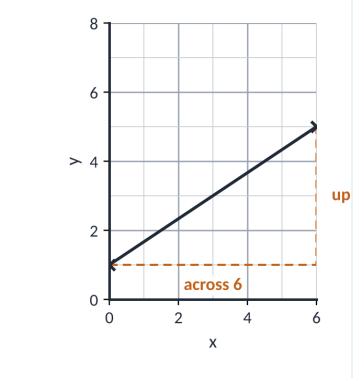
Lesson 1 — Straight lines: gradient, equation, parallel and perpendicular (Worksheets 1 and 2)

Key words

Word	What it means	Example
Gradient	How steep the line is: up ÷ across. A rate of change.	£ per hour
y intercept	Where the line crosses the yaxis. The starting or fixed value.	c in y = mx + c
Parallel	Same gradient.	y = 3x + 1 and y = 3x − 4
Perpendicular	At right angles. The gradients multiply to −1.	2 and −1/2

Reading a line



gradient = up ÷ across

Here: up 4, across 6.

Divide, then simplify the fraction.

The y intercept is where the line meets the yaxis.

Write y = mx + c.

Through (2, 1) and (6, 9)

1. Gradient = up ÷ across = (9 − 1) ÷ (6 − 2). **m = _____**
2. Put one point into y = mx + c. **1 = 2 × 2 + c**
3. Solve for c, then write the equation. **c = _____, y = 2x − 3**

Perpendicular to y = 4x − 3, through (8, 1)

1. Flip the gradient and change the sign. **m = _____**
2. Put (8, 1) into y = mx + c. $1 = -\frac{1}{4} \times 8 + c$
3. Solve for c. **c = _____**

Real-life meaning

On a graph	In a story
y intercept	the fixed charge or start
gradient	the rate: £ per hour, litres per minute
negative gradient	going down, e.g. a tank emptying

Common mistakes (and sentence starters)

- Subtract the y values and the x values in the SAME order.
- Perpendicular: flip AND change the sign. The gradient of y = 2x + 3 is 2, not 3.
- Start: "The gradient is … because the line goes up … for every … across."

Lesson 2 — Distance–time and velocity–time graphs (Worksheets 3 and 4)

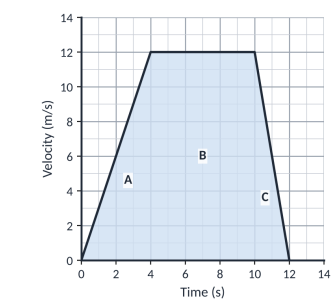
Key words

Word	What it means	Example
Speed	Distance ÷ time. The gradient of a distance–time graph.	36 km in 2 hours
Average speed	TOTAL distance ÷ TOTAL time, including stops.	not the mean of speeds
Acceleration	Change in velocity ÷ time. The gradient of a velocity–time graph.	m/s^2
Deceleration	Slowing down: a negative acceleration.	$-3\ m/s^2$

12 km in 20 minutes: speed

1. Change the minutes to hours. **20 ÷ 60 = _____ hour**
2. Speed = distance ÷ time. $12 \div \frac{1}{3} = _____\ km/h$

Area under a velocity–time graph



gradient = acceleration

area = distance

Split the shape: A is a triangle, B a rectangle, C a triangle.

Distance from the graph (A, B and C)

1. A: ½ × 4 × 12. B: 6 × 12. **A = _____, B = 72**
2. C: ½ × 2 × 12. **C = _____**
3. Add the areas. **distance = _____ metres**

Common mistakes (and sentence starters)

- Change minutes to hours BEFORE you divide. 1 hour 30 minutes is 1.5 hours, not 1.3.
- A flat line on a distance–time graph means stopped. On a velocity–time graph it means constant speed.
- Start: "The area under the graph is the distance, so ..."
- Check before you finish: I showed my working, my answer has units (km/h, m/s, m/s^2, metres) and it makes sense for the story.