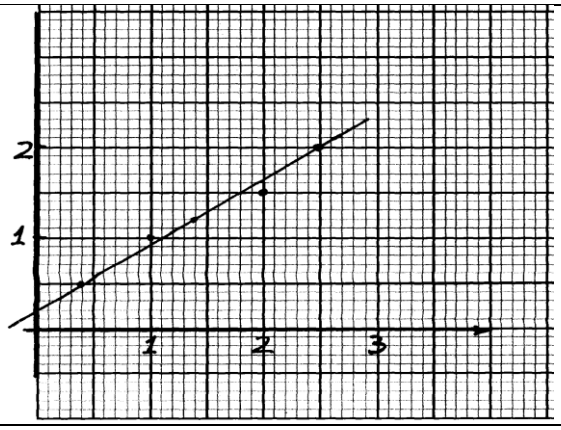
MARKING SCHEME
THE ROYAL EXAM SERIES

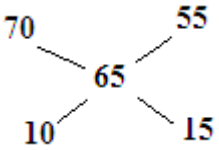
Kenya Certificate of Secondary Education

121/2 – MATHEMATICS – Paper 2

1.	$= \log 5^2 - \log 16^{\frac{1}{2}} + \log 40^2$ $= \log 25 - \log 4 + \log 1600$ $= \log\left(\frac{25\times 1600}{4}\right)$ $= \log\ 10{,}000$ $= 4$	M1 M1 A1	Apply law nlogA = log A^n Combining logs For ✓ answer
		3mks	
2.	$2x-(x-3)=0$ $2x-x+3=0$ $x=-3$	M1 A1	For equating determinant to zero For ✓ value of x
		2mks	
3.	$a^4=\frac{1+d^2}{b^2}+\frac{b}{3}$ $a^4-\frac{b}{3}=\frac{1+d^2}{b^2}$ $b^2\left(a^4-b/3\right)=1+d^2$ $b^2\left(a^4-b/3\right)-1=d^2$ $d=\sqrt{b^2\left(a^4-b/3\right)-1}$	M1 M1 A1	For squaring both sides For d^2 For d
		3mks	
4.	$=\frac{3\sqrt{7}+\sqrt{7}-2}{\sqrt{7}\ \left(\sqrt{7}-2\right)}$ $=\frac{4\sqrt{7-2}}{7-2\sqrt{7}}$ $=\frac{4\sqrt{7}-2}{7-2\sqrt{7}}\times\frac{7+2\sqrt{7}}{7+2\sqrt{7}}$ $=\frac{4\sqrt{7}+\left(7+2\sqrt{7}\right)-2\left(7+2\sqrt{7}\right)}{21}$	 M1 M1	 For conjugate For rationalizing denominator

	$= \dfrac{28\sqrt{7}+56-14-4\sqrt{7}}{21}$ $= \dfrac{42+24\sqrt{7}}{21}$ $= 2+{}^{8}\!/_{7}\sqrt{7}$	 A1	
		3mks	
5.	$height = \sqrt{15^2-9^2} = 12.0cm$ $v = {}^{1}\!/_{3}\times\pi\times 9.0\times 9.0\times 12.0$ $\%\ error = \left(\dfrac{0.05}{9.0}+\dfrac{0.05}{9.0}+\dfrac{0.05}{12.0}\right)\times 100$ $= 1.528\%$	B1 M1 A1	For height
		3mks	
6.	$A = k+\dfrac{m}{B}$ $-10 = k+\dfrac{m}{2.5} \quad (i)$ $-25+2.5k+m$ $10 = k+\dfrac{m}{1.25} \quad (ii)$ $12.5 = 1.25k+m$ $-25 = 2.5k+m$ $-$ $\underline{12.5 = 1.25k+m}$ $-37.5 = 1.25k$ $k = -30$ $12.5 = 1.25(-30)+m$ $m = 50$ $A = -30+\dfrac{50}{B}$ $= -30+\dfrac{50}{1.5}$ $= 3\,{}^{1}\!/_{3}$	 M1 M1 A1	For simultaneous equations for ✓attempt to solve simultaneous equations.
		4 mks	
7.	Area = h (y_1+y_2……..) = 0.4 (6.2+4.3+2.6 = 5.24	 M1 A1	 for substitution for ✓ answer (CAO)
		2mks	
8.	$= 14\times\dfrac{18}{10}\times\dfrac{30}{27}$ $= 28\ pple$	M1 M1 A1	for $\times {}^{18}\!/_{10}$ for $\times {}^{20}\!/_{27}$ for 28 pple

