

Mathematics Level 3

Chapter 6 — Statistics

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Acquiring and recording data: frequency tables and spreadsheets

Code: VC2M3ST01 (.E01, .E02, .E03, .E04, .E05)

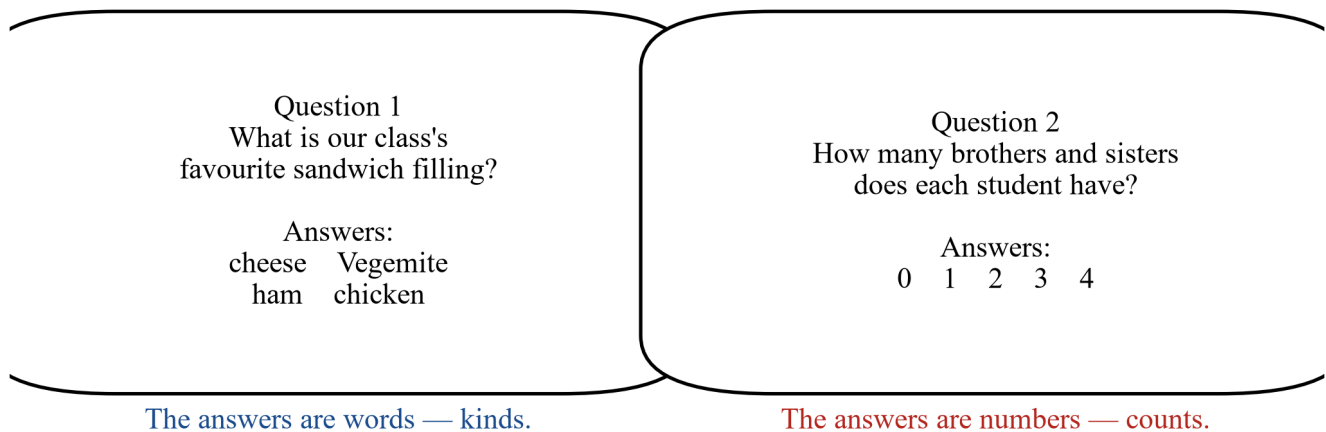
In this topic you will ask a question, collect the answers, and record them so they are easy to read. The answers you collect are called **data**. Data is a word for the answers you collect. Each question asks about something that can change from person to person, and those things are called **variables**. You will record data in two ways: in a **frequency table** on paper, and with **spreadsheets** on a computer.

You will need: paper and pencils, a spinner for one part, and a computer with spreadsheets for some parts.

Learn about collecting and recording data

1. Data starts with a question

We collect data to answer a question that interests us. The question decides what data we collect. Look at these two questions.



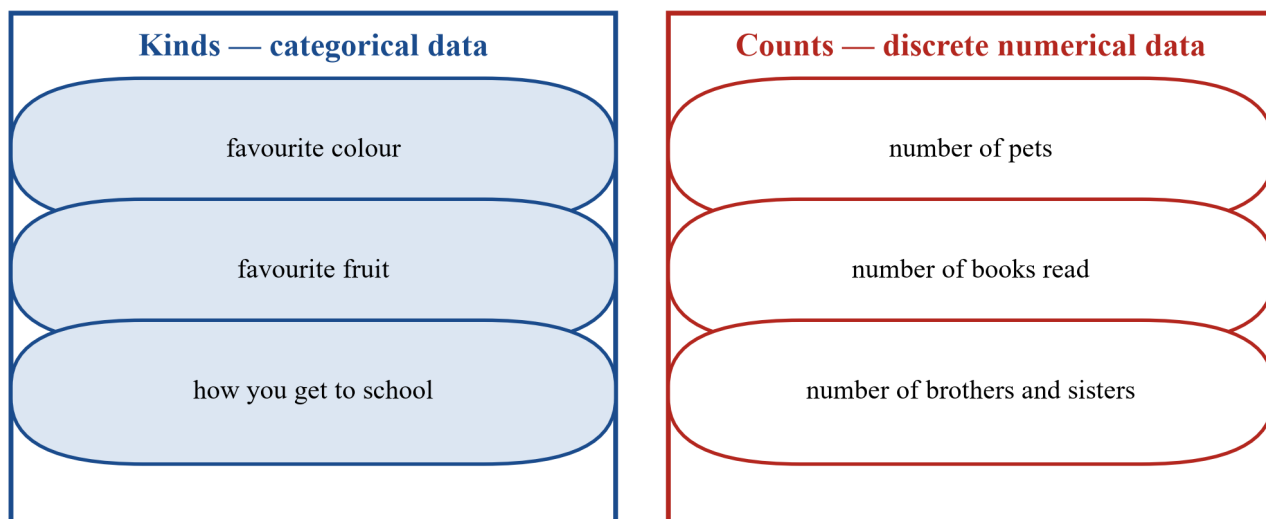
Each question brings its own kind of data.

Two question cards. The first asks what the favourite sandwich filling is, and its answers are words like cheese and Vegemite. The second asks how many brothers and sisters each student has, and its answers are numbers like 0, 1, 2, 3 and 4.

The first question brings back words — kinds. The second question brings back numbers — counts. Each question brings its own kind of data.

2. Two kinds of data

When the answers are words that name kinds, the data is **categorical data**. When the answers are counts — numbers you can count, like 0, 1, 2, 3 — the data is **discrete numerical data**.



Two sorting boxes. The blue box is labelled kinds, categorical data, and holds the cards favourite colour, favourite fruit and how you get to school. The red box is labelled counts, discrete numerical data, and holds the cards number of pets, number of books read and number of brothers and sisters.

Favourite colour is categorical data, because the answers are words. Number of pets is discrete numerical data, because the answers are counts.

3. Ways to collect data

You can collect data by:

- **observing** — watching and counting, like counting the cars that go past the school gate at lunch time;
- **asking** — doing written surveys, or asking the class and having each student call out an answer;
- **running an experiment** — spinning a spinner 20 times and writing down what happens.

Sometimes the data is already out there, and you **access** it from an online source instead of collecting it yourself. The Bureau of Meteorology keeps weather records for towns all over Australia, and you can access those records on its website.

Source: Bureau of Meteorology, *Climate data online*, retrieved 2026-08-20.

However you get the data, record it as it comes in.

4. Record with lists, tallies and symbols

A **list** writes down every answer in the order it comes in. A list is fine for a few answers, but a long list is hard to read.

A **tally** is a quick way to record. You draw one mark for each answer, and the fifth mark crosses the group of four. Then the groups of five are quick to count.

1: |

2: ||

3: |||

4: ||||

5: |||||

6: |||||

7: |||||

8: |||||

9: |||||

The fifth mark crosses the group. Groups of 5 are quick to count.

Tally marks for the numbers 1 to 9, in three rows of three. In each group of five, the fifth mark crosses the four marks before it.

A **symbol** can also stand for one thing: one star for one book, one cross for one car.

A **digital data table** is a table on a screen. You tap the answer each time, and the table fills in for you.

5. A frequency table shows how many of each

The **frequency** of an answer is how many times it comes in. A **frequency table** has one row for each kind of answer, a place for the tallies read from left to right, and a place for the frequencies. A total row at the bottom adds up the frequencies. The total must match the number of answers you collected — that is how you check your table.

6. Spreadsheets hold data in cells

Spreadsheets are computer programs that hold data in a grid of boxes called **cells**. Each cell has a name made from a letter and a number. The letter comes from the top of the grid, and the number comes from the side. The cell named B2 sits in the line under the letter B and in row 2. Two real spreadsheets are Microsoft Excel and Google Sheets.

Source: Microsoft, *Microsoft Excel*, retrieved 2026-08-20. Source: Google, *Google Sheets*, retrieved 2026-08-20.

Spreadsheets can **sort** rows for you, putting them in order from smallest to largest, or from largest to smallest. They can add for you too: type =SUM(B2:B6) in a cell and the computer adds the numbers in cells B2, B3, B4, B5 and B6. This is the **sum function**.

7. The computer is fast, but you do the thinking

Spreadsheets sort and add quickly, but they only use the numbers you type. If you type a wrong number, the computer adds it anyway. Always check the total against your own count.

Worked examples

Example 1 — with help

A class asked 20 students, “What is your favourite sandwich filling?” Here are the 20 answers, in the order they were collected.

The 20 answers, in the order they were collected

- | | | | |
|-------------|-------------|--------------|--------------|
| 1. cheese | 6. ham | 11. chicken | 16. ham |
| 2. ham | 7. cheese | 12. cheese | 17. Vegemite |
| 3. Vegemite | 8. Vegemite | 13. ham | 18. cheese |
| 4. cheese | 9. ham | 14. Vegemite | 19. Vegemite |
| 5. chicken | 10. cheese | 15. cheese | 20. ham |

The 20 answers in order: 1 cheese, 2 ham, 3 Vegemite, 4 cheese, 5 chicken, 6 ham, 7 cheese, 8 Vegemite, 9 ham, 10 cheese, 11 chicken, 12 cheese, 13 ham, 14 Vegemite, 15 cheese, 16 ham, 17 Vegemite, 18 cheese, 19 Vegemite, 20 ham.

Record the data in a frequency table.

Working

What we did

Draw one row for each kind: cheese, Vegemite, ham, chicken.

Each kind gets its own row.

Read the list from 1 to 20. Draw one tally mark for each answer; the fifth mark crosses the group.

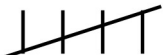
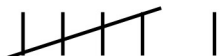
Tallying as we read keeps every answer safe.

Count each row's tallies: cheese 7, Vegemite 5, ham 6, chicken 2. Write the frequencies.

The frequency is how many times each answer came in.

Total: $7 + 5 + 6 + 2 = 20$. ✓

The total matches the 20 answers we collected.

Sandwich filling	Tally	Frequency
cheese		7
Vegemite		5
ham		6
chicken		2
Total		20

The finished frequency table. Cheese has a group of five tallies and two more, frequency 7. Vegemite has one group of five, frequency 5. Ham has a group of five and one more, frequency 6. Chicken has two tallies, frequency 2. The total row says 20.

Cheese has the largest frequency, so cheese is the favourite filling in this class.

Example 2 — with help

Ms Chen's class asked, "How many brothers and sisters does each student have?" The counts came out 3, 5, 4, 2 and 1. Type the table into Google Sheets and use the sum function to find the total.

Working

Type Brothers and sisters in A1 and Frequency in B1.

Type 0, 1, 2, 3, 4 in cells A2 to A6, and 3, 5, 4, 2, 1 in cells B2 to B6.

Type =SUM(B2:B6) in B7. The computer writes 15.

Check: $3 + 5 + 4 + 2 + 1 = 15$. ✓

What we did

The top row tells what each line holds.

Each frequency sits next to its count.

The sum function adds B2, B3, B4, B5 and B6.

Our count matches the computer's count.

	A	B
1	Brothers and sisters	Frequency
2	0	3
3	1	5
4	2	4
5	3	2
6	4	1
7	Total	=SUM(B2:B6)

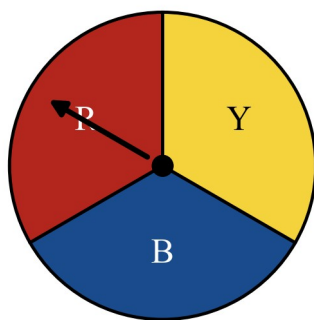
The sum function adds B2, B3, B4, B5 and B6. The computer writes 15.

The grid in Google Sheets. The line under A holds the counts 0, 1, 2, 3, 4 under the heading Brothers and sisters. The line under B holds the frequencies 3, 5, 4, 2, 1 under the heading Frequency. Cell B7 holds =SUM(B2:B6), and the computer writes 15 there.

15 students were asked.

Example 3 — on your own

A group spun this spinner 20 times and recorded the results in order. R stands for red, B for blue and Y for yellow.



The spinner

The 20 results, in order

1. R	6. R	11. R	16. B
2. B	7. B	12. Y	17. Y
3. R	8. Y	13. B	18. R
4. Y	9. R	14. R	19. B
5. R	10. B	15. R	20. Y

On the left, a spinner with three equal parts coloured red, blue and yellow, lettered R, B and Y. On the right, the 20 results in order: 1 R, 2 B, 3 R, 4 Y, 5 R, 6 R, 7 B, 8 Y, 9 R, 10 B, 11 R, 12 Y, 13 B, 14 R, 15 R, 16 B, 17 Y, 18 R, 19 B, 20 Y.

- Record the 20 results in a frequency table with tallies.
- Which colour came in the most? Which came in the least?
- Does your total match 20? Show the check.
- Red 9, blue 6, yellow 5.

Spinner result	Tally	Frequency
Red	five crossed group and four more	9
Blue	five crossed group and one more	6
Yellow	one group of five	5
Total		20

(b) Red came in the most (9). Yellow came in the least (5).

