

Summer Block 5

**Statistics**

## Small steps

Step 1

Interpret charts

Step 2

Comparison, sum and difference

Step 3

Interpret line graphs

Step 4

Draw line graphs

# Interpret charts

## Notes and guidance

In Year 3, children learnt how to interpret and draw pictograms and bar charts to represent discrete data. They also learnt how to collect and represent data in a table. In this small step, they revise this learning before using charts to compare data in the next step.

Give children the opportunity to explore which scale will be the most appropriate when drawing their own bar charts and which key will be the most appropriate for a pictogram. They can also gather their own data and then present it as a bar chart or pictogram. Further questioning about the data should be explored, so that children can demonstrate their ability to interpret the data as well as draw charts. At this stage, they do not need to use the data in calculations to solve problems, as this will be covered in the next step.

### Things to look out for

- Children may assume that the scale on a bar chart always goes up in 1s.
- Children may choose symbols that are difficult to work with, either in terms of complexity or their appropriateness for splitting into equal parts.
- Children may make errors when labelling scales.

## Key questions

- How could you represent this data?
- What do you notice about the scale of the bar chart?
- What else does the data tell you?
- What is the same/different about the way in which the data has been shown?
- What scale will you use for your bar chart? Why?
- What does each \_\_\_\_\_ represent in the pictogram? How do you know?
- What symbol will you use for your pictogram? Why?

## Possible sentence stems

- The scale of the bar chart is going up in \_\_\_\_\_s.
- In the pictogram, 1 \_\_\_\_\_ represents \_\_\_\_\_, so there are \_\_\_\_\_ × \_\_\_\_\_ = \_\_\_\_\_

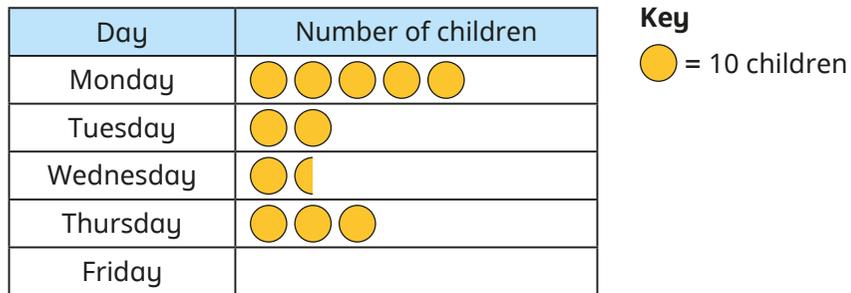
### National Curriculum links

- Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs

# Interpret charts

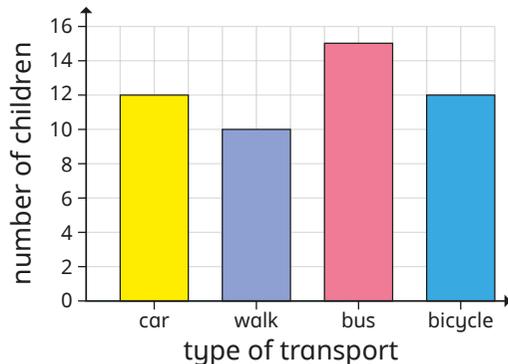
## Key learning

- The pictogram shows the number of children who visited a park last week.



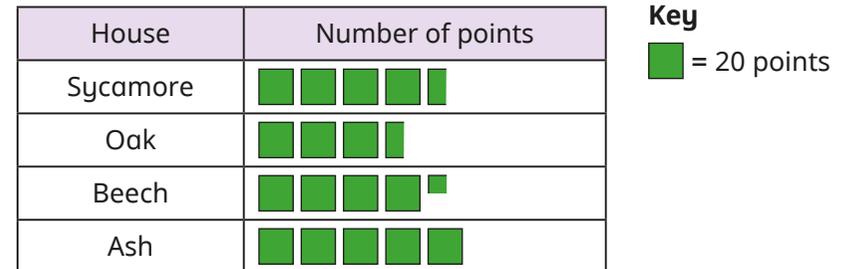
- ▶ How many children visited the park on Monday?
- ▶ How many children visited the park on Wednesday?
- ▶ 25 children visited the park on Friday.
- ▶ Complete the pictogram to show this.

- The bar chart shows how Year 4 children travel to school.

