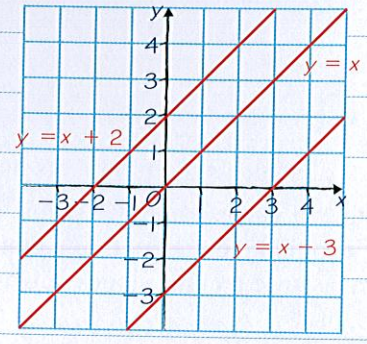
Had a look ☐ Nearly there ☐ Nailed it! ☐

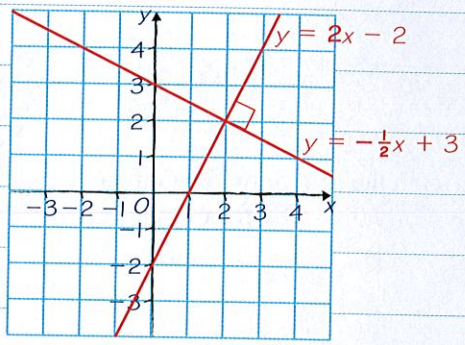
A* A B C D

Parallel and perpendicular

PARALLEL lines have the same gradient.
These three lines all have a gradient of 1.



PERPENDICULAR means at right angles.
If a line has gradient m then any line perpendicular to it will have gradient $-\frac{1}{m}$.

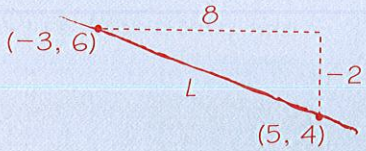


Worked example

grade A

A line L passes through the points $(-3, 6)$ and $(5, 4)$.
Another line, P, is perpendicular to L and passes through the point $(0, -7)$. Find the equation of line P.

Gradient of line L
$= \frac{-2}{8} = \frac{-1}{4}$



Gradient of line P
$= \frac{-1}{\frac{-1}{4}} = 4$

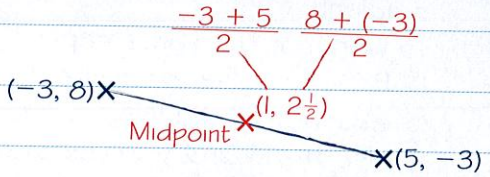
P passes through $(0, -7)$
Equation of P is: $y = 4x - 7$

1. Draw a sketch to find the gradient of line L.
2. The line slopes down so the gradient is negative.
3. Use $-\frac{1}{m}$ to calculate the gradient of P. If m is a fraction, you can just find its reciprocal and change the sign.
4. You know P passes through $(0, -7)$. Use $m = 4$ and $c = -7$ to write the equation of line P.

Check it!
If two lines are perpendicular the product of their gradients is -1: $-\frac{1}{4} \times 4 = -1$ ✓

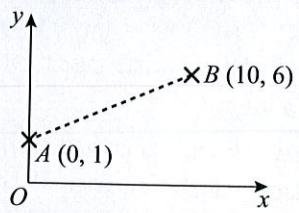
Midpoints

A LINE SEGMENT is a short section of a straight line.
You can find the MIDPOINT of a line segment if you know the coordinates of the ends.
Coordinates of midpoint = (average of x-coordinates, average of y-coordinates)



Now try this

edexcel



A is the point $(0, 1)$.
B is the point $(10, 6)$.

The equation of the straight line through A and B is $y = \frac{1}{2}x + 1$

(a) Write down the equation of another straight line that is parallel to AB. **(1 mark)**

(b) Write down the equation of another straight line that passes through the point $(0, 1)$. **(1 mark)**

(c) Find the equation of the line perpendicular to AB passing through B. **(2 marks)**

grade B

grade A