(c) $9 + 6 + 5 = 20$. ✓ The total matches the 20 spins.

Practice questions

With help

Q1. Look at the six cards. Sort them into two groups: questions that bring back kinds (categorical data) and questions that bring back counts (discrete numerical data).

favourite subject	number of pencils in your bag	favourite season
number of hops in 30 seconds	favourite day of the week	number of teeth you have lost

Is each one a kind or a count?

Six cards: favourite subject, number of pencils in your bag, favourite season, number of hops in 30 seconds, favourite day of the week, number of teeth you have lost.

Q2. A class asked students to pick a drink for lunch. The tallies show what they found.

Drink	Tally
water	
milk	
juice	

A tally table of drinks: water has a group of five and three more, milk has one group of five, juice has three marks.

- Write the frequency for each drink.
- Which drink was picked the most?
- How many students were asked in all?

Q3. The counts in this fruit table are done, but the tallies are missing. Draw the tallies to match.

Fruit	Count	Tally — you draw
apple	4	
banana	7	
orange	3	
pear	9	

A table with fruit names apple, banana, orange and pear, counts 4, 7, 3 and 9, and a blank space for tallies.

- (a) Draw the tallies for each fruit.
- (b) What is the total number of fruit? Show the check.

Q4. A group asked 15 students, “What is your favourite season?” Here are the answers in order:

summer, winter, summer, spring, summer, autumn, winter, summer, spring, summer, winter, summer, spring, summer, winter

Make a frequency table of the data. Draw one row for each season, tally as you read, write the frequencies, and add the total row.

Q5. A class counted the books borrowed from the library each day. One star stands for one book.



Key: one star = 1 book

A symbol chart: Monday four stars, Tuesday six stars, Wednesday three stars, Thursday five stars, Friday two stars.
Key: one star = 1 book.

- (a) Which day had the most books borrowed?
- (b) How many books were borrowed on Monday?
- (c) How many books were borrowed in all over the week?

Q6. Here is a frequency table with a missing number. The total must match.

Favourite pet	Frequency
Dog	8
Cat	6
Fish	?
Total	18

- (a) How many students picked fish?
- (b) How do you know your answer is right?

Q7. Mia typed her pets table into Google Sheets.

	A	B
1	Pets	Frequency
2	0	4
3	1	6
4	2	4
5	3	2
6	Total	=SUM(B2:B5)

Mia typed her pets table into a spreadsheet.

Mia's table in Google Sheets. The line under A holds the counts 0, 1, 2, 3 under the heading Pets. The line under B holds the frequencies 4, 6, 4, 2 under the heading Frequency. Cell B6 holds =SUM(B2:B5).

- What number is in cell B3?
- Which cell holds the frequency for 3 pets?
- The total cell shows =SUM(B2:B5). What number will the computer write there?

Q8. Ben's table is out of order.

How they get to school	Frequency
Bike	5
Walk	9
Car	7
Bus	3

- Write the rows again in order from largest to smallest.
- Write the rows in order from smallest to largest.

On your own

Q9. Write two questions of your own: one that brings back categorical data, and one that brings back discrete numerical data.

Q10. Here is a tally chart written in words.

- apple: one group of five, and two more
- banana: one group of five
- orange: three

- Write the frequency for each fruit.
- Which fruit is the most liked?
- What is the total? Show the check.

Q11. A group asked each student, "How many books did you read in the holidays?" The answers were:

2, 3, 2, 5, 2, 4, 3, 2, 5, 3, 4, 2

Make a frequency table of the data, with a total row.

Q12. A class asked 30 students a question and wrote every answer down in a long list. Why is a tally a quicker way to record?

Q13. A group rolled a die 15 times. The results were:

3, 1, 5, 3, 2, 3, 6, 3, 1, 5, 3, 2, 4, 3, 6

- (a) Record the results in a frequency table with a total row.
- (b) Which number came in the most?

Q14. Here is a paper grid, like the grids spreadsheets use.

	A	B
1	Favourite colour	Frequency
2	blue	9
3	green	6
4	red	5

- (a) What number is in cell B2?
- (b) Type =SUM(B2:B4) in cell B5. What number will the computer write there?
- (c) Sort the rows from largest to smallest, and write the table again.

Q15. A frequency table has a missing number. The total is 24. Dog is 10, cat is 7, and bird is the rest. How many is bird? Show how you know.

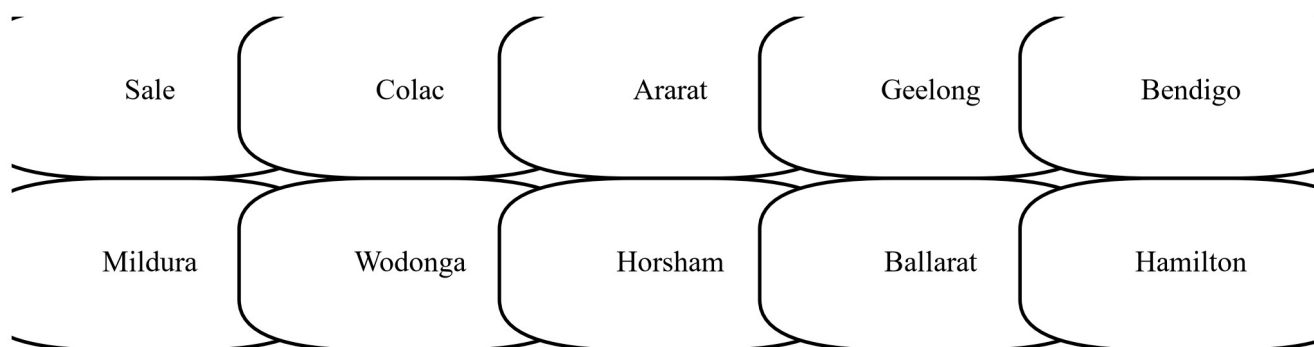
Q16. Tom's class wants to know how many rainy days Melbourne had last July. Tom says the class should stand outside and count the rainy days this July. Mia says they can access the Bureau of Meteorology website and get last July's records. Give two reasons why Mia's way is better.

Q17. Zoe's table in Google Sheets says the total is 30. When Zoe adds the frequencies herself, she gets 28. What could have happened? What should Zoe do?

Q18. Your class wants to know how many hours each student slept last night.

- (a) Is this categorical data or discrete numerical data? Why?
- (b) How will you collect the answers?
- (c) How will you record them?

Q19. Here are ten towns in Victoria.



Ten towns in Victoria. Count the letters in each name.

Ten cards naming Victorian towns: Sale, Colac, Ararat, Geelong, Bendigo, Mildura, Wodonga, Horsham, Ballarat and Hamilton.

Source: Wikipedia, *List of localities in Victoria*, retrieved 2026-08-20.

Count the letters in each town name, and record the counts in a frequency table.

- (a) Make the frequency table, with tallies, frequencies and a total row.
 - (b) Which letter count came in the most?
 - (c) What is your total? What must it match?
 - (d) Now add Melbourne, which has 9 letters. What changes in your table?
-

Answers

Q1. Kinds (categorical): favourite subject, favourite season, favourite day of the week. Counts (discrete numerical): number of pencils in your bag, number of hops in 30 seconds, number of teeth you have lost. **Q2.** (a) water 8, milk 5, juice 3 (b) water (c) 16. **Q3.** (a) apple four marks, banana a group of five and two more, orange three marks, pear a group of five and four more (b) 23; $4 + 7 + 3 + 9 = 23$. **Q4.** summer 7, winter 4, spring 3, autumn 1; total 15. **Q5.** (a) Tuesday (b) 4 (c) 20. **Q6.** (a) 4 (b) $8 + 6 + 4 = 18$, the total. **Q7.** (a) 6 (b) B5 (c) 16. **Q8.** (a) Walk 9, Car 7, Bike 5, Bus 3 (b) Bus 3, Bike 5, Car 7, Walk 9. **Q9.** Many different pairs are right. **Q10.** (a) apple 7, banana 5, orange 3 (b) apple (c) 15; $7 + 5 + 3 = 15$. **Q11.** 2 books: 5, 3 books: 3, 4 books: 2, 5 books: 2; total 12. **Q12.** With tallies you draw one mark per answer and count groups of five at the end; a long list must be read and counted again. **Q13.** (a) 1: 2, 2: 2, 3: 6, 4: 1, 5: 2, 6: 2; total 15 (b) 3. **Q14.** (a) 9 (b) 20 (c) blue 9, green 6, red 5. **Q15.** 7; $24 - 10 - 7 = 7$, and $10 + 7 + 7 = 24$. **Q16.** Any two: it is faster; last July has already happened, so counting this July would collect new data, not last July's; the Bureau of Meteorology kept a record for every day. **Q17.** Zoe could have typed a wrong number into one cell; she should check each cell against her tallies and fix it. **Q18.** (a) discrete numerical, because the answers are counts of hours (b) any way that works, such as asking each student (c) any way that works, such as a tally or a frequency table. **Q19.** (a) 4 letters: 1, 5 letters: 1, 6 letters: 1, 7 letters: 5, 8 letters: 2; total 10 (b) 7 letters (c) 10; it must match the ten towns (d) a new row for 9 letters with frequency 1, and the total becomes 11.

Worked answers

Q1. Favourite subject, favourite season and favourite day of the week bring back words — kinds — so they are categorical data. Number of pencils, number of hops and number of teeth lost bring back counts, so they are discrete numerical data.

Q2. (a) Water has a group of five and three more, so 8. Milk has one group of five, so 5. Juice has three marks, so 3. (b) Water was picked the most. (c) $8 + 5 + 3 = 16$ students. ✓

Q3. (a) Apple: four marks. Banana: a crossed group of five and two more. Orange: three marks. Pear: a crossed group of five and four more. (b) $4 + 7 + 3 + 9 = 23$ fruit. ✓

Q4. Tallying the 15 answers: summer 7, winter 4, spring 3, autumn 1. Total: $7 + 4 + 3 + 1 = 15$, which matches the 15 students. ✓

Q5. (a) Tuesday, with 6 stars. (b) Monday had 4 stars, so 4 books. (c) $4 + 6 + 3 + 5 + 2 = 20$ books. ✓

Q6. (a) The total is 18, and $8 + 6 = 14$, so fish is $18 - 14 = 4$. (b) Check: $8 + 6 + 4 = 18$, which matches the total. ✓

Q7. (a) Cell B3 sits in the line under B and in row 3, so it holds 6. (b) The frequency for 3 pets sits in row 5 under B: cell B5. (c) The sum function adds $4 + 6 + 4 + 2 = 16$, so the computer writes 16.

Q8. (a) Largest to smallest: Walk 9, Car 7, Bike 5, Bus 3. (b) Smallest to largest: Bus 3, Bike 5, Car 7, Walk 9.

Q9. Any two questions with the right kind of answers. For example, "What is your favourite fruit?" brings back kinds, so it is categorical data. "How many people live in your house?" brings back counts, so it is discrete numerical data.

Q10. (a) Apple: $5 + 2 = 7$. Banana: 5. Orange: 3. (b) Apple is the most liked. (c) $7 + 5 + 3 = 15$. ✓

Q11. Reading the list: 2 came in five times, 3 three times, 4 two times, and 5 two times.

Books read	Tally	Frequency
2	five crossed group	5
3	three marks	3
4	two marks	2
5	two marks	2
Total		12

Check: $5 + 3 + 2 + 2 = 12$, which matches the 12 answers. ✓

Q12. In a tally, each answer is one mark, put down as it comes in, and groups of five are quick to count at the end. A long list has to be read through and counted again, which is slower and easier to get wrong.

Q13. (a) Tallying the 15 results:

Die result	Tally	Frequency
1	two marks	2
2	two marks	2
3	five crossed group and one more	6
4	one mark	1
5	two marks	2
6	two marks	2
Total		15

(b) 3 came in the most, with a frequency of 6.

Q14. (a) Cell B2 holds 9. (b) The sum function adds $9 + 6 + 5 = 20$, so the computer writes 20. (c) Largest to smallest: blue 9, green 6, red 5.

Q15. Bird is $24 - 10 - 7 = 7$. Check: $10 + 7 + 7 = 24$, the total. ✓

Q16. Any two of these: Mia's way is faster, because the records are already there; last July has already happened, so standing outside this July would collect new data, not last July's data; the Bureau of Meteorology kept a record for every day, so no rainy day gets missed.

Q17. Zoe could have typed one of the numbers wrong, so the computer added a wrong number. Zoe should check each cell against her tallies, fix the wrong cell, and check that the new total matches her own count.

Q18. (a) Discrete numerical data, because each answer is a count of hours — a number you can count. (b) Any way that works, such as asking each student to call out an answer, or written surveys. (c) Any way that works, such as a tally as the answers come in, then a frequency table.

