Line segment graphs

Year 12 Further Mathematics
Units 3 and 4

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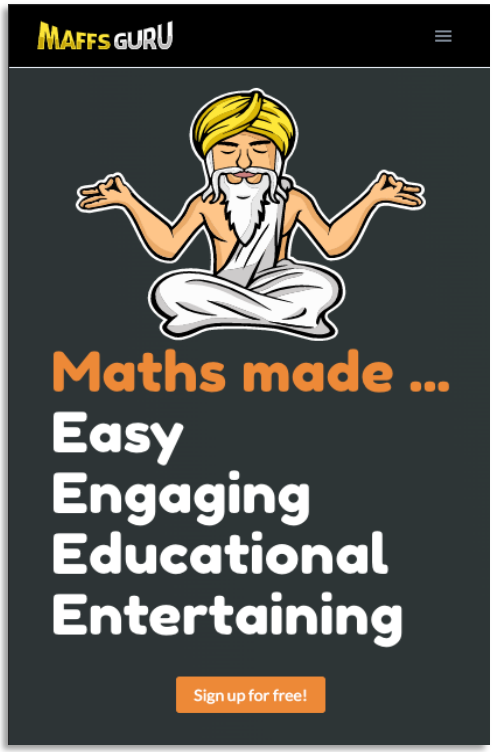


Learning Objectives

By the end of the lesson I would hope that you have an understanding and be able to apply to questions the following concepts:

- Understand what a line segment graph is
- Know how to read information from a line segment graph

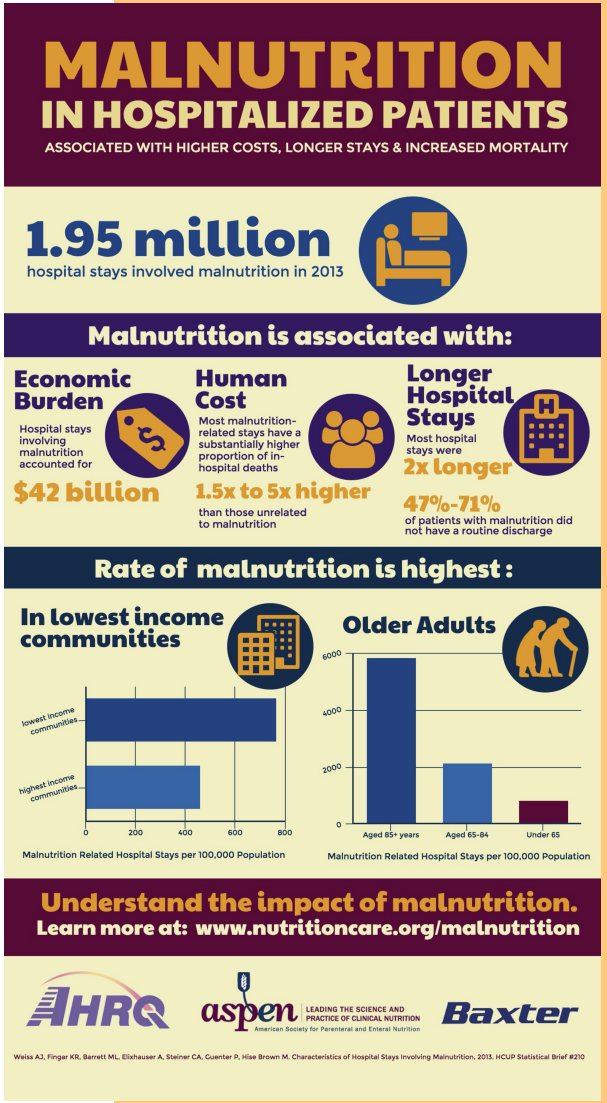
Recap

This is a new section of videos which deal with analysis and interpreting graphs.

Graphs are everywhere. They are great for the brain. In fact, they are easier for the brain to interpret than a page of text! This is why there is a massive market in the design and use of Infographics.

