

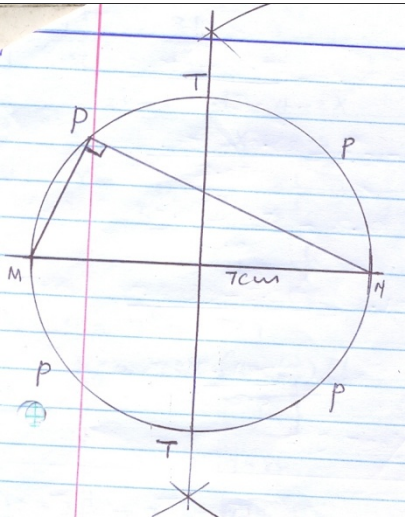
SCHOOL BASED FORM 4 EXAM JULY-AUGUST 2017

KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E.)

121/2 MATHEMATICS

PAPER 2 MARKING SCHEME

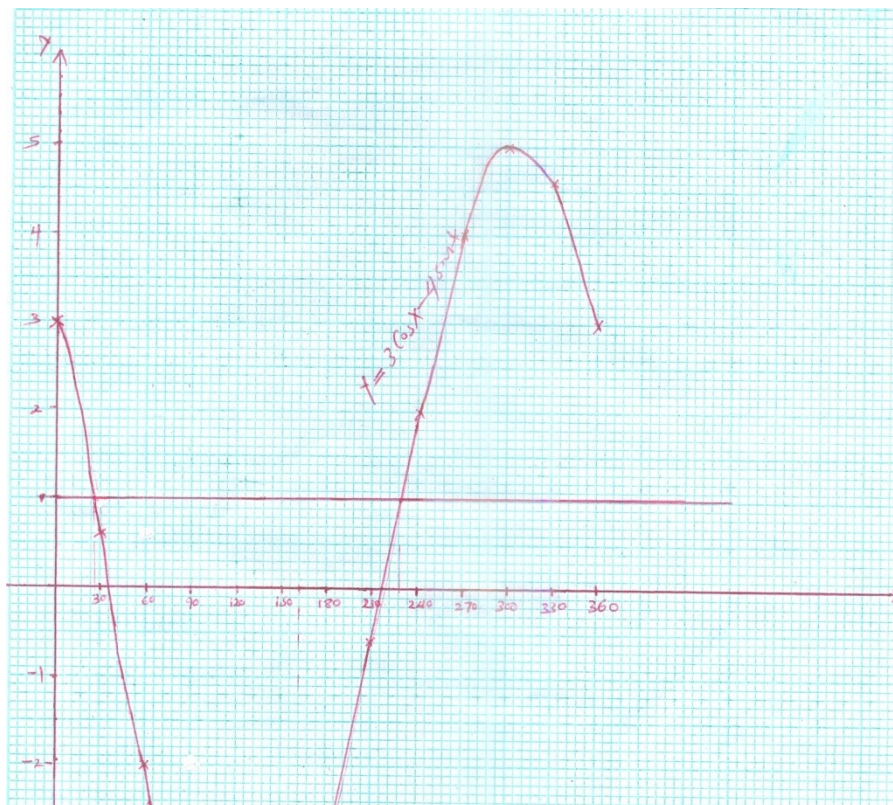
No		MARKS	
1.	$\text{Max } \frac{2.35+8.75}{1.95} = 5.6923$ $\text{Min } \frac{2.25+8.65}{2.05} = 5.3171$ $\text{Actual } \frac{2.3+8.7}{2.0} = 5.0$ $\text{Error } \frac{5.6923-5.3171}{2} = 0.1876$ $\% \text{ Error } \frac{0.1876}{5.0} \times 100 = 3.752\%$	M1 M1 A1	
		03	
2.	$\frac{2\sqrt{5}}{\sqrt{3}} \times \frac{\sqrt{3}+\sqrt{5}}{\sqrt{3}+\sqrt{5}}$ $= \frac{2\sqrt{15}+2\sqrt{25}}{3-5}$ $= \frac{2\sqrt{15}+10}{-2}$ $= -5 - \sqrt{15}$	M1 A1	
		02	
3.	(a) $\frac{40}{60} \times 360 = 240$ (b) Length = $\frac{240}{360} \times 2 \times \frac{22}{7} \times 6.37$ = 26.693⁰cm	M1A1 M1 A1	
		03	
4.	$\angle AOP = \frac{AOB}{2} = \frac{160}{2} = 80$ OA = OP = Radius $\therefore \angle A = \angle P$ $\frac{100}{2} = 50$ $\angle OAT = 90^0$ $\angle PAT = 90 - 50 = 40^0$	M1 M1 A1	
5.	$\frac{7}{9} \times 90 = 70$ Boys : Girls = 70 : 20 New ratio 5 : 4 = 70 : 20 + x $\frac{4}{5} \times 70 = 56$ x = 56 - 20 = 36	B1 M1 A1	
		03	
6.	$3x + 10(6) = 180$ $3x = 120$ x = 40 Volume = Cross-section x length = $(\frac{1}{2} \times 10 \times 10 \sin 60) \times 40$	M1 B1 M1	