Q19. (a) Counting letters: Sale 4, Colac 5, Ararat 6, Geelong 7, Bendigo 7, Mildura 7, Wodonga 7, Horsham 7, Ballarat 8, Hamilton 8.

Letters in the name	Tally	Frequency
4	one mark	1
5	one mark	1
6	one mark	1
7	five crossed group	5
8	two marks	2
Total		10

(b) 7 letters came in the most, with a frequency of 5. (c) The total is 10, and it must match the ten towns on the cards. ✓ (d) A new row appears for 9 letters with frequency 1, and the total becomes 11, to match the eleven towns.

Creating and comparing data displays

Code: VC2M3ST02 (.E01, .E02, .E03, .E04)

In the last topic you collected data and put it in a table. Now you will make **displays** of your data. A **display** is a way to show data so people can see it. You will make two kinds of displays: a **picture graph** and a **bar graph**. A picture graph shows data with pictures. A bar graph shows data with bars. You will also learn to **compare** displays. To compare is to look for what is the same and what is different.

In this topic, one picture or one square always stands for one thing.

You will need: grid paper, counters or sticky notes, coloured pencils, and a computer with graphing software for some parts.

Learn about data displays

1. A display shows data in a way you can see

In the last topic your class asked a question, collected data, and recorded it in a table. Here is a table from one class.

Favourite pet	Number of students
Dog	9
Cat	6
Fish	3
Bird	2

A table gives you the exact counts, but you have to read every row. A display shows the same data as a picture. Then you can see what it shows with one quick look.

2. A picture graph uses one picture for each thing

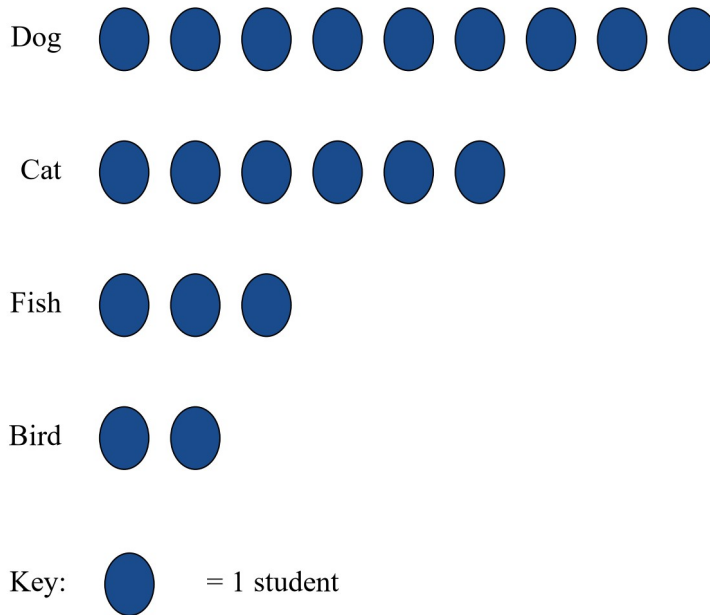
A picture graph shows data with pictures. Each picture stands for one thing. Here is the pet data as a picture graph.

Favourite pets of 20 students

Dog	● ● ● ● ● ● ● ● ● ●
Cat	● ● ● ● ● ●
Fish	● ● ●
Bird	● ●

Key: ● = 1 student

Favourite pets of 20 students



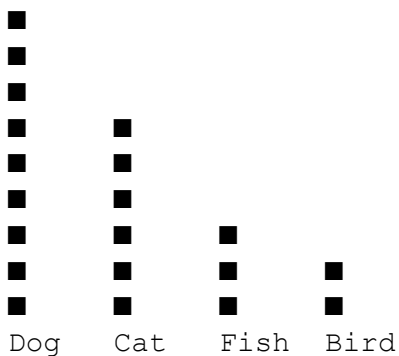
A picture graph of favourite pets. The dog row has 9 dots, the cat row has 6, the fish row has 3 and the bird row has 2. The key says one dot is 1 student.

The **key** tells you what one picture stands for. The dog row has the most pictures, so most students in this class picked dogs.

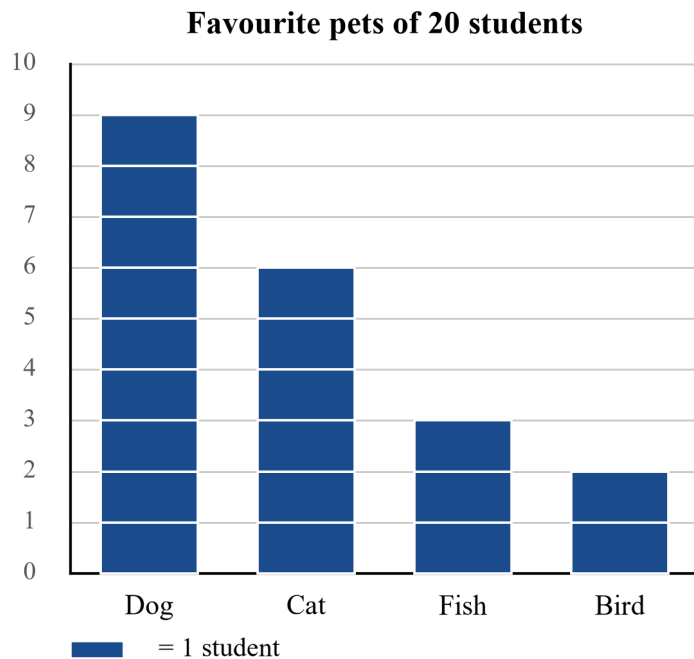
3. A bar graph uses a bar for each kind

A bar graph shows data with bars. There is one bar for each kind. Each bar is built one square at a time, and one square stands for one thing. Here is the pet data as a bar graph.

Favourite pets of 20 students



Each  is 1 student.



A bar graph of favourite pets. The dog bar is 9 squares high, the cat bar is 6, the fish bar is 3 and the bird bar is 2. One square stands for 1 student.

The tallest bar shows the most. The shortest bar shows the least. The dog bar is the tallest, so dogs are the most liked pet. The bird bar is the shortest, so birds are the least liked pet.

4. The same data can be shown in different ways

Look back at the table, the picture graph, and the bar graph above. All three show the same pet data. Each display shows that dogs are the most liked pet and birds are the least liked pet. The data did not change. Only the way it is shown changed.

5. Compare displays to see what is the same and what is different

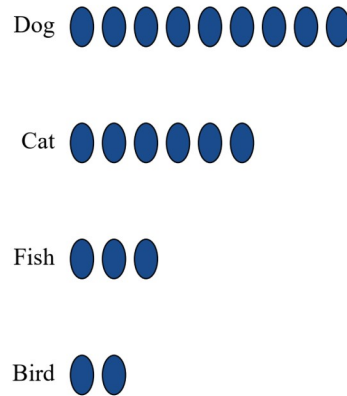
What is the same in the three displays? They all show the same counts. Dogs are 9 in each display.

What is different? A table gives the exact counts. A picture graph shows one picture for each student. A bar graph lets you see the most and the least the fastest.

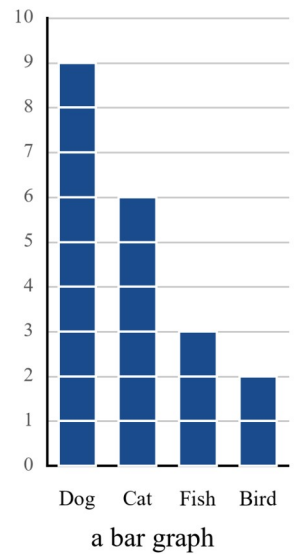
The same data, shown three ways

Favourite pet	Number of students
Dog	9
Cat	6
Fish	3
Bird	2

a table



a picture graph



a bar graph

One dot is 1 student. One square is 1 student.

The same pet data shown three ways: a table, a picture graph and a bar graph. Dogs are the most liked pet in all three.

6. Pick the display that fits your audience

Your **audience** is the people who will see your display. Pick a display that works for them.

Job	A good display
You need the exact counts.	a table
You want people to see the most and the least fast.	a bar graph
You are making a poster for families.	a picture graph with colour

7. Software can make displays for you

You can use graphing software to make a display. You type the numbers from your table into the program. Then the software draws the graph for you. Two real programs that can do this are Microsoft Excel and Google Sheets.

Source: Microsoft, *Microsoft Excel*, retrieved 2026-08-19. Source: Google, *Google Sheets*, retrieved 2026-08-19.

The software draws the graph fast, but it does not do the thinking. You still have to read the graph and say what it shows. You also have to check that it matches your table.

8. You can find displays in many places

Newspapers, magazines, and news stories use displays to show data. When you see one, stop and read it. What is its title? What does it show? What is the most? What is the least?

Worked examples

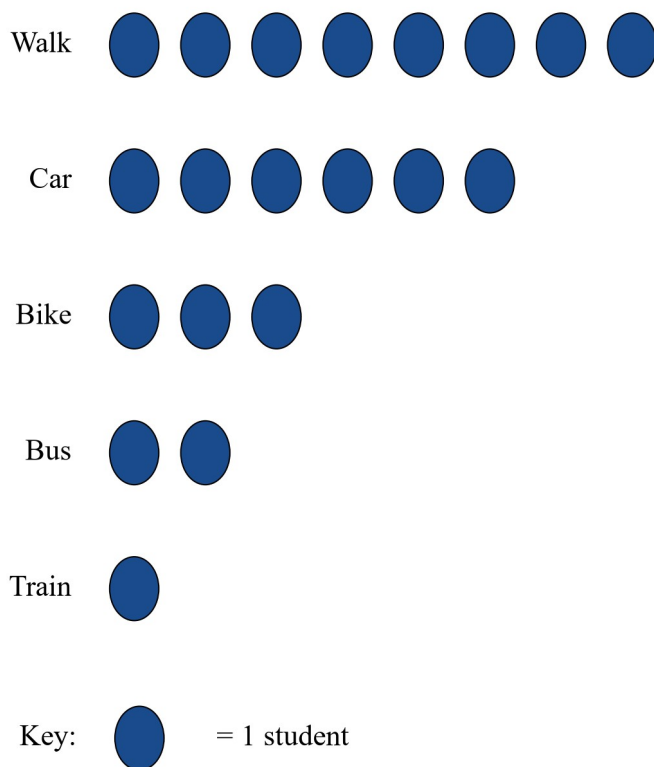
Example 1 — with help

Ada's class asked 20 students how they get to school. The table shows what they found. Draw a picture graph of the data. Let ● = 1 student.

How they get to school	Number of students
Walk	8
Car	6
Bike	3
Bus	2
Train	1

Working	What we did
Write a title: <i>How Ada's class gets to school.</i>	A title tells what the graph is about.
Make one row for each kind: Walk, Car, Bike, Bus, Train.	Each kind gets its own row.
Walk: draw 8 pictures, one for each student.	One picture stands for one student.
Car: 6 pictures. Bike: 3 pictures. Bus: 2 pictures. Train: 1 picture.	Keep going until each row is done.
Write the key: ● = 1 student.	The key tells what one picture stands for.
Check: $8 + 6 + 3 + 2 + 1 = 20$. ✓	The total matches the 20 students.
How Ada's class gets to school	
Walk ● ● ● ● ● ● ● ● Car ● ● ● ● ● ● Bike ● ● ● Bus ● ● Train ●	
Key: ● = 1 student	

How Ada's class gets to school



A picture graph of how Ada's class gets to school. The walk row has 8 dots, the car row has 6, the bike row has 3, the bus row has 2 and the train row has 1. The key says one dot is 1 student.

Example 2 — with help

Ms Lee's class recorded the books borrowed from the class library each day. Draw a bar graph of the data. Let one square stand for one book.

Day	Books borrowed
Monday	12
Tuesday	9
Wednesday	15
Thursday	11
Friday	7

Working

Write a title: *Books borrowed this week.*

Write the days of the week along the bottom.

Monday: build a bar 12 squares high. One square stands for one book.

Build the bars for Tuesday (9), Wednesday (15), Thursday (11), Friday (7).

Check: $12 + 9 + 15 + 11 + 7 = 54$. ✓

The tallest bar is Wednesday (15). The shortest bar is

What we did

A title tells what the graph is about.

Each day gets its own bar.

The bar matches the count.