Trying to convert mathematical data into a graph will see it more likely to be understood.

We can also use graphs to show us patterns in data (which we have already covered in the one of the Core Module).



What is a line segment graph?

This is one of those amazing moments where the English actually makes sense and leads us to knowing what we are talking about.

A line segment graph is a graph wot is made out of line segments.

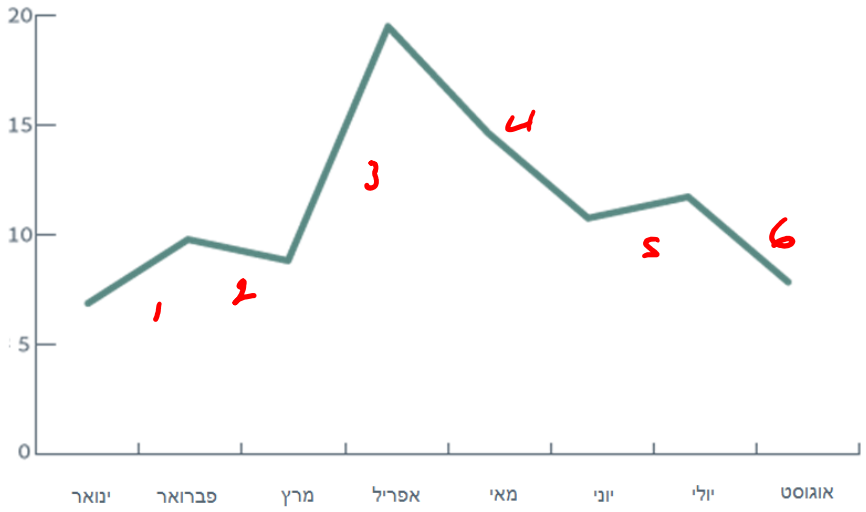


Image source: Wikipedia

Other examples

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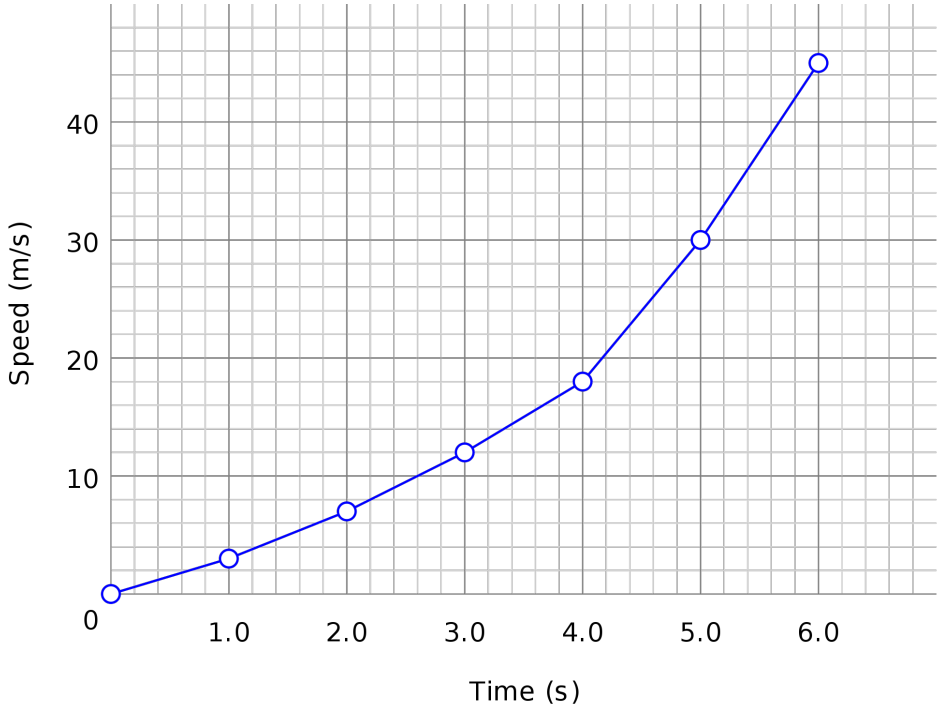

