THE KENYA NATIONAL EXAMINATIONS COUNCIL

Kenya Certificate of Secondary Education

Confidential

Paper 1

Serial No.
1318BB19

121/1 MATHEMATICS Alt. A

Nov. 2025 – 2 ½ hours

Name: PROPOSED MARKING GUIDE **Index Number:** ....

Candidate's signature: .... **Date:** ....

Instructions to candidates:

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of examination in the spaces provided above.
(c) This paper consists of **two** sections: **Section I** and **Section II.**
(d) Answer **all** the questions in **Section I** and only **five** questions from **Section II.**
(e) **Show all the steps in your calculation, giving your answers at each stage in the spaces provided below each question.**
(f) Marks may be given for correct working even if the answer is wrong.
(g) **Non-programmable** silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.
(h) **This paper consists of 18 printed pages.**
(i) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
(j) **Candidates should answer the questions in English.**

For Examiner's Use Only

Section I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total

Section II

17	18	19	20	21	22	23	24	Total

Grand Total

SECTION I (50 marks)

*Answer **all** the questions in this section in the spaces provided.*

1. Without using a mathematical table or calculator, evaluate; (3 marks)

$$\sqrt{\frac{11}{12}-\frac{1}{3}\div 1\frac{1}{2}}$$

$\frac{1}{3} \div \frac{3}{2} = \frac{1}{3} \times \frac{2}{3} = \frac{2}{9}$

$\frac{11}{12} - \frac{2}{9} = \frac{33-8}{36}$

$= \frac{25}{36}$ ✓m_1

$\sqrt{\frac{25}{36}} = \pm\sqrt{\frac{5 \times 5}{2 \times 2 \times 3 \times 3}}$ ✓m_1

$= \pm\frac{5}{2 \times 3}$

$= \pm\frac{5}{6}$ ✓A_1

2. Baraka earns Ksh 210 per hour working at a supermarket. The employer changed the amount earned per hour in the ratio of 8:7.

Determine the amount that Baraka would earn in $10\frac{1}{2}$ hours at the new rate. (3 marks)

New rate $= \frac{8}{7} \times 210$

$=$ Ksh 240 ✓m_1

Amount $= 240 \times 10\frac{1}{2}$ ✓m_1

$=$ Ksh 2 520 ✓A_1

3. Solve for x in the equation. (3 marks)

$$4^{3x} \times 8 = \left(\frac{1}{32}\right)^{2x-3}$$

$4^{3x} \times 8 = (32^{-1})^{2x-3}$

$(2^2)^{3x} \times 2^3 = (2^{-5})^{2x-3}$ ✓m_1

$2^{6x} \times 2^3 = 2^{-10x+15}$

$2^{6x+3} = 2^{-10x+15}$

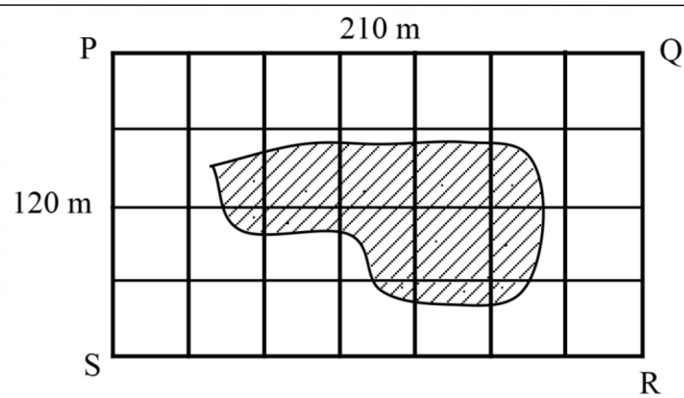
$6x + 3 = -10x + 15$ ✓m_1

$16x = 12$

$x = \frac{12}{16} = \frac{3}{4}$ or 0.75 ✓A_1

4. Solve $-1 \le \frac{5-2x}{3} < 2x-1$, giving the answer as a combined inequality. (3 marks)	
$-3 \le 5 - 2x < 6x - 3$ $-3 \le 5 - 2x$ $2x \le 8$ $x \le 4$ ✓m_1	$5 - 2x < 6x - 3$ $-8x < -8$ $x > 1$ ✓m_1 $1 < x \le 4$ ✓A_1

5. The following figure represents a rectangular farm, PQRS, of length 210 m and with 120 m drawn on a grid of 1 cm squares. The dotted area inside the farm represents a flooded section.



Estimate in m², the area of the farm that is not flooded. (3 marks)

Shaded area $= \left(1 + \frac{12}{2}\right) \text{cm}^2 \times (30 \times 30)\frac{m^2}{\text{cm}^2}$ $= 6\ 300\ m^2$ ✓m_1 **Total Area** $= 210 \times 120 = 25\ 200\ m^2$ **Unflooded Area** $= 25\ 200 - 6\ 300$ ✓m_1 $= 18\ 900\ m^2$ ✓A_1	**ALTERNATIVELY** Unshaded $= 15 + \frac{12}{2} = 21$ ✓m_1 Area $= 21 \times (30 \times 30)$ ✓m_1 $= 18\ 900\ m^2$ ✓A_1

