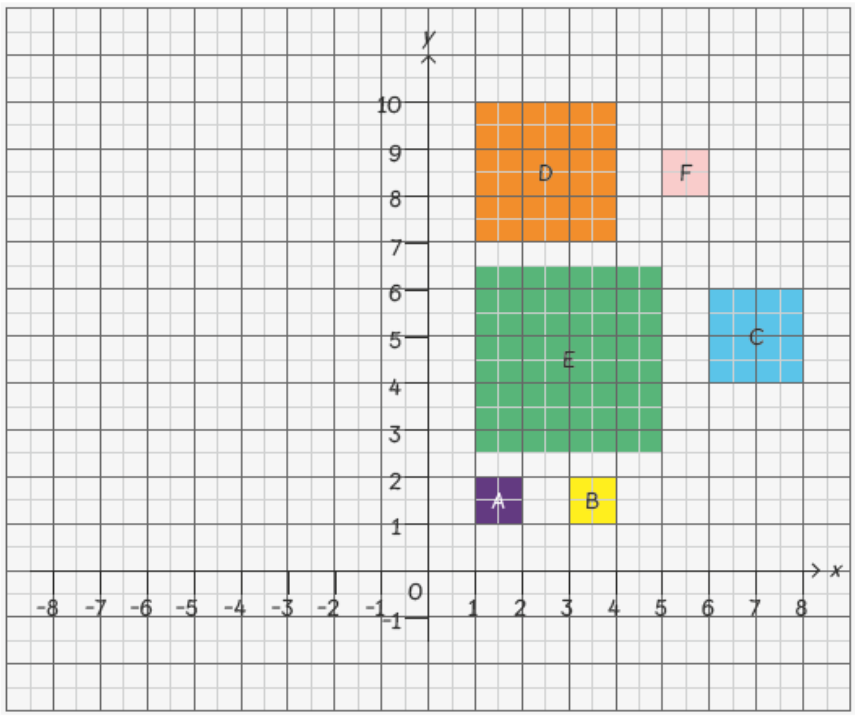
Lesson 9

# Using Algebra to Describe Position

**In Focus**




drew squares on the coordinate grid. Given the coordinates of a square's vertex, is it possible to work out the coordinates of the opposite vertex?

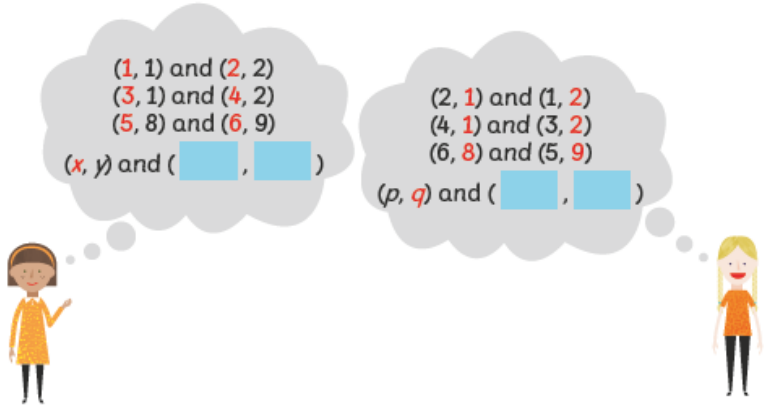


Look at Square A. If the coordinates of A's vertex is (1, 1), what would be the coordinates of the diagonally opposite vertex? What would be the coordinates of the other pair of diagonally opposite vertices? Can you find the two pairs of coordinates for each of the 1 by 1 squares, A, B and F? Organise the coordinates systematically using a table.
Once you have completed the table, can you see a pattern emerging in the pairs of coordinates. Describe the pattern by using (x, y) for the first vertex, and ask them what would be the diagonally opposite vertex's coordinates in terms of x and y. Then use (p, q) for the other two pairs of coordinates. Do the same for Squares B and F. Think about how we used algebra before. You might find it challenging to apply it on coordinates but you can always go through ‘Let’s learn’ which explains it clearly.