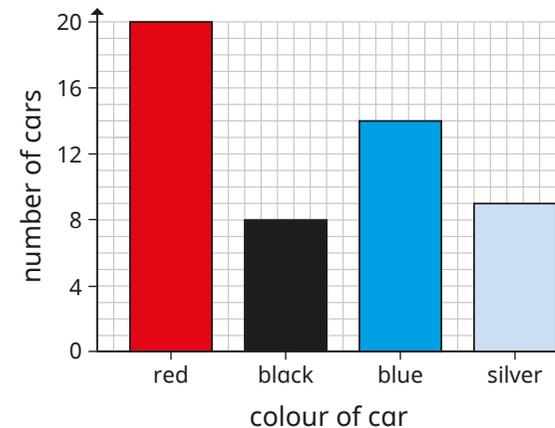


Draw a table using the information in the bar chart.

- Represent the data shown in the pictogram as a bar chart.



- The bar chart shows the number of each colour car parked in a car park.



Draw a pictogram using the information in the bar chart.

# Interpret charts

## Reasoning and problem solving

Alex wants to show the favourite drinks of everyone in her class. She decides to use ● to represent 5 children. Explain why this is not a good idea.



It will be difficult to show amounts that are not multiples of 5

The pictogram shows how many books the children have read this week.

Key ▲ = 2 books

Child	Number of books
Jack	▲ ▲ ▲
Eva	▲ ▲ ▲
Whitney	▲



Eva read two and a half books.

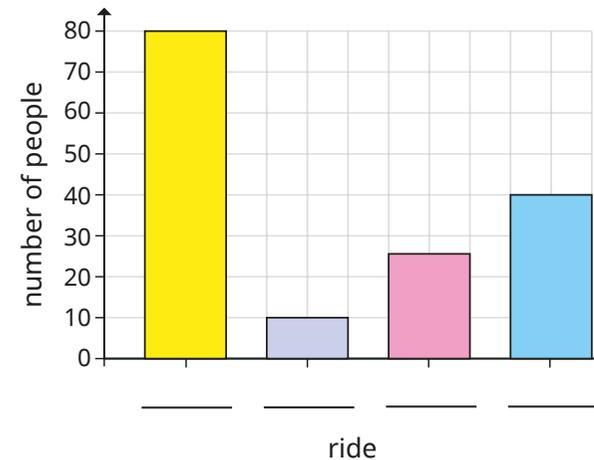
Do you agree with Max?

No

The bar chart shows the number of people who went on each ride at a theme park.



Use the clues to label the bar chart.



- The Wild West had half as many people as Dragonball.
- Fewer people went on The Flipper than on The Lazy River.
- Dragonball was the most popular ride.

Dragonball, The Flipper, The Lazy River, The Wild West

# Comparison, sum and difference

## Notes and guidance

In this small step, children build on their learning from the previous step to solve comparison, sum and difference problems using discrete data.

Recap key vocabulary, such as “difference”, before looking at questions that use this terminology. Children use key skills from the addition and subtraction block in the Autumn term to answer questions.

Give children the opportunity to ask their own questions about the data in pictograms, bar charts and tables. Although examples of data are given in this step, children can also collect their own data and represent it as pictograms, bar charts and tables, and then ask and answer questions relating to their own data.

### Things to look out for

- Children may assume that the scale on a bar chart always goes up in 1s.
- Children may see the word “more” and assume that they need to add, even when the question is “How many more ...?”
- Children may assume that the pictures in a pictogram represent 1, instead of looking at the key.

## Key questions

- What does each symbol represent on the pictogram? How do you know?
- What questions could you ask about the pictogram?
- What do you notice about the scale of the bar chart?
- What do you know? What can you find out?
- What is the total number of \_\_\_\_\_?
- How many more/fewer people chose \_\_\_\_\_ than \_\_\_\_\_?

## Possible sentence stems

- The difference between \_\_\_\_\_ and \_\_\_\_\_ is \_\_\_\_\_
- There are \_\_\_\_\_ more \_\_\_\_\_ than \_\_\_\_\_
- Altogether, there are \_\_\_\_\_

## National Curriculum links

- Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and line graphs
- Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs

# Comparison, sum and difference

## Key learning

- The pictogram shows the points scored by a school's houses.

House	Number of points
Savile	● ● ● ●
Grange	● ● ● ●
Heath	● ● ● ●
Manor	● ● ●

**Key**  
● = 20 points

- ▶ How many more points does Savile have than Manor?
  - ▶ How many points do Heath and Grange have altogether?
  - ▶ How many more points does Manor need to be equal to Grange?
  - ▶ How many points do the houses have altogether?
- A group of people were asked to vote for one activity.

