
KENYA NATIONAL EXAMINATION COUNCIL

KCSE 2007

MATHEMATICS PAPER 1 MARKING SCHEME

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Mathematics Paper 1

1.

$$\frac{0.0084 \times 1.23 \times 3.5}{2.87 \times 0.056}$$

(2 marks)

$$= \frac{84 \times 123 \times 35}{287 \times 56 \times 100}$$

$$= \frac{9}{40}$$

2.

$$\begin{aligned} 3x + (x - 20) &= 180^0 \\ 4x &= 200^0 \\ x &= 50^0 \end{aligned}$$

$$\begin{aligned} (x - 20)n &= 360 \\ 30n &= 360 \\ n &= 12 \end{aligned}$$

(3 marks)

3.

$$\begin{aligned} (x^2 - y^2)(x^2 + y^2)(x^4 - y^4) \\ = (x^4 - y^4)(x^4 - y^4) \\ = x^8 - 2x^4y^4 + y^8 \end{aligned}$$

(2 marks)

4.

$$\frac{2950000}{118}$$

$$= \text{US dollar } 25,000$$

$$\begin{aligned} \text{Duty Paid} &= 25,000 \times \frac{20}{100} \times 76 \\ &= \text{Shs } 380,000 \end{aligned}$$

(3 marks)

5.

$$\frac{dy}{dx} = 3ax^2 + b$$

$$3a + b = -5$$

$$a + b = 1$$

$$a = -3$$

$$b = 4$$

(4 marks)

6.

$$\begin{aligned} \frac{15a^2b - 10ab^2}{3a^2 - 5ab + 2b^2} &= \frac{5ab(3a - 2b)}{(3a - 2b)(a - b)} \\ &= \frac{5ab}{a - b} \end{aligned}$$

(3 marks)

7.

$$\begin{aligned}\text{Volume of plate} &= \frac{1.05 \times 1000}{8.4} \\ &= 125 \text{ cm}^3 \\ \text{Length of the side} &= \sqrt{\frac{125}{0.2}} \\ &= 25 \text{ cm}\end{aligned}$$

(3 marks)

8.

$$\begin{aligned}l^2 &= 5^2 - (2\sqrt{5})^2 = 5 \\ l &= \sqrt{5} \\ \therefore \tan(90-x)^\circ &= \frac{2\sqrt{5}}{\sqrt{5}} \quad \text{or } 2\end{aligned}$$

(2 marks)

9.

$$\begin{aligned}\cos \theta &= \frac{2.5}{5} = 0.5 \\ \theta &= 60^\circ \times 2\end{aligned}$$

$$\begin{aligned}\text{Surface under water} &= \frac{2 \times 60}{360} \times \pi \times 10 \times 12 \\ &= 125.7\end{aligned}$$

(4 marks)

10.

$$\begin{aligned}\frac{1}{2} \angle ACB &= 38.5^\circ \\ \frac{8.4}{\sin 100.5} &= \frac{x}{\sin 41^\circ} \\ x &= \frac{8.4 \sin 41^\circ}{\sin 100.5} \\ x = \text{CN} &= 5.6\end{aligned}$$

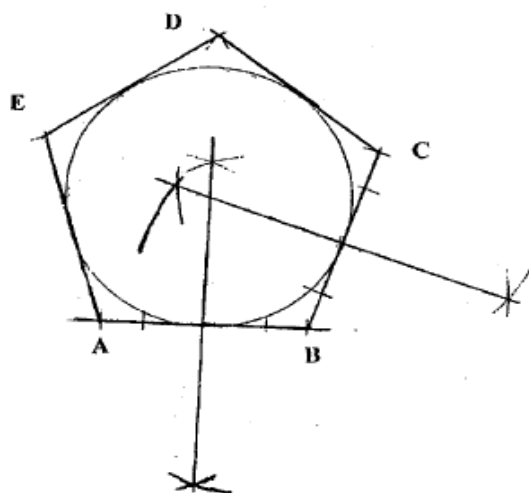
(3 marks)

11.

$$\begin{aligned}m + 14 &= 2(s + 14) \\ (m - 4) + (s - 4) &= 30 \\ m &= 25 + 14 \\ m + s &= 38 \\ \therefore 2s + 14 + s &= 38 \\ s &= 8 \\ m &= 30 \\ \therefore \text{Mother's age when she was born} &= 30 - 8 \\ &= 22\end{aligned}$$

(4 marks)

12.



