Science lesson 2 – Student worksheet

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Learning aim:

To calculate, evaluate and present conclusions from distance time graphs.

Scenario:

Aliyah is a planning officer with the Department for Transport working on the building routes between Creweston station and 3 destinations for the HS2 (high speed train) government project. They need to start building the fastest route first due to budgeting limitations.

The 3 destinations are:
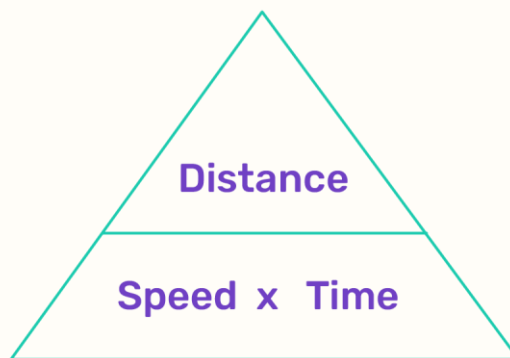
1) Birmingbeef

2) Ladychester

3) Liverpond

Aliyah has distance-time graphs which simulate the 3 routes and must work out which is the quickest. (They are all 60 miles away). As the train slows down due to stop signals or going through rock, journey times can be impacted. Aliyah has lost the information that tells her which distance time graph is which destination. She has also made some calculations but did them in a rush.

> **Career spotlight:**
> Transport planners manage road, rail and air transport networks at local, regional and national levels. Their responsibilities include simulating transport problems using computer models, analysing and interpreting data from transport studies and improving road safety. They need to be complex problem solvers and have knowledge of transport methods, costs and benefits, as well as engineering science and technology.
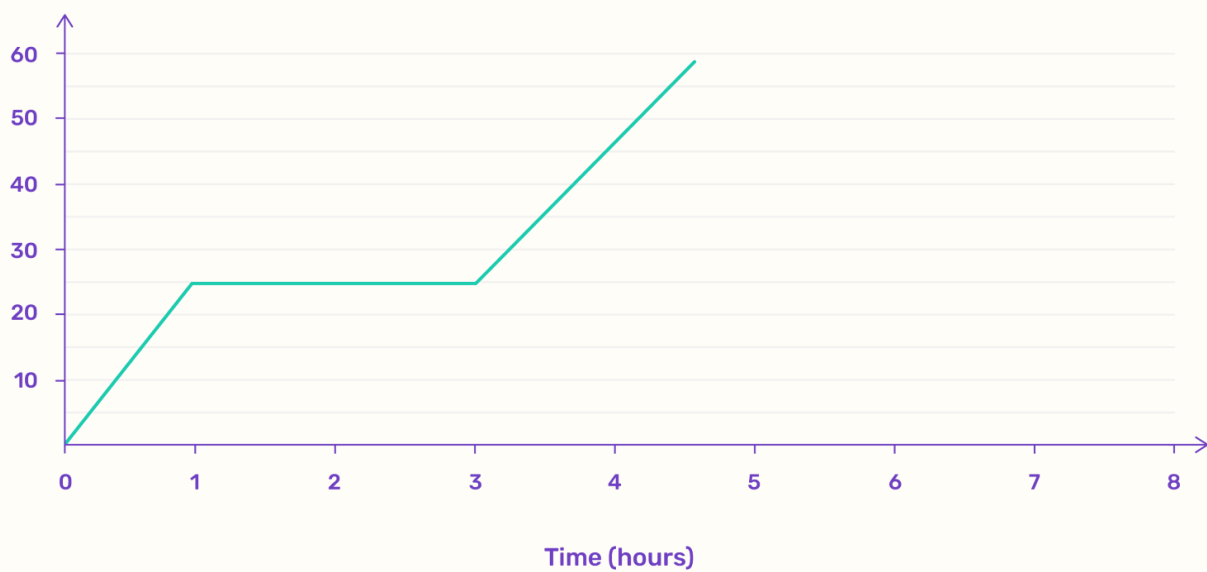
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Answer the following questions to help Aliyah. (The below formula triangle might be useful.)
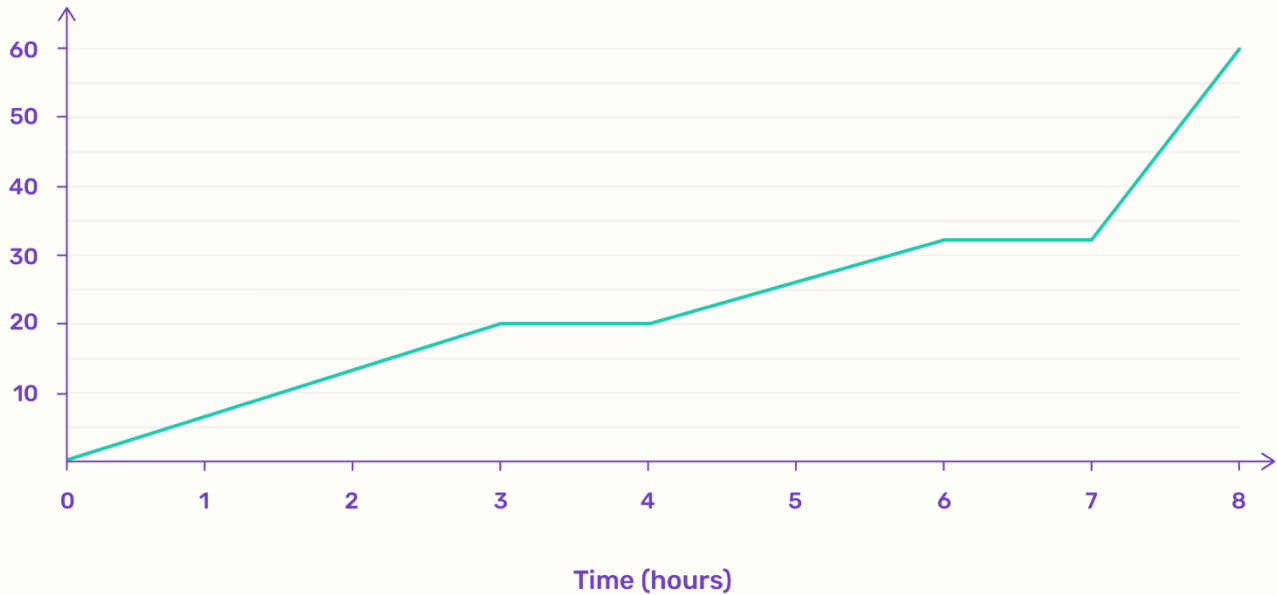
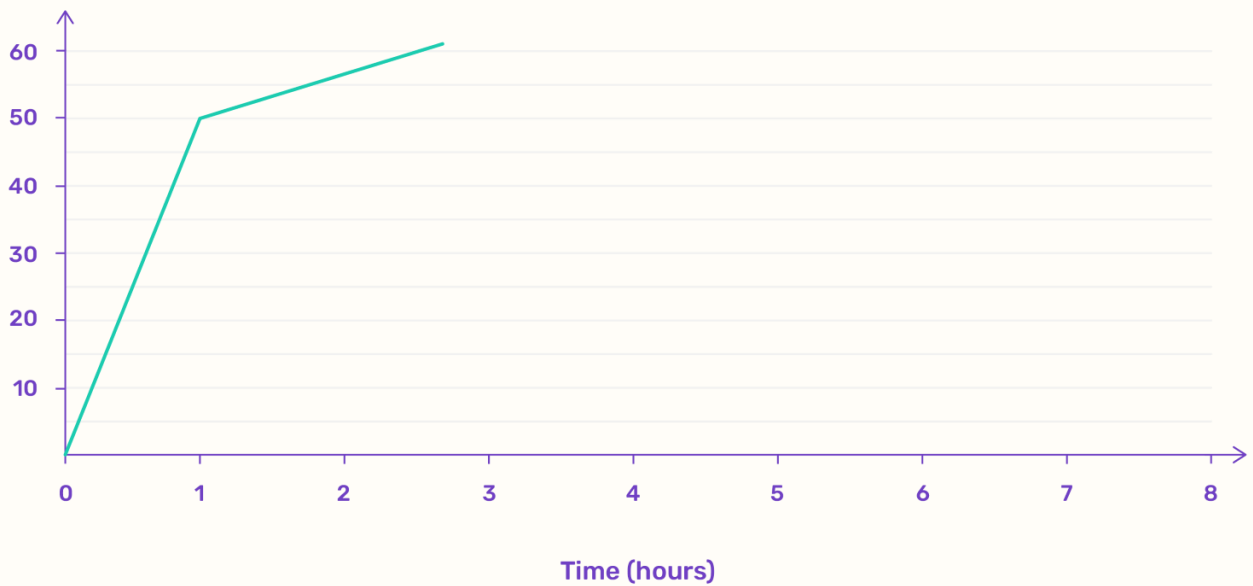$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

