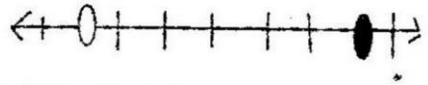
K.C.S.E 2002 MATHEMATICS PAPER 121/1 MARKING SCHEME

SOLUTION	MARKS	ALTERNATIVE METHOD
1. $\frac{+4 \times 4 - (20)}{-6 - (+6 + 3) + (6)} = \frac{4 \times 4 + 20}{-6 \times 2 - 6} = \frac{36}{-18}$	3 marks	
2. Either $(x^2 + 4xy + 4y^2) - (x^2 - 4xy + 4y^2)$ $4xy + 4xy$ $8xy$ or $\{(x + 2y) - (x-2y)\}\{(x+2y) + (x-2y)\}$ $(4y)(2x)$ $8xy$	3 marks	
3. $Px - Py = xy$ $Px = xy + Py$ $Px = y(x+P)$ $y = \frac{Px}{x + P}$	2 marks	
4. $XY = OY - OX$ $= \begin{vmatrix}3\\2\\-2\end{vmatrix} - \begin{vmatrix}2\\1\\-3\end{vmatrix} = \begin{vmatrix}1\\1\\1\end{vmatrix}$ $= i + j + k$	2 marks	$xy = 1$ 1 1
5. $1 = 0.04072$ 24.56 $4.346^2 = 18.89$ $0.04072 + 18.89 = 18.93071$ $= 18.93$	3 marks	
6. $H = 12 \sin 60$ $= 10.39$ $AD = (12 \cos 60) \times 2 + 4$ $= 16$ Area $= \{ 1/2 \times (4 + 16) 10.39$ $= 103.9 \times 2$ $= 207.8\ cm^2$	M1 A1 4 marks	
7. (a) Swiss francs $52/1.28 = 40.63$ (b) Kshs '40.63' x 45.21 = 1837	B1 A1	
8. $X > 1$ $X \leq 4$ 	B1 B1 B1 3 marks	
9. $P(1-0.09)^3 = 150\ 700$ $P = 150\ 700$ 0.91	M1 M1	

	SOLUTION	MARKS	ALTERNATIVE METHOD
	No | Log 150 700 | 5.1781 0.913 | T9590 x 3 T.8770 2.0×10^5 | 5.3011	M1 A1 4 marks	
10.	(a) Making 3 equal length from B along BA and joining the last point Z to C Construction of angle at x equal to angle Z and identify D (b) Area of DABD = $\frac{1}{2} \times 2.7 \times 8$ = 7.83cm²	B1 B1 M1 A1 4 marks	
11.	x-section area = $\frac{22}{7}(4^2 - 3^2)$ cm Volume = $\frac{22}{7} \times 7 \times 0.2$ cm³ = cm²	 M1 A1	
12.	MY = 14 - 8 = 6 CM Therefore 4 (MQ) = 8 x 6 MQ = 12	M1 A1 2 marks	
13.	a) $x^2 = (\sqrt{5})^2 - 1^2 = 4$ x = 2 Therefore Cos x = $\frac{2}{\sqrt{5}}$ = $\frac{2\sqrt{5}}{5}$ b) Tan (90 - x) = 2	B1 B1 B1 3 marks	
14.	P = $\frac{k + c}{q}$ $10 = \frac{k + c}{1.5}$ $k + 1.5c = 15$ $20 = \frac{k + c}{1.25}$ $K + 1.25 = 25$ $P = \frac{75 - 40}{0.5}$ $c = -40$ $K = 75$	M1 M1 A1 4 marks	
15.	$\frac{(5 \times 220) + (3 \times 120) + (4 \times 180) + (12 \times 150)}{6 + 3 + 4 + 2}$ = $\frac{2700}{15}$ = 180	M1 M1 M1 4 marks	
16.	(i) $\frac{dy}{dx} = 6 \times 2 + x + -4$ When x = 1 $\frac{dy}{dx} = 6 + 1 \ldots = 3$ (ii) $y + \frac{1}{2} = \ldots(x - 1)$ $y = 3x - 3 - \frac{1}{2}$ $\ldots y = 3x - \frac{7}{2}$	M1 A1 ... marks	...cept $2y = 6x - 7$)