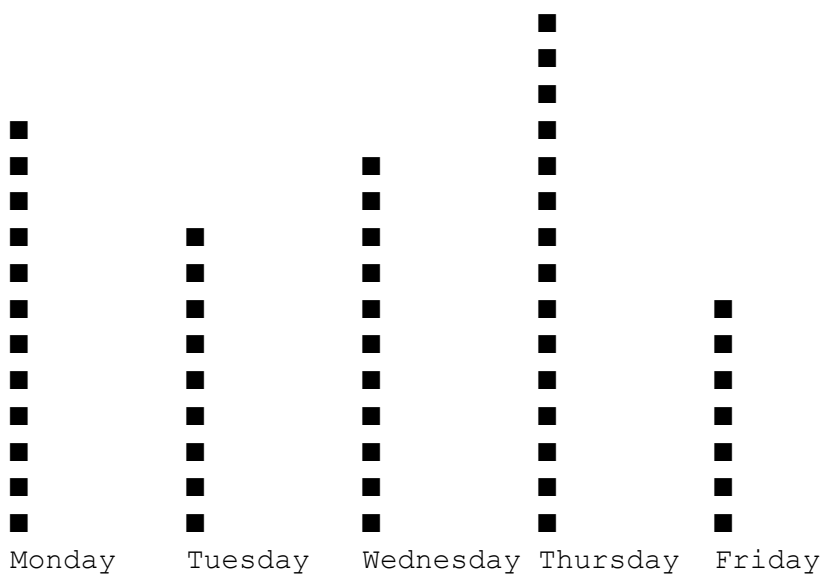
Make each bar the same size.

The total matches 54 books.

The tallest bar shows the most.

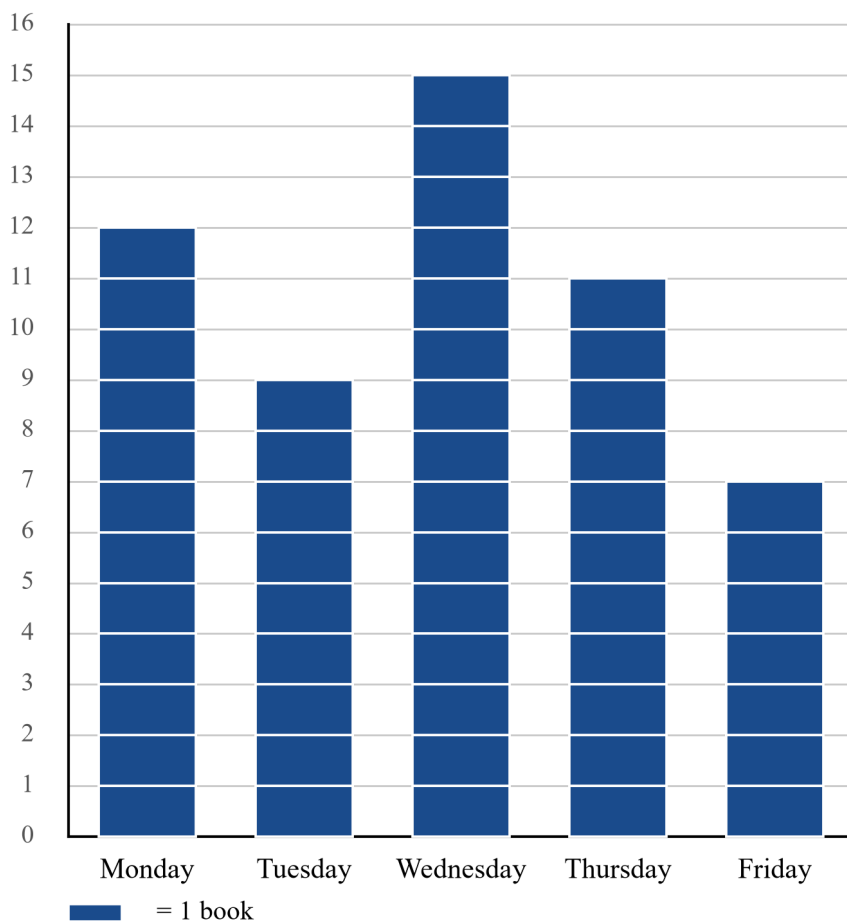
Friday (7).

Books borrowed this week



Each ■ is 1 book.

Books borrowed this week

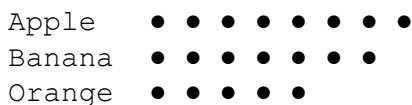


A bar graph of books borrowed each day. The Monday bar is 12 squares high, Tuesday is 9, Wednesday is 15, Thursday is 11 and Friday is 7. One square stands for 1 book.

Example 3 — on your own

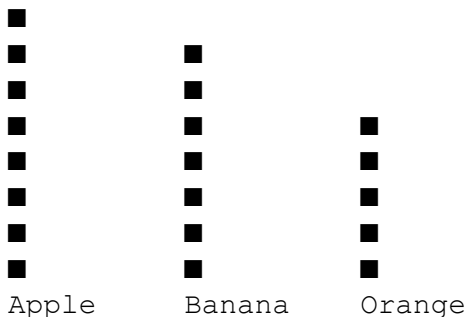
Zoe's group and Ben's group asked 20 students about their favourite fruit. Both groups showed the same data. Zoe's group made a picture graph. Ben's group made a bar graph.

Favourite fruit (Zoe's group)

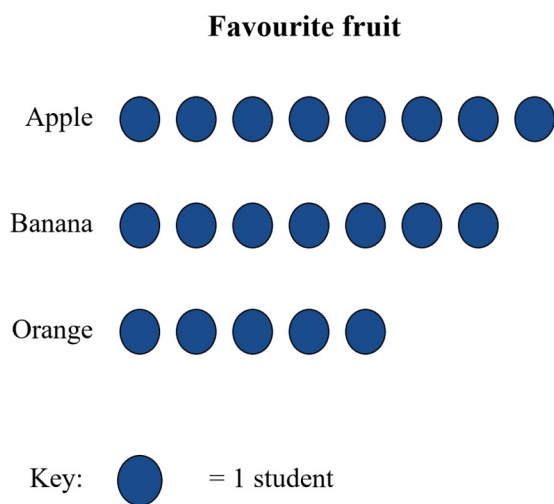


Key: • = 1 student

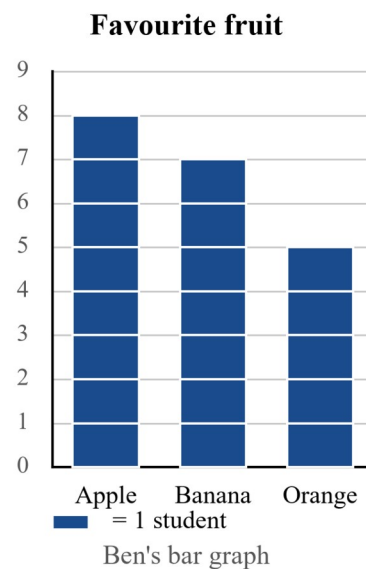
Favourite fruit (Ben's group)



Each ■ is 1 student.



Zoe's picture graph



The same fruit data shown two ways. On the left, Zoe's picture graph has 8 dots for apple, 7 for banana and 5 for orange. On the right, Ben's bar graph shows the same counts.

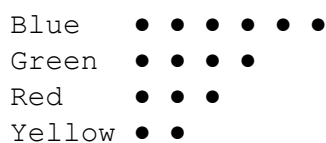
- How many students were asked?
- Which fruit is the most liked?
- Write one thing that is the same about the two displays, and one thing that is different.
- Count the pictures in Zoe's graph: $8 + 7 + 5 = 20$. **20 students** were asked.
- The apple row has the most pictures, and the apple bar is the tallest. **Apples** are the most liked fruit.
- Same: both displays show the same counts — 8 for apple, 7 for banana, 5 for orange — and both show that apples are the most liked. Different: Zoe's display uses one picture for each student, and Ben's display uses bars. The bar graph shows the most the fastest. The picture graph shows each student one by one.

Practice questions

With help

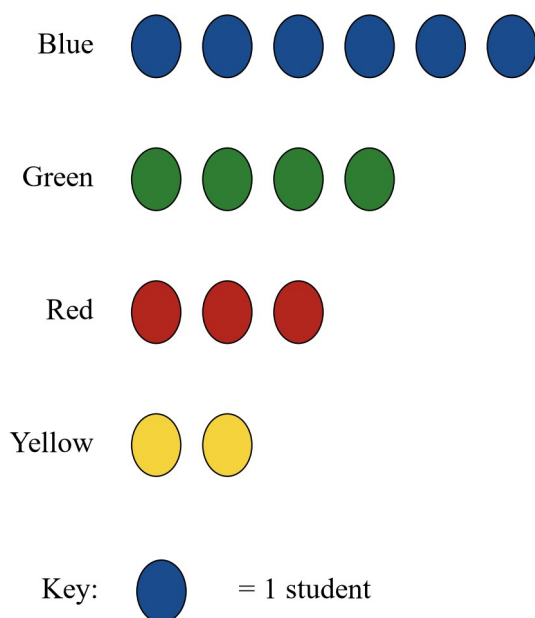
Q1. Here is a picture graph of favourite colours.

Favourite colours of 15 students



Key: • = 1 student

Favourite colours of 15 students

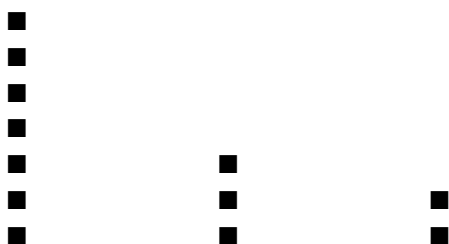


A picture graph of favourite colours. The blue row has 6 blue dots, the green row has 4 green dots, the red row has 3 red dots and the yellow row has 2 yellow dots. The key says one dot is 1 student.

- How many students picked blue?
- Which colour is the most liked?
- How many students were asked in all?

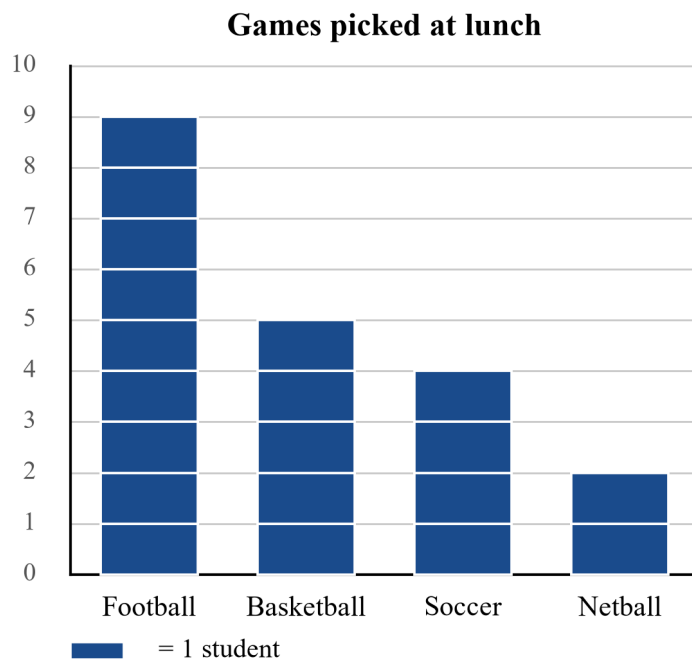
Q2. Here is a bar graph of the games students picked at lunch.

Games picked at lunch



■ ■ ■ ■
 ■ ■ ■ ■
 Football Basketball Soccer Netball

Each ■ is 1 student.



A bar graph of games picked at lunch. The football bar is 9 squares high, basketball is 5, soccer is 4 and netball is 2. One square stands for 1 student.

- Which game did the most students pick?
- How many more students picked football than netball?
- How many students were asked in all?

Q3. Here is a table of the pets of one group of students. Draw a picture graph of the data. Let ● = 1 pet.

Pet	Number of students
Dog	5
Cat	3
Fish	2
Bird	1

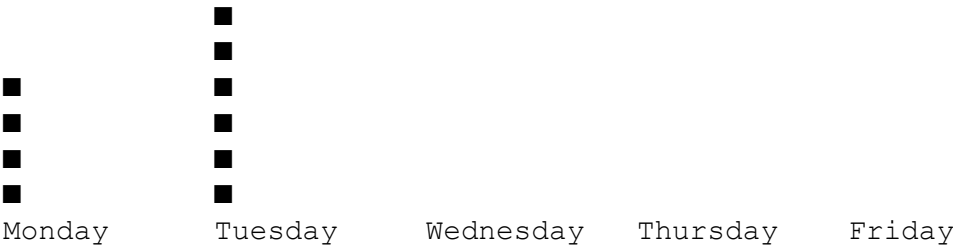
Follow these steps: write a title, make one row for each pet, draw one ● for each pet, and write the key.

Q4. The table shows the school buses that came to school each day last week.