(3 marks)

13.

$$\begin{aligned}
 x + y &= 40 \Rightarrow y = 40 - x \\
 \therefore \text{Sum of the squares in terms of } x \\
 s &= x^2 + (40 - x)^2 \\
 &= 2x^2 - 80x + 1600 \\
 \frac{ds}{dx} &= 4x - 80 = 0 \\
 \Rightarrow 4x &= 80 \\
 x &= 20 \\
 \text{Sum of the squares} \\
 &= 20^2 + (40 - 20)^2 \\
 &= 20^2 + 20^2 \\
 &= 400 + 400 \\
 &= 800
 \end{aligned}$$

(4 marks)

14.

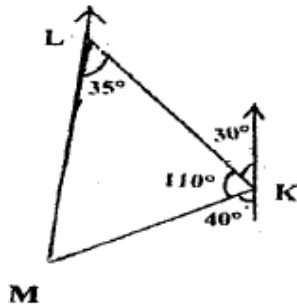
$$\begin{aligned}
 \text{Area of each Sector} \\
 &= \frac{60}{360} \times \pi \times 6^2 \\
 &= 18.84955592 \\
 \text{Area of } \Delta &= \frac{1}{2} \times 6 \times 6 \times \sin 60^\circ \\
 &= 15.58845727
 \end{aligned}$$

$$\begin{aligned}
 \text{Therefore, Area of shaded region} \\
 &= 15.58845727 + 2(18.84955592 - 15.58845727) \\
 &= 15.58845727 + 6.522197303 \\
 &= 22.11065457 \\
 &= 22.11
 \end{aligned}$$

(4 marks)

15.

$$\begin{aligned}
 \angle LKM &= 110^\circ \\
 \angle KLM &= 35^\circ \text{ OR } \angle KML = 35^\circ \\
 \text{Bearing is } &185^\circ
 \end{aligned}$$



(3 marks)

16. Amount of fuel used = $\frac{120}{4} \times \frac{8}{3} = 50$ litres

Amount of money spent = $80 \times 59 = 4720$

(3 marks)

17. (a) % Profit for taxes and insurance

$$= \frac{40}{100} \times \frac{75}{100}$$

Amount shared

$$= \frac{100 - (25 + 30)}{100} \times 225000$$

$$= \frac{45}{100} \times 225000$$

$$= 101250$$

Amount Cherop received more than Asha: Ratio of contribution

$$60000 : 85000 : 105000$$

$$12 : 17 : 21$$

$$\frac{21 - 12}{50} \times 101250$$

$$= 18225$$

(5 marks)

(b) Profit during 2nd year:

$$225000 \times \frac{10}{9}$$

$$= 250000$$

Nangila's new ratio:

$$= \frac{110000}{275000} = \frac{2}{5}$$

∴ Nangila's New Share of Profit

$$= \frac{2}{5} \times 112500$$

$$= 45000$$

(5 marks)

18. (a)

$$\angle ABQ = 180^\circ - 95.5^\circ = 84.5^\circ$$

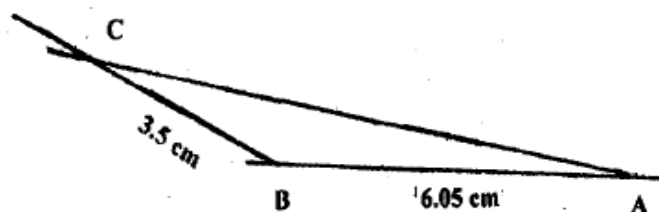
$$\therefore AB = \frac{5.8}{\cos 84.5} \text{ OR } \frac{5.8}{\sin 5.5}$$

$$= 60.5\text{m}$$

$$= 61\text{m}$$

(2 marks)

- (b) (i) $\angle ABC = 95.5^\circ + (90^\circ - 30.5^\circ)$
 $= 155^\circ$
 Scale : 1cm:10m



$$AC = 9.4 \times 10 = 94\text{cm} \pm 1\text{m}$$

(5 marks)

(ii)

$$\angle BCA = 16^\circ \pm 1^\circ (15^\circ \text{ or } 17^\circ)$$

Therefore, $\angle$ of depression of A from C
 $= 30.5^\circ - 16^\circ$
 $= 14.5^\circ \pm 1^\circ$
 $= 15.5^\circ \text{ or } 13.5^\circ$

