

Mathematics Level 2

Chapter 5 — Statistics

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Acquiring categorical data by survey, observation and experiment; sorting into lists and tables

*acquire data for categorical variables through surveys, observation, experiment and using digital tools;
sort data into relevant categories and display data using lists and tables — VC2M2ST01*

What is your favourite? Let us ask, look, try — and put our answers in order.

Things you need: sticky notes, counters, a big sheet of paper, pencils, a bowl of water, some small things from home, and (if your teacher has one) a computer with survey software.

Before we start — what you know from Level 1

This is a quick look back at work you have already done. It is not new work, and it is not for marks.

- You can collect things and sort them into groups (VC2M1ST01).
- You can show sorted things with one picture for each one (VC2M1ST02).
- You can count a big group by 2s, 5s and 10s (VC2M1N03).

What we learn

Data is what we find out

When we want to find something out, we collect facts. The facts we collect are called **data**.

We ask a question first. Then we get the data. Then we put the data in order so we can answer the question.



Five boxes in a row with arrows between them: Ask a question, Collect the data, Sort into categories, Make a table, Answer the question.

Categories and categorical data

A **category** is a group with a name.

Think about pets. Some pets are cats. Some are dogs. Some are birds. Some are fish. *Cat, dog, bird* and *fish* are categories. Each pet goes into one group only. A cat goes in the cat group, not the dog group.

Categorical is a maths word. **Categorical data** is data we can sort into categories. The answers are names, not counts.

Three ways to get data

A survey is asking. We ask people a question, and we write down their answers. We ask each person the same question. Each person answers one time.

An observation is watching. We watch, and we write down what we see. We do not ask. We look.

An experiment is trying. We try something and see what happens. Then we write down what happened.

Here is one of each:

- Survey: ask your class, *What is your favourite fruit?*
- Observation: watch children come to school in the morning. Do they walk, ride, or come in a car, a bus or a train?

- Experiment: put things in water, one at a time. Does each thing float or sink?

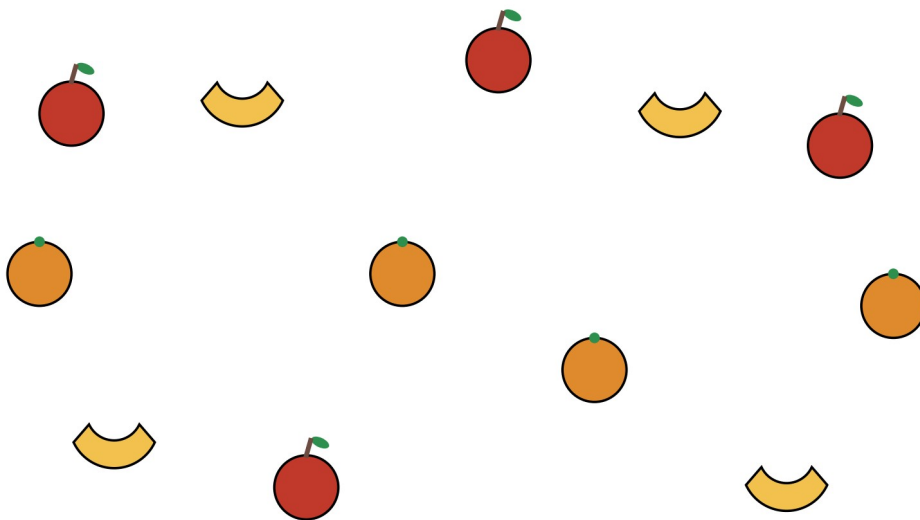
Getting data with digital tools

We can get data with digital tools too. Survey software asks the question and keeps the answers for us. Google Forms is one real tool we can use. Your teacher can make a survey in Google Forms, and you can answer it on a computer. The software puts the answers in order and counts them.

Source: Google, Google Forms, forms.google.com, retrieved 2026-08-20.