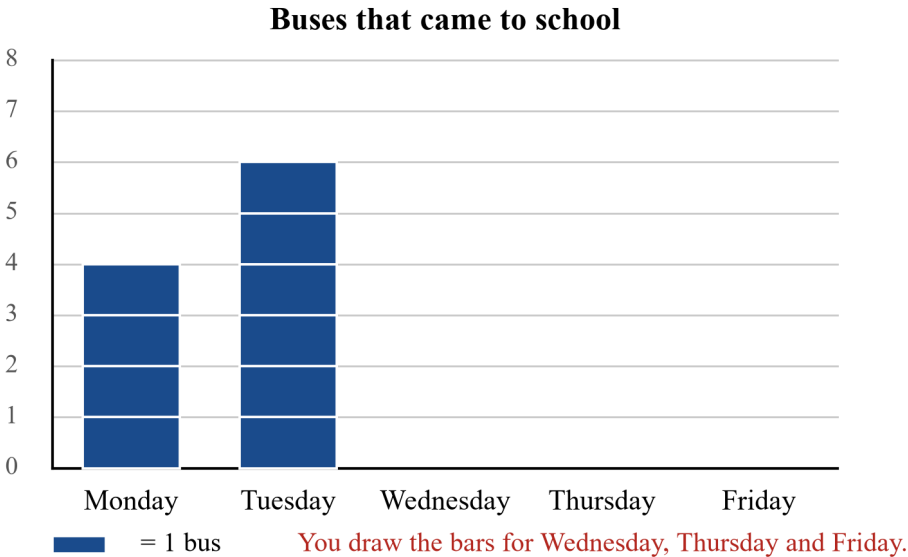
Day	Buses
Monday	4
Tuesday	6
Wednesday	5
Thursday	3
Friday	7

The bar graph below has the bars for Monday and Tuesday done. Finish the bars for Wednesday, Thursday, and Friday. Let one square stand for one bus.

Buses that came to school



Each ■ is 1 bus.



A bar graph of school buses. The Monday bar is 4 squares high and the Tuesday bar is 6. The bars for Wednesday, Thursday and Friday are left for you to draw. One square stands for 1 bus.

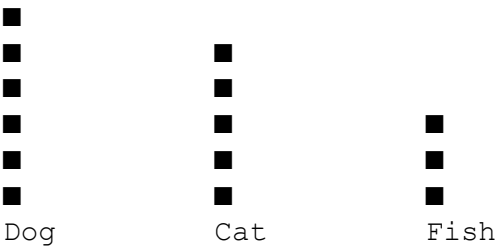
- (a) Finish the graph.
- (b) Which day had the most buses?
- (c) How many buses came in all over the week?

Q5. The class wants to put a display on the wall for families to see. The display must show which book was the most liked. They can make a list of the counts, or a big picture graph with colour. Which is better for this job? Why?

Q6. Zoe showed the same pet data two ways: in a table and in a bar graph.

Pet	Number of students
Dog	6
Cat	5
Fish	3

Pets of the students in Zoe's class

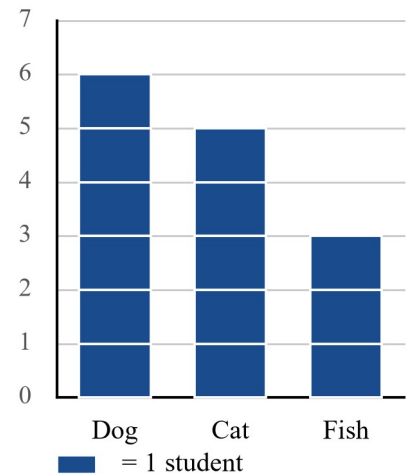


Each ■ is 1 student.

Pets of the students in Zoe's class

Pet	Number of students
Dog	6
Cat	5
Fish	3

the table



the bar graph

The same pet data shown two ways. On the left, a table with dog 6, cat 5 and fish 3. On the right, a bar graph with the same counts.

- How many students were asked?
- Write one thing that is the same about the table and the bar graph, and one thing that is different.

Q7. Mia typed her table into a computer program. The software drew a bar graph very fast. What two things does Mia still have to do herself?

Q8. Sam looked at this picture graph.

Favourite colours

Blue ● ● ● ● ●
 Green ● ● ● ●
 Red ● ● ●

Key: ● = 1 student

Sam says 14 students were asked. Is Sam right? Count the pictures and check.

On your own

Q9. A class asked 24 students how they get to school.

How they get to school	Number of students
Walk	8
Car	7
Bike	4
Bus	3
Train	2

Draw a picture graph of the data. Let ● = 1 student. Give your graph a title and a key.

Q10. A class asked 20 students about their favourite sport.

Sport	Number of students
Football	8

Sport	Number of students
Soccer	5
Basketball	4
Netball	3

Draw a bar graph of the data on grid paper. Let one square stand for one student. Give your graph a title.

Q11. Look at your bar graph from Q10.

- (a) Which sport is the most liked?
- (b) How many more students like football than basketball?

Q12. Zoe's class did a science test with bean seeds. They put 10 seeds in Tray A. Tray A was in the light. They put 10 seeds in Tray B. Tray B was in a dark place. After one week, 8 seeds grew in Tray A and 7 seeds grew in Tray B.

- (a) Draw a bar graph to show how many seeds grew in each tray. Let one square stand for one seed.
- (b) In which tray did more seeds grow?
- (c) How many seeds did not grow in Tray A?

Q13. Ben says, "A bar graph is the best display to find the most liked quickly." Is Ben right? Tell why you think so.

Q14. Your class wants to show students in Prep which library book was the most liked this week. Would you make a table or a big picture graph? Why?

Q15. Find a display in a newspaper, a magazine, or a news story. Look at it with your teacher or your family.

- (a) Write what the display is about.
- (b) What is the most? What is the least?

Q16. When is a table better than a graph? Write one reason.

Q17. Ada typed her table into a computer program. The software drew a bar graph. In Ada's table, green was the most liked. But in the graph, blue is the tallest bar. What could have happened?

Q18. Tom made a picture graph of favourite fruit. His table says: apple 8, banana 7, orange 5. In his picture graph, the apple row has 6 pictures. What is wrong? What should Tom do?

Q19. Football is big in Victoria. The Grand Final of the AFL is played at the MCG in Melbourne. Each sport puts a different number of players on the field for one team.

Sport	Players on the field for one team
AFL	18
Soccer	11
Netball	7
Basketball	5

Source: AFL, *Laws of the Game*, retrieved 2026-08-19. Source: FIFA, *Laws of the Game*, retrieved 2026-08-19.

Source: Netball Australia, *Rules of Netball*, retrieved 2026-08-19. Source: FIBA, *Official Basketball Rules*, retrieved 2026-08-19.

- (a) Draw a bar graph of the data on grid paper. Let one square stand for one player.
- (b) Which sport has the most players on the field for one team?
- (c) How many more players are on an AFL team than on a netball team?
- (d) Ava wants to show this data to her little sister, who is in Prep. Would a picture graph or a table be better? Why?

Answers

Q1. (a) 6 (b) blue (c) 15. **Q2.** (a) football (b) 7 more (c) 20. **Q3.** Picture graph with 5 ● for dog, 3 ● for cat, 2 ● for fish, and 1 ● for bird, plus a title and a key. **Q4.** (a) Wednesday 5 squares, Thursday 3 squares, Friday 7 squares (b) Friday (c) 25. **Q5.** The picture graph; it shows the most liked book at a quick look. **Q6.** (a) 14 (b) Same: both show the same counts; different: the bar graph shows the most the fastest, and the table gives the exact counts to read. **Q7.** Any two: check the graph matches her table; give the graph a title; read the graph and say what it shows. **Q8.** No; 12 students were asked. **Q9.** Picture graph with 8 ● for walk, 7 ● for car, 4 ● for bike, 3 ● for bus, and 2 ● for train, plus a title and a key. **Q10.** Bar graph with football 8, soccer 5, basketball 4, netball 3, plus a title. **Q11.** (a) football (b) 4 more. **Q12.** (a) Bar graph with Tray A 8 and Tray B 7 (b) Tray A (c) 2 seeds. **Q13.** Yes — you can see the tallest bar at a quick look (any answer with a reason). **Q14.** A big picture graph; students in Prep can see the most liked book without reading numbers. **Q15.** Answers will be different. **Q16.** When you need the exact counts. **Q17.** Ada could have typed a wrong number into the program. **Q18.** The apple row should have 8 pictures; Tom needs to add 2 more pictures. **Q19.** (a) Bar graph with AFL 18, soccer 11, netball 7, basketball 5 (b) AFL (c) 11 more (d) a picture graph; her sister can see the counts without reading numbers (any answer with a reason).

Worked answers

Q1. (a) The blue row has 6 pictures, so 6 students picked blue. (b) The blue row has the most pictures, so blue is the most liked. (c) Count all the pictures: $6 + 4 + 3 + 2 = 15$ students. ✓

Q2. (a) The football bar is the tallest, so the most students picked football. (b) Football is 9 and netball is 2. $9 - 2 = 7$, so 7 more students picked football than netball. (c) $9 + 5 + 4 + 2 = 20$ students. ✓

Q3. Title: *Pets of our group* (titles may be different). Make one row for each pet: 5 ● for dog, 3 ● for cat, 2 ● for fish, and 1 ● for bird. Write the key: ● = 1 pet. Check: $5 + 3 + 2 + 1 = 11$. ✓

Q4. (a) Wednesday's bar is 5 squares high, Thursday's bar is 3 squares high, and Friday's bar is 7 squares high. (b) Friday's bar is the tallest, so Friday had the most buses. (c) $4 + 6 + 5 + 3 + 7 = 25$ buses. ✓

Q5. The picture graph is better for this job. Families can see the most liked book at a quick look. A list gives the counts, but you have to read every number to find the most.

Q6. (a) $6 + 5 + 3 = 14$ students. (b) Same: both show the same counts — dogs are 6, cats are 5, and fish are 3. Different: the bar graph shows the most the fastest, and the table gives the exact counts to read. Any correct same-and-different pair is fine.

Q7. Any two of these: check that the graph matches her table; give the graph a title; read the graph and say what it shows. The software does the drawing, but Mia does the thinking.

Q8. Count all the pictures: $5 + 4 + 3 = 12$. 12 students were asked. Sam said 14, so Sam is not right.

Q9. Title: *How the class gets to school* (titles may be different). Make one row for each kind: 8 ● for walk, 7 ● for car, 4 ● for bike, 3 ● for bus, and 2 ● for train. Write the key: ● = 1 student. Check: $8 + 7 + 4 + 3 + 2 = 24$. ✓

Q10. Title: *Favourite sports* (titles may be different). Draw one bar for each sport: football 8 squares high, soccer 5, basketball 4, and netball 3. One square stands for one student. Check: $8 + 5 + 4 + 3 = 20$. ✓

Q11. (a) The football bar is the tallest, so football is the most liked. (b) Football is 8 and basketball is 4. $8 - 4 = 4$, so 4 more students like football than basketball.

Q12. (a) Draw one bar for each tray: Tray A 8 squares high and Tray B 7 squares high. One square stands for one seed. (b) The bar for Tray A is taller, so more seeds grew in Tray A. (c) $10 - 8 = 2$ seeds did not grow in Tray A.

Q13. Answers may be different. Yes: in a bar graph you can see the tallest bar with one quick look, so you find the most liked fast. A reasoned no is fine too, such as: a picture graph also shows the most as the longest row.

Q14. A big picture graph is better. Students in Prep can see which book got the most pictures at a quick look. A table of numbers is harder for them to read.

Q15. Answers will be different. Check that the student writes what the display is about, and what is the most and the least.

Q16. A table is better when you need the exact counts. A graph shows the most and the least fast, but you read a table to get the exact number for each kind.

Q17. Ada could have typed one of the numbers wrong, or put a number in the wrong row. The software draws what it is told, even when the numbers are wrong.

Q18. The table says apple is 8, so the apple row needs 8 pictures. Tom drew 6. He needs to add 2 more pictures to the apple row ($8 - 6 = 2$).

Q19. (a) Draw one bar for each sport: AFL 18 squares high, soccer 11, netball 7, and basketball 5. One square stands for one player. Title: *Players on the field for one team* (titles may be different). (b) The AFL bar is the tallest, so AFL has the most players on the field for one team. (c) $18 - 7 = 11$, so an AFL team has 11 more players than a netball team. (d) Answers may be different. A picture graph is a good choice: Ava's sister can see the counts as pictures without reading numbers. A table works too if her sister can read the numbers.

Guided statistical investigations

Code: VC2M3ST03 (.E01, .E02, .E03, .E04, .E05)

In the last two topics you collected data, put it in tables, and made displays of it. Now you will put it all together to answer a question. When you answer a question with data, you do a **statistical investigation**. In this topic your teacher guides you, and at the end your class runs one investigation together.

