Planner

Using graphs

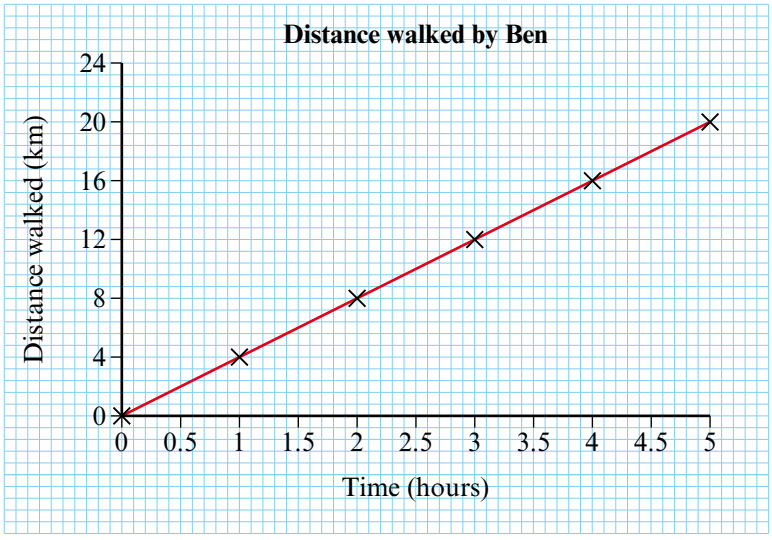
- Interpreting distance–time graphs
- Drawing graphs based on real situations
- Giving plausible explanations for the shapes of graphs

Keywords

You should know

explanation 1a | explanation 1b | online

1 The distance–time graph shows the distance Ben walked at a constant speed.



a How far did Ben walk in 5 hours?

b What was Ben's speed in kilometres per hour?

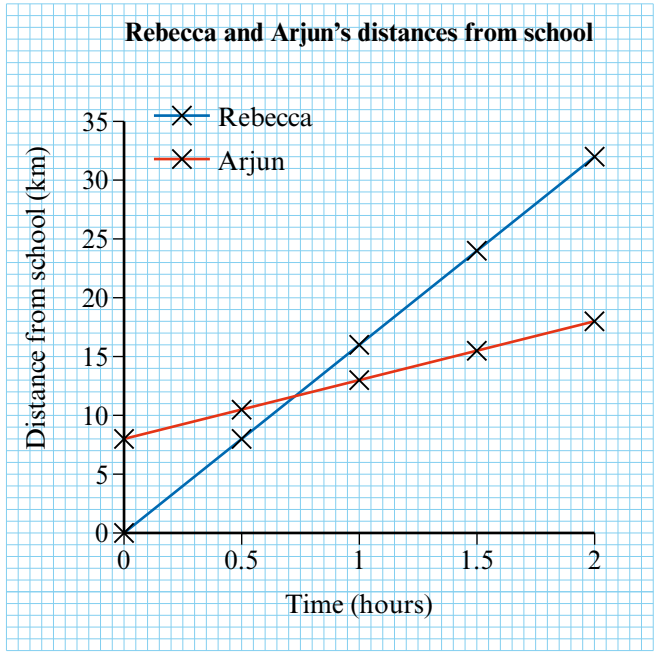
c Write an equation that links the distance Ben walked (d km) and the time he took (t hours).

d Ben continued to walk at this speed. Use your equation from part **c** to calculate how far Ben walked in 8 hours.

e Ben is going to do a walk for charity. The distance he has to walk is 34 km.

Estimate how long he will take to walk the 34 km.

2 Rebecca was at school and Arjun was at his house 8 km away.
Rebecca started cycling towards Arjun at a steady speed.
At the same time, Arjun started walking in the same direction at a steady speed.
This distance–time graph shows their distances from school.



a From the graph, estimate how long it took Rebecca to overtake Arjun.

b Explain how you arrived at your answer to part **a**.

c How far did Rebecca cycle in 2 hours?

d What was Rebecca's speed in kilometres per hour?

e How far did Arjun walk in 2 hours?

