
KENYA NATIONAL EXAMINATION COUNCIL

KCSE 2007

MATHEMATICS PAPER 2 MARKING SCHEME

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24.3.2 Mathematics Paper 2 (121/2)

1.

No	log	
0.032	$\overline{2}.5051$	
14.26	1.1541	+
	$\overline{1}.6592$	
0.006	$\overline{3}.7782$	-
	1.8810	
17.95	1.2540	$\times \frac{2}{3}$
	17.95	

(3 marks)

2.

$$\begin{aligned}
 yx + 3yz &= 2x - z \\
 yx - 2x &= -3yz - z \\
 x(y - 2) &= -3yz - z \\
 x &= \frac{-3yz - z}{y - 2}
 \end{aligned}$$

(3 marks)

3.

$$\begin{aligned}
 3 \cos x &= 2(1 - \cos^2 x) \\
 2 \cos^2 x + 3 \cos x - 2 &= 0 \\
 (2 \cos x - 1)(\cos x + 2) &= 0 \\
 \cos x &= \frac{1}{2} \text{ or } \cos x = -2 \\
 \cos x &= \frac{1}{2} \\
 x &= 60^\circ, 300^\circ
 \end{aligned}$$

(4 marks)

4.

(a)

$$\begin{aligned}
 &1.1^5 \left(\frac{1}{2}x\right)^0 + 5.1^4 \left(\frac{1}{2}x\right)^1 + 10.1^3 \left(\frac{1}{2}x\right)^2 + 10.1^2 \left(\frac{1}{2}x\right)^3 + 5.1 \left(\frac{1}{2}x\right)^4 + 1.1^0 \left(\frac{1}{2}x\right)^5 \\
 &= 1 + \frac{5}{2}x + \frac{5}{2}x^2 + \frac{5}{4}x^3 + \frac{5}{16}x^4 + \frac{1}{32}x^5
 \end{aligned}$$

(2 marks)

(b)

$$\begin{aligned}\left(1\frac{1}{20}\right)^5 &= 1 + \frac{5}{2} \times \frac{1}{10} + \frac{5}{2} \times \frac{1}{100} \\ &= 1 + \frac{5}{20} + \frac{5}{200} \\ &= 1\frac{11}{40}\end{aligned}$$

(2 marks)

5.

$$s = 2t - \frac{t^2}{2} + c$$

$$\text{When } s = 5, t = 2$$

$$\text{Therefore, } 5 = 2 \times 2 - \frac{2^2}{2} + c$$

$$c = 3$$

$$\text{Thus, } s = 2t - \frac{1}{2}t^2 + 3$$

(3 marks)

6.

$$\text{Interest} = (13800 - 2280) \times \frac{20}{100} \times 2$$

$$= 11520 \times 0.2 \times 2 = 4608$$

$$\begin{aligned}\text{Each monthly instalment} &= \frac{11520 + 4608}{24} \\ &= \text{Kshs. } 672\end{aligned}$$

(3 marks)

7.

$$\left(\frac{6+2}{2}, \frac{1+3}{2}\right) = (4, 2)$$

$$\frac{1-3}{6-2} \times M_2 = -1$$

$$M_2 = 2$$

$$\frac{y-2}{x-4} = 2$$

$$\text{Therefore, } 2x - y = 6$$

(4 marks)

8.

$$\begin{aligned}\text{Greatest possible error} &= \frac{64(3.15 - 3.05)}{2} \\ &= \frac{201.6 - 195.2}{2} \\ &= 3.2 \text{ cm}^3\end{aligned}$$

(2 marks)

9.

$$\text{Vol. of water} = \frac{4}{5} \times 2500 = 2000 \text{ cm}^3$$

$$\text{Vol. of milk} = \frac{1}{5} \times 2500 = 500 \text{ cm}^3$$

$$\begin{aligned} \text{The mass of the mixture} &= 2000 \times 1\text{g} + 500 \times 1.2\text{g} \\ &= 2600\text{g} \end{aligned}$$