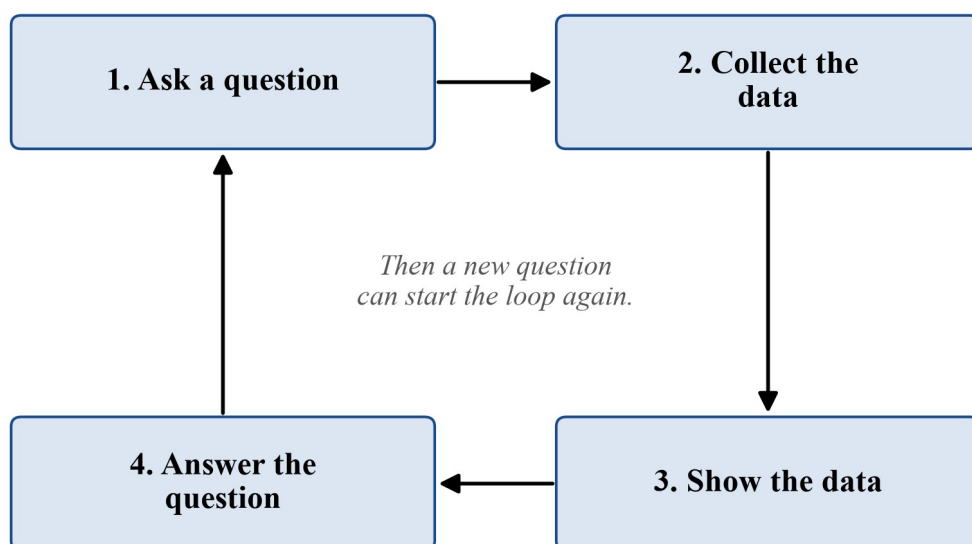
You will need: tally sheets or paper, a clipboard, counters or sticky notes, grid paper, and coloured pencils.

Learn about statistical investigations

1. A statistical investigation answers a question with data

A statistical investigation follows four steps. Step 1: **ask a question**. Step 2: **collect the data**. Step 3: **show the data**. Step 4: **answer the question**. When you are done, a new question can start the loop again.

The four steps of a statistical investigation



Four boxes joined in a loop. The boxes name the four steps of a statistical investigation: ask a question, collect the data, show the data, and answer the question. Each box points to the next one.

2. Start with a question that needs data

Some questions can be answered with data. Many answers are possible, so we ask people and collect their answers. Other questions have only one answer. You do not need data for them — you just look and see.

Can be answered with data

One fixed answer, no data needed

What is our class's favourite fruit?

What is the name of our school?

How many students walk to school?

What colour is the front door?

Many answers are possible, so we collect them.

You can just look and see the answer.

Question cards sorted into two groups. The left group can be answered with data: what is our class's favourite fruit, and how many students walk to school. The right group has only one answer: what is the name of our school, and what colour is the front door.

A data question is a good start for an investigation. A one-answer question is not, because there is nothing to collect.

3. Make your question small enough to answer

A data question must name the people you will ask. "Which is the most popular breakfast cereal?" is too big, because it does not say who we ask. We make the question small enough by naming our group.

Which is the most popular breakfast cereal?

Too big! Who are we asking?

Name the people you will ask.

Which is the most popular breakfast cereal among the students in our class?

Now the question is small enough to answer.

A funnel shape joins two boxes. The top box asks which is the most popular breakfast cereal. The bottom box asks which is the most popular breakfast cereal among the students in our class. The question gets small enough to answer.

Now we can ask every student in our class, one by one. The question is small enough to answer.

4. Know what kind of data you will get

Your question decides the kind of answers you get. This book uses two kinds of data. The things you ask about are called **variables**, and the two variables in this book give us the two kinds of data below.

Categorical data

The answers are words or kinds.

favourite colour: blue,
green or red



way to school:
walk, car, bus or train

Discrete numerical data

The answers are numbers you count.

number of pets: 0, 1, 2,
3 and so on



people in your home:
2, 3, 4, 5 and so on

Two boxes side by side. The left box is categorical data, where the answers are words or kinds, like favourite colour or way to school. The right box is discrete numerical data, where the answers are numbers you count, like number of pets or people in your home.

Categorical data gives answers that are words or kinds, like *blue*, *green* or *red*, or *walk*, *car*, *bus* or *train*. **Discrete numerical data** gives answers that are numbers you count, like 0, 1, 2, 3 and so on. Both kinds work for an investigation.

5. Collect one answer from each person

When you collect data, ask each person once, and write each answer down at once. Tally marks are a quick way to do this. Draw one line for each answer. Every fifth line goes across the group of four, so you can count in fives.

Favourite fruit of 17 students

Fruit	Tally	Number
Apple		7
Banana		5
Orange		3
Pear		2
Total		17

A group of five is four strokes with one across.

A tally chart of the favourite fruit of 17 students. Apple has 7, banana has 5, orange has 3 and pear has 2. The fifth tally line goes across each group of four. The numbers add up to 17.

Count your tally marks, and add the numbers up. The total must match the number of people you asked. Here the total is $7 + 5 + 3 + 2 = 17$, and 17 students were asked, so nothing was missed.

6. Show the data so people can read it

You can show your data as a table, a picture graph or a bar graph, just like in the last two topics. In this book, one picture or one square always stands for one thing. A table gives the exact counts. A bar graph shows the most and the least at a quick look.

7. Read the data and answer your question

Now read your display. Which kind has the most? Which has the least? How many more? Then use what you see to answer your first question with a sentence about your class. This is called **interpreting** the data. If the data does not answer your question, your question may not be small enough — go back to Step 1.

8. Do one investigation together as a class

Now your class runs a full investigation together, with your teacher helping at each step.

Step	What the class does
1. Ask	Pick one data question together, and make it small enough to answer.
2. Collect	Ask each student once, and record each answer with tally marks.
3. Show	Draw a picture graph or a bar graph, with one picture or one square for each answer.

Step	What the class does
4. Answer	Read the display, then answer the question with a sentence about the class.

Worked examples

Example 1 — with help

A class ran this investigation. Their question was: *What is our class's favourite fruit?* Follow their four steps.

Step	What the class did
1. Ask	The question names the group: the students in our class. Each student picks one fruit.
2. Collect	They asked each of the 17 students once, and recorded the answers with tally marks.
3. Show	They drew a bar graph on grid paper. One square stands for one student.
4. Answer	The apple bar is the tallest, so apple is the class's favourite fruit.

The tally chart they made at Step 2 is shown here.

Favourite fruit of 17 students

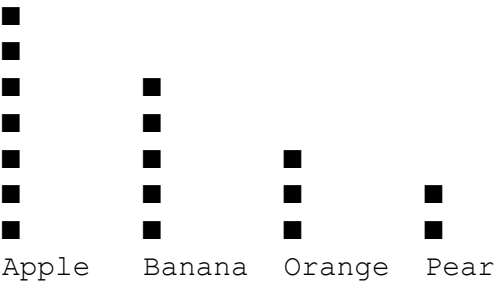
Fruit	Tally	Number
Apple		7
Banana		5
Orange		3
Pear		2
Total		17

A group of five is four strokes with one across.

A tally chart of the favourite fruit of 17 students. Apple has 7, banana has 5, orange has 3 and pear has 2. The numbers add up to 17.

Here is their bar graph from Step 3.

Favourite fruit of 17 students



Each ■ is 1 student.

Check: $7 + 5 + 3 + 2 = 17$. The total matches the 17 students they asked. ✓

Example 2 — with help

A class wanted to pick a day for their picnic. Their question was: *Which day should our class picnic be?* They asked each of the 20 students once. Each student picked one day. Here is their tally chart.

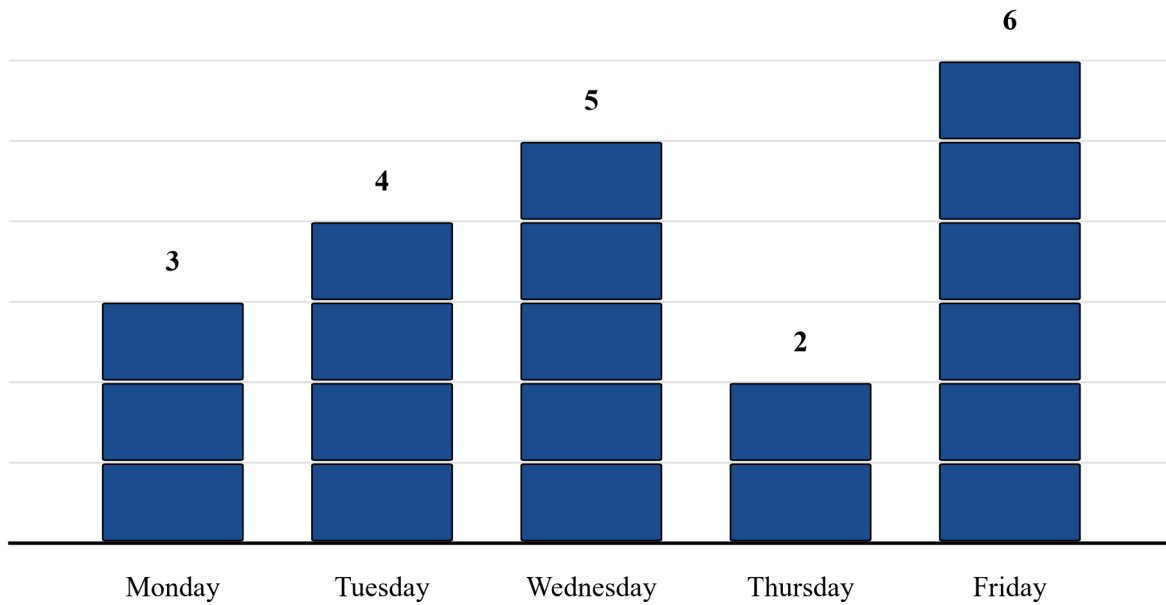
Votes for the class picnic day		
Day	Tally	Number
Monday		3
Tuesday		4
Wednesday	 	5
Thursday		2
Friday	 	6
Total		20

20 students voted. Each student voted once.

A tally chart of votes for the class picnic day. Monday has 3, Tuesday has 4, Wednesday has 5, Thursday has 2 and Friday has 6. The votes add up to 20.

The class then drew a bar graph of the votes.

Votes for the class picnic day



Each ■ is 1 vote. 20 students voted.

A bar graph of votes for the class picnic day. One square is 1 vote. Monday has 3, Tuesday has 4, Wednesday has 5, Thursday has 2 and Friday has 6. The Friday bar is the tallest.

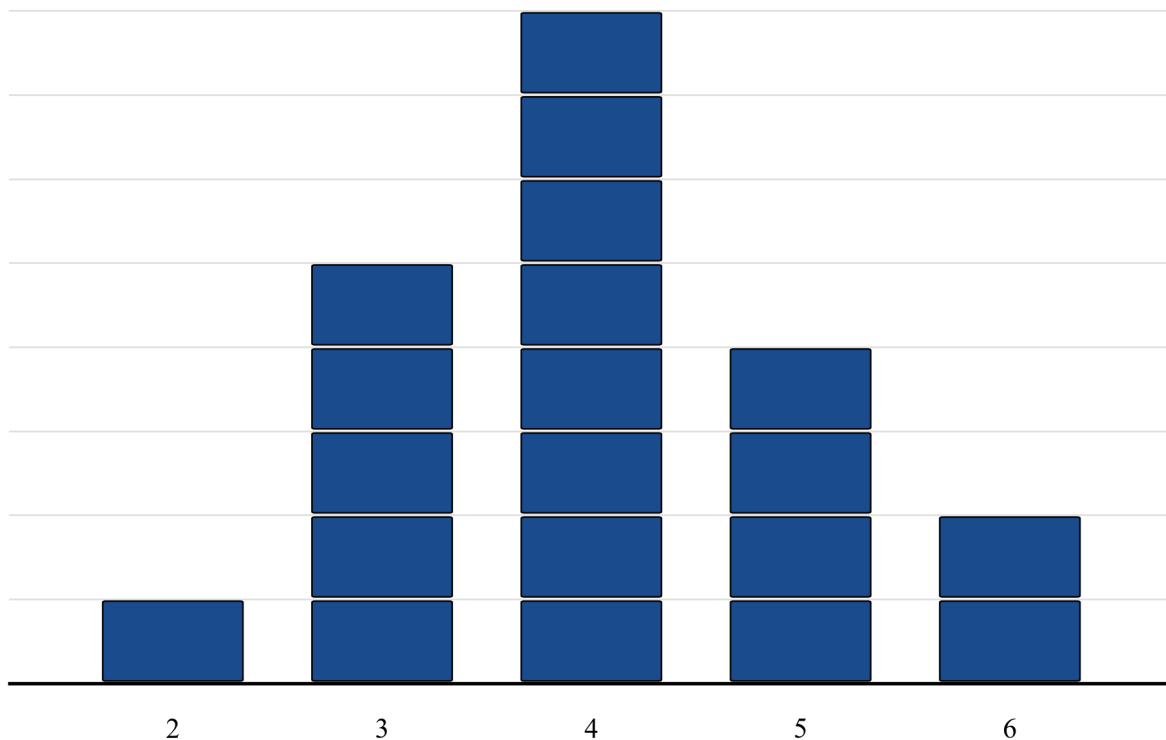
Now read the graph and answer the question. The Friday bar is the tallest, so Friday got the most votes. The class answers the question with a sentence: *Our class picnic should be on Friday.*

Check: $3 + 4 + 5 + 2 + 6 = 20$. The total matches the 20 students who voted. ✓

Example 3 — on your own

A class asked 20 students: *How many people live in your home?* Each student gave one answer. Here is their bar graph.

