

WALT read and draw line graphs

Success Criteria: I can

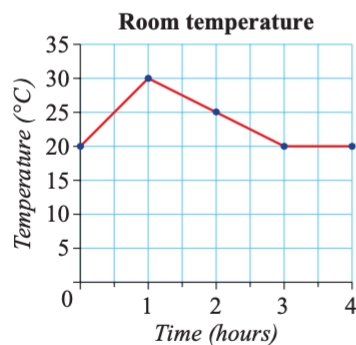
- Understand that line graphs show how quantities change over time.
- Locate 'Time' as always being shown on the **x axis**
- Locate readings over time on the **y axis**



Line graphs can be used to show how quantities change over time.

▶ Let's start: Room temperature

As an experiment, the temperature in a room is measured hourly over 4 hours. The results are shown in this line graph.

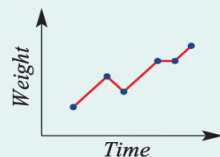


- Describe the temperature changes over the four hours.
- An air conditioner was turned on at some stage. When do you think this happened? Why?
- What was the approximate temperature 90 minutes (1.5 hours) after the experiment started?



Teacher discussion

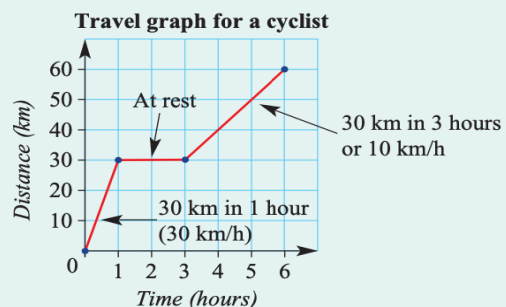
- A **line graph** consists of a series of points joined by straight line segments.
- Time is often shown on the horizontal axis. For example:



- A common type of line graph is a **travel graph**.
 - Time is shown on the horizontal axis.
 - Distance is shown on the vertical axis.
 - The slope of the line shows the rate at which the distance is changing over time. This rate is called speed.

Line graph
A graph that shows the data as points joined with line segments

Travel graph
A line graph that describes a traveller's position at different times



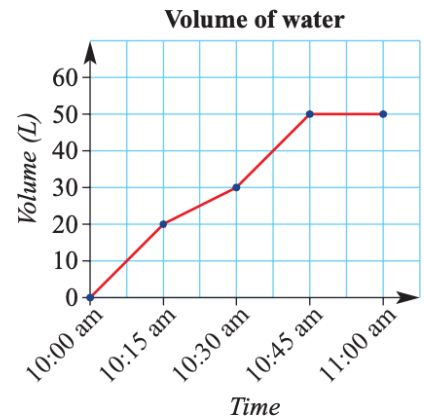
Draw and read the following graphs and answer the questions

- 1** A dog is weighed over a period of 3 months. Draw a line graph of its weight.
January: 5 kg, February: 6 kg, March: 8 kg, April: 7 kg.

Use grid paper to help draw graphs

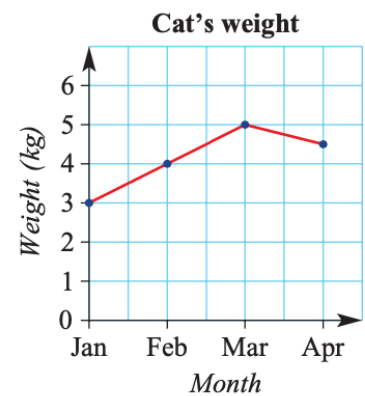


- 2** The volume of water running into a tank is measured and graphed. State the volume of water at:
- a** 10:15 am
 - b** 10:30 am
 - c** 10:45 am
 - d** 11:00 am



- 3** This line graph shows the weight of a cat over a 3-month period. The cat is weighed at the start of each month. State the cat's weight at the start of:

- a** January
- b** February
- c** March
- d** April



Interpreting Line Graph (Teacher discussion)

The graph shows Lillian's height over a 5-year period from birth.