(3 marks)

10.

$$\frac{67 - 32}{14}$$

$$= 2.5$$

$$\begin{aligned} T_7 &= 67 - 6 \times 2.5 \\ &= 52 \text{ cm} \end{aligned}$$

(3 marks)

11. (a)

$$\begin{aligned} NR &= \sqrt{4^2 + 7.5^2} \\ &= 8.5 \text{ cm} \end{aligned}$$

(1 mark)

(b)

$$\begin{aligned} QR(14 + 8.5) &= 7.5^2 \\ QR &= 2.5 \\ 4 \times AN &= 14(8.5 - 2.5) \\ AN &= \frac{14 \times 6}{4} \\ &= 21 \text{ cm} \end{aligned}$$

(3 marks)

12.

$$|p| = \sqrt{3^2 + (-1)^2 + (1\frac{1}{2})^2} = 3.5$$

$$q = 2p$$

$$q = 6i - 2j + 3k \text{ or } -6i + 2j - 3k$$

(2 marks)

$$\begin{aligned} 13. \text{ Longitude difference} &= 360^\circ - (133^\circ + 118^\circ) \\ &= 109^\circ \end{aligned}$$

$$109^\circ \times 60 \cos x = 5422$$

$$\cos x = 0.8291$$

$$x = 33.99^\circ$$

Therefore, Latitude of A and B is 34°N

(3 marks)

14.

$$\text{When } x = 0, y = 2$$

$$2 = k \times 1 \times -2$$

$$2 = -2k$$

$$k = -1$$

(2 marks)

15.

$$\frac{3}{\sqrt{5}-2} + \frac{1}{\sqrt{5}} = \frac{3(\sqrt{5}+2)}{5-4} + \frac{1}{5} \sqrt{5}$$

$$\begin{aligned}
 &= 3\sqrt{5} + 6 + \frac{1}{5}\sqrt{5} \\
 &= 6 + \frac{16}{5}\sqrt{5}
 \end{aligned}$$

(3 marks)

16.

$$\begin{aligned}
 x^2 - \frac{3}{4}x + \left(\frac{-3}{4}\right)^2 + y^2 + y + \left(\frac{1}{2}\right)^2 &= -\frac{1}{4} + \frac{9}{16} + \frac{1}{4} \\
 &= \frac{9}{16}
 \end{aligned}$$

$$\left(x - \frac{3}{4}\right)^2 + \left(y + \frac{1}{2}\right)^2 = \frac{9}{16}$$

$$\text{Radius} = \frac{3}{4}$$

$$\text{Centre} \left(\frac{3}{4}, -\frac{1}{2}\right)$$

(4 marks)

17. (a) (i)

Fraction filled in 1 hour (P & Q)

$$= \frac{2}{9} + \frac{1}{3} = \frac{5}{9}$$

$$\text{Time taken to fill tank} = 1\frac{4}{5} \text{ hr} \quad (2 \text{ marks})$$

ii) Fraction filled in 1 hour (P, Q & R)

$$= \frac{5}{9} - \frac{1}{2} = \frac{1}{18}$$

$$\text{Time taken to fill tank} = 18 \text{ hr.} \quad (2 \text{ marks})$$

(b) (i) Fraction filled by 9.00 am

$$P \rightarrow \frac{2}{9} \times 1\text{h} = \frac{2}{9}$$

$$Q \rightarrow \frac{1}{3} \times \frac{1}{4}\text{h} = \frac{1}{12}$$

For 1 hour

$$P \& Q \rightarrow \frac{2}{9} + \frac{1}{12} = \frac{11}{36} \quad (3 \text{ marks})$$