How many people live in each home?



Number of people in the home

Data from 20 students. Each ■ is 1 student.

A bar graph of how many people live in each home. One square is 1 student. The bars show homes with 2, 3, 4, 5 and 6 people. The tallest bar is 4 people.

- (a) How many students have 4 people living in their home?
- (b) How many students were asked in all?
- (c) Which number of people got the most answers?
- (d) Write one sentence to answer the class's question.
- (e) Count the squares above 4: there are 8. So **8 students** have 4 people living in their home.
- (f) Add the bars: $1 + 5 + 8 + 4 + 2 = 20$. **20 students** were asked.
- (g) The tallest bar is 4 people, so **4 people** got the most answers.
- (h) Answers may be different, such as: *In our class, the most homes have 4 people.*

Practice questions

With help

Q1. Here are four question cards.

Sort these question cards.

What is our class's favourite fruit?

What colour is the classroom door?

How many pets do the students in our class have?

What day is it today?

Four question cards. Card 1: what is our class's favourite fruit? Card 2: what colour is the classroom door? Card 3: how many pets do the students in our class have? Card 4: what day is it today?

- (a) Which two cards are data questions?
- (b) Which two cards have only one answer?
- (c) How would you answer the card *What day is it today?*

Q2. Sam asks: *What is our favourite animal?* That question is too big. Which question below is small enough to answer?

- (a) What is the favourite animal of people in Australia?
- (b) What is the favourite animal of the students in our class?
- (c) What animals live at the zoo?

Say why your question is small enough to answer.

Q3. Say what kind of data each question gives. Write *categorical* or *discrete numerical*.

- (a) What is your favourite colour?
- (b) How many pencils are in your pencil case?
- (c) How do you get to school?
- (d) How many doors are in our classroom?

Q4. Here is a tally chart.

Favourite sandwiches of 18 students

Sandwich	Tally	Number
Cheese		6
Ham		5
Egg		4
Salad		3
Total		18

Read the tally marks, then read the numbers.

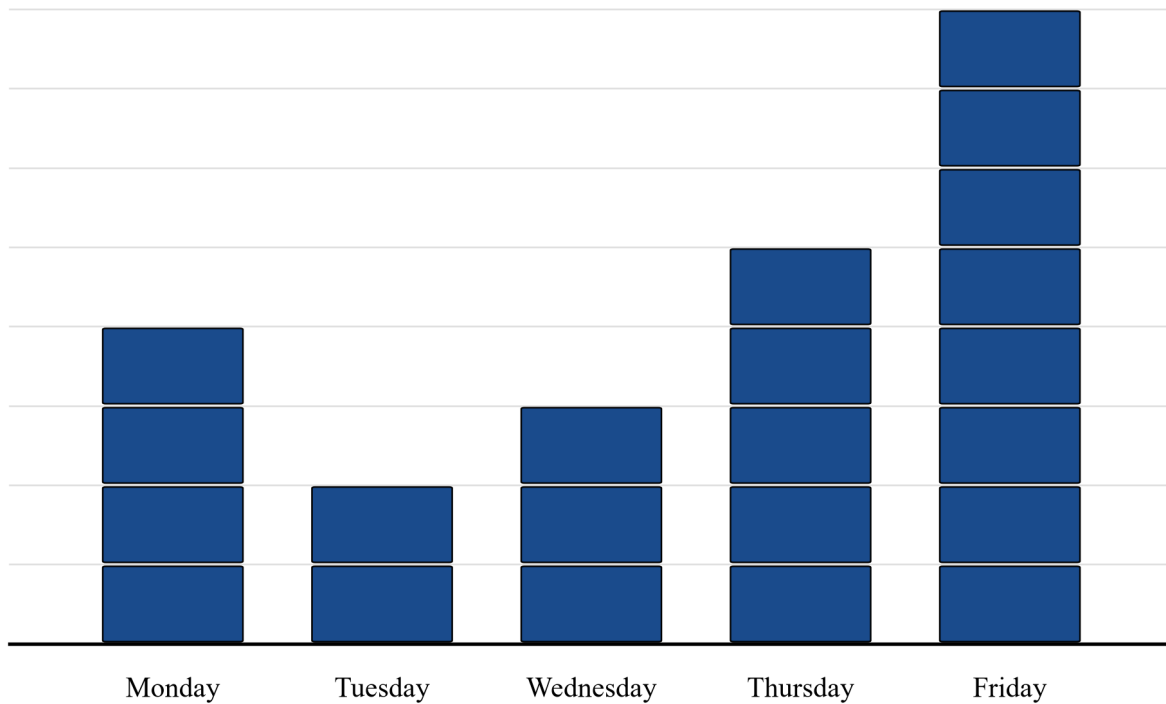
A tally chart of the favourite sandwiches of 18 students. Cheese has 6, ham has 5, egg has 4 and salad has 3. The numbers add up to 18.

- How many students chose cheese?
- How many students chose egg?
- Which sandwich is the most popular?
- How many students were asked in all?

Q5. A class asked 15 students to name their favourite colour. Here are the counts: blue 5, green 4, red 3, yellow 3. Draw tally marks for each colour. Check your total.

Q6. Here is a bar graph. One square stands for one student.

Favourite day of the week



Each ■ is 1 student.

A bar graph of favourite days of the week. One square is 1 student. Monday has 4, Tuesday has 2, Wednesday has 3, Thursday has 5 and Friday has 8.

- (a) Which day is the most popular?
- (b) How many students chose Tuesday?
- (c) How many students were asked in all?

Q7. These four steps of a statistical investigation are mixed up. Number them 1 to 4 in the right order.

- () Show the data.
- () Ask a question.
- () Answer the question.
- () Collect the data.

Q8. A class asked: *What is our favourite season?* Here are their counts.

Season	Number of students
Summer	9
Winter	4
Spring	3
Autumn	2

- (a) Which season is the most popular?
- (b) How many students were asked in all?
- (c) Tom says 16 students answered. Is Tom right? Count and check.

On your own

Q9. Write two questions of your own: one data question, and one question with only one answer.

Q10. Mia asks: *Which is our favourite movie?* The question is too big. Write a question that is small enough to answer.

Q11. Your class wants to find its favourite pizza topping. Write what you will do at each step: ask, collect, show, answer.

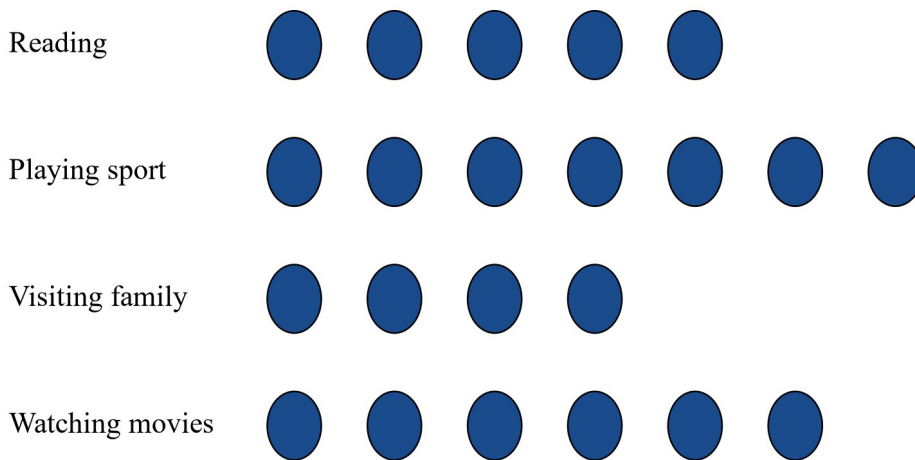
Q12. Say what kind of data each question gives. Write *categorical* or *discrete numerical*.

- (a) How many books did you read this month?
- (b) What is your favourite day of the week?
- (c) How many people live in your home?
- (d) What is your favourite sandwich?

Q13. Make a poster or a flow chart that shows the four steps of a statistical investigation. Draw one small picture for each step.

Q14. Here is a picture graph. Each dot stands for one student.

Favourite weekend activities of 22 students



Key: ● = 1 student

A picture graph of the favourite weekend activities of 22 students. Each dot is 1 student. Reading has 5, playing sport has 7, visiting family has 4 and watching movies has 6.

- (a) Which activity is the most popular?
- (b) How many students chose reading?
- (c) How many more students chose playing sport than reading?
- (d) How many students were asked in all?

Q15. Ten students said how many books they read this month. Here are their answers, one for each student: 2, 3, 1, 4, 2, 5, 2, 3, 0, 3.

- (a) Put the data into a table. Count how many students said 0, 1, 2, 3, 4 and 5.

- (b) Which number of books did the most students say?
- (c) Check that your counts add up to 10.

Q16. Ada's class asked: *How do we get to school?* Of their 20 students, 12 walk. Ben's class asked the same question. Of their 20 students, 5 walk. Why can the two classes get different results?

Q17. A class asked: *Do students like the playground or the library better at lunch?* Of 20 students, 14 picked the playground and 6 picked the library. Write one sentence to answer the question.

Q18. Football is big in Victoria. The AFL started in Melbourne, and the Grand Final is played at the MCG. Each season, one club is the champion of the AFL. The table shows how many times some clubs have been champion.

Club	Times champion
Collingwood	16
Carlton	16
Essendon	16
Richmond	13
Geelong	10
Brisbane Lions	5

Source: Wikipedia, *List of VFL/AFL premiers*, retrieved 2026-08-20.

- (a) Which clubs have been champion the most times?
- (b) Draw a bar graph of the data on grid paper. Let one square stand for 1 time as champion.
- (c) How many more times has Richmond been champion than the Brisbane Lions?
- (d) Your class wants to find out about football. Write one data question your class could answer with a survey.

Answers

Q1. (a) *What is our class's favourite fruit?* and *How many pets do the students in our class have?* (b) *What colour is the classroom door?* and *What day is it today?* (c) You just look or think — there is only one answer, so there is no data to collect. **Q2.** (b); it names the people we will ask, and we can ask every student in our class. **Q3.** (a) categorical (b) discrete numerical (c) categorical (d) discrete numerical. **Q4.** (a) 6 (b) 4 (c) cheese (d) 18. **Q5.** Blue: one group of five. Green: four lines. Red: three lines. Yellow: three lines. Check: $5 + 4 + 3 + 3 = 15$. ✓ **Q6.** (a) Friday (b) 2 (c) 22. **Q7.** Show the data: 3. Ask a question: 1. Answer the question: 4. Collect the data: 2. **Q8.** (a) summer (b) 18 (c) no — 18 students answered, not 16. **Q9.** Answers will be different. **Q10.** Any question that names the group, such as: *Which is the favourite movie of the students in our class?* **Q11.** Ask: pick the question *What is our class's favourite pizza topping?* Collect: ask each student once and use tally marks. Show: draw a bar graph with one square for each answer. Answer: read the graph and say which topping won. **Q12.** (a) discrete numerical (b) categorical (c) discrete numerical (d) categorical. **Q13.** Posters and flow charts will be different; all four steps must appear in the right order. **Q14.** (a) playing sport (b) 5 (c) 2 (d) 22. **Q15.** (a) 0: 1 student, 1: 1, 2: 3, 3: 3, 4: 1, 5: 1 (b) 2 and 3 are tied (c) $1 + 1 + 3 + 3 + 1 + 1 = 10$. ✓ **Q16.** The students in the two classes are different people, so their answers can be different. **Q17.** More students like the playground better at lunch. **Q18.** (a) Collingwood, Carlton and Essendon — they are tied with 16 each (b) a bar graph with bars of 16, 16, 16, 13, 10 and 5 squares (c) 8 (d) answers will be different, such as *Which AFL club do the students in our class follow?*

Worked answers

Q1. (a) A data question has many possible answers, so we collect data. The fruit card and the pets card are data questions. (b) The door colour and the day have only one answer each. (c) You do not need to ask anyone. You can look at the door or a calendar, so there is no data to collect.

