

KCSE 2012**8.0 MATHEMATICS (121 & 122)****8.1 Mathematics Alt. A Paper 1 (121/1)**

$$1. \quad \frac{2\frac{1}{5} + \frac{2}{3} \times \frac{15}{4} - 4\frac{1}{6}}{1\frac{1}{4} - \frac{12}{5} \times \frac{3}{4} + 3\frac{3}{4}} = \frac{\frac{8}{15}}{3\frac{1}{5}} = \frac{1}{6}$$

(3marks)

$$2. \quad \sqrt{11.25^2 - 6.75^2} = 9$$

$$\text{Perimeter} = 2(9 + 6.75)$$

$$= 31.5$$

(2marks)

3. Let d be distance covered

$$\frac{3d}{5} - \frac{d}{2} = \frac{d}{10}$$

$$\% \text{ change} = \frac{\frac{d}{10}}{\frac{d}{2}} \times 100\%$$

$$= \frac{d}{10} \times \frac{2}{d} \times 100\%$$

$$= 20\%$$

(3marks)

$$4. \quad 60 = 2^2 \times 3 \times 5$$

$$42 = 2 \times 3 \times 7$$

$$\text{Side of room} = 2^2 \times 3 \times 5 \times 7 = 420\text{cm}$$

$$\text{Least area} = 4.2\text{m} \times 4.2\text{m} = 17.64 \text{ m}^2$$

(3marks)

$$5. \quad \sin(x + 60^\circ) = \cos 2x$$

$$x + 60 + 2x = 90^\circ$$

$$3x = 30^\circ$$

$$x = 10^\circ$$

$$\tan(x + 60^\circ) = \tan 70^\circ$$

$$= 2.75$$

(3marks)

6.

$$\frac{4x - 9x^3}{3x^2 - 4x - 4} = \frac{x(2 - 3x)(2 + 3x)}{(3x + 2)(x - 2)}$$

$$= \frac{x(2 - 3x)}{x - 2}$$

(3marks)

7. Internal Dimensions: 40, 20 and 15

$$\text{Volume unoccupied} = 40 \times 20 \times 15 - 8000$$

$$= 4000$$

$$\text{Height above water level} = \frac{4000}{40 \times 20} = 5\text{cm}$$

(4marks)

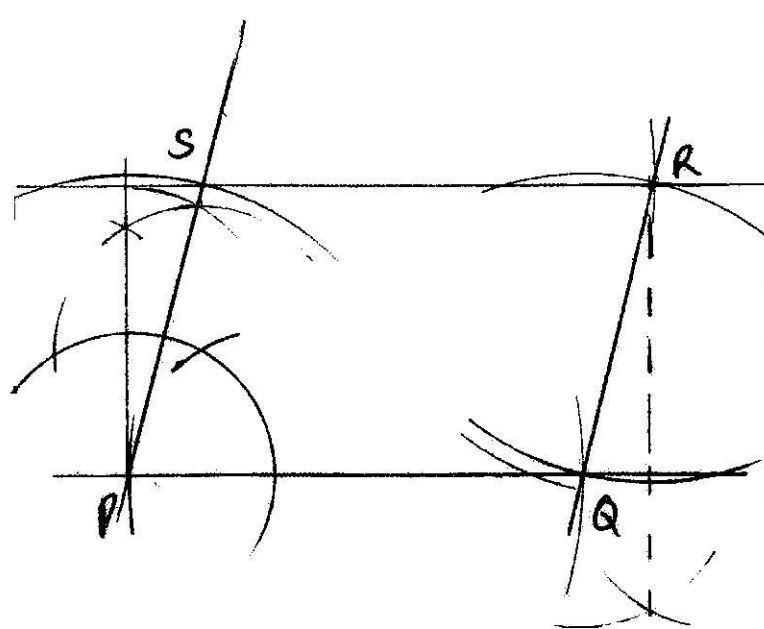
$$8. \quad 2x^2y^2 - 5xy - 12 = 2x^2y^2 - 8xy + 3xy - 12$$

$$= 2xy(xy - 4) + 3(xy - 4)$$

$$= (2xy + 3)(xy - 4)$$

(2marks)

9.



Perpendicular distance between PQ and SR = 3.9cm

(4marks)

10.