(ii) Fraction to be filled = $\frac{25}{36}$

$$\text{Time taken } \frac{25}{36} \times 18 = 12\frac{1}{2} \text{ hr}$$

Time tank will fill up

$$0900 + 1230$$

$$= 2130 \text{ h (9.30 pm)}$$

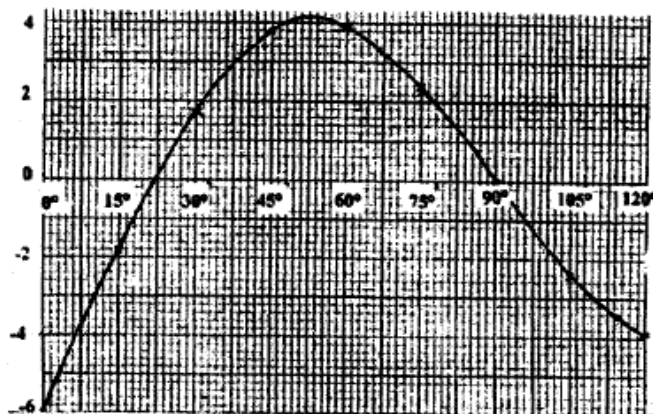
(3 marks)

18. (a) (i) $y = \frac{k}{x^n}$ (1 mark)
- (ii) $k = 12 \times 2^n$ and $k = 3 \times 4^n$
- $$12 \times 2^n = 3 \times 4^n \text{ or } \frac{k}{3} = \frac{k^2}{144}$$
- $$2^{n+2} = 2^{2n} \text{ or } k^2 - 48k = 0$$
- $$n + 2 = 2n \text{ or } k(k - 48) = 0$$
- $$n = 2 \text{ or } k = 48$$
- $$k = 48 \text{ or } n = 2$$
- (7 marks)

(b) $y = \frac{48}{\left(5\frac{1}{3}\right)^2}$

$$= 1\frac{11}{16}$$
 (2 marks)

19. (a)
- | | | |
|---|-----|------|
| x | 30° | 105° |
| y | 1.7 | -2.4 |
- (b) (2 marks)



- (c) (i) Maximum $y = 4.1 \pm 0.1$ (4 marks)
- (ii) $8 \sin 2x - 6 \cos x = 2$ (1 mark)
- $x = 31.5 \pm 0.75^\circ$
- $x = 78 \pm 0.75^\circ$ (3 marks)

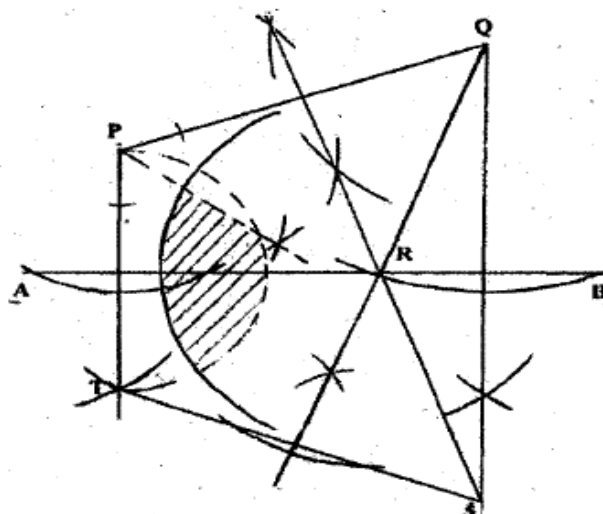
20. (a) (i)
- $$y = \frac{2x^2}{2} + x + c$$
- at $x = -4, y = 6$
- $$6 = (-4)^2 - 4 + c$$
- $$c = -6$$
- $$y = x^2 + x - 6$$
- (3 marks)
- (ii)
- $$x^2 + x - 6 = 0$$
- $$(x - 2)(x + 3) = 0$$
- $$x = 2 \text{ or } x = -3$$
- (3 marks)

(b)

$$\begin{aligned}\int_{-3}^2 (x^2 + x - 6) dx &= \left[\frac{x^3}{3} + \frac{x^2}{2} - 6x \right]_{-3}^2 \\ &= \left[\frac{8}{3} + \frac{4}{2} - 12 \right] - \left[\frac{-27}{3} + \frac{9}{2} + 18 \right] \\ &= -7\frac{1}{3} - 13\frac{1}{2} = -20\frac{5}{6} \\ \text{Area} &= 20\frac{5}{6}\end{aligned}$$

(4 marks)

21.



