Year 8 - Unit 9: Coordinates & Straight Line Graphs

Learning Journey:

Prior Learning
- Plot and read coordinates in all four quadrants.
- Substitute values into simple algebraic expressions and solve one-step equations.

Next Steps
- Calculate gradients and use them to compare and interpret straight-line graphs.
- Solve problems involving parallel and perpendicular lines and explore graphs of non-linear functions.

By the end of this unit, you should be able to:
- Calculate the midpoint of a line segment and solve problems involving coordinates.
- Plot straight-line graphs and determine the equation of a line from its graph.

Keywords:

Coordinate – A pair of numbers showing a point's position.
Midpoint – The point halfway between two coordinates.
Axis – A reference line used on a graph.
Gradient – The steepness of a straight line.
Intercept – The point where a graph crosses an axis.
Linear graph – A straight-line graph representing a linear equation.

Calculating midpoints of coordinates

If the points $A(x_1, y_1)$ and $B(x_2, y_2)$ are the endpoints of a line segment, then the midpoint of the line segment joining the points A and B is $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$.

Find the midpoint of the line segment joining the points $(0, 6)$ and $(4, 10)$.

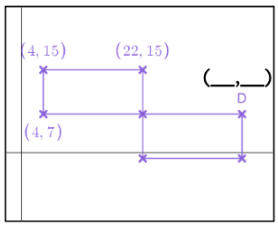
Find the average of the **x** coordinates $\frac{0+4}{2} = \frac{4}{2} = 2$

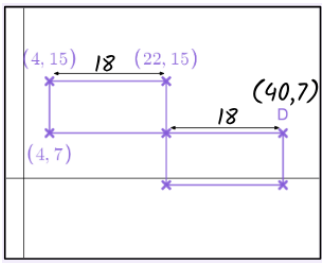
Find the average of the **y** coordinates of the two endpoints. $\frac{6+10}{2} = \frac{16}{2} = 8$

Write down the coordinates of the point. $(2, 8)$

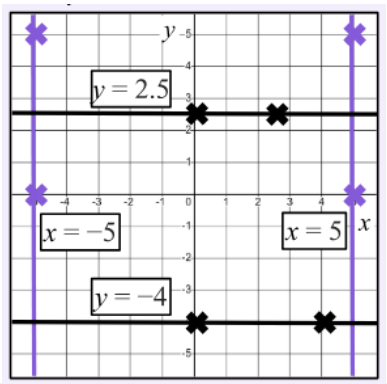
Problem solving with coordinates

These two rectangles are the same size. Work out the missing coordinate D.





Plotting horizontal and vertical lines

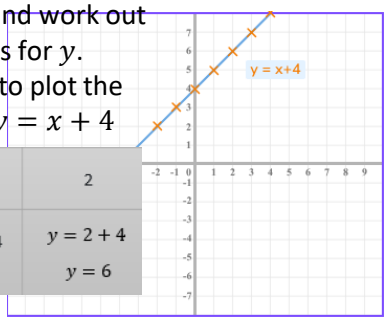


Plotting straight line graphs

To plot straight line graphs, we need to substitute values for x into the equation for the graph and work out the corresponding values for y.

E.g. Complete the table to plot the graph of the equation. $y = x + 4$

x	0	1	2
$y = x + 4$	$y = 0 + 4$ $y = 4$	$y = 1 + 4$ $y = 5$	$y = 2 + 4$ $y = 6$



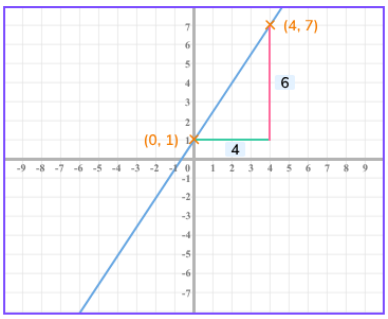
Finding equations of straight-line graphs from the graph

A **straight line graph** is a visual representation of a linear function.

A straight line has a general equation of

$$y = mx + c$$

gradient — y-intercept



Find the equation of the line:

m=6/4 =3/2

So the gradient of the line is $m = \frac{3}{2}$.

It crosses through the y axis at 1.

So equation of the line is y =3/2 x + 1