6. A relief organization donated 240 kg of maize and 150 kg of beans to needy families. Each family received exactly the same quantity by mass of either maize or beans. No family received both. Determine the least possible number of the needy families. (3 marks)

$240 = 2^4 \times 3 \times 5$

$150 = 2 \times 3 \times 5^2$

$GCD = 2 \times 3 \times 5 = 30\ Kg$ ✓m_1

Number of families $= \frac{240}{30} + \frac{150}{30}$ ✓m_1

$= 8 + 5$

$=$ 13 families ✓A_1

7. Simplify $\frac{x^2 - 4y^2}{x^2 + 4xy + 4y^2}$ (3 marks)

NUMERATOR

$x^2 - 4y = (x - 2y)(x + 2y)$ ✓m_1

DENOMINATOR

$x^2 + 4xy + 4y^2$

$x^2 + 2xy + 2xy + 4y^2$

$x(x + 2y) + 2y(x + 2y)$

$(x + 2y)(x + 2y)$ ✓m_1

$\frac{N}{D} = \frac{(x - 2y)(x + 2y)}{(x + 2y)(x + 2y)}$

$= \frac{x - 2y}{x + 2y}$ ✓A_1

8. The area of a sector of a circle is 550 cm^2. The sector is curved to form an open cone of radius 7 cm. Calculate the height of the cone. (4 marks)

Curved $S.A = \pi r l$

$\frac{22}{7} \times 7 \times l = 550$ ✓m_1

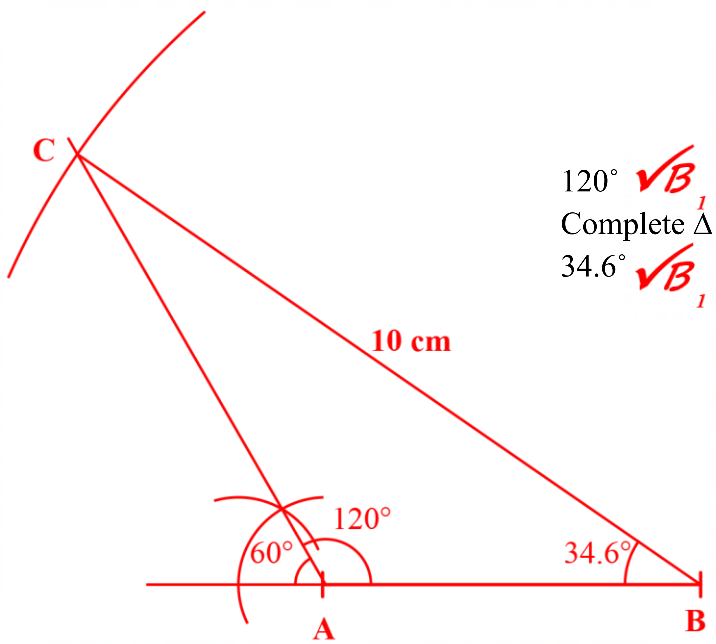
$l = \frac{550}{22} = 25$ cm ✓m_1

$h = \sqrt{25^2 - 7^2}$

$= 24$ cm ✓A_1

9. A clock which loses 18 seconds every hour was set to read the correct time at 8:00 am on Monday. Determine the time, in 12 hour system, the clock will read on the following Saturday at 11:20 am. (3 marks)	
Total time $= 5 \times 24 \Leftrightarrow 120 + 3 + 20$ mins $= 123$ hrs and 20 mins $= 123\frac{1}{3}$ hrs $= \frac{370}{3}$ hrs	$= \frac{370}{3} \times 18$ ✓M_1 $= 2\ 220$ sec $= \frac{2\ 220}{3\ 600} = \frac{37}{60}$ hrs ✓M_1 $= 11:20$ am $- 37$ $10:43$ am ✓A_1

10. In the following figure, line AB = 5 cm is a side of a triangle ABC in which <BAC = 120° and line BC = 10 cm. using a pair of compasses and a ruler, complete triangle ABC and hence measure the size of angle ABC. (3 marks)



120° ✓B_1
Complete Δ ABC ✓B_1
34.6° ✓B_1

11. A shopkeeper bought an item from a wholesaler. If the shopkeeper sells the item for Ksh 2 740, he would make a profit of Ksh $3x$. If the shopkeeper sells that item for Ksh 2 340, he would make a loss of Ksh $2x$. Determine the amount that the shopkeeper paid for the item.

$2\ 740 - 3x = 2\ 340 + 2x$ ✓M_1

$2\ 740 - 2\ 340 = 3x + 2x$

$5x = 400$

$x = 80$ ✓M_1

$2\ 340 + 2(80) =$ Ksh 2 500 ✓A_1

12. The following table shows the frequency distribution of marks scored by students in a Mathematics test. The frequencies for the two classes are not shown. The table also shows the height of each rectangular bar of a histogram drawn to represent the information on the scored by students.