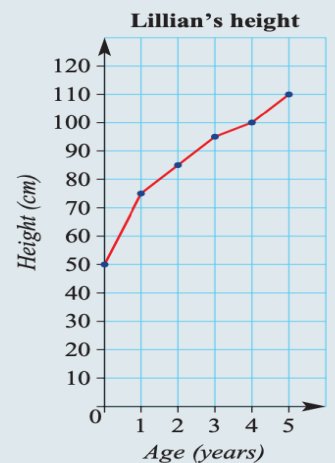
- a** What was her height when she turned 2?
- b** Estimate her height at $2\frac{1}{2}$ years.

Solution

- a** 85 cm
- b** About 90 cm

Explanation

Read this directly from the graph.
This is halfway between 2 years (85 cm) and 3 years (95 cm).

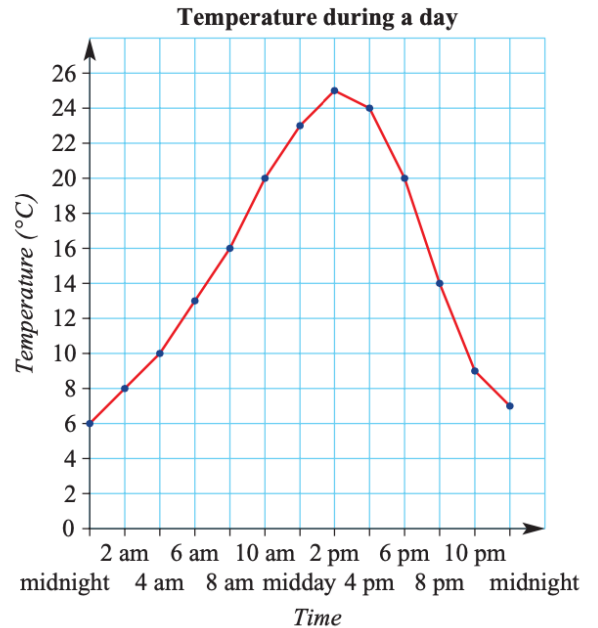


- 4 Look at the graph of Lillian's height in Example 6.
- What was Lillian's height when she was born?
 - What was Lillian's height when she turned 3?
 - How much did Lillian grow in the year when she was 2 years old?
 - Use the graph to estimate her height at the age of $4\frac{1}{2}$ years.

For part c, compare Lillian's height at age 2 and age 3.



- 5 This graph shows the outside temperature over a 24-hour period that starts at midnight.
- What was the temperature at midday?
 - When was the hottest time of the day?
 - When was the coolest time of the day?
 - Use the graph to estimate the temperature at these times of the day.
 - 4:00 am
 - 9:00 am
 - 1:00 pm
 - 5:00 pm



- 6 Oliver measures his pet dog's weight over the course of a year. He gets the following results.

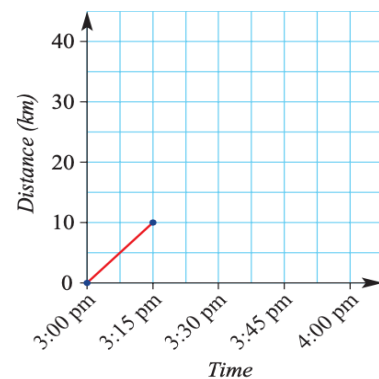
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Weight (kg)	7	7.5	8.5	9	9.5	9	9.2	7.8	7.8	7.5	8.3	8.5

- Draw a line graph showing this information, making sure the vertical axis has an equal scale from 0 kg to 10 kg.
- Describe any trends or patterns that you see.
- Oliver put his dog on a weight loss diet for a period of 3 months. When do you think the dog started the diet? Justify your answer.



- 7 This table shows how far Aisha has driven over the course of an hour. Copy and complete the travel graph.