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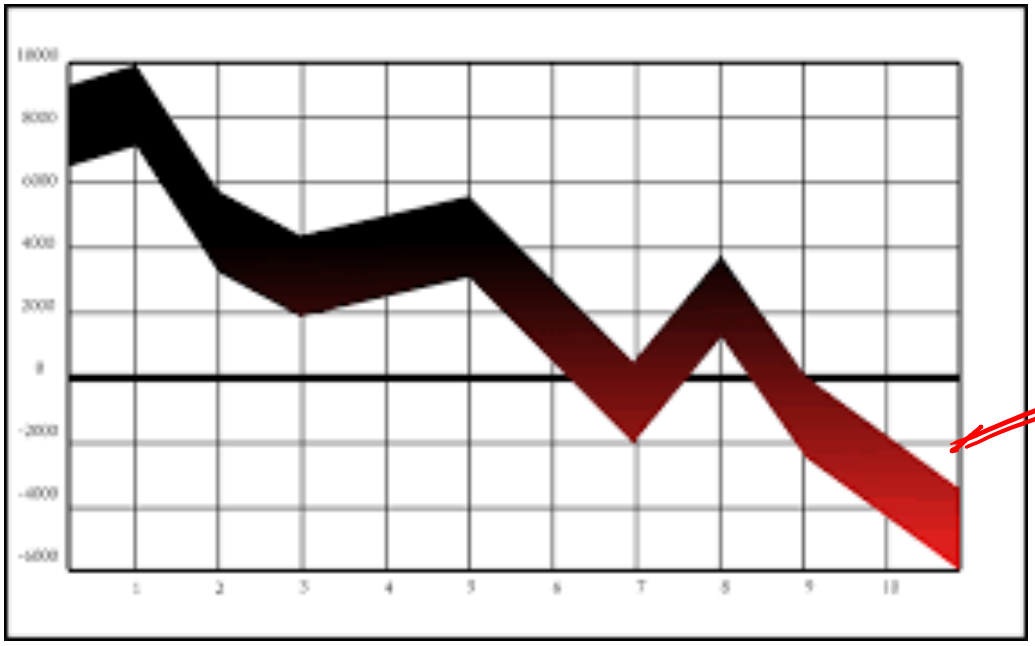


Image source: Wikipedia

Reading line segment graphs

Graphs have two axes. Each one of the axes is giving us information.

For example, the graph shows distance related to time.

We can read along the axes and find a time.

Reading up until we meet the line and then across to the distance, we can find the distance travelled in that time,

Distance t = 3 hrs

140 km

Time dist = 80 km.