		3mks	
9.	(i) $35+15 = 50^0$ (ii) $Time = \frac{60 \times 50 \times \cos 60}{250}$ = 6hrs	B1 M1 A1	
		3mks	
10.	$(a)\ = x^5 + 5x^4(-0.2) + 10x^3(-0.2)^2 + 10x^2(-0.2)^2 + 5x(-0.2)^4$ $= x^5 - x^4 + 0.4x^3 - 0.08x^2 + 0.008x - 0.00032$ $(b)\ = 10^5 - 10^4 + 0.4(10)^3 - 0.08(10)^2$ 90392	M1 A1 M1 A1	
		4mks	
11.	(a) AC $(b)\quad AC = \sqrt{12^2 + 5^2} = 13cm$ $\tan\theta = \frac{6.5}{13}$ $\theta = 26.57^0$	B1 B1 M1 A1	At 13 for tan θ for θ
		3mks	
12.	$= \frac{\sin x \cos x + \sin x}{\cos x}$ $= \frac{\sin x \cos x}{\cos x} + \frac{\sin x}{\cos x}$ $= \sin x + \tan x$	M1 M1 A1	
		3mks	
13.	$A(-1,1,0)\qquad B(x,y,z)$ $\Rightarrow \frac{-1+x}{2} = 1,\ \frac{1+y}{2} = -1.5,\ \frac{0+z}{2} = 2$ $x = 3,\ \ y = -4,\ \ z = 4$ $B(3,-4,4)$ $/OB/ = \sqrt{3^2 + (-4)^2 + 4^2}$ $= \sqrt{41}$ $= 6.403\ units$	M1 A1 M1 A1	Can be implied (accept column form)
		4mks	
14.		P1 L1 B1	

	y = 0.7x +0.2		
		3mks	
15.	$\frac{2600}{40} = 65$  2:3	B1 B1 A1	 for equivalent
		3mks	
16.	$x(x+9)=36$ $x^2+9x-36=0$ $(x+12)\ (x-3)=0$ $x=-12,\quad x=3$ $BC=3cm$	M1 M1 B1	
		3mks	
17.	$(a)\ (i)\quad 250{,}000\left(1+{}^{4}/_{100}\right)^{10}$ $=sh.370061.0712$ $(ii)\quad \frac{370{,}000}{4}$ $=sh.\ 92{,}500$ $(iii)\quad 10\,000\times 4\times 36$ $=sh.\ 1440\,000$ $(b)\ (i)\quad 92500\left(1-{}^{20}/_{100}\right)^{3}$ $=sh.\ 47\,360$ $(ii)\quad \text{Profit} = (61+1440\,000+189\,440)-250\,000$ $=1379\ 501$	M1 A1 M1 A1 M1 A1 M1 A1 M1 A1	 Accept 370061.10
		10mks	
18.	(a) 31-40	B1 B1 M1	For ✓median class For ✓ ft column

Class	x	tx-45.5	f	ft	ft^2	cf
21-30	25.5	-20	15	-300	6000	15
31-40	35.5	-10	11	-110	1100	26
41-50	45.5	0	17	0	0	43
51-60	55.5	10	4	40	400	47
61-70	65.5	20	2	40	800	49
71-80	75.5	30	1	30	900	50
			50	-300	9200	

