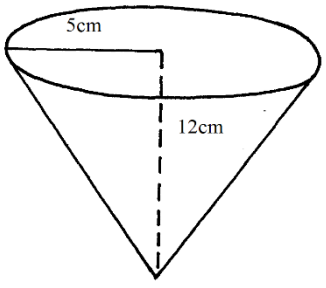
MARKING SCHEME

THE ROYAL EXAM SERIES

Kenya Certificate of Secondary Education

MATHEMATICS 121/1

Qn	working	Marks	REMARKS
1.	$\frac{1.9\times0.032\times10000}{20\times0.0038\times10000}$ $=\frac{19\times32}{20\times38}$ $=\frac{16}{20}$ $=\frac{8}{10}$	M1 B1 A1	
		03	
2.	$5\times\frac{1}{8.29\times10^{-2}}-14\times\frac{1}{5.81\times10^{-1}}$ $5x0.1206x10^2-14x0.1721x10$ $=60.3-24.094$ $=36.206$	M1 M1 A1	
		03	
3.	$\text{Cos}=\frac{Ads}{hps}=\frac{8}{10}$ QR=8 and PQ=10 $PR^2=PQ^2-QR^2=10^2-8^2$ $PR=\sqrt{36}=6$ (a) $\sin\theta=\frac{6}{10}$ *or* $\frac{3}{5}$ (b) $\tan(90-\theta)=\frac{QR}{PR}=\frac{8}{6}$ *or* $\frac{4}{3}$	B1 M1 A1	
		03	
4.	 SA=πrl $1=\sqrt{5^2+12^2}$	M1 M1 A1	

	$=\sqrt{169}$ =13cm =3.142x13x5 =188.5		
5.	Let cost of text bk be t and pen p. 3t+5p=970…….(i) 2t+8p=880…….(ii) Multiply e.g(i) by 8 and (ii0 by 5 24t+40p=7760 10t+40p=4400 14t=240 Cost of 1 text bk=sh.240	M1 M1 A1	
		03	
6	(a) 1.28 Deutche marks=1 Swiss franc 52 Deutche marks =? $\frac{52\times 1 swiss\ \ franc}{1.28\ Deutche\ \ marks}$ =40.635 ≈40.63 Swiss francs (b) I swiss franc =42.21Ksh. 40.63 Swiss franc=? $\frac{42.21\times 40.63}{1}$ =1,714.99 Kenya shillings	M1 A1 M1 A1	
7.	(a) Dist= ½ x4x80+80x16+ ½ x 4x80 =160+1280+160 =1600m (b) Deceleration=$\frac{0-80}{4}=20m/s^2$	M1 A1	
		02	
8	Soln:x=$\frac{-5}{3}$ and x=1 =-5 and x=1 $\therefore$ (3x+5)(x-1)=0 3x(x-1)+5(x-1)=0 $3x^2$-3x+5x-5=0 $3x^2$+2x-5=0	M1 A1	
9.	Diag, Bearing of A from C $=270+\theta$ (b) (i) $AC^2=AB^2+BC^2$ $=40^2+30^2$ $=\sqrt{2500}$	M1 M1	

	=50km (ii) $\sin\theta = \frac{40}{50} = 0.8$ θ =53.13 $\approx 53^0$	A1	
		03	
10.	$L_1 = x \geq 0$ $L_2 = \frac{x}{5} + \frac{y}{4} = 1$ $4x + 5y = 20$ $4x + 5y \leq 20$ $L_3 : \frac{x}{4} + \frac{y}{-3} = 1$ $3x - 4y = 12$ $\therefore 3x - 4y < 12$	B1 B1 B1 A1	
		04	
11.	Let ext. < x^o Interior < = $3x + 20^o$ $x + 3x + 20^o = 180^o$ $4x = 160^o$ $4x = 160^o$ x = 40 $\frac{360}{40}$ = 9 sides	 M1 M1 A1	
		03	
12	$s = \sqrt{s(s-a)(s-b)(s-c)}$ $s = \frac{1}{2}(4.8 + 6.8 + 5.7) = 8.4$ $Area = \sqrt{8.4(2.7)(3.6)(2.1)}$ $= 18.05 - 13.0943$ $= \sqrt{171.4608} = 13.0943$ $= 4.9557$ ≈ 4.96	BI M1 A1	
		03	
13.	Change to base 3 $3^{2(x-1)} \times 3^{(2x+1)} = 3^5$ 2(x-1)+2x+1=5 2x-2=2x+1=5 4x-1=5 4x=6 x=1.5	 M1 M1 A1	

