

FORM FOUR CLUSTER KCSE MODEL1

MATHEMATICS PAPER 2 ANSWERS

SECTION I (50 Marks)

Answer all questions in this section in the spaces provided

1.

No	Log
0.038	$\bar{2}.5798$
$\log 31.42$	0.4972
	$\bar{1}.6966 +$
	$\bar{2}.2764$
132.7	$2.1229 -$
	$\bar{4}.1535$
$\frac{\bar{4}.1535}{3} = \frac{\bar{6}}{3} + \frac{2.1535}{3}$	
	$\bar{2}.7178$
	$= 0.05222$

2.

$$X^2 = \frac{BM^2 + BA}{E^2 B^2 M^2}$$

$$M^2 [E^2 B^2 X^2 - B] = BA$$

$$M = \pm \sqrt{\frac{BA}{E^2 B^2 X^2 - B}}$$

3.

$$\frac{(2 + \sqrt{7})^2}{7 + 2\sqrt{7} - 2 - \sqrt{7}}$$

$$\frac{11 + 4\sqrt{7}}{5 + \sqrt{7}}$$

$$\frac{55 - 11\sqrt{7} + 20\sqrt{7} - 28}{25 - 7}$$

$$= \frac{3 + \sqrt{7}}{2}$$

4.

$$1 + 6\left(-\frac{1}{4}x\right) + 15\left(-\frac{1}{4}x\right)^2 + 20\left(-\frac{1}{4}x\right)^3$$

$$1 - \frac{3}{2}x + \frac{15}{16}x^2 - \frac{5}{4}x^3$$

$$1 - \frac{1}{4}x = -\frac{3}{2}$$

$$x = 10$$

$$1 - \frac{30}{2} + \frac{1,500}{16} - \frac{5,000}{16}$$

$$= -232\frac{3}{4}$$

5. $x^2 - 4x - 12 = 0$

$$(x - 6)(x + 2) = 0$$

$$x = 6 \text{ or } x = -2$$

6. $\frac{5}{100} = 0.05$

$$20 \pm 0.05$$

$$30 \pm 0.05$$

Working area $20 \times 30 = 600$

Maximum area $20.05 \times 30.05 = 602.5025$

Minimum area $19.95 \times 29.95 = 597.5025$

$$A.E = \frac{602.5025 - 597.5025}{2} = 2.5$$

$$\% \text{ age error} = \frac{2.5}{600} \times 100$$

$$= 0.4167\%$$

7.

$$6x^2 - 5x - 6 = 0$$

$$x = -\frac{2}{3} \text{ or } x = \frac{3}{2}$$

$$\tan \theta = -\frac{2}{3}$$

$$\theta = 33.69$$

$$\theta = -33.69$$

$$\tan \theta = \frac{3}{2}$$

$$\text{or } 146.31$$

$$\theta = 56.31$$

$$\left. \begin{array}{l} \theta = -123.69 \\ \text{or} \\ 56.31 \end{array} \right\}$$

8.

$$\frac{k}{4} - \frac{k}{10} = \frac{3}{10}$$

$$k = 2$$

$$5 = \frac{2}{\sqrt{n}}$$

$$n = \frac{4}{25}$$

9.

$$-\int_0^2 x^2 - 4 + \int_2^4 (x^2 - 4) dx$$

$$-\left[\frac{x^3}{3} - 4x\right]_0^2 + \left[\frac{x^3}{3} - 4x\right]_2^4$$

$$-\left(\frac{8}{3} - 8\right) + \left[\left(\frac{64}{3} - 16\right) - \left(\frac{8}{3} - 8\right)\right]$$

$$\frac{16}{3} + \frac{32}{3} = \frac{48}{3}$$

10.

$$a \times ar \times ar^2 = 729$$

$$r = \frac{9}{a}$$

$$a + a\left(\frac{9}{a}\right) + a\left(\frac{9}{a}\right)^2 = 39$$

$$a^2 - 30a + 81 = 0$$

$$(a-3)(a-27) = 0$$

$$a = 3 \text{ and } r = 3$$

OR

$$a = 27 \text{ and } r = \frac{1}{3}$$

11.

$$1 = \log_2^2$$

$$\frac{x+3}{2} = 2x+3$$

$$x+3 = 4x+6$$

$$x = -1$$

12.

$$1 = \log_2^2$$

$$\frac{x+3}{2} = 2x+3$$

$$x+3 = 4x+6$$

$$x = -1$$

13.

$$a + b = 6$$

Two will take $\frac{1}{6}$ in a day

$$a \Rightarrow \text{will take } \frac{1}{10}$$

$$b = \frac{1}{6} - \frac{1}{10} = \frac{1}{15}$$

will take 15 days

14.