Distance

Speed x Time

Graph 1

Distance (miles)

Time (hours)

Graph 2

Distance (miles)

Time (hours)

Graph 3

Distance (miles)

Time (hours)

Task

You are in a group of 3 troubleshooters who work for the Department for Transport. Aliyah has asked for your help. You need to present your findings to each other and Aliyah. In your group, you must:

1) Work out which distance time graph is which based on the information provided below. Add labels to the graphs to help your explanation from the information below.

- Birmingbeef has a section that involves stopping for 2 hours BUT so does Ladychester.
- Ladychester has 2 one hour stops at different points along the route.
- In the first hour of the route, Liverpond trains travel 50 miles.
- In the last hour of its route, Ladychester trains travel the fastest.

2) Check Aliyah's calculations and make any corrections. The youngest in your group will check graph 1, the oldest graph 3 and the third person in your group will check graph 2. For each calculation you need to:

✓ Check if her calculations are correct or not AND be able to explain the calculation.
✓ Show the correct answer – with the working out, if you think she has made a mistake.
✓ Tell her which is the quickest route.

Graph 1 calculations

Aliyah has calculated:

1) The total journey was about 4 and a half hours.

2) The average speed was 30mph.

3) Between 3 hours and 4.5 hours the train travelled at a speed of 20mph.

4) This graph shows the shortest journey time compared to the other 2 graphs.

5) The train did not stop at any time on the journey.

Graph 2 calculations

Aliyah has calculated:

1) The train stopped once during the journey.

2) The total journey was about 6 hours.

3) The average speed was 7.5mph.

4) Between 0 hours and 6 hours the train travelled at a speed of 10mph.

5) This graph shows the shortest journey time compared to the other 2 graphs.

Graph 3 calculations

Aliyah has calculated:

1) The train stopped once during the journey.

2) The speed during the first hour was 50mph.

3) The train was travelling at its fastest during the first hour.

4) This graph shows the longest journey time compared to the other 2 graphs.

5) The train was travelling fastest AFTER the first hour.

You need to be ready to feedback your answers, explaining each of Aliyah's calculations and if they are correct and why.

Notes

Notes