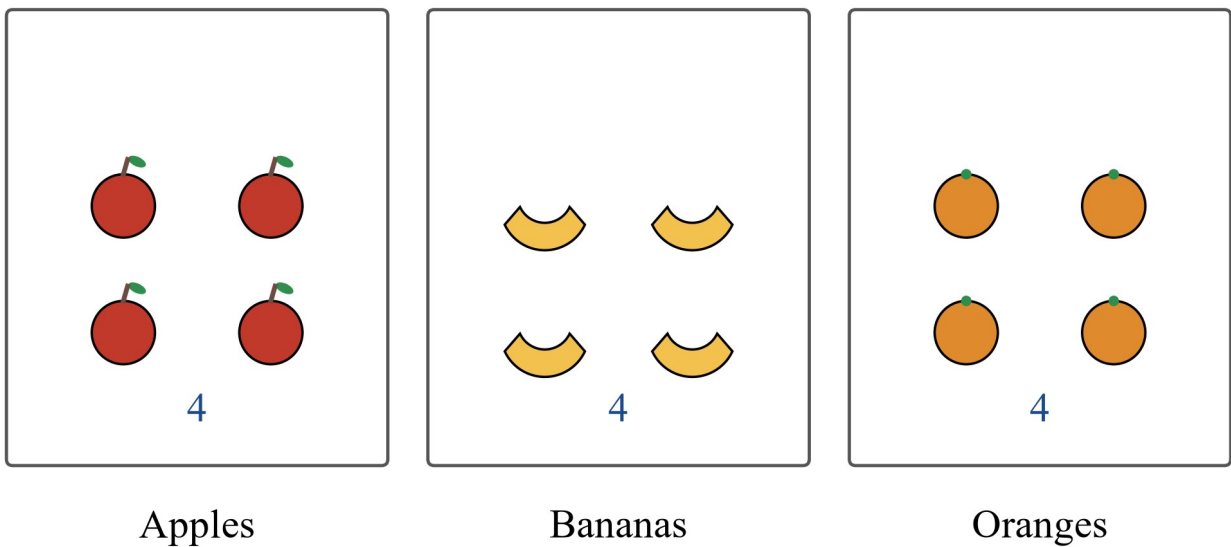
Sorting into categories

Here is a pile of fruit. It is mixed up.



Twelve pieces of fruit mixed up: four red apples with a leaf, four yellow bananas and four oranges.

We sort it. The same things go together.



The same twelve pieces of fruit sorted into three named groups: four apples in the Apples group, four bananas in the Bananas group and four oranges in the Oranges group, with the number 4 under each group.

Now we can see: 4 apples, 4 bananas and 4 oranges. Sorting makes the data easy to count.

Lists

A **list** is one way to show sorted data. We write the name of each group. Under it, we write the answers, one under the other.

Six children say their favourite colour. This is the data as it comes in:

red, blue, red, green, blue, red

Sorting puts the same answers together. As a list:

- red: red, red, red
- blue: blue, blue
- green: green

We can see red came up the most.

Tables and tally marks

A **table** is another way to show sorted data. A table has a row for each group. It shows the tally and the count for each one.

A **tally** is a way of writing down answers as they come. One mark is one answer. When we get to five, we draw four marks and then a slant mark across them. A group of five is quick to see. We count by 5s, then count on by 1s.

Each mark is one thing. Five is a group with a slant.

1	
2	
3	
4	
5	
6	
8	

Tally marks for the numbers 1, 2, 3, 4, 5, 6 and 8. A group of five is four marks with a slant mark across them.

Here is a table. It shows the favourite fruit of 20 children.

Favourite fruit of 20 children

Favourite fruit	Tally	Count
Apples	 	8
Bananas	 	7
Oranges	 	5
Total		20

A table with the words Favourite fruit of 20 children at the top. The rows are Apples, Bananas and Oranges, with tally marks and counts of 8, 7 and 5. The Total row shows 20.

- Apples got 8. Bananas got 7. Oranges got 5.
- The most popular fruit is apples. The least popular is oranges.
- Total: $8 + 7 + 5 = 20$. The total is how many children we asked. If the total is not 20, we check our counting!

We try together

Do these with your teacher. Use sticky notes, counters and things to touch.

We try 1 — survey the class about fruit

Our question is: *What is your favourite fruit — apple, banana or orange?* There are 20 children in the class. We do a survey and make a table.

Working	Note
Ask every child the same question. Each child answers one time.	That is a survey.
Each child puts one sticky note on the big sheet.	One sticky note for each answer.
Move the sticky notes into rows: apples together, bananas together, oranges together.	Sort into categories. Same things go together.
Count each row: 8 apples, 7 bananas, 5 oranges.	Count by 5s, then count on by 1s.
Check the total: $8 + 7 + 5 = 20$.	It matches the 20 children we asked. ✓
8 is the biggest count. 5 is the smallest.	Most popular: apples. Least popular: oranges.

Favourite fruit of 20 children

Favourite fruit	Tally	Count
Apples		8
Bananas		7
Oranges		5
Total		20

A table with the words *Favourite fruit of 20 children* at the top. The rows are *Apples*, *Bananas* and *Oranges*, with tally marks and counts of 8, 7 and 5. The *Total* row shows 20.

∴ The table shows our data. Most children chose apples, and the least chose oranges.

We try 2 — a float and sink experiment

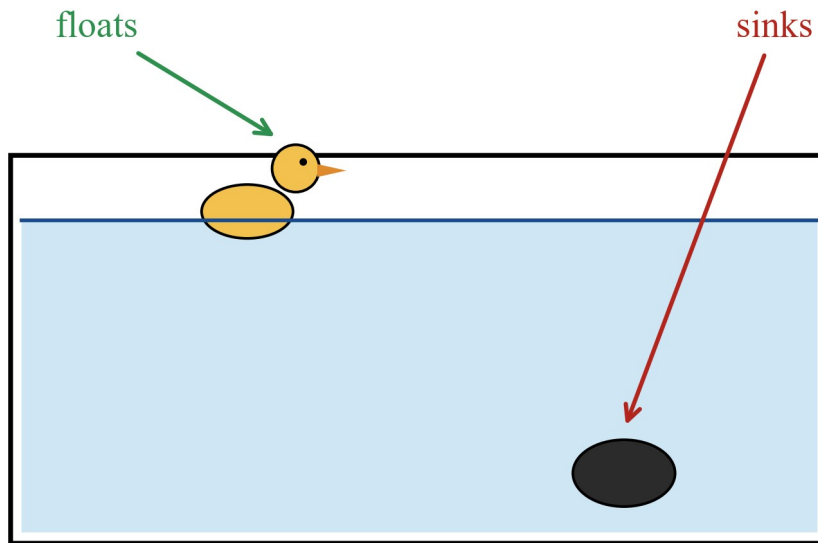
Our question is: *Do more things float or sink?* We try 7 things in a bowl of water: an apple, a coin, a toy duck, a stone, a leaf, a spoon and an orange.