Marks	**10 – 14**	**15 – 19**	**20 – 29**
Frequency	**7**	10 ✓B1	15 ✓B1
Height of bar	**1.4**	**2**	**1.5**

Calculate the missing frequencies. (3 marks)

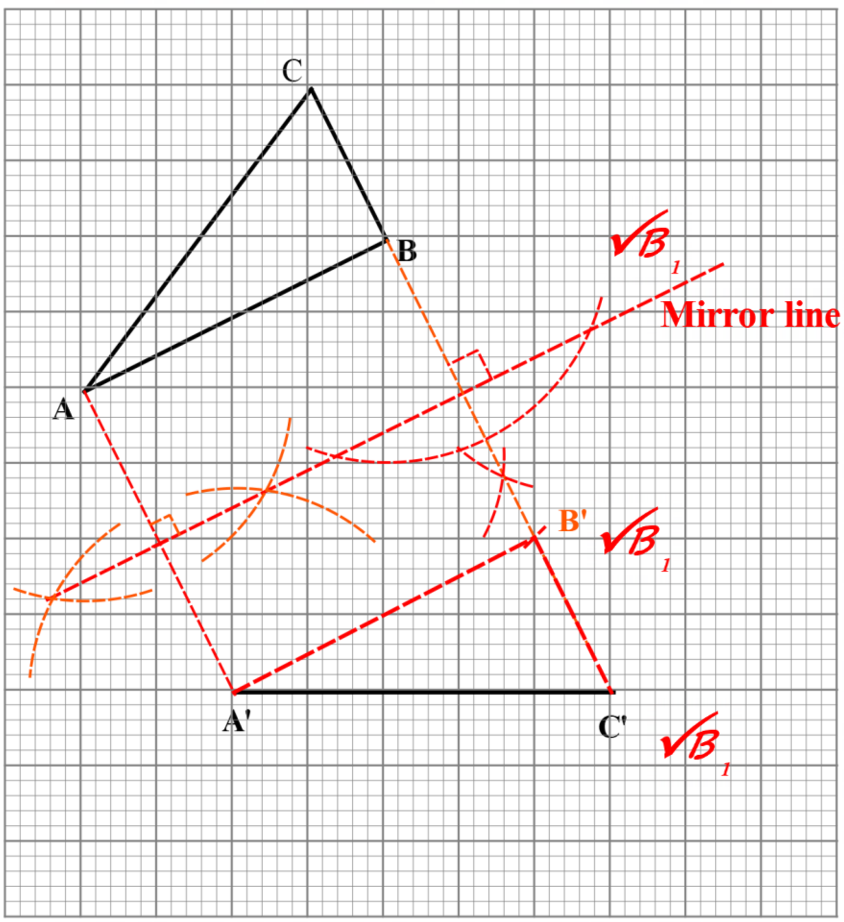
$c.w_1 = 19.5 - 14.5 = 5$

$c.w_2 = 29.5 - 19.5 = 10$ ✓B1

$f_2 = 2 \times 5 = 10$

$f_3 = 1.5 \times 10 = 15$

13. On the following grid, line A′C′ is part of Δ A′B′C′. Triangle A′B′C′ is the image of Δ ABC after a reflection along a mirror line.



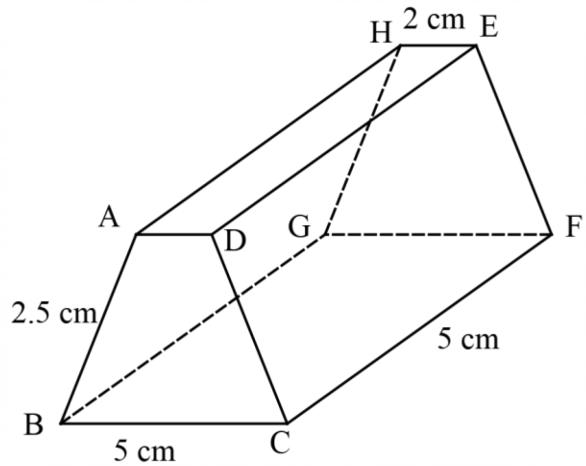
✓B1 Mirror line

✓B1 Point B′

✓B1 ΔA′B′C′

On the same grid, draw the mirror line and hence complete Δ A′B′C′. (3 marks)

14. The figure below represents a prism ABCDEFGH. The cross section of the prism is a trapezium. BC = CF = 5 cm AD = HE = 2 cm and AB = DC = 2.5 cm.