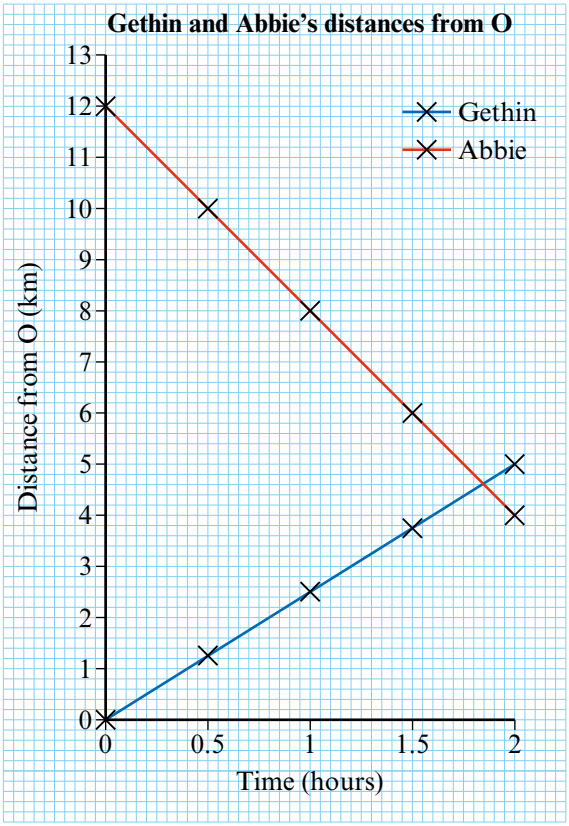
f What was Arjun's speed?

g Write an equation that links Rebecca's distance from school (r km) with time (t hours).

h Write an equation that links Arjun's distance from school (a km) with time (t hours).

i When Rebecca overtakes Arjun, they are the same distance from school, so $r = a$. By solving an equation, calculate the time that Rebecca took to overtake Arjun. Give your answer to the nearest minute.

3 Gethin and Abbie were 12 km apart. They started walking at the same time and walked towards each other. Gethin set off from point O. The distance–time graph shows their distances from O.



a What do straight lines mean on a distance–time graph?

b How far had Gethin travelled after 2 hours?

c What was Gethin's speed?

d Write an equation that links Gethin's distance from O (g km) with time (t hours).

e What was Abbie's speed?

The equation that links Abbie's distance from O (a km) with time (t hours) is $a = 12 - 4t$.

f How far apart were Gethin and Abbie after 1 hour?

g By solving an equation, calculate how long it took Gethin and Abbie to pass each other. Give your answer to the nearest minute.

4 A plumber charges a £50 call out fee and then £25 for each hour worked. The table shows the cost of hiring the plumber for different lengths of time.

Number of Hours	0	1	2	3	4
Cost (£)	50	75	100	125	150

a Plot a graph showing the cost (£C) of hiring the plumber against time (t hours).

b Write an equation that links the cost (£C) and the time (t hours).

c Use your equation to work out how much the plumber would charge for a job lasting 1 hour 45 minutes.

d How long would the plumber have worked if he charged £280 for a job?

5 Two removal companies give a family a quote for helping them move house.

Company A charges a fee of £100 and then £1.50 for each kilometre travelled.

Company B charges a fee of £150 and then £1.30 for each kilometre travelled.

a Copy and complete this table of removal costs.

Distance (km)	0	25	50	100	200	500
Charge Company A (£)	100.00					
Charge Company B (£)	150.00					

b On the same axes, plot a line graph showing the charges for each company.

c From your graph, estimate the distance for which both companies charge the same amount.

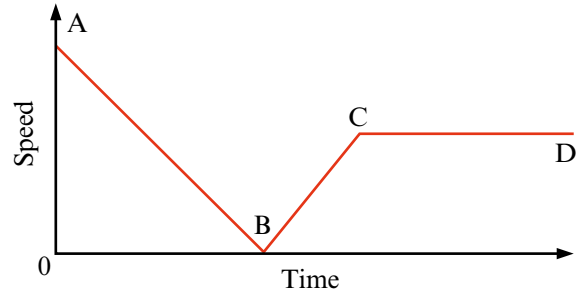
d Write an equation that links the charge (£A) and the distance ($d$km) for Company A.

e Write an equation that links the charge (£B) and the distance ($d$km) for Company B.

f Calculate the actual distance for which both companies charge the same amount. Use your equations from parts **d** and **e**.

explanation 2

6 This graph shows how the speed of a ball changes with time.



Edna says that the ball is dropped at point A. It hits the ground, then bounces back up and is caught by someone who is standing still.

Ahmed says that the ball is thrown up in the air at point A. It reaches a maximum height, then falls back towards the ground.
On the way down it is caught by someone running at constant speed.

a Which story could be correct? Explain how you know.

b Describe what is happening to the ball between

i A and B **ii** B and C **iii** C and D