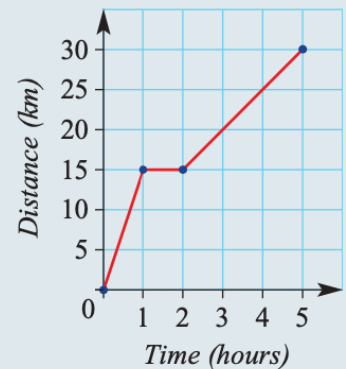
Time	Distance (km) from home
3:00 pm	0
3:15 pm	10
3:30 pm	15
3:45 pm	25
4:00 pm	30



Interpreting travel graphs - teacher discussion

This travel graph shows the distance travelled by a cyclist over 5 hours.

- How far did the cyclist travel in total?
- How far did the cyclist travel in the first hour?
- What is happening in the second hour?
- When is the cyclist travelling the fastest?
- In the fifth hour, how far does the cyclist travel?



Solution

- 30 km
- 15 km
- At rest
- In the first hour
- 5 km

Explanation

The point at the right-hand end of the graph is (5, 30).

At time = 1 hour, the distance covered is 15 km.

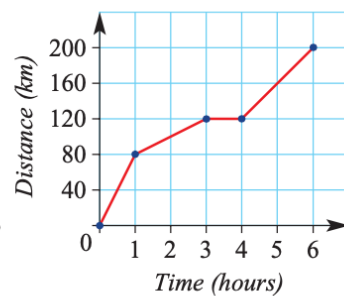
The distance travelled does not increase in the second hour.

This is the steepest part of the graph.

In the last 3 hours, the distance travelled is 15 km, so in 1 hour, 5 km is travelled.

8 This travel graph shows the distance travelled by a van over 6 hours.

- How far did the van travel in total?
- How far did the van travel in the first hour?
- What is happening in the fourth hour?
- When is the van travelling the fastest?
- In the sixth hour, how far does the van travel?

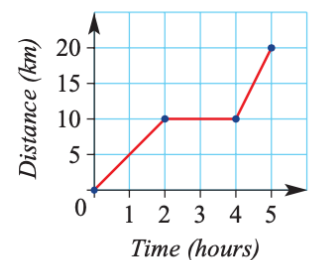


For part **c**, the fourth hour is from 3 to 4 hours.



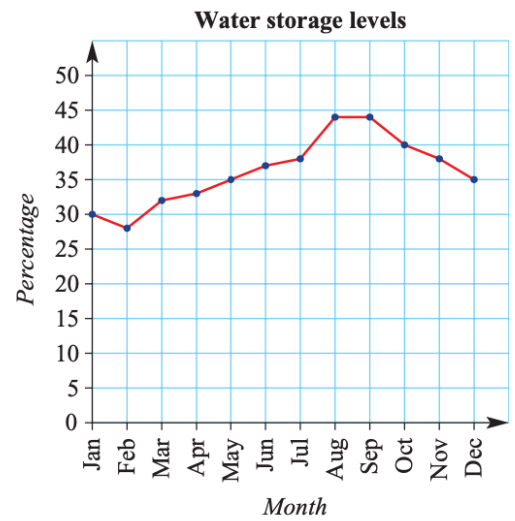
9 This travel graph shows the distance travelled by a cyclist over 5 hours.

- How far did the cyclist ride in total?
- How far did the cyclist ride in the second hour?
- During which hour did the cyclist ride the fastest?
- For how long did the cyclist rest?



10 The graph shows water storage levels for a certain city.

- a What was the water level at the start of:
 - i January
 - ii May
 - iii December?
- b Which month do you think had the highest rainfall? Why?
- c What was the maximum water level?
- d When did the water storage get to its lowest point?



11 Draw travel graphs to illustrate the following journeys.

- a A car travels:
 - 120 km in the first 2 hours
 - 0 km in the third hour
 - 60 km in the fourth hour
 - 120 km in the fifth hour
- b A jogger runs:
 - 12 km in the first hour
 - 6 km in the second hour
 - 0 km in the third hour
 - at a rate of 6 km per hour for 2 hours

When the distance travelled in an hour is 0 km, draw a horizontal line.



