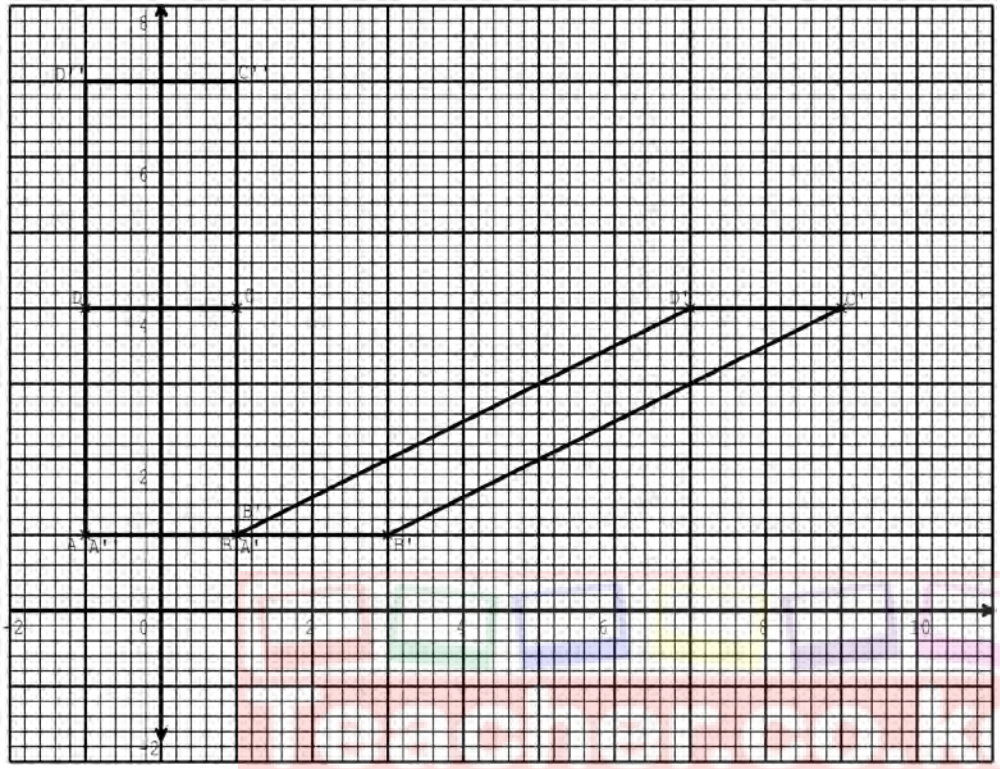
MARANDA HIGH SCHOOL

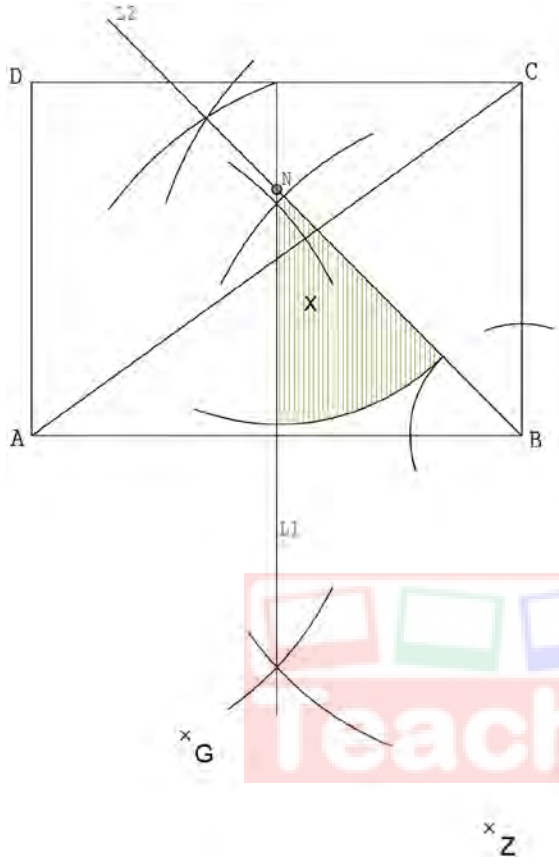
FORM 4 MATHS PAPER 2 MOCK MARKING SCHEME DECEMBER TERM 2 2021

21.	a) .		
	$8x-x^2=3x$ $\quad$ $8x-x^2=x$	B1	Coordinates of P
	$5x-x^2=0$ $\quad$ $7x-x^2=0$		
	$x(5-x)=0$ $\quad$ $x(7-x)=0$	B1	Coordinates of Q
	$x=0$ *or* $x=5$ $\quad$ $x=0$ *or* $x=7$		
	$P(5,15)$ $\quad$ $Q(7,7)$		
	b) .		
	(i) .		
	$\int_0^7 (8x-x^2)dx-\int_0^7 xdx$		
	$\left[4x^2-\frac{x^3}{3}+c\right]_0^7-\left[\frac{x^2}{2}+c\right]_0^7$	M1	Correct integration With limits
	$\left[4\times7^2-\frac{7^3}{3}\right]-\left[\frac{7^2}{2}\right]$	M1	Correct substitution
	$81\frac{2}{3}-24\frac{1}{2}$		
	$=57\frac{1}{6}$	A1	Accuracy
	(ii) .		
	$\int_0^5 (8x-x^2)dx-\int_0^5 3xdx$	M1	Correct integration With limits
	$\left[4x^2-\frac{x^3}{3}+c\right]_0^5-\left[\frac{3x^2}{2}+c\right]_0^5$	M1	Correct substitution
	$\left[4\times5^2-\frac{5^3}{3}\right]-\left[\frac{3\times5^2}{2}\right]$		
	$58\frac{1}{3}-37\frac{1}{2}$	A1	Accuracy
	$=20\frac{5}{6}$		
	(iii).	M1	Subtraction
	$shaded\ area=57\frac{1}{6}-20\frac{5}{6}$		
	$=36\frac{1}{3}\,sq.\,units$	A1	Accuracy
		10	

MARANDA HIGH SCHOOL

FORM 4 MATHS PAPER 2 MOCK MARKING SCHEME DECEMBER TERM 2 2021

22.	(a) (i) 		
		B1	Rectangle ABCD Correctly drawn
		B1	Rectangle A'B'C'D' Correctly drawn
	(ii) *transformation is a shear,*	B1	Correct transformation
	line x – axis in var *iant*	B1	invariant line
	po int $B(1,1)$ *mapped onto po* int $B'(3,1)$	B1	point not on invariant line and its image