Working	Note
Put one thing in the water. Look at it.	That is an experiment. We try, and we watch.
The thing floats on the top, or it sinks to the bottom.	Two categories: float and sink.
Put one tally mark in the float row or the sink row.	One mark for each thing we try.
Count: float gets 4 (apple, duck, leaf, orange). Sink gets	Count by 5s, then by 1s.

3 (coin, stone, spoon).

Check the total: $4 + 3 = 7$.

It matches the 7 things we tried. ✓



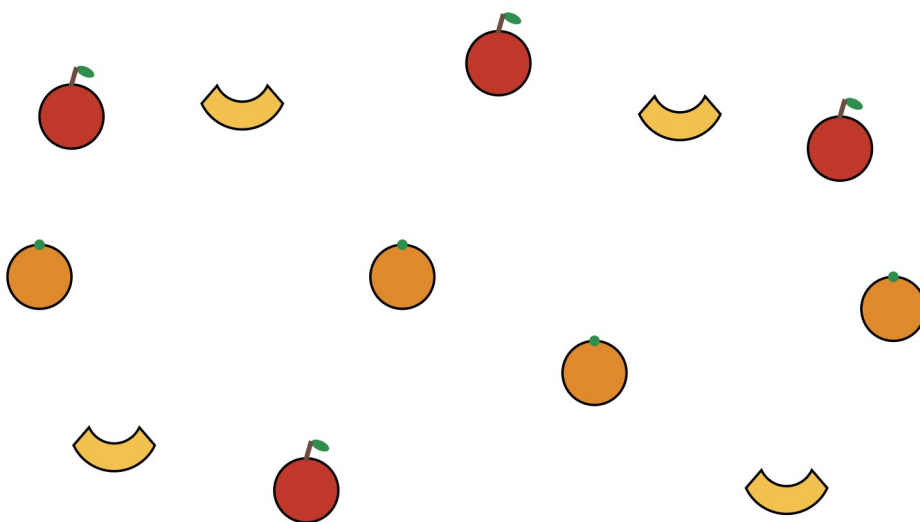
A tub of water. A yellow toy duck floats on the top, with an arrow and the word floats. A black stone sits at the bottom, with an arrow and the word sinks.

∴ 4 things float and 3 things sink. More things float than sink, so the float group has more.

Questions to practise

With help

Q1. Look at the picture of the mixed-up fruit.



Twelve pieces of fruit mixed up: four red apples with a leaf, four yellow bananas and four oranges.

a. How many apples are there?

- b. How many bananas are there?
- c. How many oranges are there?
- d. How many pieces of fruit are there altogether?

Q2. Use tally marks. Look at the tally picture to help you.

Each mark is one thing. Five is a group with a slant.

1	
2	
3	
4	
5	
6	
8	

Tally marks for the numbers 1, 2, 3, 4, 5, 6 and 8. A group of five is four marks with a slant mark across them.

- a. Draw tally marks for 3.
- b. Draw tally marks for 5.
- c. Draw tally marks for 7.
- d. A tally is one group of five and 2 more marks. How many is that?

Q3. Read the fruit table.

Favourite fruit of 20 children

Favourite fruit	Tally	Count
Apples	 	8
Bananas	 	7
Oranges	 	5
Total		20

A table with the words *Favourite fruit of 20 children* at the top. The rows are *Apples*, *Bananas* and *Oranges*, with tally marks and counts of 8, 7 and 5. The *Total* row shows 20.

- How many children chose bananas?
- Which fruit is the most popular?
- Which fruit is the least popular?
- How many more children chose apples than oranges?

Q4. Six children say their favourite colour. Here is the data as a list:

red, blue, red, green, blue, red

Sort it. Fill in this table.

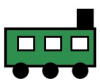
Favourite colour	Tally	Count
red		
blue		
green		

Q5. The teacher does an observation at the school gate in the morning. Eight children come to school. Here is what the teacher sees, in order:

walk, walk, car, bus, walk, bike, car, walk

Fill in the observation sheet.

How do we get to school?

Way to school	Tally	Count
 Walk		
 Bike		
 Car		
 Bus		
 Train		

An empty table with the words *How do we get to school?* at the top. The rows are *Walk, Bike, Car, Bus and Train*, and each row has a small picture of that way to travel, a Tally space and an empty Count box.

- Write the tally and the count for each way.
- Which way came up the most?
- Which ways got zero?

Q6. Match each question to the best way to get the data: **survey**, **observation** or **experiment**.

- What is each child's favourite song?
- How do the children in our class get to school?
- Which things from our pencil case float in water?

On your own

Q7. Ten children say their favourite day of the week. Here is the data as a list:

Monday, Friday, Friday, Wednesday, Friday, Monday, Friday, Monday, Wednesday, Friday

- Sort the data into a table with tally marks.
- Write the count for each day.
- Which day is the most popular?
- Which day is the least popular?

