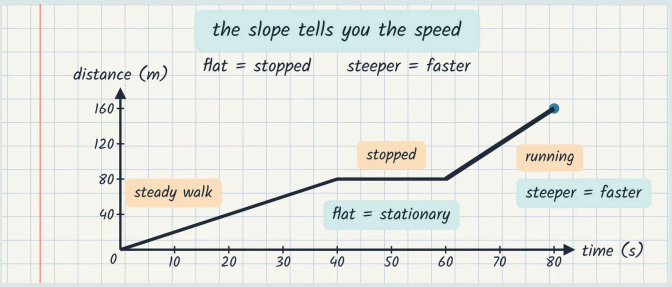
Distance–time graphs

reading the shape, speed from the gradient, drawing one, tangents

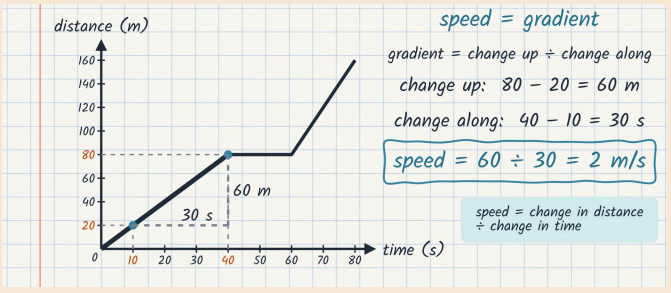
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Summary sheet

1 Reading the shape



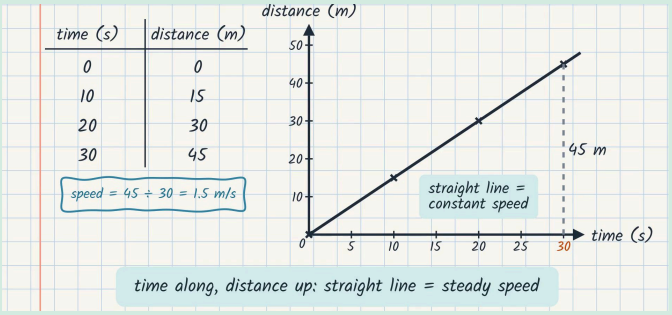
- A **distance–time graph** shows how far something has travelled at each moment: time along the bottom, distance up the side. It is **not a picture of the path**.
- The **slope tells you the speed**: a **flat** line means **stationary**, and a **steeper** line means **faster**.

2 Finding speed



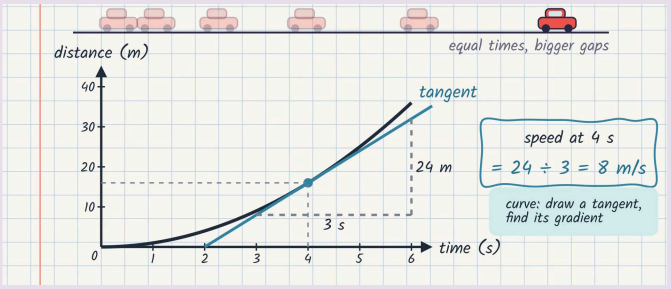
- **Speed = gradient = change in distance ÷ change in time** (change up ÷ change along).
- Example: 20 m to 80 m is 60 m up; 10 s to 40 s is 30 s along. Speed = 60 ÷ 30 = **2 m/s**. Use the changes, not one reading.

3 Drawing the graph



- Measure the distance at regular times. Put **time on the x-axis** and **distance on the y-axis**, plot each point, then join them.
- A **straight line** means a **constant speed**: 45 m in 30 s is 45 ÷ 30 = **1.5 m/s**, a typical walking speed.

4 Curves (Higher)



- When something **speeds up**, the line **curves upwards**, getting steeper: the speed is different at every moment.
- For the speed at one moment, draw a **tangent** (a straight line touching the curve at that point only) and find its gradient: 24 m ÷ 3 s = **8 m/s**.

speed = gradient

change in distance ÷ change in time

Exam tip

Divide the change up by the change along (distance ÷ time). Dividing the other way round is a common slip.

Check yourself

- 1 What does a horizontal line on a distance–time graph mean?
- 2 A line goes from 0 m at 0 s to 120 m at 20 s. What is the speed?

Answers: 1. The object is stationary (not moving) 2. 120 ÷ 20 = 6 m/s