Mass (kg), x	40 – 44	45 – 49	50 – 54	55 – 59	60 – 64	65 – 69	70 – 74
No. of people, f	1	2	12	10	2	2	1
Midpoint of x	42	47	52	57	62	67	72
fx	42	94	624	570	124	134	72

$$\text{mean mass, } \bar{x} = \frac{\sum fx}{\sum x} = \frac{1660}{30} = 55\frac{1}{3} \text{ Kg}$$

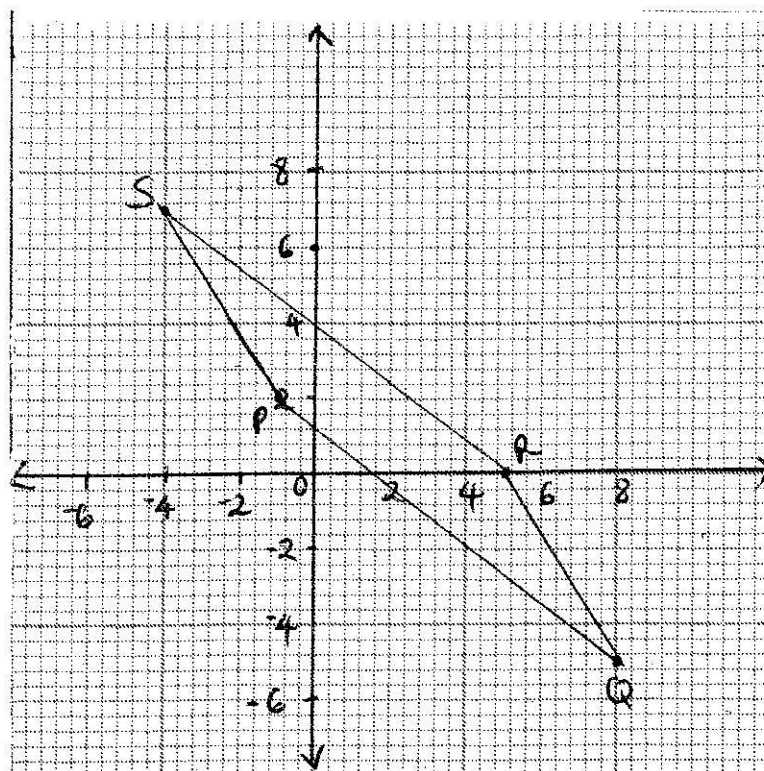
(3 marks)

11. Selling price before discount = Sh. $\frac{5880}{98} \times 100\%$
 = Sh. 6000

Price at which shopkeeper bought the suit = Sh. $\frac{6000}{120} \times 100\%$
 = Sh 5000

(3 marks)

12.



$$QS = \sqrt{12^2 + 12^2} = 16.97$$

(3 marks)

13. Let Mambo's salary be x and Simba's salary be y

$$\frac{1}{6}x + \frac{1}{5}y = 14820$$

$$\frac{1}{8}x + \frac{1}{12}y = 8675$$

$$5x + 6y = 444600$$

$$3x + 2y = 208200$$

$$5x + 6y = 444600$$

$$9x + 6y = 624600$$

$$4x = 180000$$

$$x = 45000$$

(4 marks)

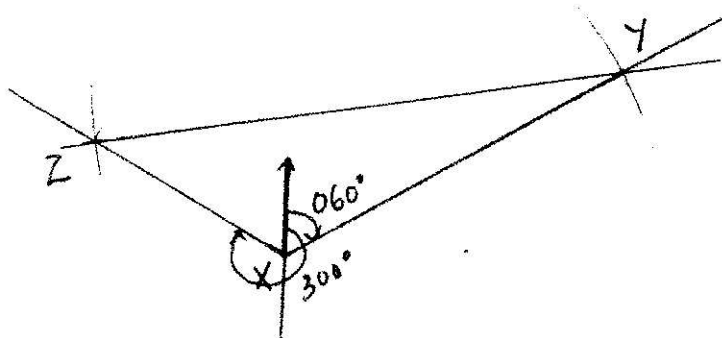
14. a) $10500 = 2^2 \times 3 \times 5^3 \times 7$

b) $P \times 10500 = 2^3 \times 3^3 \times 5^3 \times 7^3$

Smallest value of $P = 2 \times 3^2 \times 7^2 = 882$

(3 marks)

15.