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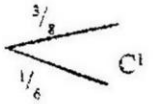
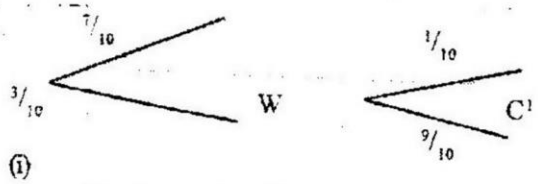
17. (a) (i) $750{,}000 \times \frac{90}{100}$ $= 675{,}000$ (ii) $675{,}000\,(1.1)^3 = 898.425$ $898{,}425 + 75{,}000 = 973\,425$ (b) $675{,}000\,(1\text{-}1)^n = 816{,}750$ $(1.1)^n = 1.21$ $n = \frac{0.0828}{0.0414}$ $n = 2$ years	M1 A1 M1 A1 M1 A1 8 marks	
18. (a) $AC = \sqrt{(8^2 + 6^2)} = \sqrt{100} = 10$ $EC = \sqrt{(10^2 + 20^2)} = 5 \times 100 = 10\sqrt{5}$ (b) (i) $\sin Q = \frac{8}{(\sqrt{5})}$ $= 20.96°$ (ii) $\tan x = \frac{8}{20}$ $x = 21.8°$	B1 M1, A1 M1 A1 M1 M1 A1	
19. (a) HHH HHT HTH HTT TTT TTH THT THH (i) P (at least two heads) $= \frac{4}{8}$ or $\frac{1}{2}$ (ii) P (only one tail) $= \frac{3}{8}$ b)  D  (i) $\frac{(7 \times 5)}{10\ 6} + \frac{(3 \times 1)}{10\ 10}$ $\frac{35}{60} + \frac{3}{100} = \frac{46}{75}$ (ii) $\frac{3}{10} \times \frac{9}{10} = \frac{27}{100}$	B1 B1 B1 B1 B1 M1 A1 B1 8 marks	

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20.	a) Gradient = -1 y = x + 7 (b) $7 - x = (x-1)^2 + 4$ $x^2 - x - 2 = 0$ $(x - 2)(x + 1) = 0$ x = 2, y = 5 x = -1, y = 8 Co-ord P (-1, 8 $\frac{1}{2}(8+5)\,3 - 2\,(x$ $= \frac{39}{2} - \{\frac{x^3}{3} - x^2$ $= 19.5 - \frac{82}{3} +$ = 19.5 - 15 = 4.5 or $4\frac{1}{2}$	B1 B1 M1 M1 A1	
21.	(a) Construction o Completion of (b) Bisector of P Location of S_1 (c) Constructio SQ constru through R $T_1 T_2 = 4.7 \pm$		
22.	(a) (i) $\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ 2a + 3b = -4 5a + 3b = -1 a = 1, b = -2 Therefore M (ii) 1 -2 4 x 0 1 1 y C1 = (2, 1) b) $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix}$		
23.	(a) (i) $135 \times \pi =$ 180 Area of sect (ii) Length of $\frac{3}{8} \times \frac{22}{7} \times$		

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	SOLUTION	MARKS	ALTERNATIVE METHOD
	(b (i) πrl = area of curved surface $r\pi = \frac{924 \times 7}{22 \times 28}$ = 10.5 cm $h = \sqrt{(28^2 - 10.5^2)}$ =25.96	M1 A1 8 marks	
24.	(b) Log P = n log r + log k		

P	1.2	1.5	2.0	2.5	3.5	4.5
Log P	0.08	0.18	0.30	0.40	0.54	0.65

B1

R	1.58	2.25	3.39	4.74	7.86	11.5
log r	0.20	0.35	0.53	0.68	0.90	1.06

B2

Scale S1
Plotting P1
Line L1

Log k = 0.05 = T.95 B1
K = 0.8913 89 B1
N = $\frac{2}{3}$ = 0.6667
0.6667 ± 0.0200

8 marks