Using Graphs

Whether you are a parent, teacher or home school educator, we've compiled examples of activities, games and puzzles which can be used to support the learning of algebra.

These examples are taken from the 'Using graphs' packs found in our SMILE resource collection. The mathematical demand increases as you work through the packs. There are lots more ideas in the complete packs, which can be downloaded at https://www.stem.org.uk/rxzeg

Answers to cards can be found at https://www.stem.org.uk/rxxo5

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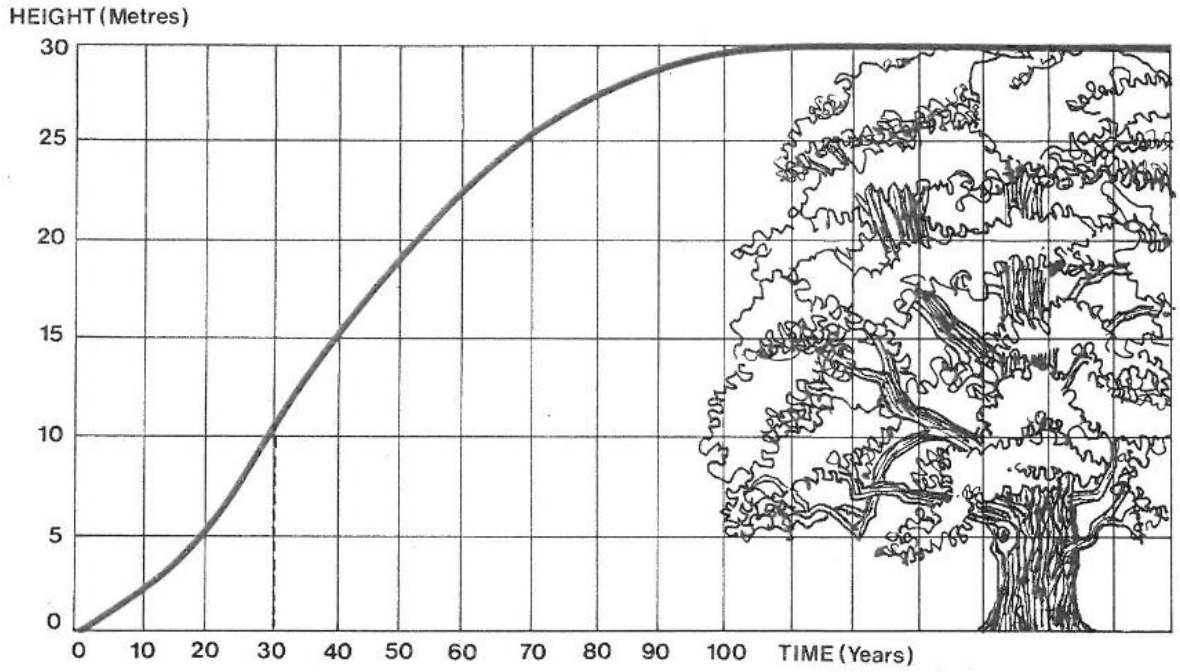
Old Oak



The graph shows the growth of an oak tree, from an acorn to a full-grown tree.

1) How tall is the oak tree when full-grown?
Do you know a building which is 30m high?

2) How tall is the oak after 30 years?

3) How tall is the oak after 10 years?

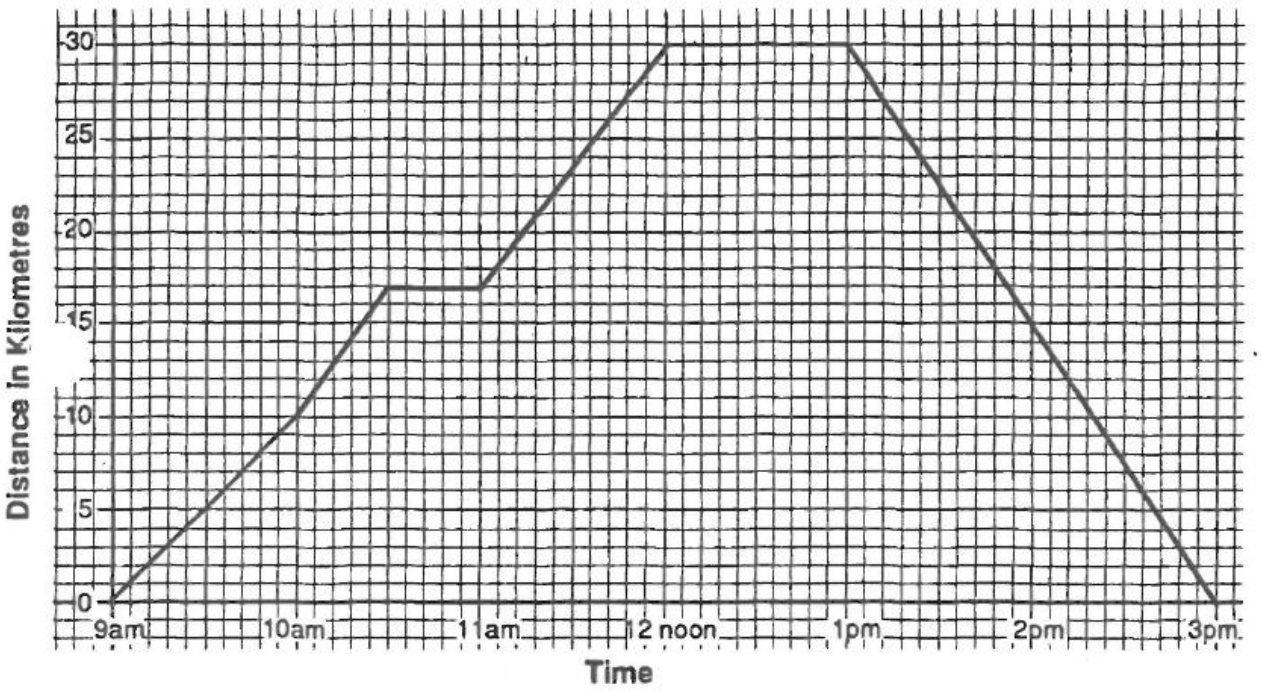
4) How long does the oak take to grow 15m?