Q8. Look at the picture of the nine things and the three bins.



orange peel



banana peel



plastic bag



glass bottle



paper



box



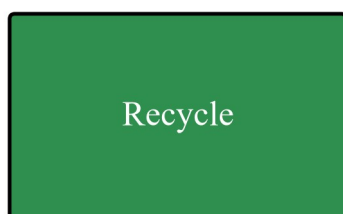
newspaper



jar



ball



Three bins labelled *Throw away*, *Recycle* and *Re-use*, and nine things above them: orange peel, banana peel, plastic bag, glass bottle, paper, box, newspaper, jar and ball.

- Sort the nine things into the three categories. Make a table with a tally and a count for each one.
- Which group has the most things?
- How many things do NOT go in the Throw away bin?

Q9. Read this table. Twenty children chose their favourite pet.

Favourite pet	Count
cat	6
dog	9
fish	2
bird	3

- Which pet is the most popular?
- Which pet is the least popular?
- How many more children chose dogs than cats?
- How many children answered altogether?

Q10. Do a survey at home. Ask 6 people, *What is your favourite fruit?*

- Write the answers as a list, as they come in.
- Sort the list into a table with a tally and a count for each fruit.
- Check the total of your counts. What should it be?

Q11. A list has 10 answers:

red, red, blue, green, red, blue, green, red, blue, green

Ben made this table from the list. Is Ben's table right? How do you know?

Colour	Count
red	5
blue	3
green	3

Q12. You want to find out where children play at lunchtime. First you watch for one lunch. You see children in the sandpit, on the slides, on the grass and playing ball games. Now you can pick the categories and make an observation table.

- a. Fill in the names of the four groups in this table.

Where we play	Tally	Count
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- b. Why did we watch first, before we made the table?

Q13. Miss Nguyen makes a survey in Google Forms. The question is: *What is your favourite animal?* The children answer on computers, and the software counts the answers.

- a. What is the name of the software Miss Nguyen uses?
b. Say one good thing about doing the survey on a computer, instead of with sticky notes.

Q14. Do your own float and sink experiment. Pick 3 small things from home. Put each one in water and watch. Make a table with a float row and a sink row, and record each thing with a tally mark. Which row has more marks — or are they the same?

Maths in real life

Q15. The Queen Victoria Market

The Queen Victoria Market is a real place in Melbourne. It has a big fruit and vegetable hall. A class visits. The children do an observation at one fruit shop. They count the kinds of fruit on show: 9 apples, 6 oranges, 5 bananas and 4 pears. (The counts here are made small.)

Source: Queen Victoria Market, Queen Victoria Market, qvm.com.au, retrieved 2026-08-20.

- a. Put the data into a table with a row for each kind of fruit.
b. Which fruit has the most on show?
c. Which fruit has the least on show?
d. How many more apples than pears are on show?
e. How many pieces of fruit are on show altogether?

Answers

Q1. a. 4 b. 4 c. 4 d. 12.

Q2. a. Three marks. b. A group of five: four marks and a slant. c. A group of five and 2 more marks. d. 7.

Q3. a. 7 b. apples c. oranges d. 3.

Q4. red 3, blue 2, green 1.

Q5. a. walk 4, car 2, bike 1, bus 1, train 0 b. walk c. train.

Q6. a. survey b. observation c. experiment.

Q7. b. Monday 3, Wednesday 2, Friday 5 c. Friday d. Wednesday.

Q8. a. Throw away 3, Recycle 4, Re-use 2 b. Recycle c. 6.

Q9. a. dog b. fish c. 3 d. 20.

Q10. Answers will be different. The total of the counts should be 6.

Q11. No. The list has 10 answers, but Ben's counts add to 11. Red should be 4, not 5.

Q12. a. sandpit, slides, grass, ball games b. To see what children do, so we pick the right categories.

Q13. a. Google Forms b. any good thing, e.g. the software counts the answers for us.

Q14. Answers will be different.

Q15. a. apples 9, oranges 6, bananas 5, pears 4 b. apples c. pears d. 5 e. 24.

All the working

Q1. Touch each piece of fruit and count. a. Apples: 4. b. Bananas: 4. c. Oranges: 4. d. $4 + 4 + 4 = 12$.

$\therefore$ a. 4 b. 4 c. 4 d. 12.

Q2. One mark is one. Five is four marks with a slant across them. a. 3 is three marks. b. 5 is one group with a slant. c. 7 is one group with a slant and 2 more marks. d. A group of five and 2 more is $5 + 2 = 7$.

$\therefore$ a. three marks b. one group of five c. five and 2 more d. 7.

Q3. Read the counts. a. Bananas: 7. b. The biggest count is 8: apples. c. The smallest count is 5: oranges. d. $8 - 5 = 3$.

$\therefore$ a. 7 b. apples c. oranges d. 3.

Q4. Sort the list: red comes up 3 times, blue 2 times, green 1 time. Check: $3 + 2 + 1 = 6$, and 6 children answered.

$\therefore$ red 3, blue 2, green 1.