	$= 1732.05\text{cm}^3$	A1	
		04	
7.	$\text{Log}_2 \left(\frac{x-2}{\frac{1}{2}+5} \right) = \text{Log}_2 2$ $\left(\frac{x-2}{\frac{1}{2}+5} \right) = 2$ $x^2 - x - 12 = 0$ $(x+3)(x-4) = 0$ $x = -3 \text{ or } 4$	M1 M1 A1	
8.	$256 - 256x + 112x^2 - 28x^3$ $x = 0.1$ $(1.975)^8 = 256 - 25.6 + 1.12 - 0.028$ $= 231.492$	A1 M1 A1	
		03	
9.	$x^2 - 6x + 3^2 + y^2 + 4y + 2^2 = 12 + 9 + 4$ $(x-3)^2 + (y+2)^2 = 25$ Centre (3, -2) Radius 5 units	M1 M1 A1	
10.			
11.	$P(R^1 \& G^1) = P(B)$ $\Rightarrow P(B) = \frac{7}{12}$	M1 A1	
		02	
12.	$20 \leq x \leq 50$ $20 \leq y \leq 50$ $x + y \leq 50$	B1 B1 A1	
		03	
13.	$\frac{dy}{dx} = 5x + \frac{3}{x^2} = 5x + 3x^{-2}$ $y = \frac{5}{2}x^2 + \frac{3}{-1}x^{-1} + c$ $2 = \frac{5}{2}(1) - \frac{3}{1}(1)^{-1} + c$ $c = 2 - 2.5 + 3 = \frac{5}{2}$	M1 M1 A1	

	$y = \frac{5}{2}x^2 - \frac{3}{x} + \frac{5}{2}$		
		03	
14.	$60\theta = 1440$ $\theta = 24^\circ$ New latitude = 40N	M1 A1	
		02	
15.	$x = \cos^{-1} \frac{\sqrt{3}}{2} = 30^\circ, -30^\circ$		
16.	$4 \begin{pmatrix} 3 \\ 2 \\ +4 \end{pmatrix} - 2 \begin{pmatrix} -3 \\ +5 \\ -2 \end{pmatrix} + 3 \begin{pmatrix} 6 \\ 3 \\ 5 \end{pmatrix} = 7j$ $3k$ $p = 6i + 7j + 3k$ $ p = \sqrt{36+49+9} = \sqrt{94}$ $= 9.6953597 = 9.695$	M1 M1 M1 A1	
17.	(a) Total amount Sh. x Njoroge got $\frac{3}{8}x$ $Mwanzia = \frac{2}{5} \left(\frac{5}{8}x \right) = \frac{1}{4}x$ Njoroge and Mwanzia $\frac{3}{8}x + \frac{1}{4}x = \frac{5}{8}x$ Three members $\frac{3}{8}x = 1800$ $x = 4,800$ (b) $Mwanzia = \frac{1}{4}x \times 4800$ $= 1200$ (c) Njoroge $\frac{3}{8}x \times 4800 = 1800$ Kiprotich = Sh. 600 $600 + 1800 + 1200 = 3600$ Profit shared $\frac{2}{3} \times 1200$ $= 800$ Ratio Kip : Mwa : Nj 1 2 3 Njoroge $\frac{3}{6} \times 800 = 400$ Mwanzia $\frac{2}{6} \times 800 = 266.70$ Kiprotich $\frac{1}{6} \times 800 = 133.30$	M1 M1 A1 M1 A1 B1 M1 A1 B1 A1	
		10	
18.	(a) $\frac{9^x}{3^{2x+1}} = \frac{81}{9^x} \Rightarrow \frac{3^{2x}}{3^{2x+1}} = \frac{3^4}{3^{2x}}$ $2x - 2x - 1 = 4 - 2x$ $x = 2.5$ (b) $r = \frac{81}{9^2} = \frac{81}{3^5} = \frac{81}{243}$	M1 M1 A1 A1 M1	