5) How long does the oak take to grow 18m?

6) When does the oak become full-grown?
How much does the oak tree change in 10 years?

TIME-DISTANCE GRAPHS

The line on the graph shows the journey made by a cyclist.
She left home at **9 a.m.** and returned home at **3 p.m.**

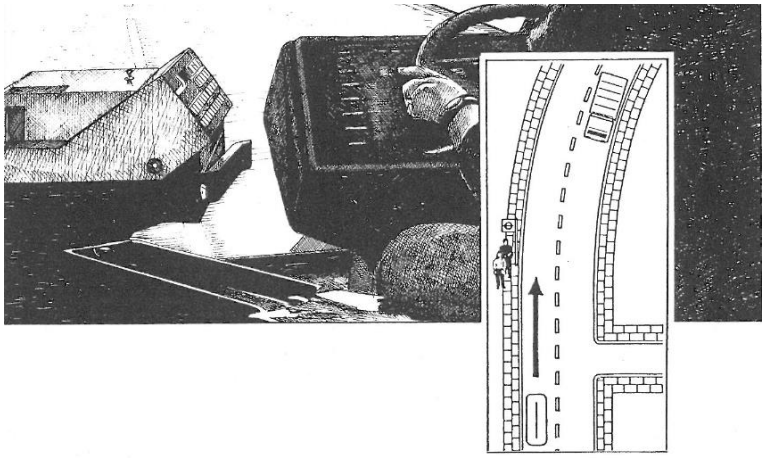


On ordinary roads it is impossible to travel at a constant speed for any length of time. *Can you think of some reasons for this?* It is only possible to calculate average speeds. Average speeds are used to draw *time-distance graphs.*

1. At what time did the cyclist reach her destination? How far was she from her home?
2. At what time did she take her first rest? For how long did she rest?
3. How far was she from home when she took this rest?
4. How many kilometres did she travel between 11 a.m. and 12 noon?
5. What was her average speed (in kilometres per hour) between (a) 9 a.m. and 10 a.m. (b) between 10 a.m. and 10.30 a.m.?
6. Between what times did she take a break for a meal and a rest?
7. After this break she returned home. How many kilometres did she have to travel?
8. What was her average speed on her return journey?
9. How far was she from home at (a) 11.30 a.m. (b) 1.30 p.m.?
10. At what time on her outward journey was she (a) 13 km (b) 22 km from home?

SMILE **1830**

The 'smoothing out' principle

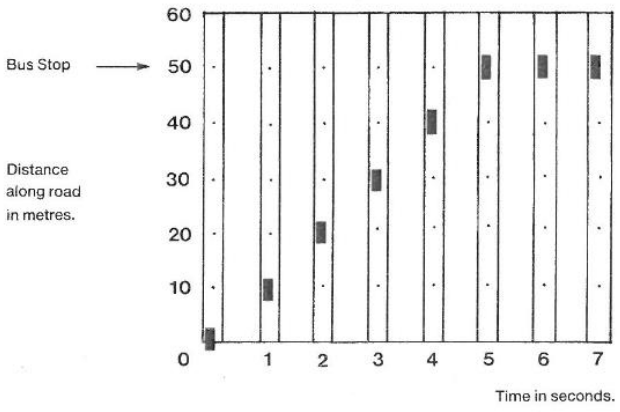


A bus is travelling at 10 metres per second towards a bus stop 50 metres away.