		03	
14.	<table><tr><td>Mean in kg</td><td>41-50</td><td>51-55</td><td>56-65</td><td>66-70</td><td>71-80</td></tr><tr><td>Frequency</td><td>20</td><td>70</td><td>50</td><td>50</td><td>10</td></tr></table> b) Modal frequency is 70.	B1 B1 B1	
		03	
15.	L.S.F=V.S.F lsf=$\sqrt[3]{\frac{4752}{1408}}$ =1.5 l.s.f^2=A.S.F $1.5^2=\frac{Area\ of\ larger\ cylinder}{352}$ Area of larger cylinder 792cm^2	M1 A1	
		02	
16.	Reduce 5y+2x=7 in the form y=mx+c $\therefore y=\frac{-2}{5}x+\frac{7}{5}$ But gradient $=\frac{k-5}{3-2}=\frac{k-5}{5}$ $=\frac{k-5}{5}=\frac{2}{3}$ K=3		
17	$(a)\quad \frac{5\times25+2\times30+45\times1}{8}=28.75$ $\text{Pr}ofit \quad 28.75\frac{\times20}{100}=sh.5.75$ $(b)\ (i)\quad New\ \text{Pr}ice=\frac{28.75}{100}\times110\times\frac{115}{100}=36.40$ $(ii)\quad \frac{28.75\times110}{100}=31.60$ $New\ \text{Pr}ofit\ \frac{45-31.60}{31.60}\times100$ $=\frac{13.4}{31.60}\times100$ $=42.41\%$		
18	<table><tr><td>X</td><td>-3</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr></table>		

X^2	9	4	1	0	1	4	9	16
$2x^2$	18	8	2	0	2	8	18	32
-3x	9	6	3	0	-3	-6	-9	-12
-5	-5	-5	-5	-5	-5	-5	-5	-5

Y	22	9	0	-5	-6	-3	4	15

Mini

mum at point (1,6)