1.5 hrs

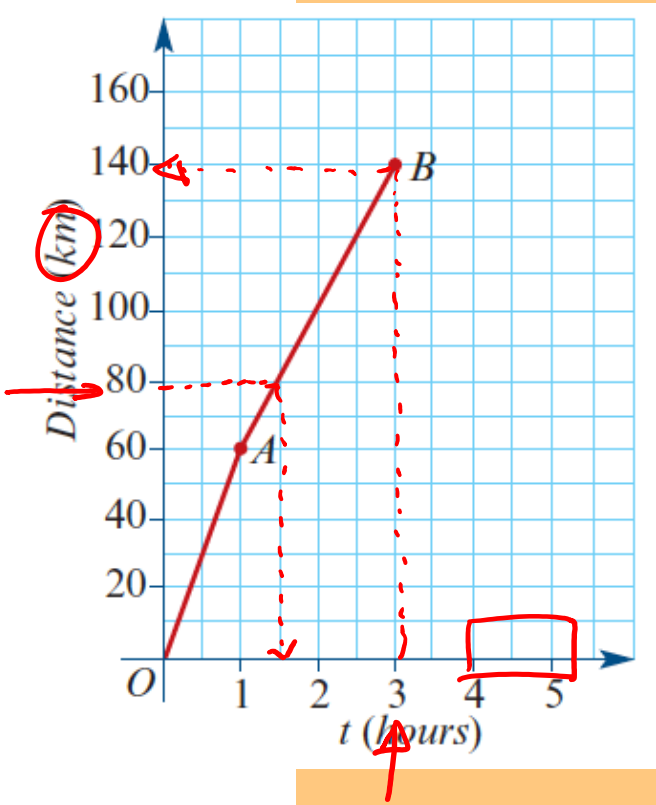


Image source: Cambridge Further Maths Textbook (Units 3 and 4)

Reading line graphs

Each line segment has it's own **gradient**.

Remember that gradient is given by:

$$gradient = m = \frac{rise}{run}$$

(x_1, y_1) (x_2, y_2) ←

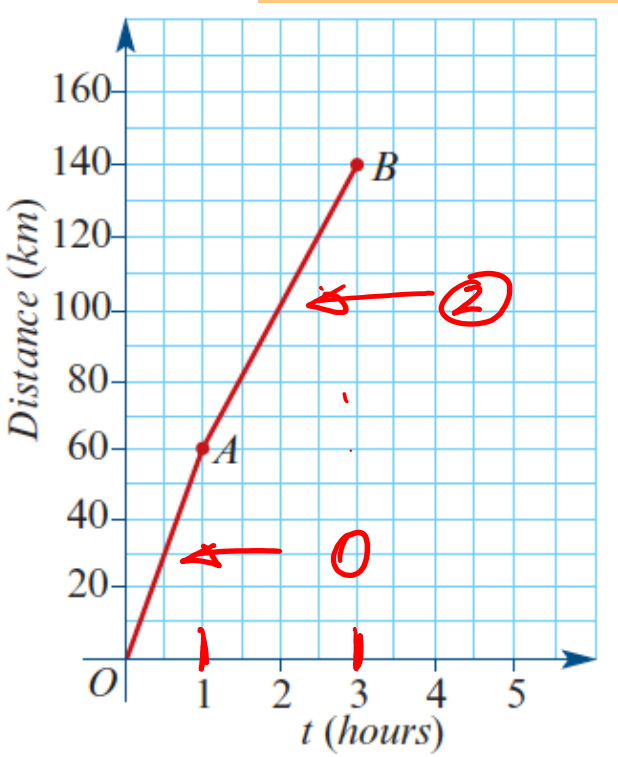
$$gradient = m = \frac{y_2 - y_1}{x_2 - x_1}$$

We can use the formulae to find the gradient between points A and B.

$\therefore m = \frac{rise}{run} = \frac{80}{2} = 40$

B $(3, 140)$ A $(1, 60)$ $grad = \frac{140 - 60}{3 - 1}$

$= \frac{80}{2} = 40$



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The gradient of a distance time graph

The gradient of a distance time graph actually has meaning.

It's the average speed (or velocity) of an object.

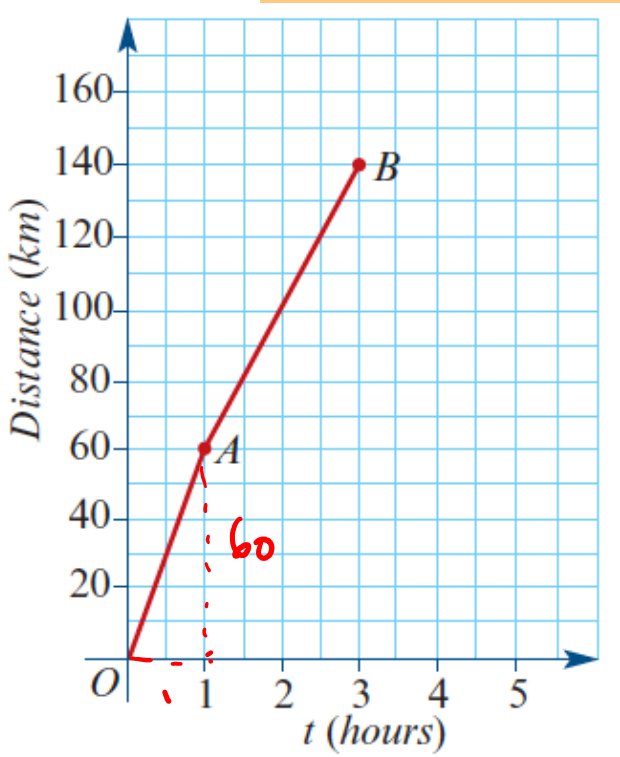
When we work out the gradient we are actually finding a speed (km per hour).