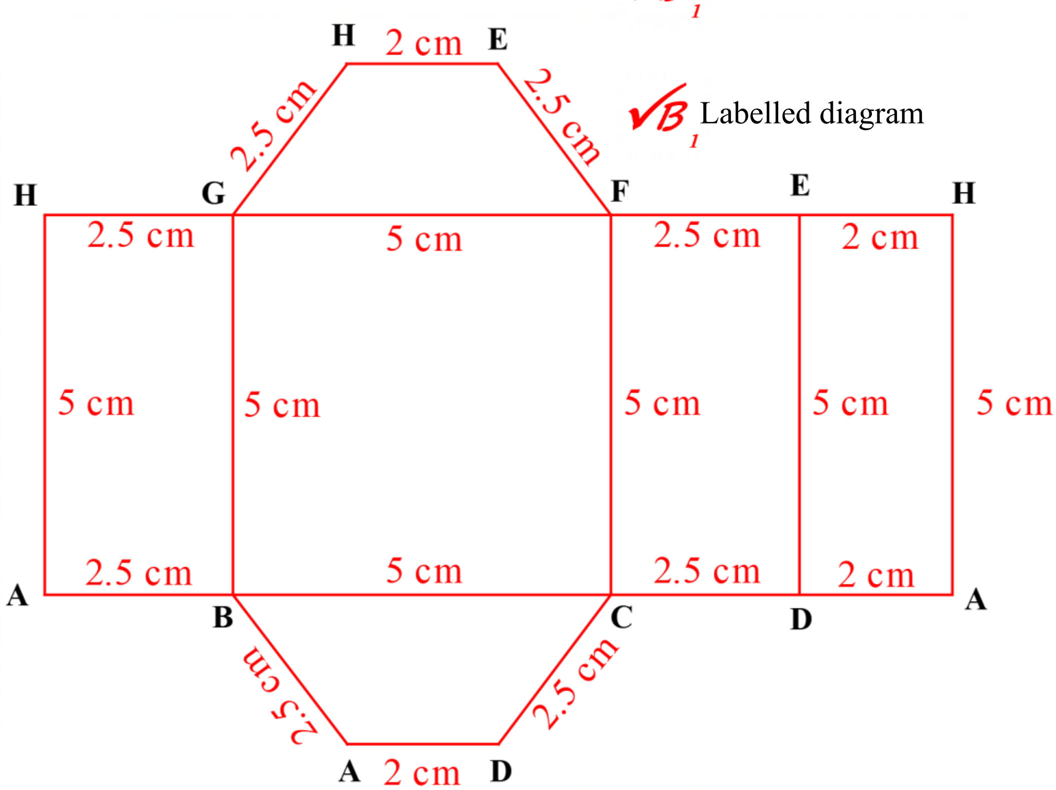


Draw a labelled net of the prism. (3 marks)

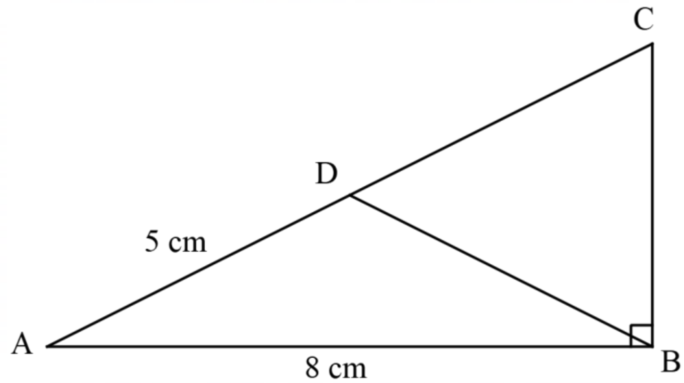
✓B1 Complete diagram

✓B1 Accurate

✓B1 Labelled diagram



15. In the following figure, triangle ABC is right angled at B and AB = 8 cm. D is a point on AC such that AD = 5 cm and the area of triangle ABD = 10 cm^2.



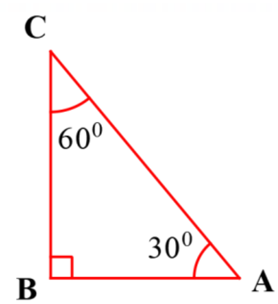
Calculate the length of side BC. (4 marks)

$$10 = \frac{1}{2} \times 5 \times 8 \sin\theta \quad \checkmark m_1$$

$$\sin\theta = \frac{1}{2}$$

$$\theta = \sin^{-1} 0.5$$

$$\theta = 30° \quad \checkmark m_1$$



$$Tan\ 60° = \frac{8}{BC} \quad \checkmark m_1$$

$$BC = \frac{8}{Tan\ 60°}$$

$$= 4.619 \text{ cm} \quad \checkmark A_1$$

16. The quadratic curve $y = 3x^2 - 4x$ passes through the point P(1,-1). Determine the equation of a tangent to the curve at point P leaving the answer in the form $ax + by = c$, where a, b and c are scalars. (3 marks)

$$\frac{dy}{dx} = 6x - 4$$

$$m = 6(1) - 4 = 2 \quad \checkmark m_1$$

$$\frac{2}{1} = \frac{y - (-1)}{x - 1}$$

$$1(y + 1) = 2(x - 1) \quad \checkmark m_1$$

$$y + 1 = 2x - 2$$

$$y = 2x - 3$$

$$-2x + y = -3 \quad \checkmark A_1$$

or

$$2x - y = 3$$

SECTION II (50 marks)

*Answer only **five** questions in this section in the spaces provided.*

17. The road connecting town A to town B is 160 km long. A lorry, travelling at an average speed of 45 km/h, left town A for town B at 11.50 am. At that same time, a car travelling at an average speed of 75 km/h, left town B for town A. The two vehicles met at C, a town along the same road.

(a) Determine:

(i) the time when the two vehicles met. (4 marks)

Relative Speed

$= 45 + 75 = 120 \frac{Km}{h}$

$\text{Time} = \frac{160}{120}$ ✓m_1

$= \frac{4}{3} h$

$= 1\,h\ 20$ mins ✓m_1

TIME

11 : 50 am
+ 01 20
1 3 1 0 hrs
or
= 1 : 10 pm ✓A_1

(ii) the distance, in km, from town A to town C. (2 marks)

$= 45 \times \frac{4}{3}$ ✓m_1

$= 60$ km ✓A_1

(b) The car stopped at town C for a period of 1 hour 40 minutes. The lorry continued with its journey at the same speed of 45 km/h. After the stop, the car left town C for town A and arrived at its destination at the same time as the lorry arrived at B.