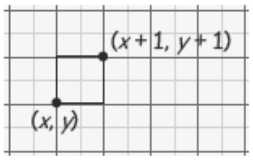
## Let's Learn

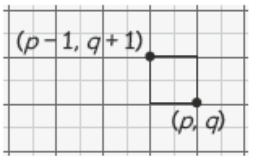
**1** Complete the table and observe a pattern.

| square | coordinates of opposite vertices | |
|---|---|---|
| | (1, 1) and (2, 2) | (2, ☐) and (1, ☐) |
| | (3, 1) and (4, 2) | (4, ☐) and (3, ☐) |
| | (5, 8) and (6, 9) | (6, ☐) and (5, ☐) |

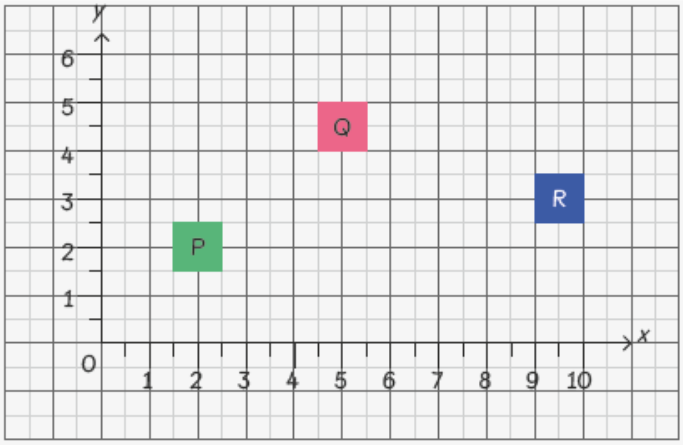



For 1 by 1 squares drawn this way, the coordinates of the opposite vertices are:



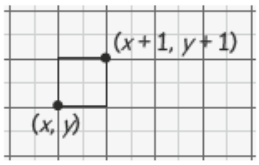



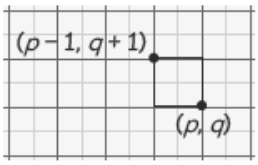
**2** Complete the table and observe a pattern.



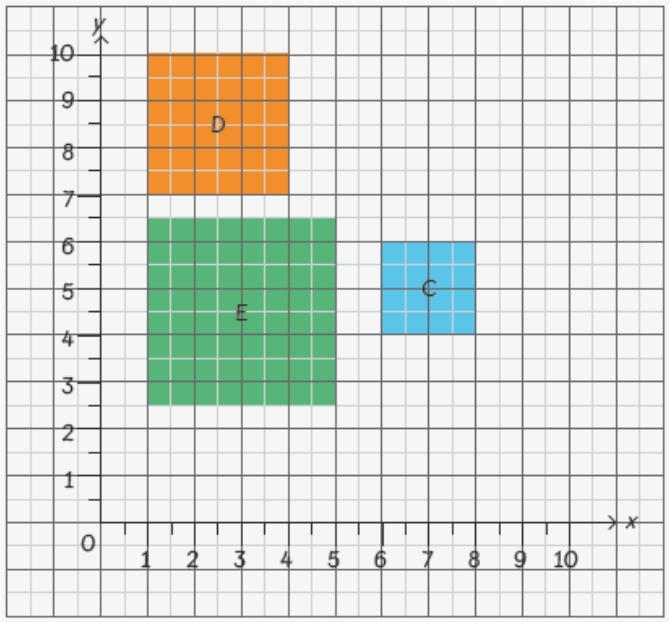

| square | coordinates of opposite vertices | |
|---|---|---|
| P | $(1\frac{1}{2}, 1\frac{1}{2})$ and $(2\frac{1}{2}, 2\frac{1}{2})$ | $(2\frac{1}{2}, 1\frac{1}{2})$ and $(1\frac{1}{2}, 2\frac{1}{2})$ |
| Q | $(4\frac{1}{2}, 4)$ and $(5\frac{1}{2}, 5)$ | $(5\frac{1}{2}, 4)$ and $(4\frac{1}{2}, 5)$ |
| R | ( , $2\frac{1}{2}$) and ( , $3\frac{1}{2}$) | (10, ) and (9, ) |
| S | $(x, y)$ and ( , ) | $(p, q)$ and ( , ) |

