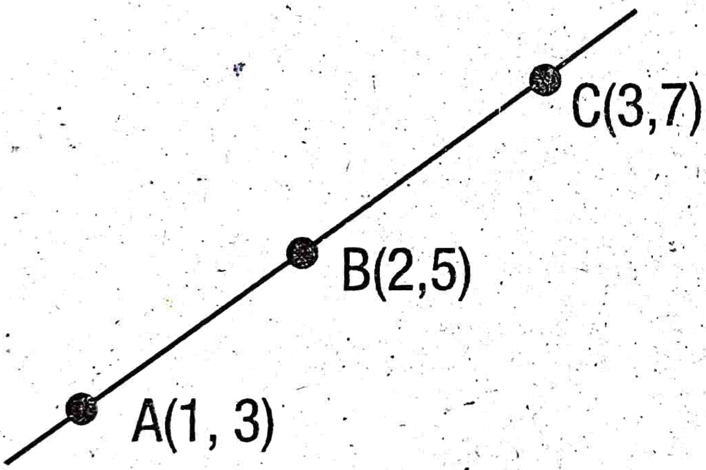
Activities (Page 227)

1. Prove that the points (1, 3), (2, 5), (3, 7) are on the same line.



When x coordinate changed from 1 to 2,
the change in x is 1.
When y coordinate changed from 3 to 5,
the change in y is 2.
That means if the change in x coordinate is 1, change in y coordinate is 2.
If x changed 1 from 2, it becomes 3.

If y changed 2 from 5, it becomes 7.

So (3, 7) is a point on this same line.

2. **Find the coordinates of two more points on the line joining (–1, 4) and (1, 2).**

(–1, 4) and (1, 2) are two points on a line.

The change in $x = 1 - (-1) = 1 + 1 = 2$

The change in $y = 2 - 4 = -2$. That means as x increases by 2, y should decrease by 2.

Another point on this line = (1 + 2, 2 – 2) = (3, 0)

Another point = (3 + 2, 0 – 2) = (5, –2)

Note: As x increases by 2, y decreases by 2.

So as x increases by 1, y decreases by 1.

Thus (1 + 1, 2 – 1) = (2, 1)

(–1 + 1, 4 – 1) = (0, 3) are also points on the same line.

3. **$x_1, x_2, x_3, \ldots$ and $y_1, y_2, y_3 \ldots$ are arithmetic sequences. Prove that all points with coordinates in the sequence $(x_1, y_1), (x_2, y_2), (x_3, y_3) \ldots$ of number pairs, are on the same line.**

$x_1, x_2, x_3, \ldots$ are in the arithmetic sequence.

So if d is the common difference of this sequence,

$x_2 = x_1 + d$

$x_3 = x_1 + 2d = x_2 + d$

$x_4 = x_1 + 3d = x_3 + d$

....

$y_1, y_2, y_3, \ldots$ are in arithmetic sequence. So if e is the common difference of this sequence.

$y_2 = y_1 + e$

$y_3 = y_1 + 2e = y_2 + e$

$y_4 = y_1 + 3e = y_3 + e$

....

As x coordinate change by d, y coordinate change by e.

When $x_3 = x_2 + d$ then $y_3 = y_2 + e$. So points (x_1, y_1), (x_2, y_2) and (x_3, y_3) are on the same line.

When $x_4 = x_3 + d$ then $y_4 = y_3 + e$. So the point (x_4, y_4) is also on the same line.