$$\det -k + 4k^2 = 5$$

$$4k^2 - k - 5 = 0$$

$$(4k - 5)(k + 1) = 0$$

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

$$k = -1$$

15. $\sqrt{\text{tangent drawn at } t=2}$
 $\sqrt{\text{Gradient using pts on tangent}}$

16. $2(3 - b) + 2b = 3b(3 - b)$
 $b^2 - 3b + 2 = 0$
 $b = 2 \text{ and } a = 1$
OR $B = 1 \text{ and } a = 2$

SECTION II (50 Marks)

Answer only five questions in this section

17. (a)
 $72,954 + 1,162 \times 12$
 $= 86,898$
(b) $4,512 \times 2 = 9,024$
 $4,512 \times 3 = 13,536$
 $4,512 \times 4 = 18,048$
 $4,512 \times 5 = 22,560$
 $x \times 6 = 23,730$
 $x = 3,955$
(c) $(4,512 \times 4) + 3,955$
 $K\text{£} = 22,003$
 $\frac{72}{100} \times 22,003$
 $15,842.16 \times \frac{20}{12}$
 $= 26,403.60$

- 18.

$$(a) 96 - 66 = 30$$

$$\frac{60 \times 30 \cos 45}{4}$$

$$381.2 \text{ knots}$$

$$(b) \theta = 66 + 114 = 180$$

$$(i) P \frac{180 \times 60 \cos 45}{400}$$

$$= 19.01 \text{ hrs}$$

$$(ii) Q \theta = 90^\circ$$

$$\frac{90 \times 60}{400}$$

$$= 13.5 \text{ hrs}$$

$$(c)$$

$$B(45^\circ N, 66^\circ W) \times (60^\circ N, 6^\circ W)$$

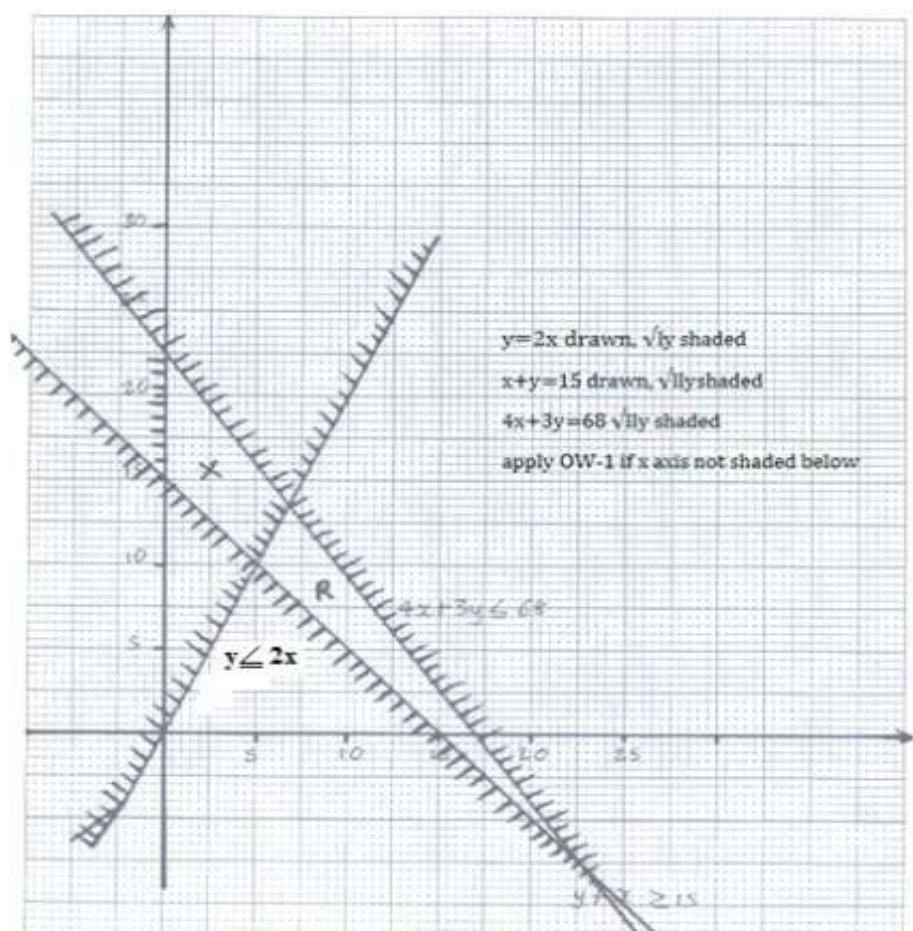
$$\alpha = 66 - 6$$

$$= 60^\circ$$

$$\frac{60}{14} = 4 \text{ hrs}$$

$$1,000 \text{ hrs} - 4 \text{ hrs} = 0600 \text{ hrs}$$

19.