Determine the average speed of the car for the journey from town C to town A. (4 marks)

Arrival Time for both

Time taken

$= \frac{100}{45} = \frac{20}{9} = 2\frac{2}{9}$ hrs

$= 2h\ 13mins\ 20sec$

= 1 3 1 0 hrs
+ 0 2 1 3 2 0 ✓m_1
1 5 2 3 2 0 hrs

Departure time for the car from

= 1 3 1 0
+ 0 1 4 0
1 4 5 0 hrs

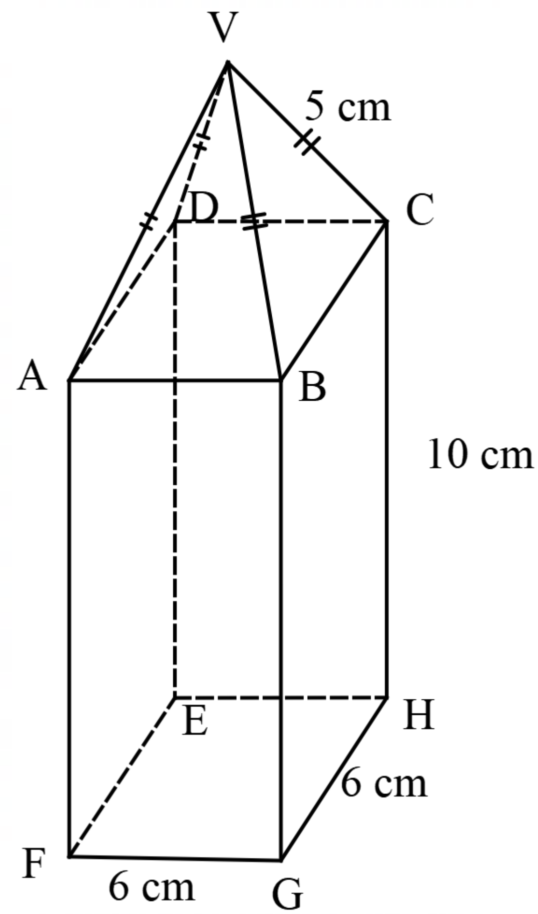
Time taken = 1 5 2 3 2 0
− 1 4 5 0 ✓m_1
3 3 2 0 hrs

$= \frac{5}{9}$ hrs

$\text{Speed} = 60 \div \frac{5}{9}$

$= 108 \frac{km}{h}$ ✓A_1

18. Figure VABCDEFGH shows a solid consisting of a right pyramid mounted on a rectangular block. The right pyramid and the rectangular block have an identical square base of length 6 cm. The height of the rectangular block is 10 cm while VA = VB = VC VD = 5 cm.



(a) Calculate the volume of the solid. (4 marks)

$$OC = \frac{\sqrt{6^2 + 6^2}}{2}$$

$= 3\sqrt{2}$ cm **or** 4.243 cm

$$VO = \sqrt{5^2 - \left(3\sqrt{2}\right)^2}$$

$= 2.646$ cm ✓m_1

Volume ✓m_1 ✓m_1

$$= \left[\frac{1}{3} \times 6 \times 6 \times 2.646\right] + [6 \times 6 \times 10]$$

$= 391.752\ cm^3$ ✓A_1

(b) The solid is cut into two identical halves along the plane of symmetry VAFHCV. Calculate the surface area of one of the pieces. (6 marks)

For Triangles $\Rightarrow$ $VAB + VBC + VAC + FGH$

$$h = \sqrt{5^2 - 3^2} = 4 \text{ cm}$$

$$h = \sqrt{6^2 - 3\left(\sqrt{2}\right)^2} = 4.243 \text{ cm}$$

$$\Rightarrow \left(\frac{1}{2} \times 6 \times 4\right) + \left(\frac{1}{2} \times 6 \times 4\right) \quad \checkmark m_1$$

$$+ \left(\frac{1}{2} \times 8.485 \times 2.646\right) \checkmark m_1 + \left(\frac{1}{2} \times 8.485 \times 4.243\right) \checkmark m_1$$