Q5. a. Count the list in order: walk, walk, car, bus, walk, bike, car, walk. Walk comes up 4 times, car 2 times, bike 1 time, bus 1 time, train 0 times. Check: $4 + 2 + 1 + 1 + 0 = 8$, and the teacher saw 8 children. b. The biggest count is 4: walk. c. Train got zero — no train came while the teacher watched.

$\therefore$ a. walk 4, car 2, bike 1, bus 1, train 0 b. walk c. train.

Q6. a. A favourite song is something people tell us — we ask: survey. b. We can see how children get to school — we watch: observation. c. We try the things in water and see what happens: experiment.

$\therefore$ a. survey b. observation c. experiment.

Q7. a. Sort the list: Monday, Monday, Monday | Wednesday, Wednesday | Friday, Friday, Friday, Friday, Friday. Table: Monday tally 3, Wednesday tally 2, Friday tally a group of five. b. Monday 3, Wednesday 2, Friday 5. Check: $3 + 2 + 5 = 10$, and 10 children answered. c. The biggest count is 5: Friday. d. The smallest count is 2: Wednesday.

∴ b. Monday 3, Wednesday 2, Friday 5 c. Friday d. Wednesday.

Q8. a. Throw away: orange peel, banana peel, plastic bag — 3. Recycle: glass bottle, paper, box, newspaper — 4. Re-use: jar, ball — 2. Check: $3 + 4 + 2 = 9$ things. b. The biggest count is 4: Recycle. c. The things not in Throw away are the Recycle and Re-use things: $4 + 2 = 6$.

∴ a. Throw away 3, Recycle 4, Re-use 2 b. Recycle c. 6.

Q9. a. The biggest count is 9: dog. b. The smallest count is 2: fish. c. $9 - 6 = 3$. d. $6 + 9 + 2 + 3 = 20$.

∴ a. dog b. fish c. 3 d. 20.

Q10. Your list and table will be different. The count for each fruit is how many people said that fruit. When we add the counts, we should get 6, because 6 people answered. If the total is not 6, we check our sorting and counting.

∴ The total of the counts should be 6.

Q11. Count red in the list: red, red, red, red — 4 reds, not 5. Check the total too: the list has 10 answers, but Ben's counts add to $5 + 3 + 3 = 11$. A table must have the same total as the data it came from.

∴ No, Ben's table is not right. Red should be 4, and the counts should add to 10.

Q12. a. The four categories we saw: sandpit, slides, grass, ball games — one row each. b. We watch first so we know what children really do. Then the categories fit the data. If we made the table first, we might pick categories that no child uses.

∴ a. sandpit, slides, grass, ball games b. watching first helps us pick the right categories.

Q13. a. The software is Google Forms. b. Good things: the software keeps the answers and counts them, so counting is quick and we do not lose sticky notes.

∴ a. Google Forms b. e.g. it counts the answers for us.

Q14. Your table will be different. Each thing goes in the float row or the sink row, one tally mark each. The total of the two counts should be 3. Look at your two counts: if float has 2 and sink has 1, the float row has more; if one row has 3 and the other has 0, all the things are in one row.

∴ The total of the counts should be 3.

Q15. a. One row for each kind of fruit: apples 9, oranges 6, bananas 5, pears 4. b. The biggest count is 9: apples. c. The smallest count is 4: pears. d. $9 - 4 = 5$. e. $9 + 6 = 15$, and $15 + 5 = 20$, and $20 + 4 = 24$.

∴ a. apples 9, oranges 6, bananas 5, pears 4 b. apples c. pears d. 5 e. 24.

Different graphs of the same data: making them, and comparing what each one shows

create different graphical representations of data using software where appropriate; compare the different representations, and identify and describe common and distinctive features in response to questions — VC2M2ST02

Data can be shown in more than one way. Let us make two graphs of the same data, and see what each one shows.

Things you need: sticky notes, counters, cubes, stickers, squared paper, coloured pencils, big paper, and a computer with software that can make graphs.

What we learn

Data and groups

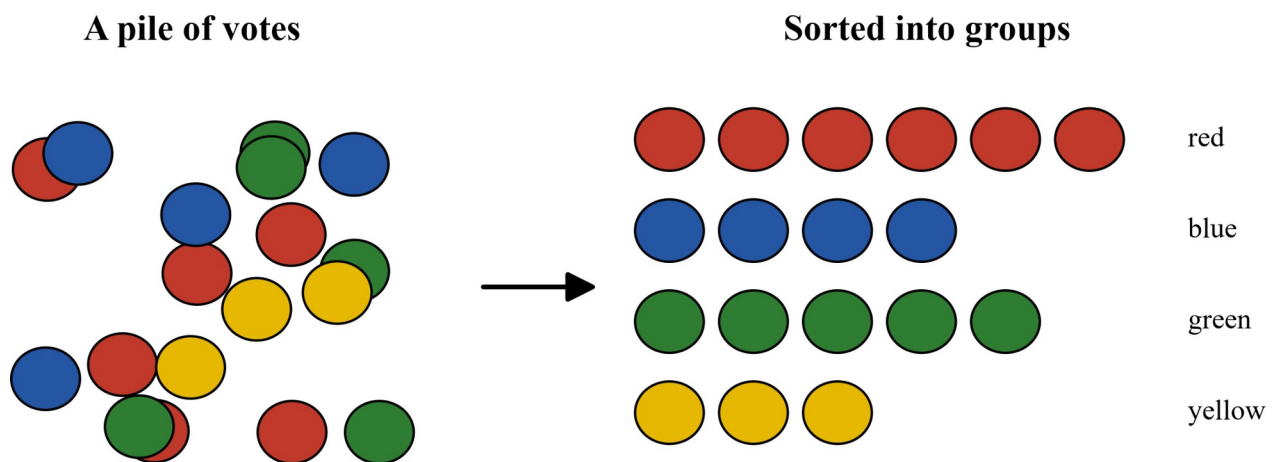
In 5A, you collected data and sorted it. Data are what we find out. The favourite colours of our class are data.