OA = 60 km/hr

AB = 40 km/hr

$$\frac{\text{distance}}{\text{time}} \leftarrow \text{per.}$$

km/hr



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Example of how to use a line graph

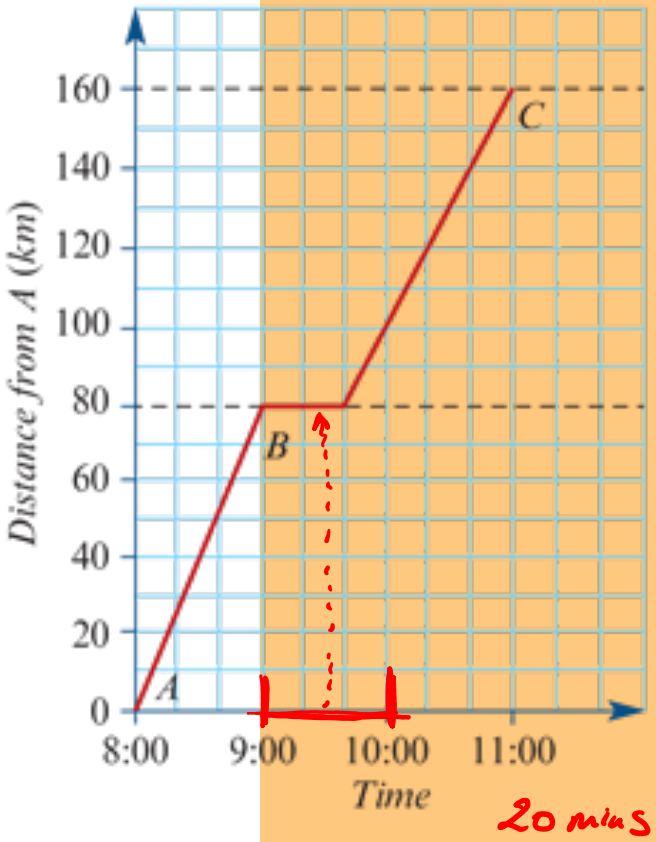
The graph shows the journey of a car through three towns, A,B and C, on a highway. B is 80 km from A.

Where was the car at:

- 9:00?
- 9:30?

@ 9:00 am B

@ 9:30 am B



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Example of how to use a line graph