$$= 12 + 12 + 11.225655 + 18.0009275$$

$$= 53.2265825 \text{ cm}^2 \quad \checkmark m_1$$

For Rectangles $\Rightarrow$ $ABFG + BGHC + CAFH$

$$= (6 \times 10) + (6 \times 10) + (8.485 \times 10)$$

$$= 60 + 60 + 84.85$$

$$= 204.85 \text{ cm}^2 \quad \checkmark m_1$$

Total $= 53.2265825 + 204.85$

$$= 258.0765825 \text{ cm}^2$$

$$\approx 258.1 \text{ cm}^2 \quad \checkmark A_1$$

19. Two lines, L_1 and L_2 are parallel. Line L_3 is perpendicular to both lines L_1 and L_2.	
(a) (i) Line L_1 passes through points A(-3, 6) and B(3, 9). Find the gradient of line L_1.	(2 marks)
$m_1 = \frac{9-6}{3+3}$ ✓m_1 $= \frac{1}{2}$ ✓A_1	
(ii) Line L_2 intersects the x-axis at point C(-5, 0). Determine the equation of L_2 in the form $y = mx + c$.	(2 marks)
$m_1 = m_2 = \frac{1}{2}$ $\frac{1}{2} = \frac{y-0}{x+5}$ ✓m_1 $2(y) = 1(x+5)$ $y = \frac{1}{2}x + 2\frac{1}{2}$ ✓A_1	
(b) Line L_3 intersects lines L_1 and L_2 at points A(-3,6) and P respectively. (i) Determine the equation of L_3 in the form $y = mx + c$.	(3 marks)
$m_3 = -\frac{2}{1}$ $-\frac{2}{1} = \frac{y-6}{x+3}$ ✓m_1 $y - 6 = -2(x+3)$ $y - 6 = -2x - 6$ ✓m_1 $y = -2x + 0$ ✓A_1	
(ii) Determine the coordinates of point P.	(3 marks)
$-2x + 0 = \frac{1}{2}x + 2\frac{1}{2}$ ✓m_1 $-2.5x = 2.5$ $x = -1$, $y = 2$ ✓m_1 $\Rightarrow P(-1, 2)$ ✓A_1	

20. A transporter was contracted to transport 133 tonnes of sand from site A to site B. The transporter used two lorries; a 7-tonne lorry and a 14-tonne lorry. The transporter incurred a cost of Ksh 3 000 per trip for the 7-tonne lorry and Ksh 4 000 per trip for the 14-tonne lorry. The total cost incurred by the transporter was Ksh 47 000.

(a) Given that the 7-tonne lorry made x trips while the 14-tonne lorry, made y trips, write down two equations to represent the information. (2 marks)

$$7x + 14y = 133 \Leftrightarrow x + 2y = 19 \quad \checkmark B_1$$

$$3\,000x + 4\,000y = 47\,000 \Leftrightarrow 3x + 4y = 47 \quad \checkmark B_1$$

(b) Use matrix method to solve the equation in (a). (5 marks)

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 19 \\ 47 \end{bmatrix} \quad \checkmark m_1$$

$$\det = 4 \times 1 - 2 \times 3 = -2$$

$$-\frac{1}{2}\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix} = \begin{bmatrix} -2 & 1 \\ 1.5 & -0.5 \end{bmatrix} \quad \checkmark m_1$$

$$\begin{bmatrix} -2 & 1 \\ 1.5 & -0.5 \end{bmatrix}\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -2 & 1 \\ 1.5 & -0.5 \end{bmatrix}\begin{bmatrix} 19 \\ 47 \end{bmatrix} \quad \checkmark m_1$$

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \end{bmatrix} \quad \checkmark m_1$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \end{bmatrix}$$

x = 9 trips
y = 5 trips $\checkmark A_1$

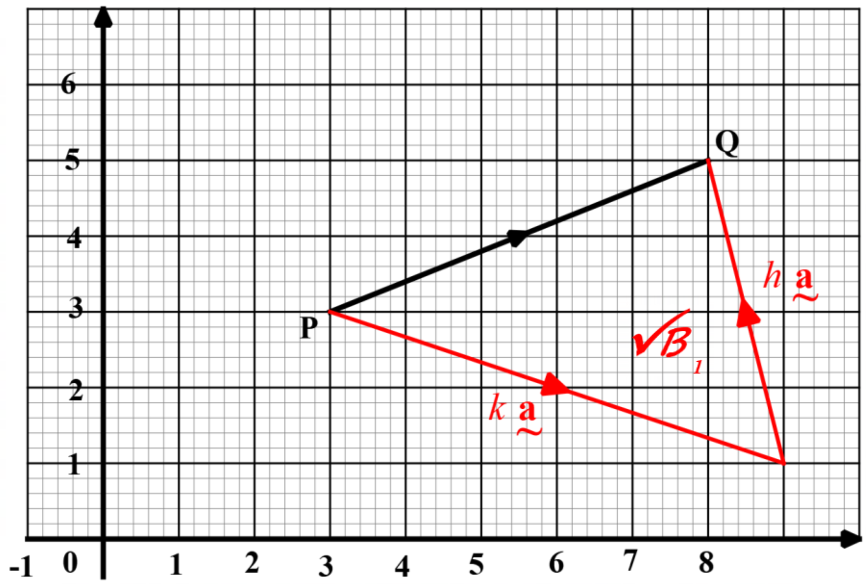
(c) The transporter was paid Ksh 500 per tonne of sand delivered to site B. calculate the amount of profit made by the transporter. (3 marks)

Income $= 500 \times 133$ $\checkmark m_1$
$=$ **Ksh 66 500**

Expenditure $= 3\,000(9) + 4\,000(5)$
$=$ **Ksh 47 000**

Profit $= 66\,500 - 47\,000$ $\checkmark m_1$
$=$ **Ksh 19 500** $\checkmark A_1$

21. In the grid provided, the coordinates of points P and Q are (3, 3) and (8, 5) respectively. Vector **PQ** is also shown.