Each kind of answer is a **group**. Red, blue, green and yellow are four groups. We can also call the groups **categories**. Categories are groups of things that go together.

The same data, different ways

We can show the same data in different ways. Each way is called a **display**.

Look at this pile of counters. It is hard to see what it shows.



A pile of mixed red, blue, green and yellow counters next to the same counters sorted into four colour rows.

When we sort the counters into rows, we can see which colour has the most. Graphs sort data so they are easy to see.

First, record the data

Before we make a graph, we record the data. We can use a **list** or a **tally chart**.

A list writes the number for each group:

red 6 · blue 4 · green 5 · yellow 3

A tally chart uses marks. One mark for each vote. Five marks make a bundle: four marks go down, and one mark goes across.

Favourite colour

Colour	Tally	Number
red		6
blue		4
green		5
yellow		3

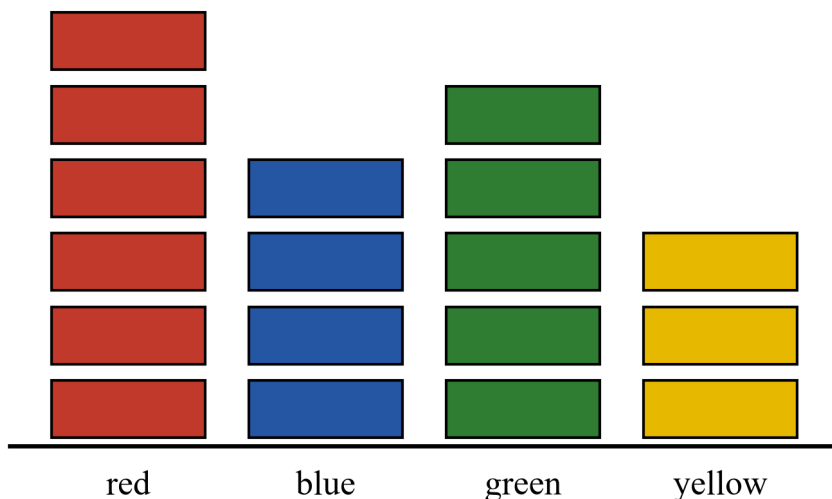
A tally chart of favourite colours with tally marks and numbers: red 6, blue 4, green 5 and yellow 3.

Picture graphs

A **picture graph** shows data with pictures. Each vote gets one picture.

In this picture graph, one square stands for one vote. Red has 6 squares. Yellow has 3 squares.

Favourite colour

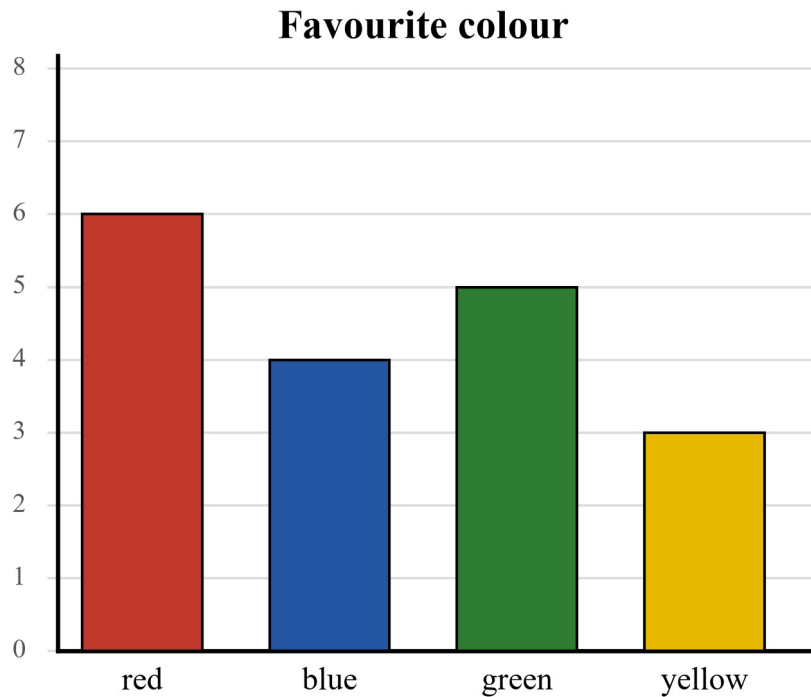


A picture graph of favourite colours where each vote is one coloured square: red 6, blue 4, green 5 and yellow 3.

Column graphs

A **column graph** shows data with a column for each group. Each column goes up as tall as the number of votes.

The numbers go up the side in 1s: 0, 1, 2, 3, 4, 5, 6, 7, 8. The groups go along the bottom.