(10 marks)

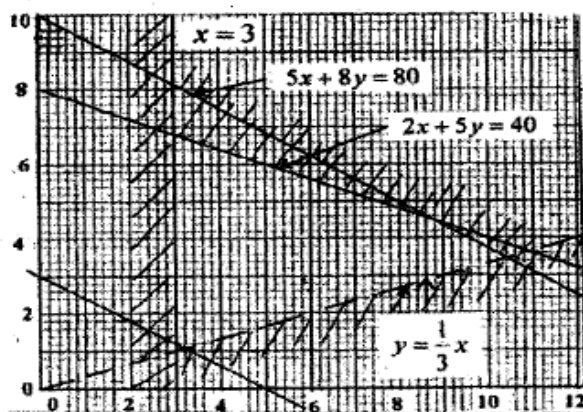
22.

(a)

$$\begin{aligned}2x + 5y &\leq 40 \\ 5x + 8y &\leq 80 \\ x &\geq 3 \\ y &> \frac{1}{3}x\end{aligned}$$

(4 marks)

(b)



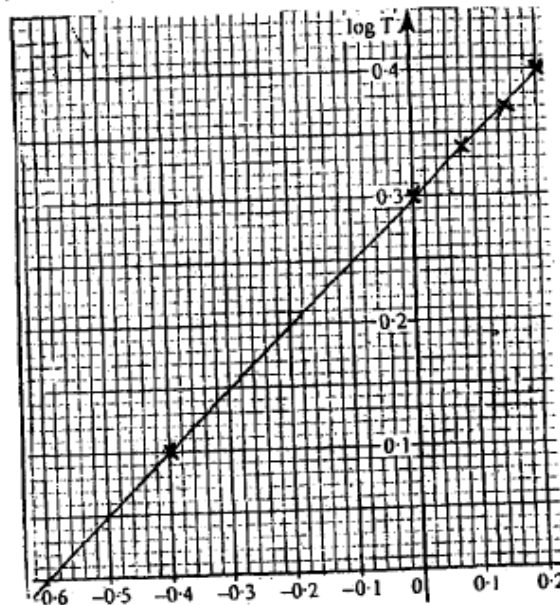
(6 marks)

23. (a)

Log x	-0.40	0.00	0.08	0.15	0.20
Log T	0.10	0.30	0.34	0.37	0.40

(2 marks)

(b) (i)



(2 marks)

(ii) $a = \log^{-1} 0.3 = 2.00$

$$b = \text{Grad.} = \frac{0.4 - 0.1}{0.1 - (-0.4)} \text{ or equivalent}$$

$$= 0.5$$

(3 marks)

(c) $\text{Log } T = b \log X + \log a$
 $0 = 0.5 \log X + 0.3$
 $\text{Log } X = \frac{-0.3}{0.5}$
 $X = 0.25$

(3 marks)

24. (a)

$$P(\text{Both red}) = \frac{4}{6} \times \frac{2}{5} = \frac{8}{30}$$

$$P(\text{Both yellow}) = \frac{2}{6} \times \frac{3}{5} = \frac{6}{30}$$

$$(P \text{ same colour}) = \frac{8}{30} + \frac{6}{30}$$

$$= \frac{7}{15}$$

(4 marks)

(b) (i)

$$P(\text{the two balls from bag A are Red}) = \frac{4}{6} \times \frac{3}{5} = \frac{2}{5}$$

$$P(\text{the two balls from bag B are Red}) = \frac{2}{5} \times \frac{1}{4} = \frac{1}{10}$$

$$P(\text{Both Red for bag A or bag B}) = \frac{2}{5} + \frac{1}{10} = \frac{1}{2}$$

(4 marks)

(ii)

$$P(\text{All the four balls one Red}) = \frac{2}{5} \times \frac{1}{10} = \frac{1}{25}$$

(2 marks)