

SAMPLE PAPER 5: PAPER 2

QUESTION 4 (25 MARKS)

Question 4 (a)

$$l: 2x - 3y + k = 0$$

$$(1, 4) \in l \Rightarrow 2(1) - 3(4) + k = 0$$

$$2 - 12 + k = 0$$

$$-10 + k = 0$$

$$\therefore k = 10$$

Question 4 (b)

$$l: 2x - 3y + 10 = 0$$

$$\text{Slope of } l: m_1 = -\frac{2}{-3} = \frac{2}{3}$$

$$\begin{array}{l} \text{Line: } ax + by + c = 0 \\ \text{Slope } m = -\frac{a}{b} \end{array}$$

$$\text{Slope of } q: m_2 = \frac{2}{3} \quad [\text{Parallel lines: } m_1 = m_2]$$

$$\text{Equation of } q: \text{Point } (5, 2) = (x_1, y_1), m = \frac{2}{3} \quad \boxed{y - y_1 = m(x - x_1)}$$

$$y - 2 = \frac{2}{3}(x - 5)$$

$$3(y - 2) = 2(x - 5)$$

$$3y - 6 = 2x - 10$$

$$0 = 2x - 3y - 4$$

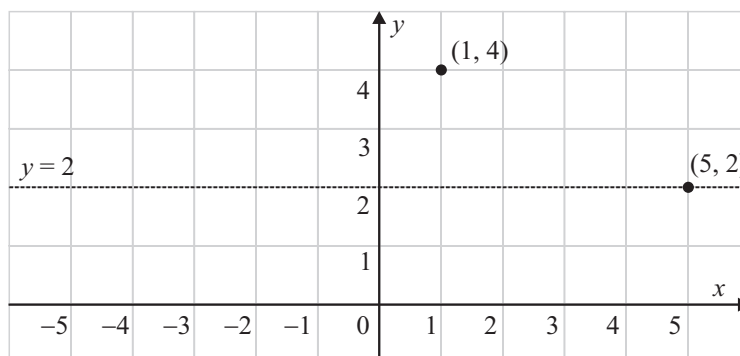
Question 4 (c)

Draw the line $y = 2$. [This is a horizontal line passing through the y -axis at 2.]

The x -axis is highlighted. The equation of the x -axis is $y = 0$.

These two lines are parallel and form opposite sides of the parallelogram.

The other two lines pass through $(1, 4)$ and $(5, 2)$ and are parallel to each other. You can see from the diagram that $(5, 2)$ is one of the vertices. To calculate another vertex, find where q cuts the x -axis by letting $y = 0$.



q cuts x -axis:

$$q: 2x - 3y - 4 = 0$$

$$y = 0: 2x - 3(0) - 4 = 0 \Rightarrow 2x = 4$$

$$\therefore x = 2$$

Second vertex: $(2, 0)$

Find where l cuts the x -axis and the line $y = 2$:

$$l: 2x - 3y + 10 = 0$$

$$y = 0: 2x - 3(0) + 10 = 0 \Rightarrow 2x = -10$$

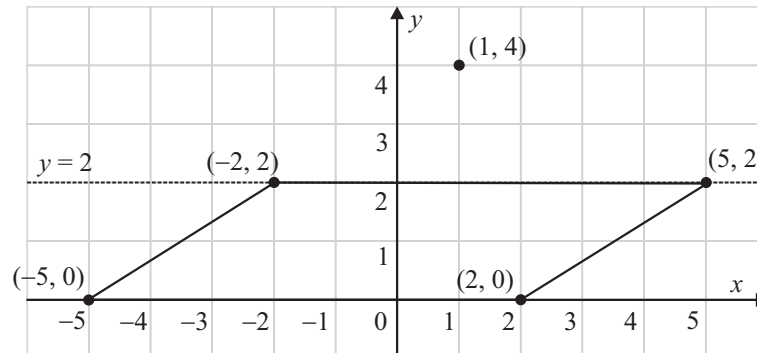
$$\therefore x = -5$$

Third vertex: $(-5, 0)$

$$y = 2: 2x - 3(2) + 10 = 0 \Rightarrow 2x = -4$$

$$\therefore x = -2$$

Fourth vertex: $(-2, 2)$



Vertices: $(-5, 0)$, $(2, 0)$, $(5, 2)$, $(-2, 2)$