	$= \frac{1}{3}$ (c) $a = 3^6 = 729$ $S_4 = 729 \frac{(1 - (1/3)^4)}{1 - \frac{1}{3}}$ $= 1080$ (d) $5^{\text{th}} = 9 \quad 7^{\text{th}} = 1$ $S_{20} = \frac{20}{2}(18 + 19 \times 8)$ $= 1700$	M1 A1 M1 A1																	
		10																	
19.	(a) <table border="1"><tr><td>x</td><td>0</td><td>30</td><td>60</td><td>90</td><td>120</td><td>150</td></tr><tr><td>y</td><td>3</td><td>0.6</td><td>-2.0</td><td>-4.0</td><td>-5.0</td><td>-4.6</td></tr></table>	x	0	30	60	90	120	150	y	3	0.6	-2.0	-4.0	-5.0	-4.6				
x	0	30	60	90	120	150													
y	3	0.6	-2.0	-4.0	-5.0	-4.6													
	<table border="1"><tr><td>x</td><td>180</td><td>210</td><td>240</td><td>270</td><td>300</td><td>330</td><td>360</td></tr><tr><td>y</td><td>-3</td><td>-0.6</td><td>2.0</td><td>4</td><td>5.0</td><td>4.6</td><td>3.0</td></tr></table>	x	180	210	240	270	300	330	360	y	-3	-0.6	2.0	4	5.0	4.6	3.0		
x	180	210	240	270	300	330	360												
y	-3	-0.6	2.0	4	5.0	4.6	3.0												

(b) On the graph



(c) $280 \pm 2^\circ$ $226^\circ \pm 2^\circ$

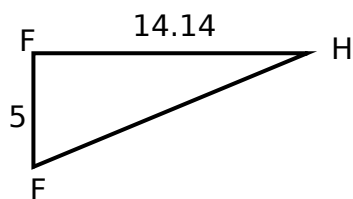
(d) $90^\circ < x < 162^\circ$

20.

(a) $ME^2 = 5^2 + 10^2$
 $ME = \sqrt{125} = 11.18$
 $MH^2 = 11.18^2 + 10^2$
 $MH = \sqrt{224.99}$

$14.997 = 15.00\text{cm}$

(b) $FH^2 = FE^2 + FH_2$
 $= \sqrt{200}$

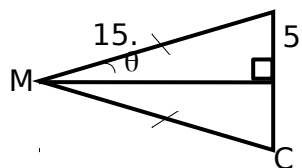


$\tan \theta = \frac{5}{19.47^\circ}$

$\theta = 14.14^\circ$

$\theta = 19.47^\circ$

(c)