	$(b)\quad (i)\ Mean = \frac{-300}{50} + 45.5$ $= 39.5 yrs$ $s.d = \sqrt{\frac{9200}{50} - \left(\frac{-300}{50}\right)^2}$ $= 12.17$ $(c)\quad 6^{th} = 40.5 + \left(\frac{30-26}{17}\right)10$ $= 42.85$	A1 B1 M1 A1 B1 M1 A1	For ✓ft^2 column For ✓ c.f column
		10mks	
19.	(a) a+2d, a+8d, a+24d $(b)\quad (ii)\ \frac{a+8d}{a+2d} = \frac{a+24d}{a+8d}$ I $a + 6d + 2(a+5d) = 78$ II $16d = 10a$ I $3a + 16d = 78$ II $3a + 10a = 78$ $13a = 78$ $a = 6$ $16d = 10 \times 6$ $d = 3.75$ $(ii)\quad S_q = \frac{9}{2}(2 \times 6 + (9-1)3.75)$ $= 189$ $(ii)\quad \Rightarrow [6 + 6(3.75)] - [6 + 3(3.75)]$ $= 11.25$	B1 M1 M1 M1 M1 A1 A1 M1 A1 M1 A1	 For substitution or equivalent
		10mks	

20.

$P(A) = \frac{3}{4}$ $\quad P(A^1) = \frac{1}{4}$

$P(B) = \frac{2}{3}$ $\quad P(B^1) = \frac{1}{3}$

$P(C) = \frac{4}{5}$ $\quad P(C^1) = \frac{1}{5}$ M1

$(a)\quad P(ABC) = \frac{3}{4} \times \frac{2}{3} \times \frac{4}{5}$ A1

$= \frac{2}{5}$

$(b)\quad P(A^1B^1C^1) = \frac{1}{4} \times \frac{1}{3} \times \frac{1}{5}$ M1 A1

$= \frac{1}{60}$

$(c)\quad \Rightarrow P\left(A^1B^1C^1 \ \ or \ \ A^1BC^1 \ \ A^1B^1C\right)$ M1 A1

$= \left(\frac{3}{4} \times \frac{1}{3} \times \frac{1}{5}\right) + \left(\frac{1}{4} \times \frac{2}{3} \times \frac{1}{5}\right) + \left(\frac{1}{4} \times \frac{2}{3} \times \frac{4}{5}\right)$

$= \frac{9}{60}$

$(d)\ \Rightarrow\ P(ABC^1 \ \ or \ \ AB^1C \ \ or \ \ A^1BC$ M1 A1

$= \left(\frac{3}{4} \times \frac{2}{3} \times \frac{1}{5}\right) + \left(\frac{3}{4} \times \frac{1}{3} \times \frac{1}{5}\right) + \left(\frac{1}{4} \times \frac{2}{3} \times \frac{4}{5}\right)$

$= \frac{26}{60}$

$(e)\quad \Rightarrow 1 - P(ABC)$ M1 A1

$= 1 - \frac{2}{5}$

$= \frac{3}{5}$

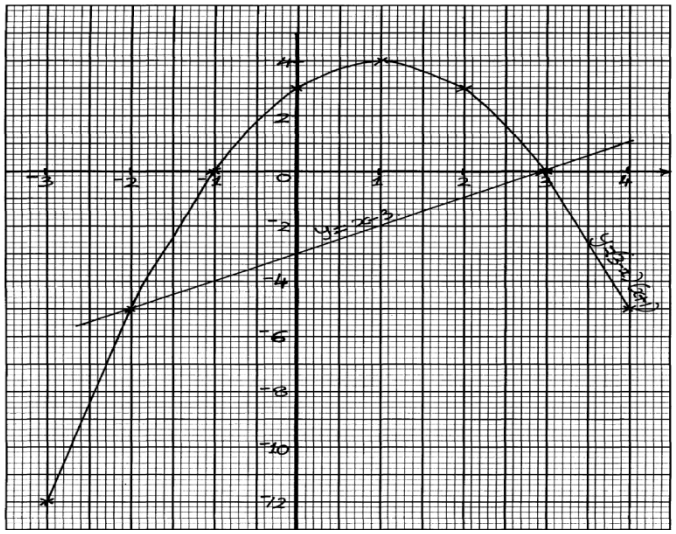
		10mks	

21. (a)

x								
x+1			**0**		**2**			**5**
3-x				**3**			**0**	
y			**0**			**3**		

B_2 For all ✓ values
Allow B_1 for any four ✓values

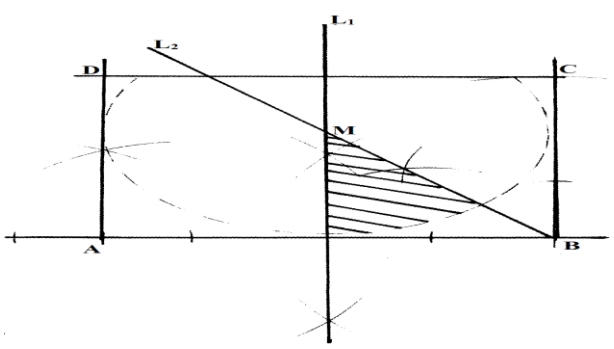
(b)

