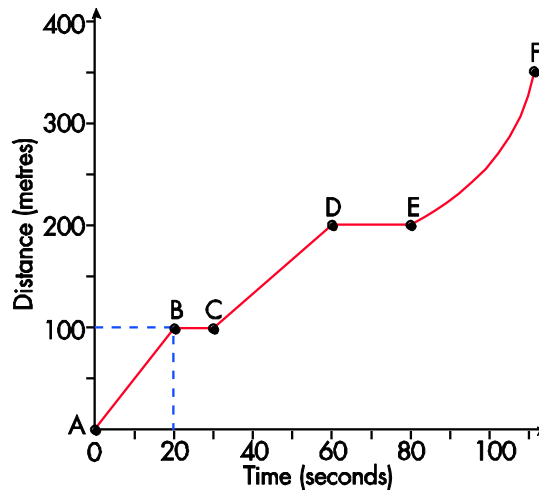


## Worksheet 4.1

# Distance–time graphs

This **distance–time** graph below shows part of Lucy’s bicycle ride along the Southbank cycle path. She started off riding at quite a fast constant speed, heading towards Kangaroo Point. After 20 seconds Lucy stopped to check her tyres. After another 10 seconds, she hopped back on her bicycle. Thirty seconds later Lucy stopped at some traffic lights for 20 seconds before accelerating off up the road, reaching her destination 30 seconds later.



**Figure 1** A distance–time graph of Lucy’s journey. (Note: time is always on the horizontal axis.)

From the graph, note the following:

- A–B, C–D: A straight sloped line illustrates constant speed. The steeper the line, the greater the speed. Where on the graph is Lucy’s speed the greatest?
- B–C, D–E: A horizontal line indicates that Lucy is not moving.
- E–F: A curved line indicates that Lucy is not travelling at a constant speed (she is accelerating—either speeding up or slowing down).

Speed can be calculated from a **distance–time** graph. The gradient (slope) of the line is the speed. This is found by dividing the rise by the run of a linear section of the graph:

$$\text{average speed} = \text{gradient} = \frac{\text{rise}}{\text{run}}$$

The speed at which Lucy is travelling in the first part of her journey (A–B) is:

$$\begin{aligned} \text{speed (gradient)} &= \frac{\text{rise (distance)}}{\text{run (time)}} \\ &= \frac{100\text{m}}{20\text{s}} \\ &= 5 \text{ m/s} \end{aligned}$$



- 1 Use the graph on page 1 to answer the following.
- a How fast is Lucy riding during section C–D of her journey?

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- b How fast is she riding during section E–F?

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- 2 What information does a distance–time graph give?

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- 3 What does a horizontal line above the time axis mean on a distance–time graph?

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- 4 Use the graph to answer the following.

- a What is Lucy’s average speed when travelling from B to E?

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- b What is her average speed over the whole trip?

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- 5 Describe the motion represented by each of the following distance–time graphs.

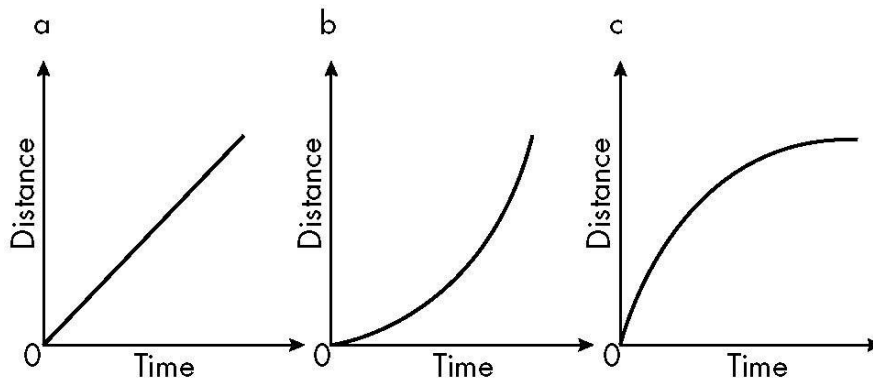


Figure 2 Distance–time graphs

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