Use the table to complete the sentences.

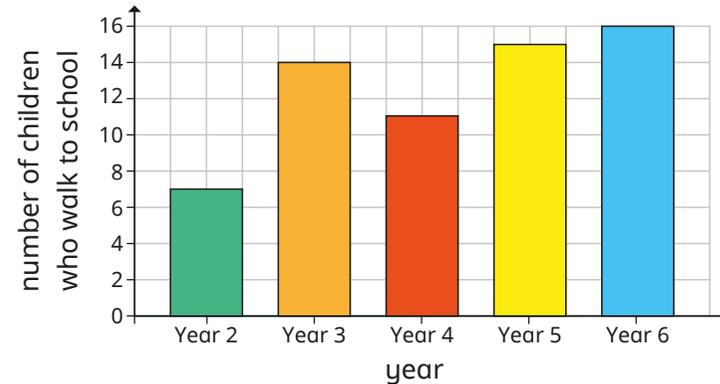
- ▶ \_\_\_\_\_ people voted in total.
- ▶  $\frac{1}{4}$  of the votes were for \_\_\_\_\_
- ▶ 7 more people voted for \_\_\_\_\_ than for \_\_\_\_\_

Activity	Number of votes
boxing	9
cinema	10
swimming	7
ice skating	14

What scale would you use to draw a bar chart using this data? Why?

- Children from Years 2 to 6 were asked if they walk to school.

The bar chart shows the results.



- ▶ How many more children walk to school in Year 5 than in Year 4?
- ▶ How many children walk to school in total?
- ▶ In which year group do twice as many children walk to school compared to Year 2?

What else do you know? What can you find out?

- As a class, choose some data that you would like to collect, for example favourite books, films or food.

Collect and record the data in a table.

Choose a pictogram or a bar chart to represent your data, giving reasons for your choices.

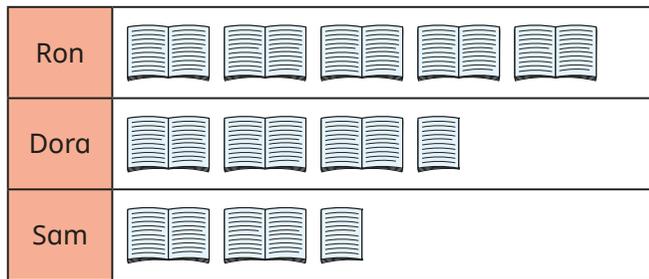
What questions can you ask about the data?

# Comparison, sum and difference

## Reasoning and problem solving

The pictogram shows the number of books each child read during the holidays.

Key  = 4 books



Dexter

Ron read one and a half more books than Dora.



Tommy

Sam read half the number that Ron did.

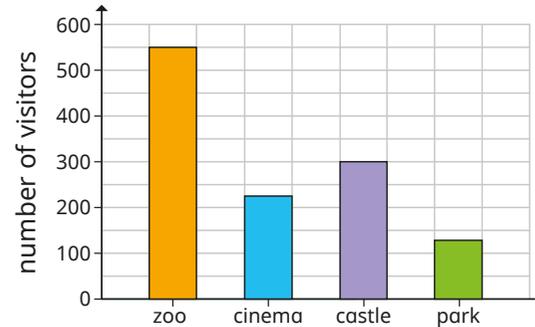
Are Dexter and Tommy correct?

Explain your answers.

Dexter is incorrect.

Tommy is correct.

The bar chart shows the number of visitors at some attractions one weekend.



Are the statements true or false?

- More people went to the zoo than the total of the other three places combined.
- Double the number of people visited the zoo than the castle.
- Less than one quarter of the total visitors went to the park.

Explain your answers.

False  
False  
True

# Interpret line graphs

## Notes and guidance

In this small step, children are introduced to line graphs for the first time. Most of the line graphs look at changes of a variable, such as temperature, over time.

Children apply their knowledge of scales on a graph to read a line graph accurately. They learn about continuous data, understanding that temperature can change all the time rather than be counted, and so representing it as a bar chart or pictogram would not be appropriate. They also learn that for many line graphs, the values are only known for specific times and reading off any other values will only give an estimate. Using dashed rather than solid lines is useful, as it emphasises that they show the trend in the change, not the exact values.

### Things to look out for

- Children may need support to understand the difference between discrete and continuous data.
- Children may interpret the points between readings as exact values rather than estimates.
- Children may make errors when reading values off the axes, in particular with points that lie between two values that are written on the scale.