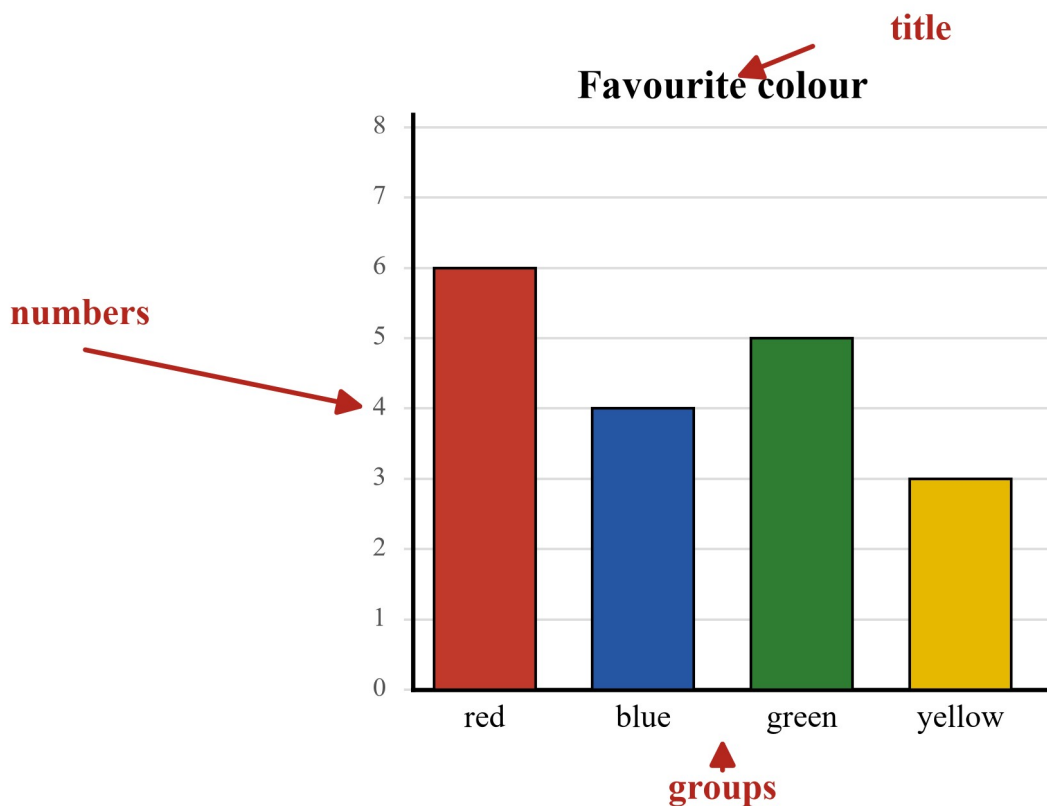


A column graph of favourite colours with numbers in ones from 0 to 8 up the side: red 6, blue 4, green 5 and yellow 3.

The parts of a graph

A graph has a **title**. The title says what the graph is about.

In a column graph, the numbers go down the side. The names of the groups go along the bottom.

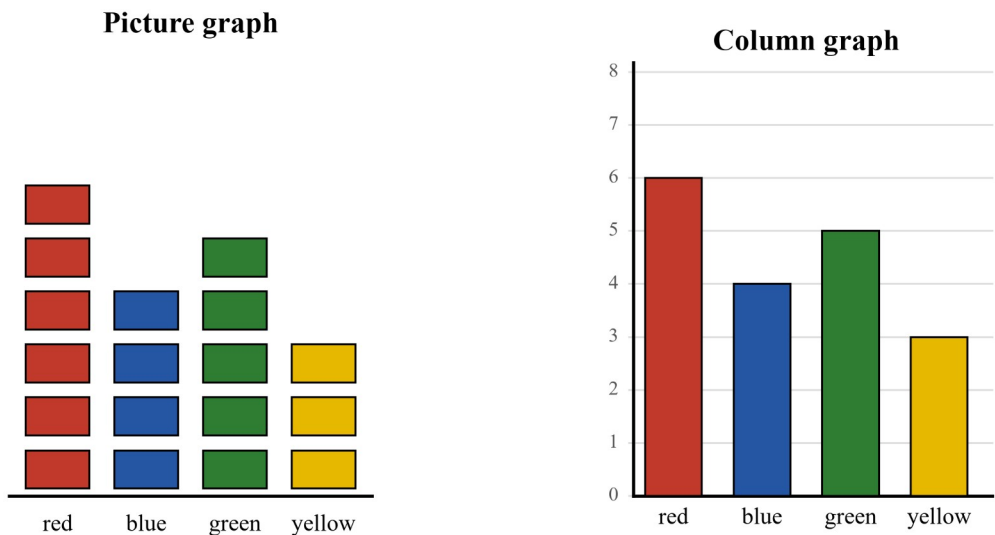


The parts of a column graph: the title at the top, the numbers down the side, and the groups along the bottom.

Before you make a graph, check your groups. Do they fit the question you asked?

Compare the two graphs

Here is the same data in two ways: a picture graph and a column graph.



The favourite-colour data shown two ways, side by side: a picture graph and a column graph.