Q2. (b) is small enough. It names the people we will ask — the students in our class — and we can ask each of them once. (a) is too big: we cannot ask everyone in Australia. (c) does not ask our group at all.

Q3. (a) The answers are words, so the data is categorical. (b) The answers are numbers you count, so the data is discrete numerical. (c) The answers are words like walk or car, so the data is categorical. (d) The answers are counts, so the data is discrete numerical.

Q4. (a) Cheese has one group of five and one more line: 6 students. (b) Egg has four lines: 4 students. (c) Cheese has the most, so cheese is the most popular. (d) $6 + 5 + 4 + 3 = 18$ students. ✓

Q5. Blue is 5: one group of five, with the fifth line across. Green is 4: four lines. Red is 3: three lines. Yellow is 3: three lines. Check: $5 + 4 + 3 + 3 = 15$, and 15 students were asked. ✓

Q6. (a) The Friday bar is the tallest, so Friday is the most popular. (b) The Tuesday bar has 2 squares, so 2 students chose Tuesday. (c) $4 + 2 + 3 + 5 + 8 = 22$ students. ✓

Q7. The steps run: ask a question (1), collect the data (2), show the data (3), answer the question (4).

Q8. (a) Summer has 9, which is the most, so summer is the most popular. (b) $9 + 4 + 3 + 2 = 18$ students. (c) No. The counts add to 18, so 18 students answered, not 16. Tom may have missed 2 students when he added.

Q9. A data question has many possible answers, such as *What is our class's favourite game?* A one-answer question has a single answer, such as *How many doors are in our classroom?*

Q10. Any question that names the group is fine, such as *Which is the favourite movie of the students in our class?* The group is small enough that we can ask each student once.

Q11. Ask: agree on one question, such as *What is our class's favourite pizza topping?* Collect: ask each student once and record the answers with tally marks. Show: draw a picture graph or a bar graph with one picture or one square for each answer. Answer: read the display and say which topping got the most answers.

Q12. (a) Counts of books are numbers you count: discrete numerical. (b) Days are kinds, not counts: categorical. (c) Counts of people are discrete numerical. (d) Sandwiches are kinds: categorical.

Q13. Check that all four steps appear in order — ask, collect, show, answer — and that each step has a picture.

Q14. (a) Playing sport has the most dots (7), so playing sport is the most popular. (b) Reading has 5 dots, so 5 students chose reading. (c) Playing sport has 7 and reading has 5. $7 - 5 = 2$, so 2 more students chose playing sport. (d) $5 + 7 + 4 + 6 = 22$ students, which matches the title. ✓

Q15. (a) Count each number in the list: 0 appears once, 1 appears once, 2 appears three times, 3 appears three times, 4 appears once, and 5 appears once.

Books

read	0	1	2	3	4	5
Students	1	1	3	3	1	1

(b) 2 and 3 are tied: three students said 2, and three students said 3, and no other number got more. (c) $1 + 1 + 3 + 3 + 1 + 1 = 10$, which matches the 10 students. ✓

Q16. The two classes are different groups of people. Different people can give different answers, so two classes can get different results from the same question.

Q17. 14 of the 20 students picked the playground, so the sentence is: *More students like the playground better at lunch.*

Q18. (a) The top count is 16, and three clubs have it: Collingwood, Carlton and Essendon. They are tied for the most times champion. (b) Draw one bar for each club: Collingwood 16 squares high, Carlton 16, Essendon 16, Richmond 13, Geelong 10, and Brisbane Lions 5. One square stands for 1 time as champion. (c) Richmond has been champion 13 times and the Brisbane Lions 5 times. $13 - 5 = 8$, so Richmond has been champion 8 more times. (d) Any data question about your group is fine, such as *Which AFL club do the students in our class follow?* That question can be answered by asking each student once.

Test

Test T6 · Chapter 6 — Statistics

Mathematics Level 3 (Year 3) · Victorian Curriculum 2.0

Codes assessed: VC2M3ST01 · VC2M3ST02 · VC2M3ST03

Name: _____ Date: _____

Total marks	15
Guidance duration	25 minutes
Timing	This is a classroom check, not an exam. There is no strict time limit. Your teacher will let you finish.
Equipment	You may use a pencil, grid paper and a ruler.
Calculators	None of the content descriptions in this chapter says “without a calculator”. You may use a calculator if you want one, but you do not need one for any question.

Attempt every question. Show your working where the question asks for it.

Question 1 — Acquiring and recording data (5 marks)

- (a) Mia’s class asks each student, “How many books did you read this term?” The answers are numbers you can count, like 0, 1, 2 and 3. What kind of data is this? (1 mark)

- A. Categorical data
- B. Discrete numerical data
- C. A frequency table
- D. A tally

- (b) Ben’s class counted the letters in the name of each of ten towns in Victoria, and recorded the counts in this frequency table.

Letters in the town name	Frequency
4	1
5	1
7	5
8	2
9	1

The ten towns are Sale, Colac, Bendigo, Geelong, Horsham, Mildura, Wodonga, Ballarat, Hamilton and Melbourne.

Source: Wikipedia, *List of localities in Victoria*, retrieved 2026-08-20.

- (i) How many of the towns have 7 letters in their name? (1 mark)
- (ii) How many towns were counted in all? Show how you know. (1 mark)
- (iii) Zoe’s class asked 12 students, “What is your favourite pizza topping?” Here are the 12 answers, in the order they were collected.

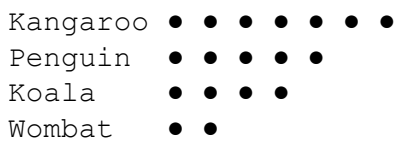
cheese, ham, cheese, mushroom, cheese, ham, ham, cheese, mushroom, ham, cheese, mushroom

Record the data in a frequency table. Draw one row for each topping, with tallies and frequencies, and add a total row. (2 marks)

Question 2 — Creating and comparing data displays (5 marks)

Mia's class asked 18 students, "What is your favourite animal at the zoo?" Here is their picture graph.

Favourite zoo animals of 18 students



Key: ● = 1 student

- (a)
- (i) How many students picked penguin? (1 mark)
- (ii) How many more students picked kangaroo than wombat? (1 mark)
- (b) In a school footy match, the class team kicked goals in each quarter.

Quarter	Goals kicked
First quarter	3
Second quarter	5
Third quarter	2
Fourth quarter	4

Draw a bar graph of the data on grid paper. Let one square stand for one goal. Give your graph a title. (2 marks)

- (c) The class wants to put a display of the zoo animal data on the wall. The whole school must see which animal is the favourite at a quick look. Would a table or a bar graph be better for this job? Why? (1 mark)
-

Question 3 — Guided statistical investigations (5 marks)

- (a) These four steps of a statistical investigation are mixed up. Number them 1 to 4 in the right order. (1 mark)
- () Answer the question.
- () Collect the data.
- () Ask a question.
- () Show the data.
- (b) Which question can be answered by collecting data from students? (1 mark)
- A. What is the name of our school?
- B. How do the students in our class get to school?
- C. What colour is our classroom door?
- D. What day is it today?
- (c) Mia's class asked, "What is our class's favourite animal at the zoo?" The picture graph in Question 2 shows their results. Write one sentence that answers their question. Use at least one number from the picture graph. (2 marks)
- (d) Ben's class asked the same question in their class. Six students in Ben's class picked koala. Only four students in Mia's class picked koala. Why can the two classes get different results? (1 mark)
-

Total: 15 marks

Solutions

Teacher-facing. Test T6 is a classroom check, not an exam: untimed in principle with a 25-minute guidance duration, equipment permitted, and no question is calculator-free, because no Chapter 6 content description says “without a calculator” (calculator status follows D7 of the series plan). Task K2 also assesses VC2M3ST01 and VC2M3ST03 as a guided investigation; T6 gives those two CDs written form so a student absent for the task is not left with an unassessed content description (§7 of the series plan).

The CDs assessed, quoted verbatim from the authority file `maths_3.json`:

- VC2M3ST01: “acquire data for categorical and discrete numerical variables to address a question of interest or purpose by observing, collecting and accessing data sets; record the data using appropriate methods, including frequency tables and spreadsheets”
- VC2M3ST02: “create and compare different graphical representations of data sets, including using software where appropriate; interpret the data in terms of the context”
- VC2M3ST03: “conduct guided statistical investigations involving the collection, representation and interpretation of data for categorical and discrete numerical variables with respect to questions of interest”

The achievement standard extracts this maps to, quoted verbatim from the authority file `maths_3.json`:

- shared by VC2M3ST01 and VC2M3ST03: “Students conduct guided statistical investigations involving categorical and discrete numerical data and interpret their results in terms of the context.”
- VC2M3ST02: “They record, represent and compare data they have collected.”

Coverage and mark map

CD	Subtopic	Questions	Marks
VC2M3ST01	6A Acquiring and recording data: frequency tables and spreadsheets	Q1	5
VC2M3ST02	6B Creating and comparing data displays	Q2	5
VC2M3ST03	6C Guided statistical investigations	Q3	5
Total			15

Every CD contributes at least 3 separately scored marks, as §7 requires. Multiple choice is 2 marks of 15 (13%), inside the one-quarter cap: Q1(a) and Q3(b), four options A–D each.

Answer key

Q	Part	Answer	Marks
1	(a)	B (discrete numerical data)	1
1	(b)(i)	5 towns	1
1	(b)(ii)	10 towns; $1 + 1 + 5 + 2 + 1 = 10$	1
1	(c)	cheese 5, ham 4, mushroom 3; total 12, working shown	2
2	(a)(i)	5 students	1
2	(a)(ii)	5 more students	1
2	(b)	Bar graph with bars of 3, 5, 2 and 4 squares, plus a title	2
2	(c)	A bar graph — the tallest	1

Q	Part	Answer	Marks
		bar shows the most at a quick look	
3	(a)	Ask a question: 1, collect the data: 2, show the data: 3, answer the question: 4	1
3	(b)	B	1
3	(c)	Sentence naming kangaroo as the favourite, with a number from the graph	2
3	(d)	The classes are different groups of people, so their answers can differ	1

Worked solutions

Q1. (a) The answers are counts — numbers you can count, like 0, 1, 2 and 3 — so the data is discrete numerical data. The answer is **B**. (Categorical data gives answers that are words or kinds. A frequency table and a tally are ways to record data, not kinds of data.)

(b)

(i) Read the row for 7 letters: the frequency is 5, so **5 towns** have 7 letters in their name. (They are Bendigo, Geelong, Horsham, Mildura and Wodonga.)

(ii) Add the frequencies: $1 + 1 + 5 + 2 + 1 = 10$. Ten towns were counted, which matches the ten towns in the list. ✓

(iii) Tally the 12 answers as they come in: cheese 5, ham 4, mushroom 3.

Pizza topping	Tally	Frequency
Cheese	five crossed group	5
Ham	four marks	4
Mushroom	three marks	3
Total		12

Check: $5 + 4 + 3 = 12$, which matches the 12 answers collected. ✓

Marks: 1 for the correct tallies and frequencies, one row per topping; 1 for a total row of 12 with the check shown. Accept any clear table that holds one row per topping.

Q2. (a) (i) The penguin row has 5 pictures, so **5 students** picked penguin.

(ii) Kangaroo has 7 pictures and wombat has 2. $7 - 2 = 5$, so 5 more students picked kangaroo than wombat.

(b) Draw one bar for each quarter: first quarter 3 squares high, second quarter 5, third quarter 2 and fourth quarter 4. One square stands for one goal. Title: *Goals kicked in the footy match* (titles may be different). Check: $3 + 5 + 2 + 4 = 14$ goals. ✓

Marks: 1 for the four bars at the correct heights, one square for each goal; 1 for a title that says what the graph is about. Accept titles in the student's own words.

(c) A **bar graph** is better for this job. The tallest bar shows the favourite animal at a quick look. A table gives the exact counts, but you have to read every row to find the most. Accept any answer that picks the bar graph with a reason of this kind.

Q3. (a) The steps of a statistical investigation run: ask a question (1), collect the data (2), show the data (3), answer the question (4). As printed on the paper, the boxes read 4, 2, 1, 3.

- (b) Only question B has many possible answers — walk, car, bike, bus or train — so it can be answered by collecting data from students. The answer is **B**. Each of the other questions has only one answer, so there is no data to collect.
- (c) Answers may be different. A full-mark answer names the answer with the greatest frequency and uses at least one number from the picture graph, for example: *In our class, kangaroo is the favourite animal at the zoo. 7 students picked kangaroo.*

Marks: 1 for a sentence that answers the question about the class; 1 for using at least one correct number from the picture graph in the sentence, or saying it with the sentence.

- (d) The two classes are different groups of people. Different people can give different answers, so two classes can get different results from the same question. Accept any answer of this kind.