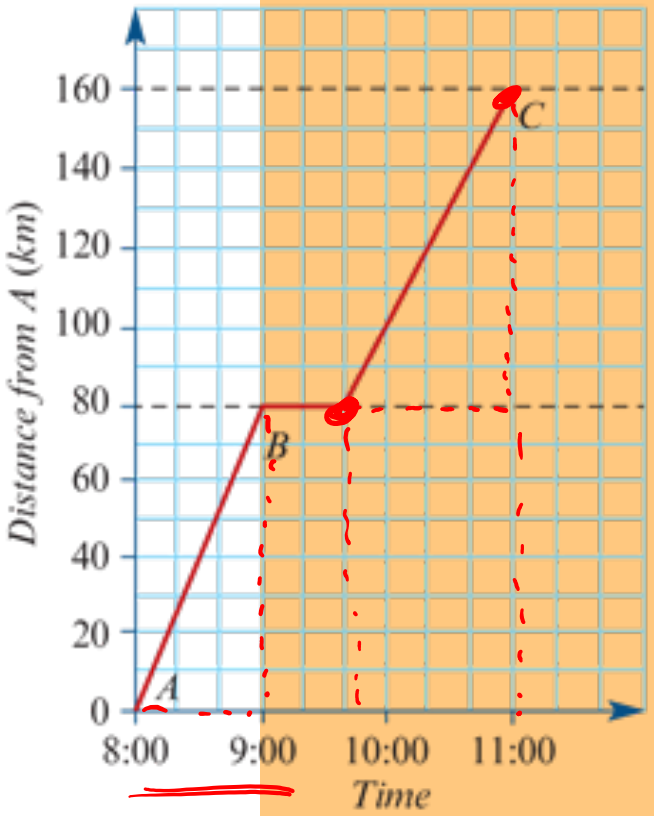
The graph shows the journey of a car through three towns, A,B and C, on a highway. B is 80 km from A.

What was the average speed of the car between:

- A and B?
- B and C?

$$\frac{\text{distance}}{\text{time}} = \text{grad}_{AB} = \frac{80}{1} = 80 \text{ km/hr}$$

$$\text{grad}_{BC} = \frac{80}{1\frac{2}{3}} = 60 \text{ km/hr}$$



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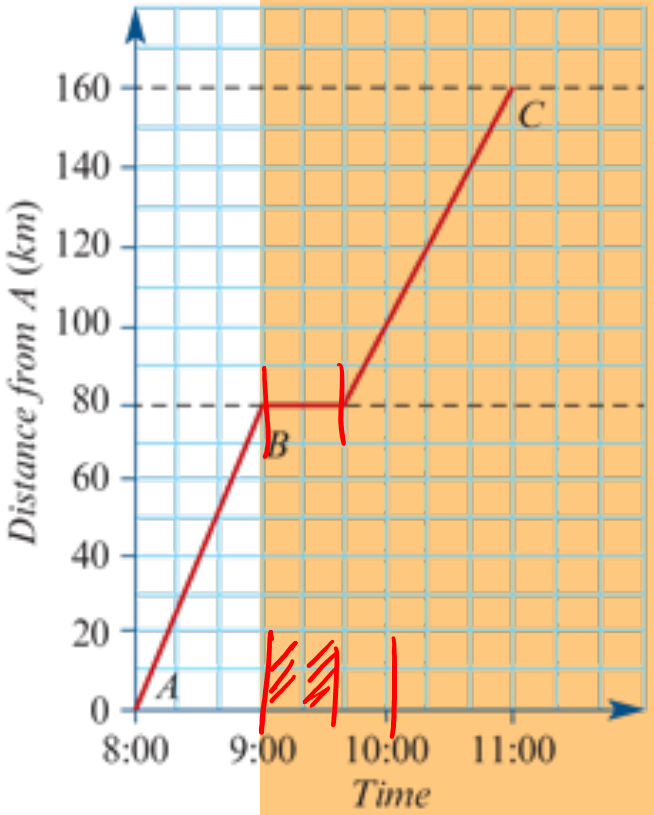
Example of how to use a line graph

The graph shows the journey of a car through three towns, A,B and C, on a highway. B is 80 km from A.

For how long does the car stop at B?