$y = 2x2 – 5x – 5$

$0 = 2x2 – 3x -5$

Y=0

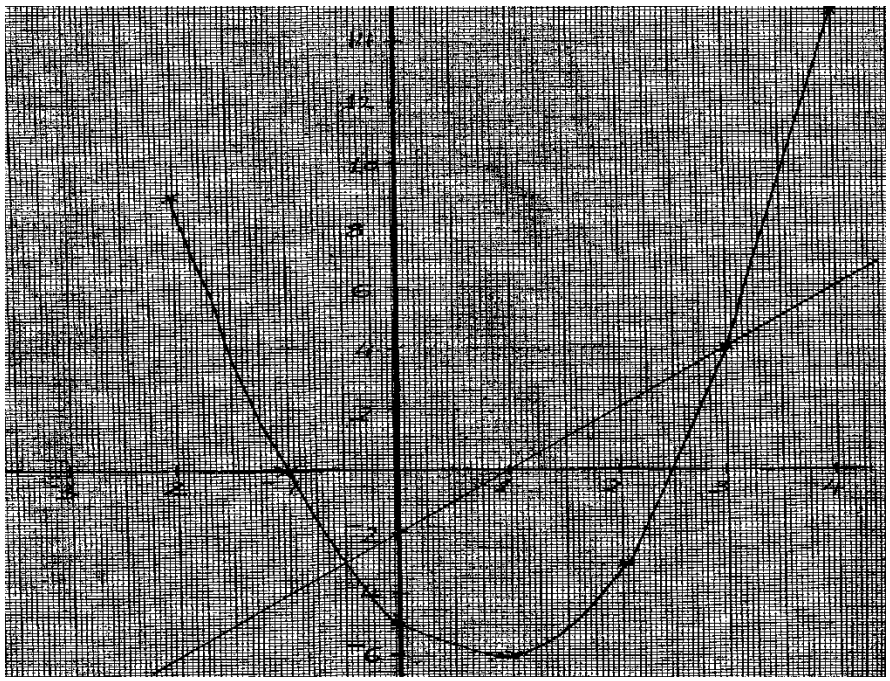
X=-1 or x = 2.5

$y = 2x2 – 3x – 5$

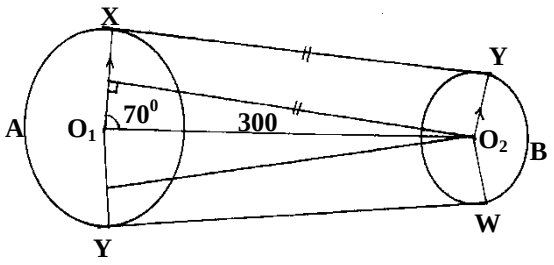
$0 = 2x2 – 5x – 3$

$Y = 2x-2$

X = -0.5 or x = 3



19



	a) XV = MO2 = 300sin 70 = 281.9cm b) YBW = $\frac{140}{360}$ x 2πr MO1 = 300 Cos 70 = 102.6cm Radius of small circle = 180 – 102.6 = 77.4cm VBW = $\frac{140}{360}$ x 2x 3.142 x 77.4 = 189.1cm c) XAY = $\frac{220}{360}$ x 2π x 180 = $\frac{220}{360}$ x 2 x 3.142 x 180 = 691.2cm d) Length of conveyor belt = 281.9 x 2 + 189.1 + 691.2 = 1444.1cm2	M1 A1 B1 M1 A1 M1 A1 M1 A1	
20	11.45=1 ½ h Distance moved by bus = 1.5x60=90km Distance btwn 2 vehicles 540-90=450 R.speed=60+90=150km/h T.taken to meet=450÷150=3h =1.15+3=~~4.15~~p.m b) Total time moved by bus when they met. 16.15-11.45=4 ½ hrs Distance from A =4.5x60 =270km c) time taken by matatu to travel from B to A=540÷90=6hrs ∴ Time matatu reaches A 13.15+6=19.15hrs ∴ Time traveled by bus until matatu reaches A =19.15-11.45=7 ½ hrs Distance moved by bus from A =7.5x60 Hence outside town B =540-450 =90km		
21	$\frac{y+2}{x-8} = \frac{-4+2}{4-8} = \frac{1}{2}$ $2y + 4 = x - 8$ $\Rightarrow x - 2y - 12 = 0$ a) $\therefore u = 1, b = -2$ *and* $c = -12$		

	$y = \frac{x}{2} - 6$, *when* $y = 0$ $\frac{x}{2} - 6 = 0 \Rightarrow x = 12$ $\therefore$ *Coordinate s of pane* $(12, 0)$ (b) $\frac{y}{x - 12} = -2$ $\Rightarrow y = 24 - 2x$ *but when* $x = 0,\ y = 24$ (c) $\therefore$ *Coordinate s of Q are* $(0,\ 24)$ $QP = \sqrt{(12 - 0)^2 + (0 - 24)^2}$ (d) $= \sqrt{144 + 576} = 26.83$ *Units*		
22	(a) volume of solid = volume of cone + volume of hemisphere $=\frac{1}{3}\pi r^2 h + \frac{1}{2} \times \frac{4}{3}\pi r^3 = 36$ $= \frac{1}{3}\pi r^2 + \frac{2}{3}\pi r^3 = 36$ $= \frac{4}{3}\pi r^3 = 36$ $\frac{4}{3}\pi r^3 = 36$ $r^3 = \frac{36 \times 3}{4 \times 3.142}$ $r^3 = 8.593$ r = 2.048cm (b) Let the level rise be x $\pi r 2x = 36$ $x = \frac{36}{3.142 \times 81}$ $= \frac{36}{254.502}$ = 0.14cm (c) volume = ½ Ah $= \frac{1}{3} \times A \times 4.2 = 36$ $A = \frac{36 \times 3}{4.2}$ = 25.71cm2 (d) Density $= \frac{mass}{volume}$ $= \frac{14.4}{36} \times 1000 Kg/m3$ = 400Kg/m3		
23	a) i) $\overrightarrow{AB} = \underset{\sim}{b} \ \underset{\sim}{a}$ ii) $BQ = \overrightarrow{BO} = \overrightarrow{OQ} = \frac{1}{2}\underset{\sim}{a} - \underset{\sim}{b}$		

$\overrightarrow{BX} = h(\frac{1}{2}\underset{\sim}{a} - \underset{\sim}{b})$

$\overrightarrow{OX} = \underset{\sim}{b} + h(\frac{1}{2}\underset{\sim}{a} - \underset{\sim}{b})$

$\frac{1}{2}h\underset{\sim}{a} + (1-h)\underset{\sim}{b}$

(c

$\overrightarrow{OX} = R\ \overrightarrow{OP}$

$but\ \overrightarrow{OP} = \frac{1}{4}\underset{\sim}{a} + \frac{3}{4}\underset{\sim}{b} = \frac{1}{4}(\underset{\sim}{a} + 3\underset{\sim}{b})$

$OX = \frac{R}{4}(\underset{\sim}{a} + 3\underset{\sim}{b})$

$OX = OX_2$

$\frac{1}{2}h\underset{\sim}{a} + (1-h)\underset{\sim}{b} = \frac{1}{4}R\underset{\sim}{a} = \frac{3}{4}k\,\underset{\sim}{b}$

$\frac{1}{2}h = \frac{1}{4} \Rightarrow \ (2h - k = 0)$

$1 - h = \frac{3}{4} \Rightarrow (-4 - 3h = -4)$

$4h - 2k = 0$

$4h - 3k = -4$

$-5k = -4$

$k = \frac{4}{5}$

$h = \frac{2}{5}$

24

Length (cm)	Mid pt (x)	F	xf	CF
118 -126	122	3	366	3
127 – 135	131	4	524	7
136 – 144	140	10	1400	17
145 – 153	149	12	1788	29
154 – 162	158	5	790	34
163 – 171	167	4	668	38
172 – 180	176	2	352	40
		40	5888	

(a) (i) Modal class ⇒ 145 – 153 B1

(ii) Median class 145 – 153 B1

(b) (i) Mean of feeding

x = $\frac{\Sigma x f}{\Sigma f}$ B1

= $\frac{5888}{40}$ B1

147.2

(ii) Median = L ($\frac{\frac{n+1}{2} - c}{f}$) *i* B1

= 144.5 + ($\frac{\frac{41}{2} - 17}{12}$)9 B1

144.5 + $\frac{20.5 - 17}{12}$ x 9

144.5 + 2.625

	= 147.125		