## Key questions

- How is a line graph different from a bar chart?
- What do the horizontal and vertical axes represent?
- What is the best way to represent the data?
- What times do you know exact values for?
- At what time on the graph is it only possible to estimate the value of \_\_\_\_\_? Why?
- How would you estimate the time it was when \_\_\_\_\_?
- What do you know? What can you find out?

## Possible sentence stems

- The temperature at \_\_\_\_\_ is \_\_\_\_\_ °C.
- The \_\_\_\_\_ axis represents \_\_\_\_\_ and the \_\_\_\_\_ axis represents \_\_\_\_\_

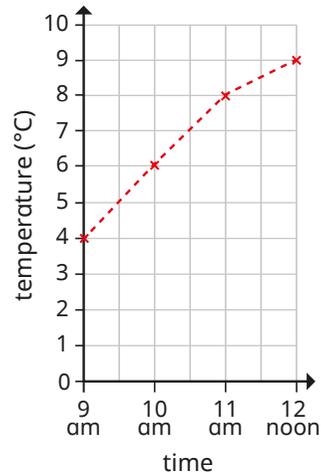
## National Curriculum links

- Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs
- Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs

# Interpret line graphs

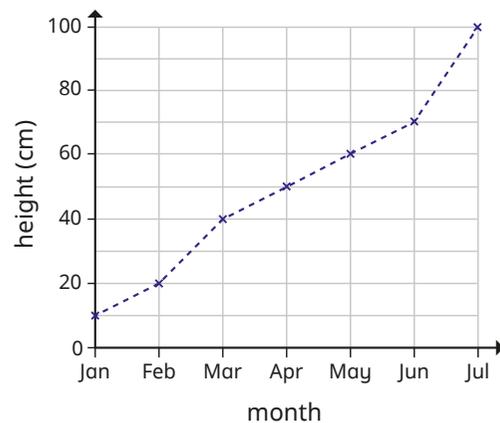
## Key learning

- The graph shows the temperature in the playground during a morning in April.



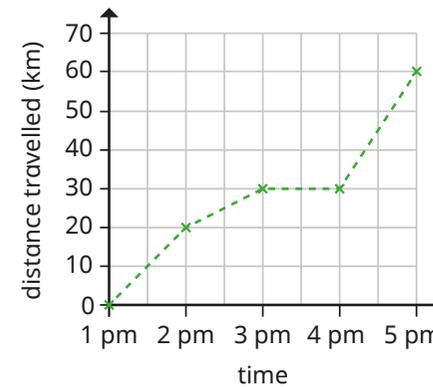
- ▶ What was the temperature at 9 am?
- ▶ At what time was the temperature 6°C?
- ▶ Estimate the temperature at 10:30 am.
- ▶ Estimate the time when the temperature was 5 °C.

- The graph shows the growth of a plant over 7 months.



- ▶ How tall was the plant at the start of May?
- ▶ In what month did the plant reach 40 cm?
- ▶ Estimate the height of the plant on 15 April.

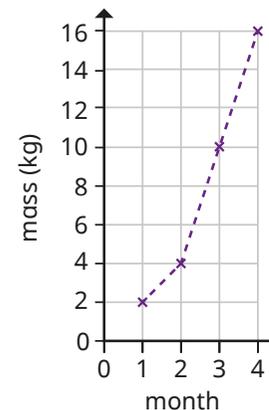
- The graph shows the distance a cyclist travels over 4 hours.



- ▶ How long does it take the cyclist to travel 20 km?
- ▶ How far has the cyclist travelled after 3 hours?
- ▶ What happens between 3 pm and 4 pm?

- The graph shows the mass of a puppy as it grows.

How many different ways can you complete the sentences?

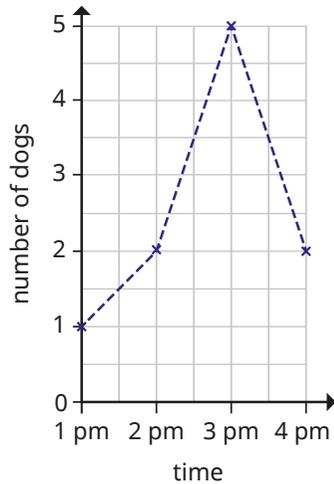


- ▶ When the puppy is \_\_\_\_\_ months old, its mass is \_\_\_\_\_ kg.
- ▶ Between month \_\_\_\_\_ and month \_\_\_\_\_, the mass increased by \_\_\_\_\_ kg.