$\sin \theta = \frac{5}{14.997}$

$\theta = 19.471$

$\angle HMC = 19.47 \times 2$
 $= 38.942^\circ$

M1

M1

A1

M1

M1

A1

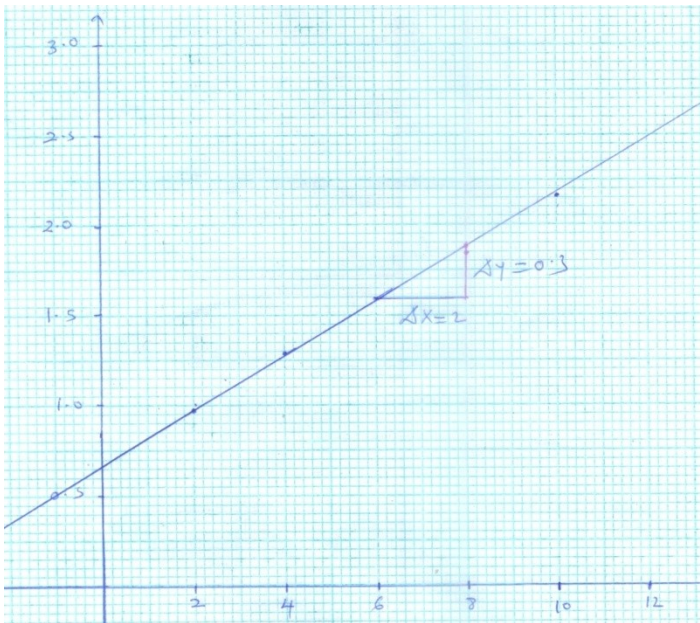
M1

M1

A1

10

21.	(a) (i) $P = \frac{KQ^2}{R}$ $2 = \frac{k16}{5}$ $k = \frac{5}{8}$ $P = \frac{5Q^2}{8S}$ (ii) $4.5 = \frac{5Q^2}{8S}$ $Q^2 = 4.5 \times 8 = 36$ $Q = \pm 6$ $Q = 6$ (ii) New $P = K \frac{(1.05)^2}{0.9R}Q$ $= 1.225 k \frac{Q^2}{R}$ % Change in $P = (1.225 - 1)100$ $= 22.5\%$	M1 A1 M1 M1 A1 M1 B1 M1B1 A1																																																													
22.	(a) $S = 3(2)^3 - 6(2)^2 + 4(2) + 5$ $= 24 - 24 + 8 + 5 = 13m$ (b) $V = \frac{ds}{dt} = 9t^2 - 12t + 4$ $= 9(3)^2 - 12(3) + 4$ $= 49m/s$ (c) at rest $V = 0$ $9t^2 - 12t + 4 = 0$ $t = \frac{-12 \pm \sqrt{144 - 144}}{18}$ $= \frac{2}{3} seconds$ $\therefore S = 3\left(\frac{2}{3}\right)^3 - 6\left(\frac{2}{3}\right)^2 + 4\left(\frac{2}{3}\right) + 5$ $= \frac{53}{9} = 5.89m$	A1 M1 M1 A1 M1 M1 A1 M1 A1																																																													
23.	(d) $V = 9t^2 - 12t + 4$ $a = 18t - 12$ $a = 18(1.5) - 12 = 15m/s^2$ <table><tr><td>x</td><td>f</td><td>t = x - a</td><td>ft</td><td>t²</td><td>ft²</td></tr><tr><td>28.2</td><td>5</td><td>-1.5</td><td>-7.5</td><td>2.25</td><td>11.25</td></tr><tr><td>28.7</td><td>8</td><td>-1</td><td>-8</td><td>1</td><td>8</td></tr><tr><td>29.2</td><td>30</td><td>-0.5</td><td>-15</td><td>0.25</td><td>7.50</td></tr><tr><td>29.7</td><td>13</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>30.2</td><td>10</td><td>0.5</td><td>5</td><td>0.25</td><td>2.50</td></tr><tr><td>30.7</td><td>20</td><td>1</td><td>20</td><td>1</td><td>20</td></tr><tr><td>31.2</td><td>10</td><td>1.5</td><td>15</td><td>2.25</td><td>22.5</td></tr><tr><td>31.7</td><td>4</td><td>2</td><td>8</td><td>4</td><td>16</td></tr><tr><td></td><td></td><td></td><td>$\Sigma ft = 17.5$</td><td>$\Sigma ft^2 = 87.75$</td><td></td></tr></table>	x	f	t = x - a	ft	t ²	ft ²	28.2	5	-1.5	-7.5	2.25	11.25	28.7	8	-1	-8	1	8	29.2	30	-0.5	-15	0.25	7.50	29.7	13	0	0	0	0	30.2	10	0.5	5	0.25	2.50	30.7	20	1	20	1	20	31.2	10	1.5	15	2.25	22.5	31.7	4	2	8	4	16				$\Sigma ft = 17.5$	$\Sigma ft^2 = 87.75$		B2 B1 B1	
x	f	t = x - a	ft	t ²	ft ²																																																										
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31.7	4	2	8	4	16																																																										
			$\Sigma ft = 17.5$	$\Sigma ft^2 = 87.75$																																																											
	Max $x^{-1} = \frac{ft}{f}$ $= \frac{17.5}{100} + 29.7$ $= 29.875$	M1 A1																																																													

	$S = \sqrt{\frac{ft}{f} - \left(\frac{ft}{f}\right)^2}$ $= \sqrt{\frac{87.75}{100} - \left(\frac{17.5}{100}\right)^2}$ $= \sqrt{0.846875}$ $= 0.9202$	M1 B1													
24.	(a) $p = Ak^n$ $\text{Log } p = \text{Log } A + n \text{ Log } K$ (b) <table><tr><td>m</td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td></tr><tr><td>Log p</td><td>0.99</td><td>1.29</td><td>1.57</td><td>1.87</td><td>2.16</td></tr></table> 	m	2	4	6	8	10	Log p	0.99	1.29	1.57	1.87	2.16	M1 A1 B1 B1 B1 B1 axis B1 scale B1 plotting B1 smooth line	
m	2	4	6	8	10										
Log p	0.99	1.29	1.57	1.87	2.16										
	(c) $\text{Log } p = \text{Log } A + n \text{ Log } k$ y – axis = Log p y – intersect = Log A Gradient = Log k x – axis = n Log A = 0.7 A = 5.01 $\text{Log } k = \frac{0.3}{2}$ = 0.15 k = 1.41														