What do I need to be able to do?

By the end of this chapter you should be able to:

- Calculate the gradient of a line
- Understand the link between the equation of a line and its gradient and y-intercept
- Find the equation of a line
- Find the points of intersection of straight lines
- Know and use the rules for parallel and perpendicular gradients
- Solve length and area problems
- Use straight line graphs to construct mathematical models

Parallel or perpendicular?

Parallel lines — have the same gradient

Perpendicular lines — the product of the gradients is -1 (the gradients are negative reciprocals of each other)

Finding the distance between two point

Find the distance between (x_1, y_1) and (x_2, y_2) - Pythagoras' theorem

$$Distance = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Sketching a straight line

IF you are given two points on the line, plot them and draw a line going through them

If you are given the equation in the form y=mx+c plot the y intercept and then use the gradient to find additional points and join up

If you are given the equation in the form ax+by+c=0, find the x intercept (sub in y=0) and the y intercept (x=0), plot and join

Mathematical modelling

ALWAYS interpret your gradient and y intercept in the context of the question!

Y12 – Chapter 5 Straight line graphs

Key words:
- Gradient — How steep a line is
- Y-intercept — The point where a line or curve crosses the y-axis of a graph
- Parallel — Always the same distance apart and never touching
- Perpendicular — At right angles (90°) to
- Linear equation — An equation that makes a straight line when it is graphed

The equation of a straight line

There are several ways you can write an equation of a straight line:

Form	Why it's useful
$y = mx + c$	The most commonly used form where m is the gradient and c the y-intercept
$y - y_1 = m(x - x_1)$	When you have the gradient and a single point on the line; substitute them in for m, y_1 and x_1 - rearrange if necessary
$ax + by + c = 0$	Useful when the gradient is a fraction and you want integer values

Finding the gradient of a straight line

The gradient (m) of the line that joins the points (x_1, y_1) and (x_2, y_2) use the formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Finding the point of intersection

Use simultaneous equations either by elimination or substitution

Pure Maths Year 1/AS