Key Vocabulary
translate
translation

| reflect |
| :---: |
| reflection |
| up |
| down |
| right |

left
coordinates
quadrant
x-axis
$y$-axis
horizontal
vertical

## Four Quadrants

Coordinates can use positive and negative numbers.
Whether positive or negative, the x-axis coordinate is written first, followed by the $y$-axis coordinate.


Look at the circle. It is 3 units along the $x$-axis and 4 down the $y$-axis. Its coordinates are $(3,-4)$.

## Completing Shapes

Using the properties of a shape, a polygon can be completed on a grid.

To make a square, think of the square's properties.


To make a right-angled triangle, think of the triangle's properties.

A right-angled triangle should have three sides with one $90^{\circ}$ angle.
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All of a square's sides are the same length. If the completed sides are 2 units in length, the missing point must complete two more sides of 2 units.


## Translation

A shape is translated when it is moved without being rotated or resized. Every point of the shape moves the same distance and in the same direction.


Shape 1 has been translated 4 units left and 3 units down.

## Reflections

A shape is reflected when it is flipped over a line which acts as a mirror. Every point on the original shape is the same distance from the mirror line as the same point on the reflected shape. The original triangle has been reflected in the $x$-axis and in the $y$-axis.


## Missing Coordinates

Shapes can be shown on unmarked grids.
b

Point $a$ is in the same position along the $x$-axis as $(5,2)$ and in the same position on the $y$-axis as $(7,9)$.
Point a $(5,9)$
Point $b$ is in the same position on the $y$-axis as $(10,4)$. Both triangles will have the same width. The width of the right-hand triangle is 3 . This means that the width of the left-hand triangle is also 3 .

Point b (2,4)