For squares drawn this way, the coordinates of the opposite vertices are:

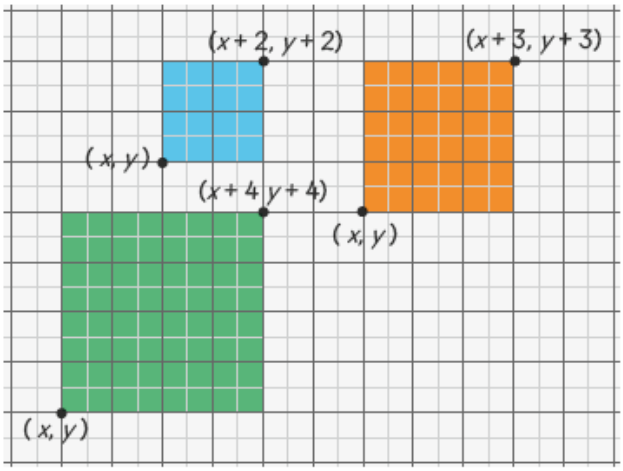


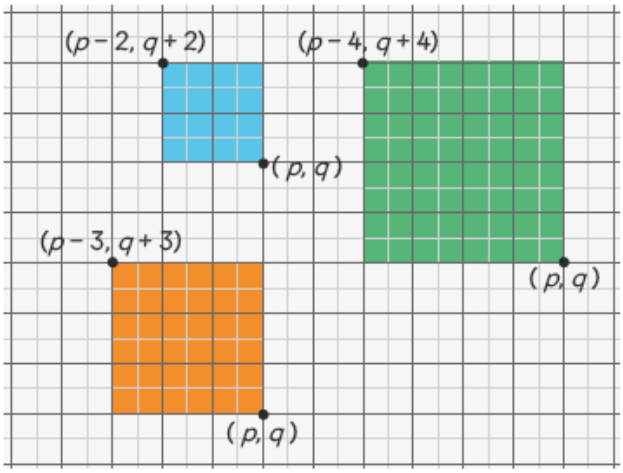



**3** Complete the table and observe a pattern.




| square | coordinates of opposite vertices | |
|---|---|---|
| | (6, 4) and (8, 6) | (8, 4) and (6, 6) |
| | ( , 7) and ( , 10) | (4, ) and (1, ) |
| | ( , $2\frac{1}{2}$) and ( , $6\frac{1}{2}$) | (5, ) and (1, ) |

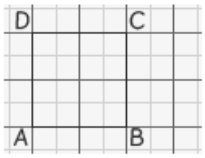

(x + 2, y + 2)
(x + 3, y + 3)
(x, y)
(x + 4, y + 4)
(x, y)
(x, y)


(p − 2, q + 2)
(p − 4, q + 4)
(p, q)
(p − 3, q + 3)
(p, q)
(p, q)


Is there a pattern?

## Guided Practice

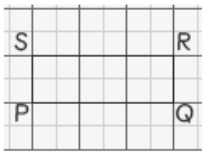
**1** The sides of the square are 2 units.




A is $(a, b)$.

Find the coordinates of the other three vertices.

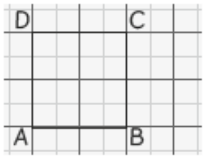
**2** The sides of the rectangle are 1 unit and 3 units.




P is $(x, y)$.

Find the coordinates of the other three vertices.

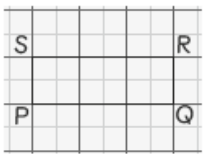
**3**




D is $(5, t)$.

Find the coordinates of the other three vertices.

**4**




R is $(m, n)$.

Find the coordinates of the other three vertices.

Complete Worksheet **9** – Page **144 – 145**