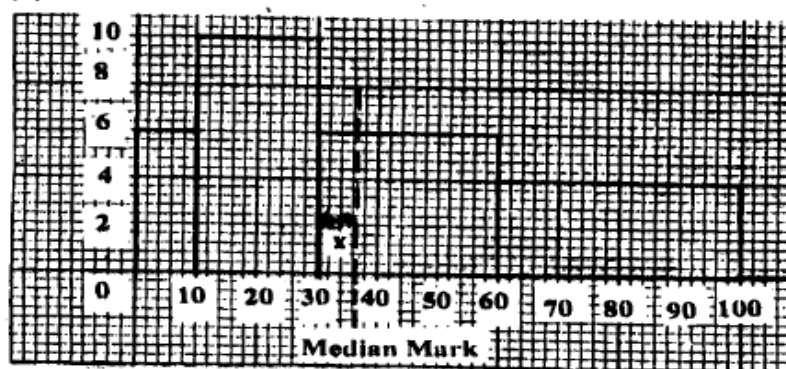
(3 marks)

19. (a) (i)

Marks	0 - 10	10 - 30	30 - 60	60 - 70	70 - 100
Frequency	12	40	36	8	24
Area of rectangle	60	200	180	40	120
Height of rectangle	6	10	6	4	4

(4 marks)

(ii)



(2 marks)

- (b) (i) Median in group 30-60

(1 mark)

(ii)

$$\begin{aligned}
& 60 + 200 + 6x \\
& = \frac{1}{2} (60 + 200 + 180 + 40 + 120) \\
& 260 + 6x = 300 \\
& x = 6 \frac{2}{3} \\
\therefore \text{Median} &= 30 + 6 \frac{2}{3} \\
&= 36 \frac{2}{3}
\end{aligned}$$

(3 marks)

20. (a)

Let x be number of computers bought using original price

$$\text{Original price per unit} = \frac{1800000}{x}$$

$$\text{New Price per unit} = \frac{1800000}{x} - 400$$

$$\therefore \frac{1800000}{x} - 4000 = \frac{1800000}{x+5}$$

$$1800000x - 4000x^2 + 9000000 - 20000x = 1800000x$$

$$x^2 + 5x - 2250 = 0$$

$$x^2 + 50x - 45x - 2250 = 0$$

$$x(x+50) - 45(x+50) = 0$$

$$(x-45)(x+50) = 0$$

$$x = 45$$

Therefore, number of computers bought = 50

(6 marks)

(b) Number of computers left after breakage

$$= 50 - 2 = 48$$

Selling price to realise 15% profit

$$= 1800000 \times 1.15 = 2070000$$

$$\text{Buying price per unit} = \frac{1800000}{50}$$

$$\begin{aligned}
\text{Profit per unit} &= \frac{2070000}{48} - \frac{1800000}{50} \\
&= 43125 - 36000 \\
&= 7125
\end{aligned}$$

(4 marks)

21. (a) (i)

$$XR = r - \frac{1}{3}q$$

(1 mark)

$$(ii) \quad YQ = q - \frac{3}{7}r$$

(1 mark)

$$(b) \quad (i) \quad OE = \frac{1}{3}q - \frac{1}{3}mq + mr$$

(1 mark)

$$(ii) \quad OE = \frac{3}{7}r - \frac{3}{7}nr + nq$$

(1 mark)

$$(c) \quad OE = \frac{1}{3}q + m(r - \frac{1}{3})$$

$$\begin{aligned}
&= \frac{3}{7}r + n(q - \frac{3}{7}r) \\
&\Rightarrow (\frac{1}{3} - \frac{1}{3}m)q + mr = nq + (\frac{3}{7} - \frac{3}{7}n)r \\
&\frac{1}{3} - \frac{1}{3}m = n \\
&m = \frac{3}{7} - \frac{3}{7}n \\
&m = \frac{3}{7} - \frac{3}{7}(\frac{1}{3} - \frac{1}{3}m) \\
&m = \frac{3}{7} - \frac{1}{7} + \frac{1}{7}m \\
&m = \frac{1}{3} \\
&n = \frac{1}{3} - \frac{1}{3} \times \frac{1}{3} = \frac{2}{9}
\end{aligned}$$

(6 marks)

22. (a)

$$\text{L.S.F} = \sqrt{\frac{20}{45}} = \sqrt{\frac{4}{9}} = \frac{2}{3}$$

$$\text{Therefore, L.S.F} = \frac{8}{27}$$

Capacity of smaller container

$$\begin{aligned}
&= \frac{8}{27} \times 0.945 \\
&= 0.281 \text{ or } 280\text{ml } (280\text{cm}^3)
\end{aligned}$$