(a) Express **PQ** as a column vector. (2 marks)

$PQ = \begin{bmatrix} 8 \\ 5 \end{bmatrix} - \begin{bmatrix} 3 \\ 3 \end{bmatrix}$ √m1

$= \begin{bmatrix} 5 \\ 2 \end{bmatrix}$ √A1

(b) Two vectors, $\mathbf{a} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$ are such that $k\mathbf{a} + h\mathbf{b} = \mathbf{PQ}$ where k and h are scalars.

(i) Determine the values of k and h. (4 marks)

$k\begin{bmatrix} 3 \\ -1 \end{bmatrix} + h\begin{bmatrix} -1 \\ 4 \end{bmatrix} = \begin{bmatrix} 5 \\ 2 \end{bmatrix}$ √m1

$3k - h = 5$
$-k + 4h = 2$ √m1

$3k - h = 5$
$3k + 12h = 6$

$11h = 11$

$h = 1$ √B1

$3k - 1 = 5$

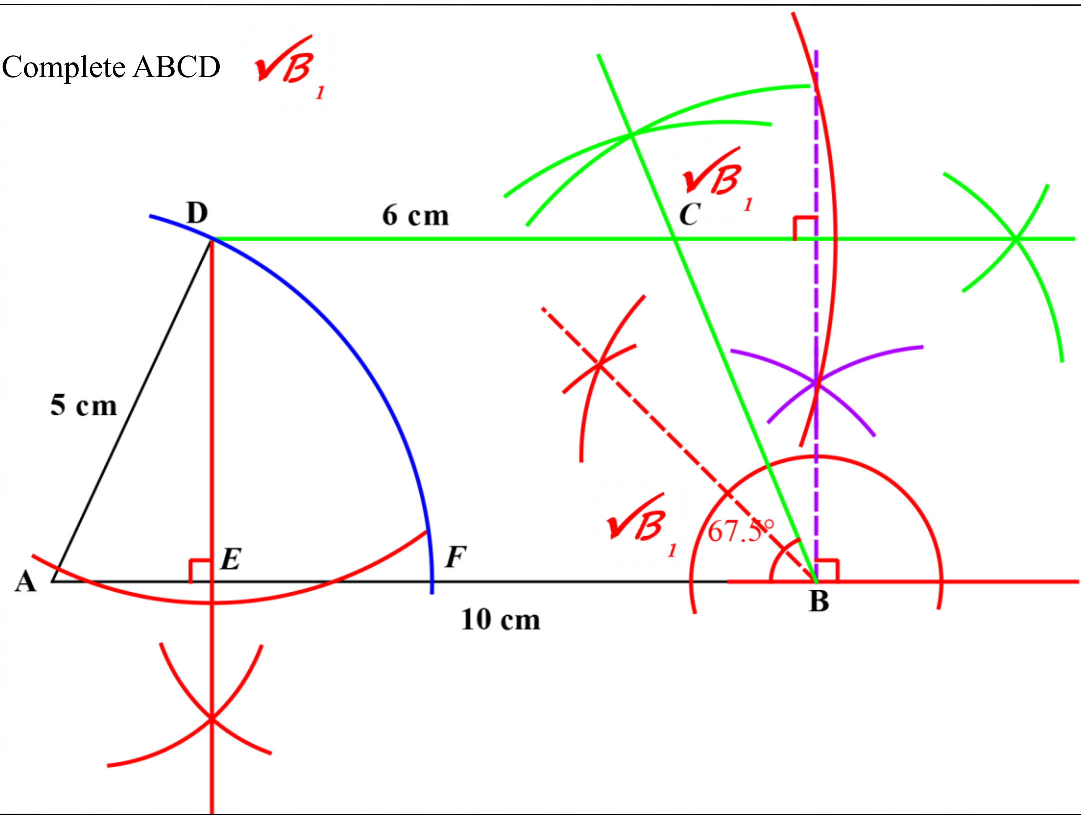
$3k = 6$

$k = 2$ √B1

(ii) On the same grid, from point P, represent by accurate drawing, the sum of vectors $k\mathbf{a}$ and $h\mathbf{b}$. (2 marks)	
$k\underset{\sim}{a} = 2\begin{bmatrix} 3 \\ -1 \end{bmatrix} = \begin{bmatrix} 6 \\ -2 \end{bmatrix}$ $h\underset{\sim}{b} = 1\begin{bmatrix} -1 \\ 4 \end{bmatrix} = \begin{bmatrix} -1 \\ 4 \end{bmatrix}$ } ✓m_1 **On the grid above**	
(c) Determine the magnitude of vector $k\mathbf{a}$. (2 marks)	
$2\begin{bmatrix} 3 \\ -1 \end{bmatrix} = \begin{bmatrix} 6 \\ -2 \end{bmatrix}$ $= \sqrt{6^2 + (-2)^2}$ ✓m_1 $= \sqrt{40}$ $= 2\sqrt{10}$ units $= 6.325$ units } ✓A_1	

22. In the following figure, lines AB = 10 cm and AD = 5 cm are part of a trapezium ABCD in which line AB is parallel to line DC. Angle DAB = 65˚.