	(iii) $\begin{pmatrix}1 & k\\0 & 1\end{pmatrix}\begin{pmatrix}1\\1\end{pmatrix}=\begin{pmatrix}3\\1\end{pmatrix}$	M1	Correct method of Finding T
	$1+k=3$		
	$k=2$	A1	Accuracy
	$T=\begin{pmatrix}1 & 2\\0 & 1\end{pmatrix}$	B1	Point C and D Correctly located
	b) $A''(-1,1), B''(1,1), C''(1,7), D''(-1,7)$	B1	Rectangle completed
		B1	Coordinates of A"B"C"D"
		10	

23.		B1	Perpendicular Bisector of AB constructed
		B1	Angle bisector of ABC constructed
		B1	N located and Labelled
		B1	Correct shading of Nearer B than A
		B1	Correct shading Of nearer AB than BC
		B1	Arc 3 cm (45m) From N drawn
		B1	X shaded and Labelled correctly
	(c) $\theta = 45 \pm 1^0$	B1	For $\theta = 45 \pm 1^0$
	$area\ of\ region\ X = \frac{45}{360} \times \frac{22}{7} \times 45^2$ $= 795.54m^2$	M1	Correct substitution
		A1	accuracy
		10	

24.	(a). (i) $\frac{8}{2}\left[2\times -11+(8-1)d\right]=52$	M1	Correct substitution
	$-88+28d=52$ $d=5$	A1	Accuracy
	(ii) $\frac{n}{2}\left[2\times -11+(n-1)5\right]>920$	M1	correct substitution
	$-22n+5n^2-5n>1840$ $5n^2-27n-1840>0$ $n=\frac{27\pm\sqrt{(-27)^2-4\times 5\times -1840}}{2\times 5}$ $n=\frac{27\pm\sqrt{37529}}{10}$ $n=\frac{27\pm 193.72}{10}$	M1	correct attempt to solve
	$n=22.072\ or\ -16.672$ *Hence least value of* $n=23$ *terms*	A1	Accuracy
	(b) (i) $\frac{a+18}{a+6}=\frac{a+48}{a+18}$	M1	Correct equation leading 1st term of A.P.
	$a^2+36a+324=a^2+54a+288$ $18a=36$ $a=2$	A1	Accuracy
	$1^{st}\ term\ of\ G.P.=2+2\times 3=8$	B1	1st term of G.P.
	(ii) $S_7=\frac{8\left(2.5^{7-1}\right)}{2.5-1}$	M1	Correct substitution
	$S_7=1302\frac{1}{12}$	A1	Accuracy
		10	

BLANK PAGE