# Interpret line graphs

## Reasoning and problem solving

Tiny creates a line graph to show the number of dogs in the park one afternoon.



At half past 1, there are 1.5 dogs in the park.



Explain Tiny's mistake.

What would be a better way of presenting the data?

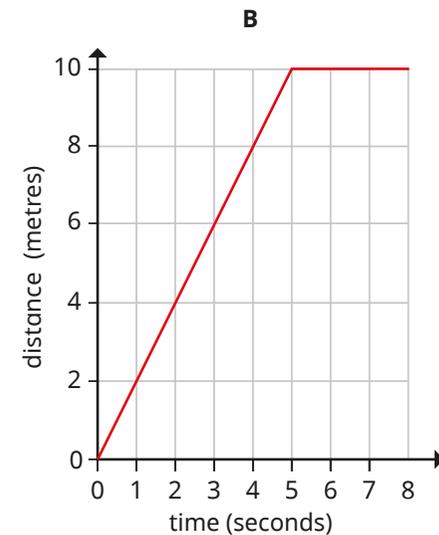
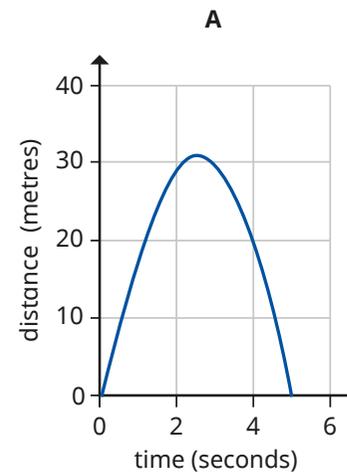
It is not possible to have 1.5 dogs.

Use a bar chart, pictogram or table.

Jack launched a toy rocket into the sky.

After 5 seconds, the rocket fell to the ground.

Which graph shows this?



Explain your answer.

Write a possible story to explain the other graph.

A

Discuss possible stories as a class.

# Draw line graphs

## Notes and guidance

Building on the previous step where children were introduced to line graphs, in this small step they draw their own line graphs to represent continuous data.

Children use their knowledge of scales to accurately draw line graphs, ensuring that they label the axes correctly. It may be useful for children to use pre-drawn axes rather than constructing their own, as this will save time as well as enable them to focus on accurately plotting data and choosing appropriate scales. Children will develop their knowledge of axes by looking formally at coordinates in the next block. Encourage children to use a ruler when drawing the lines between points on a line graph, using dashed lines in most cases and solid lines only when the change between given points is definitely happening at a constant rate.

### Things to look out for

- Children may be unsure of which data to plot on which axis.
- When drawing their own line graphs, children may not space the intervals evenly along the axes.
- Children may need further support with plotting points that do not align with labelled points of the axes.

## Key questions

- What do the two axes represent?
- What is the best way to show this data?
- What data is going to be shown on the horizontal/vertical axis?
- What scale will you use for the axes?
- How can you accurately plot this point?
- How are you going to join your points together?
- What questions can you ask about your graph?

## Possible sentence stems

- The horizontal axis represents \_\_\_\_\_ and the vertical axis represents \_\_\_\_\_
- The scale on the \_\_\_\_\_ axis goes up in \_\_\_\_\_s.

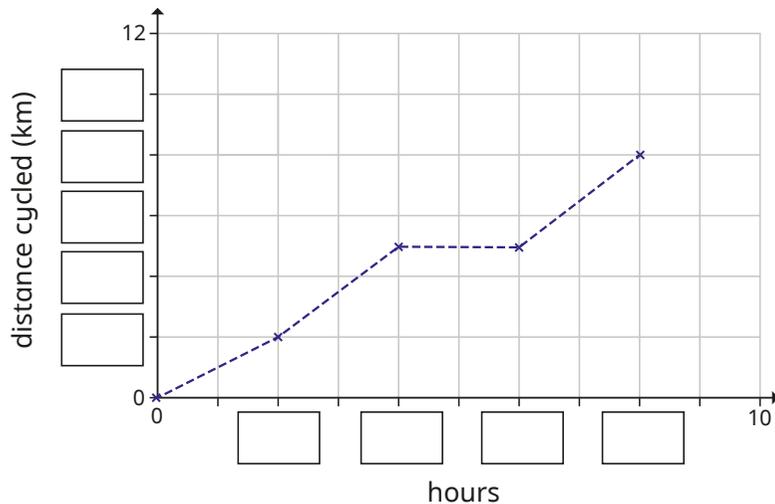
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# Draw line graphs

## Key learning

- The line graph shows the number of kilometres that Miss Lee cycled over 10 hours.
  - Fill in the missing labels.