Distance $XZ = 3 \times 10 = 30$ Km

(4 marks)

16 L.S.F. = 8: 24 = 1: 3

V.S.F = 1: 27

$$\begin{aligned}\text{Volume of frustum} &= 160 \times 27 - 160 \\ &= 4160 \text{ cm}^3\end{aligned}$$

(3 marks)

17. (a) (i) Surface area of the solid = $\pi \times 6 \times 10 + \frac{4}{3} \times \pi \times 6^2 = 414.49$

(ii) Height of cone = $\sqrt{100 - 36} = 8$

$$\begin{aligned}\therefore \text{Volume of the solid} &= \frac{1}{3} \times \pi \times 6^2 \times 8 + \frac{1}{2} \times \frac{4}{3} \times \pi \times 6^3 \\ &= 753.98 \text{ cm}^3\end{aligned}$$

(b) Mass of solid in kg = $\frac{1.3 \times 753.98}{1000} = 0.98 \text{ kg}$

(10 marks)

18. (a) (i) Let distance covered by bus be b km

$$\therefore \text{Time by train} = \frac{700 - b}{50}$$

$$\text{Time by bus} = \frac{b}{75}$$

$$\therefore \frac{700 - b}{50} + \frac{b}{75} = 11 \frac{1}{2} - \frac{1}{2}$$

$$\frac{2100 - 3b + 2b}{150} = 11$$

$$2100 - b = 11 \times 150$$

$$b = 2100 - 1650$$

$$= 450$$

(ii) Time taken by train = $\frac{700 - 450}{50} = 5 \text{ h}$

$$\text{Total time before departure of bus} = 5 \text{ h} + 30 \text{ min}$$

19. (a)
$$\begin{pmatrix} 0 & 1 \\ 2 & p \end{pmatrix} \begin{pmatrix} -1.5 & -0.5 \\ p & p-2 \end{pmatrix} = \begin{pmatrix} p & p-2 \\ -3+p^2 & -1+p^2-2p \end{pmatrix}$$

$$-p + p^3 - 2p^2 = p^3 - 2p^2 - 3p + 6$$

$$-p = -3p + 6$$

$$p = 3$$

(b) (i) $x + 30y = 50000$
 $x + 40y = 56000$

(ii)
$$\begin{pmatrix} 1 & 30 \\ 1 & 40 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 50000 \\ 56000 \end{pmatrix}$$

$$\frac{1}{10} \begin{pmatrix} 40 & -30 \\ -1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 30 \\ 1 & 40 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{10} \begin{pmatrix} 40 & -30 \\ -1 & 1 \end{pmatrix} \begin{pmatrix} 50000 \\ 56000 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{10} \begin{pmatrix} 320000 \\ 6000 \end{pmatrix}$$

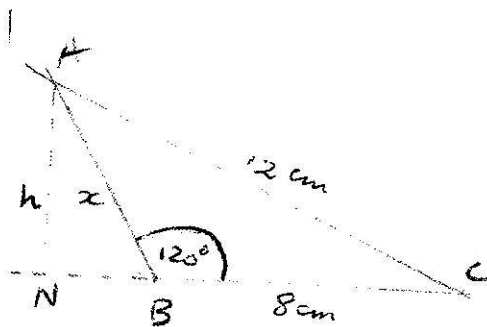
$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 32000 \\ 600 \end{pmatrix}$$

$$x = 32000$$

$$y = 600$$

(iii) $\frac{68000 - 32000}{600} = 60$

20.



21. a) ordinates

$$x = 0 \quad y_1 = 1$$

$$x = 1 \quad y_2 = 6$$

$$x = 2 \quad y_3 = 9$$

$$x = 3 \quad y_4 = 10$$

$$x = 4 \quad y_5 = 9$$

$$x = 5 \quad y_6 = 6$$

$$x = 6 \quad y_7 = 1$$

$$\text{Area} = \frac{1}{2} \times 1 \times \{1 + 1 + 2(6 + 9 + 10 + 9 + 6)\} = \frac{1}{2}(82) = 41$$

$$(b) \quad (i) \quad \int_0^6 -x^2 + 6x + 1 = \left[-\frac{1}{3}x^3 + \frac{6}{2}x^2 + x \right]_0^6 = -72 + 108 + 6 = 42$$

$$(ii) \quad \frac{42 - 41}{42} \times 100\% = 2.38\%$$

(10 marks)