(4 marks)

(b) Let depth be h
 $45(13 - h) = 20h$

$$585 = 65h$$

$$h = 9$$

(2 marks)

(c) Amount in smaller container.

$$\frac{1}{5} \times 9 \times 45 + 20 \times 9$$

$$= 261$$

Height in smaller container

$$\frac{261}{20} = 13.05\text{cm}$$

$$\text{Difference } 13.05 - \frac{4}{5} \times 9$$

$$= 13.05 - 7.2$$

$$= 5.85$$

(4 marks)

23. (a)

$$\text{Determinant of matrix} = 54 - 56 = -2$$

$$\text{Inverse matrix} = -\frac{1}{2} \begin{pmatrix} 6 & -8 \\ -7 & 9 \end{pmatrix} \text{ or } \begin{pmatrix} -3 & 4 \\ 7/2 & -9/2 \end{pmatrix} \quad (2 \text{ marks})$$

(b) Let the price of each bicycle be x and each radio be y .

$$36x + 32y = 227280$$

$$28x + 24y = 174960$$

$$\begin{pmatrix} 36 & 32 \\ 28 & 24 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 227280 \\ 174960 \end{pmatrix}$$

$$\begin{pmatrix} 9 & 8 \\ 7 & 6 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 56820 \\ 43740 \end{pmatrix}$$

$$\begin{pmatrix} 6 & -8 \\ -7 & 9 \end{pmatrix} \begin{pmatrix} 9 & 8 \\ 7 & 6 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 6 & -8 \\ -7 & 9 \end{pmatrix} \begin{pmatrix} 56820 \\ 43740 \end{pmatrix}$$

$$\begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -9000 \\ -4080 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4500 \\ 2040 \end{pmatrix}$$

$\therefore$ each bicycle price: Kshs.4500

each radio price: Kshs.2040

(4 marks)

(c) New price of bicycle = $4500 \times 0.9 = 4050$

New price of radio = $2040 \times 1.1 = 2244$

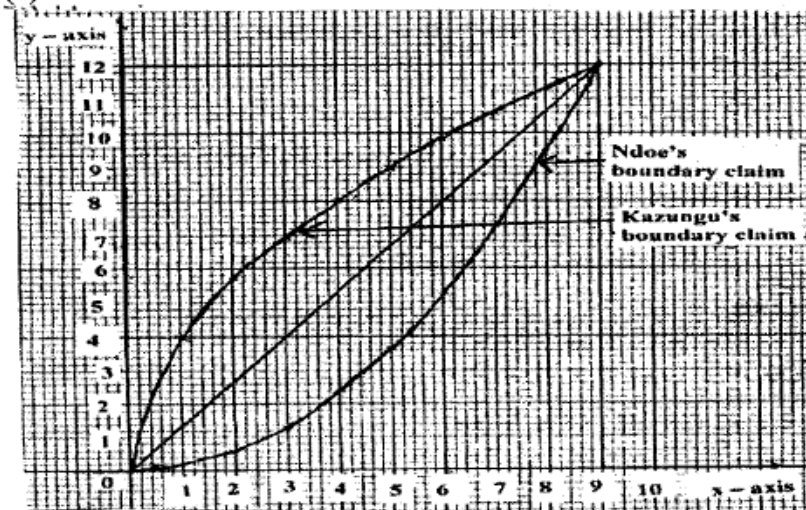
$$\therefore \begin{pmatrix} 64 & 56 \end{pmatrix} \begin{pmatrix} 4050 \\ 2244 \end{pmatrix} = (259200 + 25664)$$

Total cost in 3rd week

$$= 259200 + 125664 = 384864$$

(4 marks)

24. (a)



(2 marks)

- (b) (i) Area below upper curve:
 $= \frac{1}{2} \times 1 \times \{12 + 2(4 + 5.7 + 6.9 + 8 + 9 + 9.8 + 10.6 + 11.3)\}$
 $= \frac{1}{2} (12 + 130.6) = 71.3$
 Area below lower curve:
 $= \frac{1}{2} \times 1 \times \{12 + 2(0.2 + 0.6 + 1.3 + 2.4 + 3.7 + 5.3 + 7.3 + 9.5)\}$
 $= \frac{1}{2} (12 + 60.6) = 36.3$
 Area in dispute = $71.3 - 36.3 = 35$ **(5 marks)**
- (ii) Area in hectares = $\frac{35 \times 400}{10000}$
 $= 1.4$ **(3 marks)**