$y \leq 2x$
 $4x + 3y \leq 68$
 $x + y \geq 15$
 $x \geq 0, y \geq 0$
 7 Peacocks
 13 Turkeys

20.

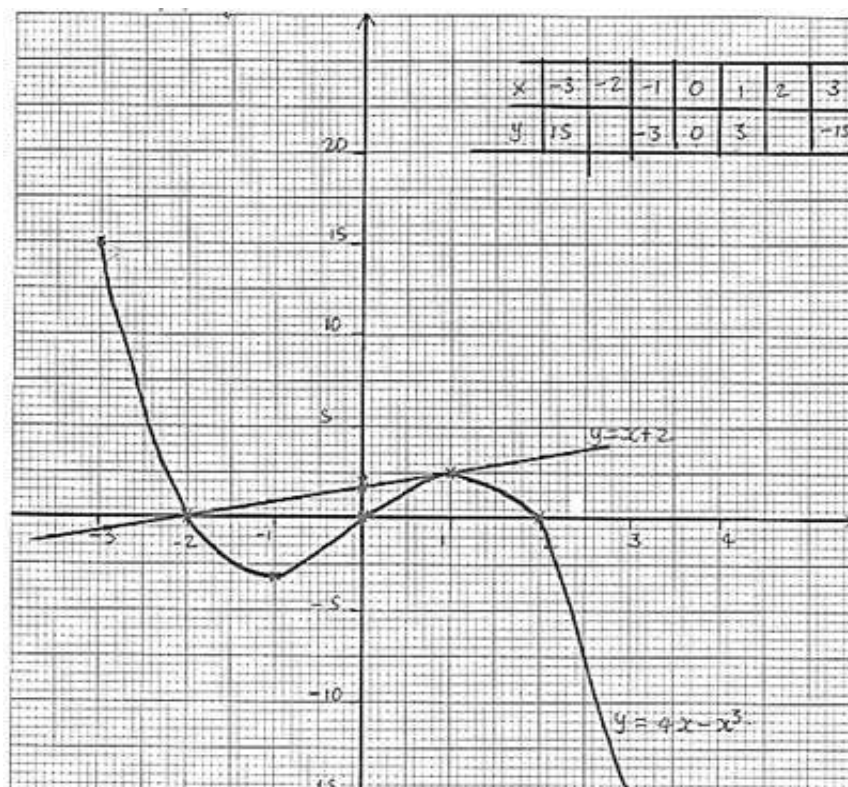
	2	4	6	8
2	(2,2)	(2,4)	(2,6)	(2,8)
3	(3,2)	(3,4)	(3,6)	(3,8)
5	(5,2)	(5,4)	(5,6)	(5,8)
7	(7,2)	(7,4)	(7,6)	(7,8)

(i) $\frac{1}{4}$

(ii) $\frac{1}{16}$

(iii) $\frac{12}{16} = \frac{3}{4}$

21.



(c) $x = -2, x = 0, x = 2$

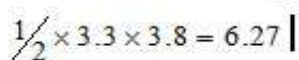
(d) $(-2, 0)$ and $(2, 4)$

(iv) $\frac{2}{16} = \frac{1}{8}$

(v) $\frac{3}{16}$

(vi) $\frac{10}{16} = \frac{5}{8}$

22.



(i) $80 - 75 = 5$
(ii) $21 - 30$

$$Q_1 = 10.5 + \left\{ \frac{20 - 2}{20} \right\} 10$$
$$= 19.5$$

$$Q_3 = 30.5 + \left\{ \frac{60 - 47}{15} \right\} 10$$

$$= 39.17$$

$$\text{Semi interquartile range} = \frac{39.17 - 19.5}{2} = 9.835$$

x	f	$d = x - 25.5$	fd^2	fd
5.5	2	-20	800	-40
15.5	20	-10	2000	-200
25.5	25	0	0	0
35.5	15	10	1500	150
45.5	7	20	2800	140
55.5	5	30	4500	150
65.5	6	40	9600	240

$$s\sqrt{\frac{21200}{80} - \left(\frac{440}{80}\right)^2} = 15.32$$

24.

$$\frac{BM}{MA} = \frac{x}{40-x} = \frac{5}{10}$$

$$x = \frac{40}{3}$$

$$\angle PBA = \cos^{-1}\left(\frac{5}{40/3}\right) = 67.98$$

$$PA = \sqrt{40^2 - 5^2}$$

$$= 36.69$$

$$PQ = \sqrt{39.69^2 - 10^2}$$

$$= 38.41$$

$$360 - (67.98 \times 2) = 224.04$$

$$\frac{224.04}{360} \times \frac{22}{7} \times 10$$

$$= 19.56$$

$$\frac{224.04}{360} \times \frac{22}{7} \times 20$$

$$= 39.12$$

$$19.56 + 39.12 + 2(38.41)$$

$$= 1355$$