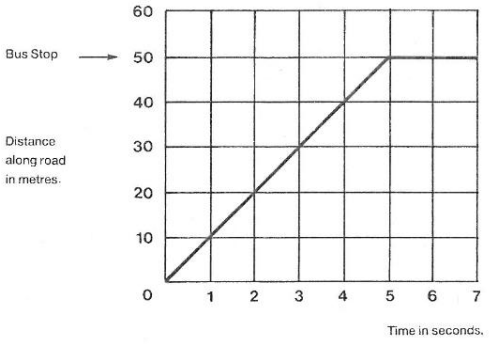
What do you think the distance-time graph will look like for the bus?

Your graph may have looked like one of the following:

A 'One second photograph' graph.



A 'Cine film' graph.



During the first 5 seconds, the bus is travelling at a constant speed of 10 m/s.

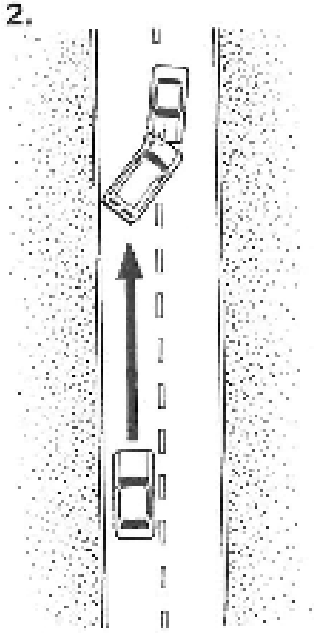
Then, on arrival at the bus stop, it *suddenly* stops dead in it's tracks!

This is shown by the way in which the graph makes a sudden turn.

What would happen if a real bus behaved in this manner?

For each of the situations drawn below, sketch a distance-time graph which will describe the events of the next few seconds . . .

2.



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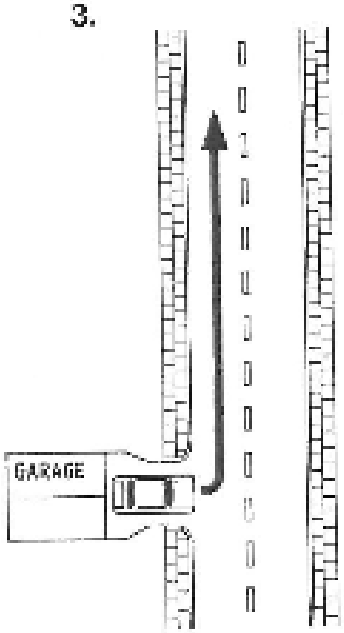

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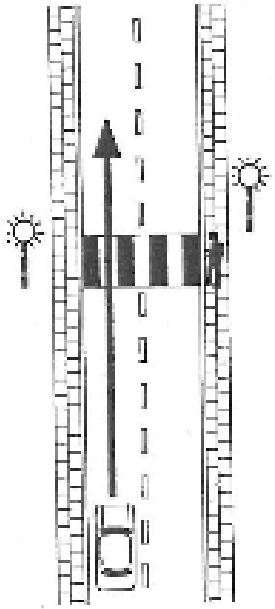

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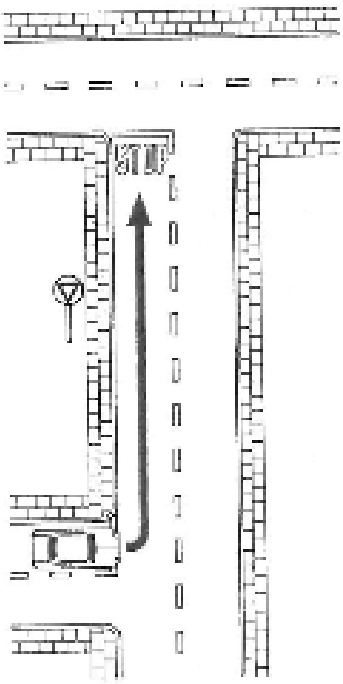

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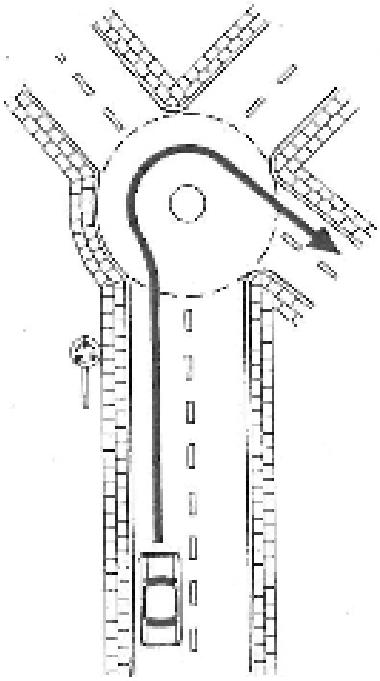

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