After 10 hours, Miss Lee has cycled 10 km.

- Complete the line graph to show this.
- Use the graph to answer the questions.

How far had Miss Lee cycled after 2 hours?

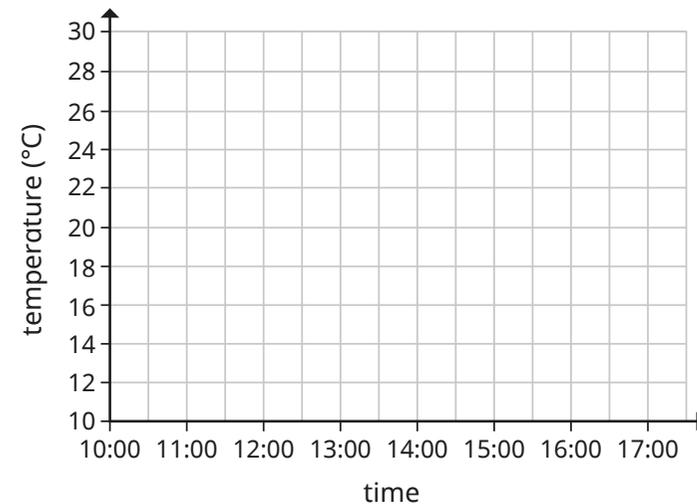
What happened between 4 and 6 hours?

Estimate how far Miss Lee had cycled after 1 hour.

- The table shows the temperature outside on Sunday.

Time	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00
Temperature (°C)	12	14	20	24	28	26	24	22

Use the information in the table to complete the graph.



- Class 4 measure the height of a plant every week for 6 weeks.

The table shows their measurements.

Week	1	2	3	4	5	6
Height (cm)	4	7	9	12	14	17

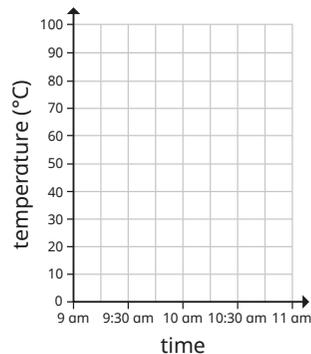
Draw a line graph to show this information.

What scale will you use on the horizontal and vertical axes?

# Draw line graphs

## Reasoning and problem solving

Sam measures the temperature of a cup of tea every 30 minutes for 2 hours.



Use the clues to complete the line graph.

- The temperature at 9:30 am was half the temperature at 9 am.
- The temperature at 10:30 am was 5 °C warmer than at 11 am.
- The temperature at 9 am was 80 °C.
- The temperature at 10:30 am was 10 °C cooler than at 10 am.
- The coolest temperature recorded was 15 °C.

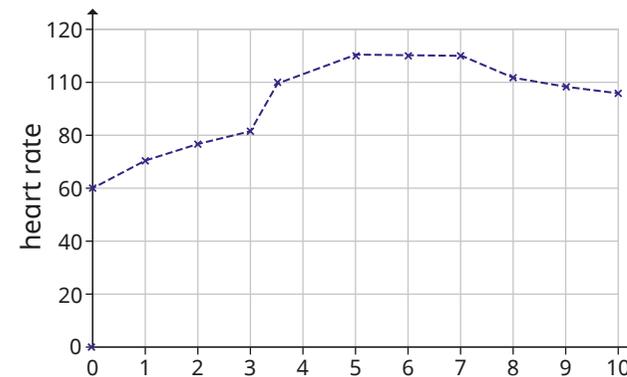
Graph accurately labelled:

- 9 am 80 °C
- 9:30 am 40 °C
- 10 am 30 °C
- 10:30 am 20 °C
- 11 am 15 °C

Tiny uses the table to draw a line graph.



Time (minutes)	0	1	2	3	4	5	6	7	8	9	10
Heart rate	65	70	77	82	100	110	110	110	102	98	96



What mistakes has Tiny made?

Compare answers with a partner.



- horizontal axis not labelled
- vertical axis labelled with 110 instead of 100
- point for 0 minutes plotted at 60, not 65
- point for 4 minutes plotted at 3.5 minutes