THE LINE (Q 2, PAPER 2)

LESSON NO. 4: SLOPE OF A LINE

2003

2 (b) $a(-2, 2)$, $b(4, 6)$ and $c(0, -4)$ are three points.

p is the midpoint of $[ab]$ and q is the midpoint of $[ac]$.

(i) Find the co-ordinates of p and the co-ordinates of q.

(ii) Plot a, b, c, p and q on a co-ordinate diagram on graph paper. Show the line segments $[bc]$ and $[pq]$ on your diagram.

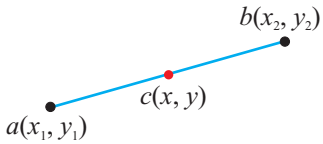
(iii) Using slopes, or otherwise, prove that pq is parallel to bc.

SOLUTION

2 (b) (i)

The formula for the midpoint, c, of the line segment $[ab]$ is:

$$\text{Midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) \quad \ldots\ldots \; 2$$



REMEMBER THE MIDPOINT FORMULA AS: $\text{Midpoint} = \left(\frac{\text{Add the } x\text{'s}}{2}, \frac{\text{Add the } y\text{'s}}{2}\right)$

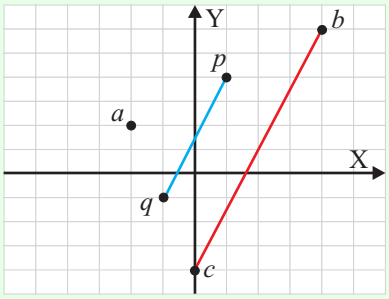
$$\begin{array}{cc} a(-2, 2) & b(4, 6) \\ \downarrow\ \downarrow & \downarrow\ \downarrow \\ x_1\ \ y_1 & x_2\ \ y_2 \end{array}$$

$$\text{Midpoint of } [ab] = \left(\frac{-2+4}{2}, \frac{2+6}{2}\right) = \left(\frac{2}{2}, \frac{8}{2}\right) = p(1, 4)$$

$$\begin{array}{cc} a(-2, 2) & c(0, -4) \\ \downarrow\ \downarrow & \downarrow\ \downarrow \\ x_1\ \ y_1 & x_2\ \ y_2 \end{array}$$

$$\text{Midpoint of } [ac] = \left(\frac{-2+0}{2}, \frac{2-4}{2}\right) = \left(\frac{-2}{2}, \frac{-2}{2}\right) = q(-1, -1)$$

2 (b) (ii)



CONT....

2 (b) (iii)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$ 3

REMEMBER IT AS:

Slope $m = \dfrac{\text{Difference in } y\text{'s}}{\text{Difference in } x\text{'s}}$

Parallel lines have the same slope.

$$\begin{array}{cccc} b(4, & 6) & c(0, & -4) \\ \downarrow & \downarrow & \downarrow & \downarrow \\ x_1 & y_1 & x_2 & y_2 \end{array}$$

Slope of bc: $m = \dfrac{-4-6}{0-4} = \dfrac{-10}{-4} = \dfrac{5}{2}$

$$\begin{array}{cccc} p(1, & 4) & q(-1, & -4) \\ \downarrow & \downarrow & \downarrow & \downarrow \\ x_1 & y_1 & x_2 & y_2 \end{array}$$

Slope of pq: $m = \dfrac{-1-4}{-1-1} = \dfrac{-5}{-2} = \dfrac{5}{2}$

As the slope of bc and pq are equal, lines pq and ab are parallel.