Complete ABCD ✓B_1



(a) On the same figure, using a ruler and a pair of compasses only;

(i) complete trapezium ABCD given that <ABC = 67.5˚. Measure the length of line DC; (4 marks)

DC = 6 cm ✓B_1

(ii) drop a perpendicular line from D to meet AB at E. Measure the length of line DE; (2 marks)

DE = 4.5 cm ✓B_1 **Perpendicular from D** ✓B_1

(iii) draw an arc of a circle, center A and radius 5 cm. The clockwise directed arc should join D to a point F on line AB. (1 marks)

Arc DF on the diagram ✓B_1

(b) Calculate the area of trapezium ABCD that lies outside the arc drawn in (a)(iii). (Take π = 3.142) (3 marks)

$$\Rightarrow \left[\frac{1}{2}(6 + 10)\,4.5\right] - \left[\frac{65}{360} \times 3.142 \times 5^2\right] \quad ✓m_1$$

$$= 36 - 14.182639 \quad ✓m_1$$

$$= 21.82\ cm^2 \quad ✓A_1$$

23. The quantity of petrol in litres used by 40 boda boda riders on a particular day is as follows.

1.7	2.9	2.1	2.8	3.6	2.1	1.6	2.8
4.0	2.4	3.1	1.8	2.5	1.9	2.6	3.2
3.1	1.5	3.4	2.9	2.9	3.4	2.1	2.6
3.4	4.1	3.9	4.3	3.7	2.8	2.3	2.7
3.3	2.7	2.4	3.5	2.0	1.5	1.8	2.3

The cost of 1 litre of petrol is Ksh 160.

(a) Starting with 1.5 litres and using a class size of 0.5, draw a frequency distribution table for the data. (2 marks)

Litres	**Tally**	**Freq, *f***	***x***	***fx***	***cf***
1.5 – 1.9	~~////~~ //	**7**	**1.7**	**11.9**	**7**
2.0 – 2.4	~~////~~ ///	**8**	**2.2**	**17.6**	**15**
2.5 – 2.9	~~////~~ ~~////~~ /	**11**	**2.7**	**29.7**	**26**
3.0 – 3.4	//// //	**7**	**3.2**	**22.4**	**33**
3.5 – 3.9	~~////~~	**4**	**3.7**	**14.8**	**37**
4.0 – 4.4	///	**3**	**4.2**	**12.6**	**40**
		$\sum f = 40$		$\sum fx = 109$	

$\checkmark B_1$ $\checkmark B_1$ $\checkmark B_1$ $\checkmark B_1$

(b) Use the frequency distribution table in (a) to estimate:

(i) the mean amount of money spent on petrol by the boda boda riders on that day. (4 marks)

$$x = \frac{\Sigma fx}{\Sigma fx} = \frac{109}{40} = 2.725 \text{ litres}$$ $\checkmark m_1$ $\checkmark m_1$

$$= 160 \times 2.725$$

$$= \text{Ksh } 436$$ $\checkmark A_1$

(ii) the median amount of money spent on fuel by the median boda boda rider. (4 marks)

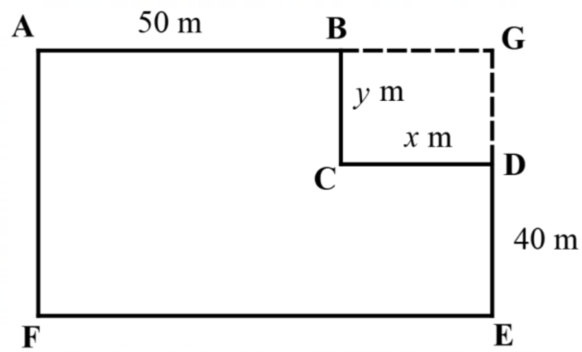
$$\text{median} = 2.45 + \frac{20 - 15}{11} \times 0.5$$ $\checkmark m_1$

$$= 2.677 \text{ litres}$$ $\checkmark m_1$

$$= 2.677 \times 160$$

$$= \text{Ksh } 428.32$$ $\checkmark A_1$

24. The figure ABCDEF represents a plot of land. Length AB = 50 m, BC = y m, CD = x m and DE = 40 m. The figure also shows an adjacent plot of land BCDG. All the angles in figure are right angles.



The owner of plot ABCDEF later purchased plot BCDG. Given that the perimeter of plot BCDG is 60 m:

(a) (i) Write an expression for y in terms of x. (2 marks)

$2x + 2y = 60$ ✓m₁

$y + x = 30$

$y = 30 - x$ ✓A₁

(ii) Write down a simplified expression in x for the area of the entire plot of land AGEF. (3 marks)

$A = (50 + x)(40 + y)$

$= (50 + x)(40 + 30 - x)$ ✓m₁

$= (50 + x)(70 - x)$

$= 3\,500 - 50x + 70x - x^2$ ✓m₁

$= 3\,500 + 20x - x^2$ ✓A₁

(b) (i) Determine the dimensions of plot BGDC that would maximize the size of the entire plot of land AGEF. (3 marks)

$\frac{dA}{dx} = 20 - 2x$

$20 - 2x = 0$ ✓m₁

$x = 10$

$y = 30 - 10 = 20$ ✓m₁

$= 3\,600$

length = $50 + 10 = 60$ m

width = $40 + 20 = 60$ m ✓A₁

(ii) Determine, in m^2, the maximum possible area of plot AGEF. (2 marks)

max A = 60×60 ✓m₁

$= 3\,600$ ✓A₁

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