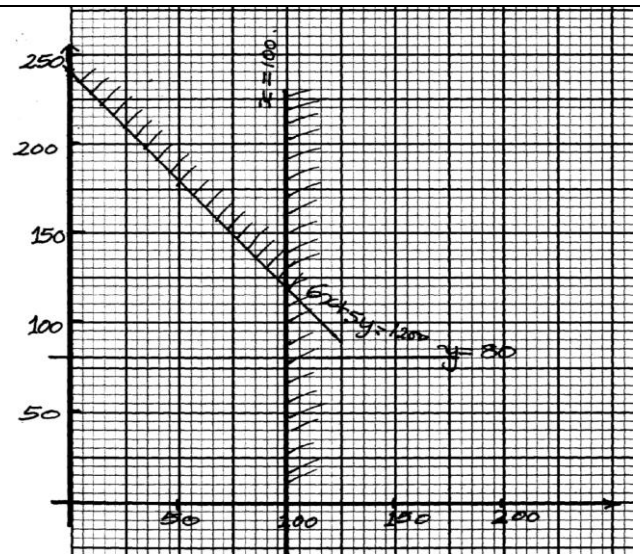


S_1 ✓scale
P_1 ✓plotting
C ✓curve

(c) (i) (3-x) (x+1) = 0
$-x^2+2x+3=0$ x=3, -1

B1B1
M1 For y = x-3
L1 For ✓ line drawn

	(ii) $-x^2+2x+3=y$ $-x^2+x+6=0$ $x-3=y$ $\quad x=-2,\ 3$	B1	For both values
		10mks	
22.	 $\frac{44}{360}\times\frac{22}{7}\times 3.5\times 3.5$ $=4.7cm_2$	B1 B1 B1 B1 B1 B1 B1 B1 M1 A1	Angle bisector drawn ✓ly locating pts A,B,C,D ✓rectangle drawn L1 constructed L2 constructed Angle measured ✓ly 44 ± 1^0 An arc broken drawn inside rectangle radius 3.5cm ✓ region shaded
23.	$(a)\quad x^2+5=8-2x$ $x^2+2x-3=0$ $(x+3)\ (x-1)=0$ $x=-3\ \ or\ \ 1$ *When* $x=-3,\ y=14$ *When* $x=1\quad y=6$ *coordinates* $C(-3,14)\quad and\quad D(1,6)$ $(b)\qquad \int_{-3}^{1}(x^2+5)dx$ $=\left[\frac{x^3}{3}+5x+c\right]_1^3$ $=\left(\frac{1}{3}+5\right)-\left(\frac{-3^3}{3}+5(-3)\right)$ $=32\frac{1}{3}\ \ square\ \ units$ $(c)\ \ Area\ \ under\ \ line\ \ y=8-2x$ $=\left(8x-\frac{2x^2}{2}\right)_{-3}^{1}$ $=(8(1)-1^2)-(8(-3)-(-3)^2)$ $=40$ $(d)\quad Shaded\ \ area=40-32\frac{1}{2}$ $=7\frac{2}{3}$	M1 M1 A1 B1 M1 M1 A1 M1 A1 B1	For equating Or equivalent For both values For both Accept if c is missing Accept 32.33 or equivalent
24.	$3x+2.5y\le 600$ $x\le 100$ $y\ge 80$	B1 B1 B1	Or equivalent

	 Solution (100, 120) 100type A and 120 type B garments Profit=80 x 100 + 60 x 120 =sh. 15, 200	B1 B1 B1 B1 B1 M1 A1	3x+2.5y $\leq$ 600 drawn x $\leq$ 100 drawn y $\geq$ 80drawn