40 mins

$\frac{2}{3}$ hr



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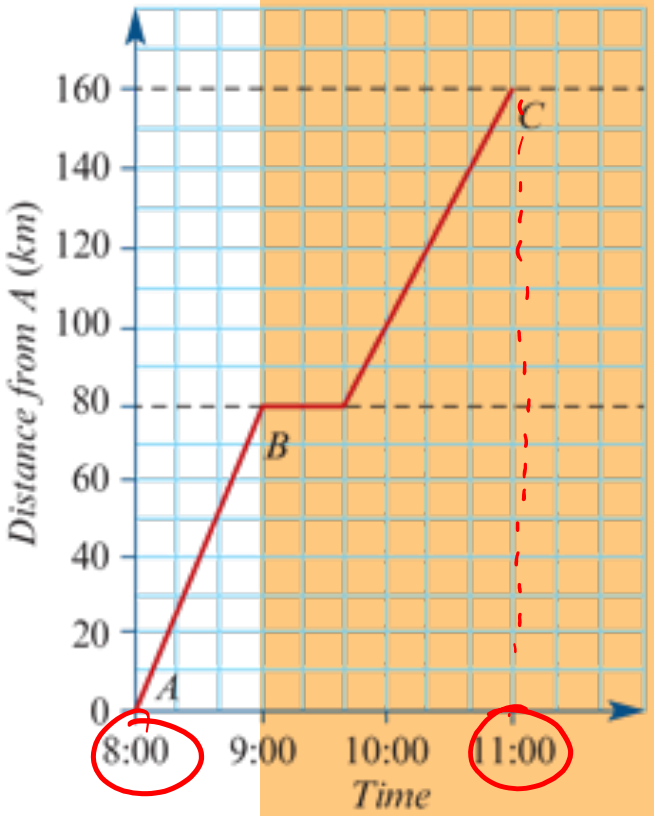
Example of how to use a line graph

The graph shows the journey of a car through three towns, A,B and C, on a highway. B is 80 km from A.

How long did the journey take?

$\therefore$ 11 − 8 = 3 hours



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Example of how to use a line graph

The graph shows the journey of a car through three towns, A,B and C, on a highway. B is 80 km from A.

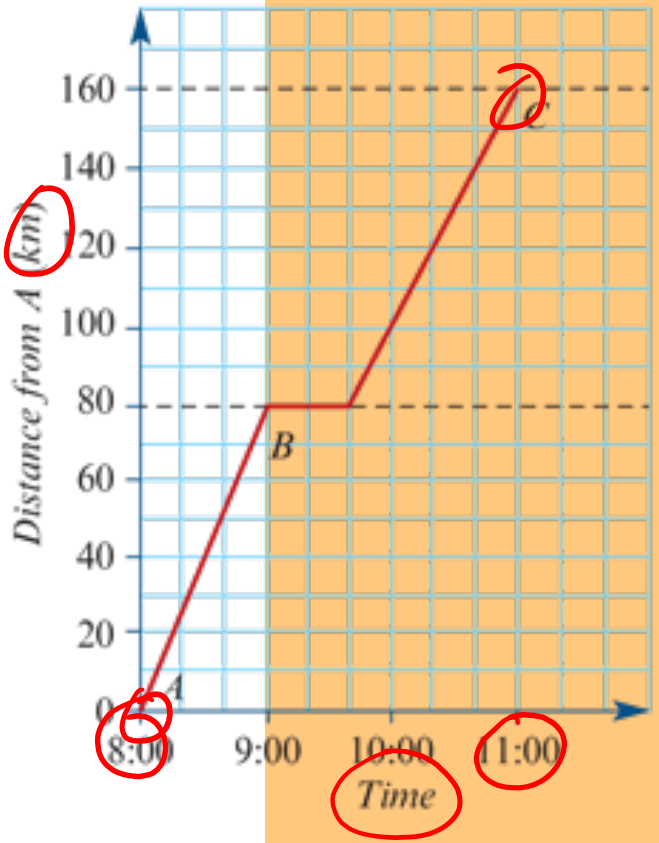
What was the average speed of the car for the whole journey? Give your answer correct to the nearest whole number.

$$\text{Average speed} = \frac{TDT}{TTT}$$

$$= \frac{160}{3}$$

$$= 53.33 \text{ km/hr}$$

$$= 53 \text{ km/hr}$$



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