22. (a) $V = \frac{ds}{dt} = 6t^2 - 10t + 4$

When $t = 3$,

$$v = 6(9) - 10(3) + 4 = 28 \text{ m/s}$$

$$(b) \quad v = 0 \Rightarrow 6t^2 - 10t + 4 = 0$$

$$3t^2 - 5t + 2 = 0$$

$$(3t - 2)(t - 1) = 0$$

$$t = \frac{2}{3} \text{ or } t = 1$$

$$(c) \quad t = \frac{2}{3}: s = 2\left(\frac{2}{3}\right)^3 - 5\left(\frac{2}{3}\right)^2 + 4\left(\frac{2}{3}\right) + 2 = 3.04\text{m}$$

$$t = 1; s = (1)^3 - 5(1)^2 + 4(1) + 2 = 3\text{m}$$

$$(d) \quad a = \frac{dv}{dt} = 12t - 10$$

$$t = 3: a = 12(3) - 10 = 26$$

(10 marks)

23. (a) (i) $BC = BD + DC$
 $= -d - a + 2a$
 $= a - d$
- (ii) $AX = k AC \Rightarrow AX = k(2a - d)$
- (iii) $DX = h DB \Rightarrow DX = h(d + a)$

(b) $AX = -d + hd + ha$
 $AX = d(h - 1) + ha$
 $AX = 2ka - kd$

$$\therefore d(h - 1) + ha = 2ka - kd$$

$$h = 2k \quad \text{and} \quad h - 1 = -k$$

$$h = -k + 1 \quad 2k = -k + 1$$

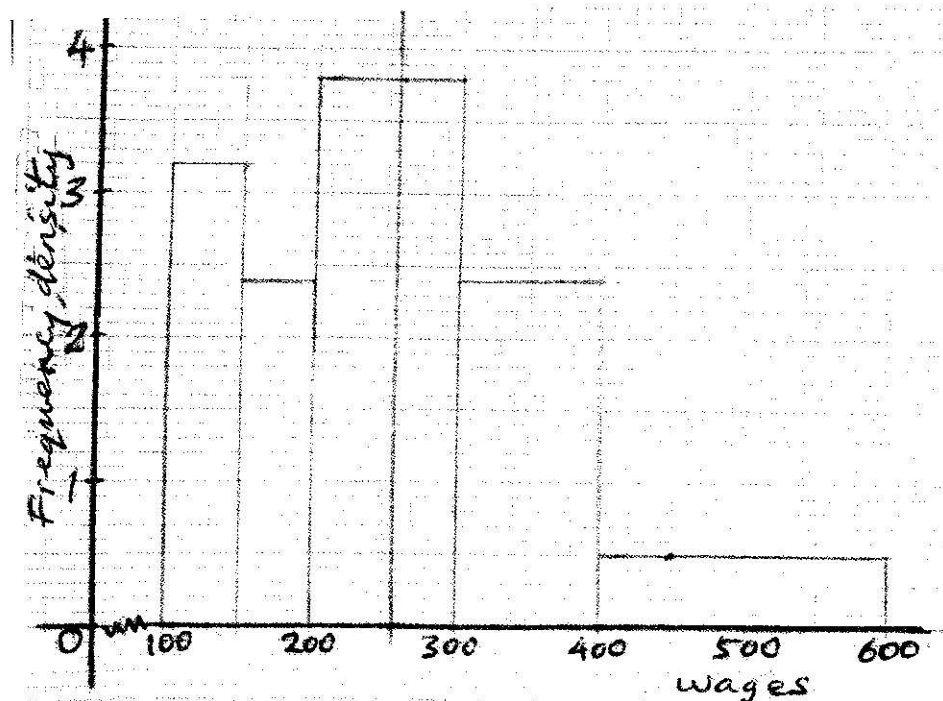
$$3k = 1$$

$$k = \frac{1}{3}$$

$$h = 2k \Rightarrow h = 2 \times \frac{1}{3} = \frac{2}{3}$$

(10 marks)

24 (a)



(b) (i) median class: 200 – 300

(c) Number of workers who earn Sh. 450 or less per day = $900 + 50 \times 0.5 = 925$

(10 marks)