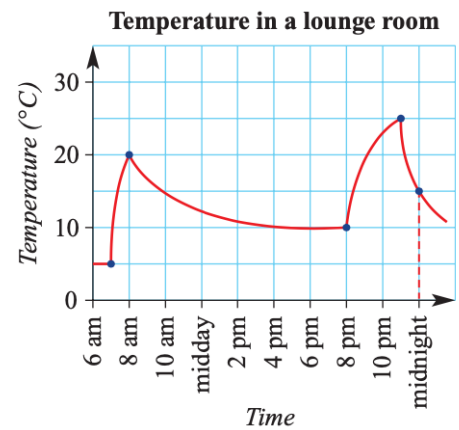
Misleading graphs

★ Heating and cooling

12 The temperature in a lounge room is measured several times on a particular day.

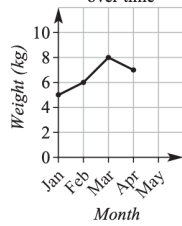
The results are shown in a line graph.

- a State the room's temperature at:
 - i 6 am
 - ii 8 am
 - iii 10 am
 - iv 8 pm
- b Twice during the day the heating was switched on. At what times do you think this happened? Explain your reasoning.
- c When was the heating switched off? Explain your reasoning.
- d The house has a single occupant, who works during the day. Describe when you think that person is:
 - i waking up
 - ii going to work
 - iii coming home
 - iv going to bed
- e These temperatures were recorded during a cold winter month. Draw a graph that shows what the lounge room temperature might look like during a hot summer month. Assume that the room has an air conditioner, which the person is happy to use when at home.



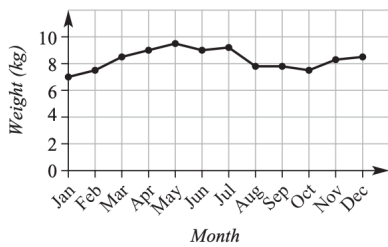
Check your answers

1 Dog's weight over time



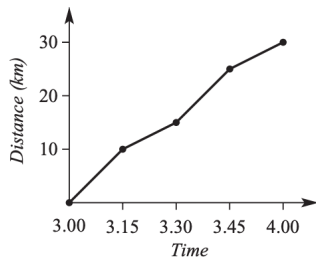
- 2 a 20 L b 30 L
 c 50 L d 50 L
- 3 a 3 kg b 4 kg
 c 5 kg d 4.5 kg
- 4 a 50 cm b 95 cm c 10 cm d 105 cm
- 5 a 23°C b 2:00 pm c 12:00 am
 d i 10°C ii 18°C iii 24°C iv 22°C

6 a



- b Weight increases from January until July, then goes down suddenly.
- c July, as the weight goes down for the next three months.

7

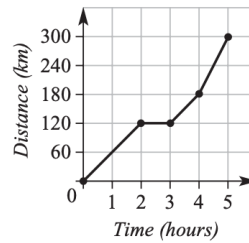


- 8 a 200 km b 80 km c at rest
 d in the first hour e 40 km

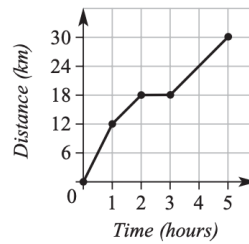
- 9 a 20 km b 5 km c Fifth hour d 2 hours
- 10 a i 30% ii 35% iii 35%

- b July, because there was the greatest rise in water level. However, at this time of year the levels of consumption and evaporation would be quite low.
- c 44%
- d Start of February

11 a



b



- 12 a i 5°C ii 20°C iii 15°C iv 10°C

- b at 7:00 am and 8:00 pm
- c at 8:00 am and 11:00 pm

- d i around 7:00 am (heater goes on)
 ii around 8:00 am (turns heater off)
 iii around 8:00 pm (heater put back on)
 iv around 11:00 pm (heater turned off)
- e Answers will vary.