What is the **same**? Both graphs show the same 18 votes. Both show that red has the most and yellow has the least.

What is **different**? The picture graph shows every vote, one by one. You can count the squares. The column graph shows the number for each group at once. You can find the biggest column fast.

Each graph makes some things easy to see. The picture graph makes it easy to see each vote. The column graph makes it easy to compare the groups.

Other ways to show data

Dot plots, sticker charts, picture graphs, bar charts and column graphs are all ways to show data. In this book, you make a picture graph and a column graph.

Make graphs with software

You can make graphs by hand, or with software. Software is the programs on a computer.

Microsoft Excel is a real program that can make graphs. You type the groups and the numbers into Excel, and it draws the column graph for you.

Source: Microsoft, Microsoft Excel, microsoft.com/en-au/microsoft-365/excel, retrieved 2026-08-20.

We try together

Do these with your teacher. You can use counters, sticky notes or stickers.

We try 1 — one set of votes, two graphs

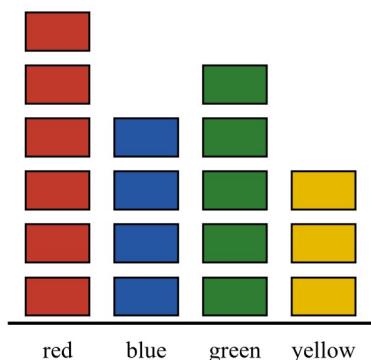
Mia, Ruby, Tom and Sam ask their class: “What is your favourite colour?” The choices are red, blue, green and yellow. Each child votes. The votes are: red 6, blue 4, green 5, yellow 3.

Working	Note
Sort the votes into groups. Use one counter for each vote.	Red has 6 counters. Blue has 4. Green has 5. Yellow has 3.
Make a tally chart. One mark for each vote.	Red gets 6 marks. Blue gets 4. Green gets 5. Yellow gets 3.
Make a picture graph. One square for each vote.	The squares for each colour make a row that goes up.
Make a column graph. The column goes up to the	Red goes up to 6. Blue goes up to 4. Green goes up to 5.

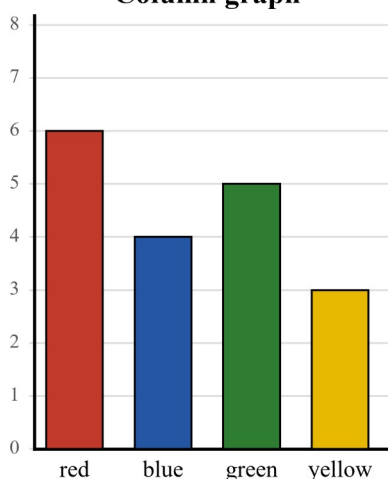
number of votes.

Yellow goes up to 3.

Picture graph



Column graph



The favourite-colour data shown two ways, side by side: a picture graph and a column graph.

∴ The same 18 votes make a picture graph and a column graph. The data did not change. Only the display changed.

We try 2 — read and compare

Look at the picture graph and the column graph above. Both show the same votes.

Find the most. The red column is the tallest. Red has 6 votes.

You can see this in both graphs.

Find the least. The yellow column is the shortest. Yellow has 3 votes.

You can see this in both graphs too.

How many more votes for red than blue? $6 - 4 = 2$.

Red has 2 more votes than blue.

Say what is the same.

Both graphs show 18 votes. Red is the most in both. Yellow is the least in both.

Say what is different.

The picture graph shows each vote as one square. The column graph shows each group as one column with a number.

∴ Same data, two graphs. The picture graph shows each vote, one by one. The column graph makes it easy to compare the groups.

Questions to practise

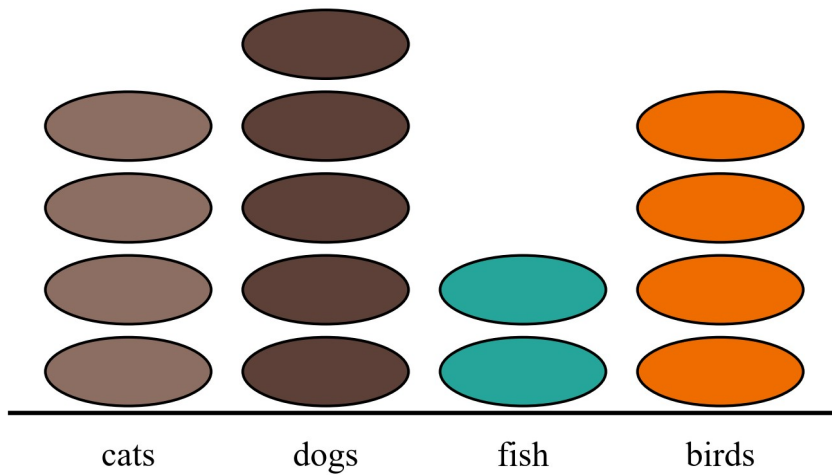
With help

Q1. Match each name to what it is. The names are: list · tally chart · picture graph · column graph.

- Marks that count the votes, in bundles of five: ☐
- One column for each group, going up to the number of votes: ☐
- One picture for each vote: ☐
- The groups and their numbers, written in a line: ☐

Q2. Look at the picture graph of pets.

Favourite pet

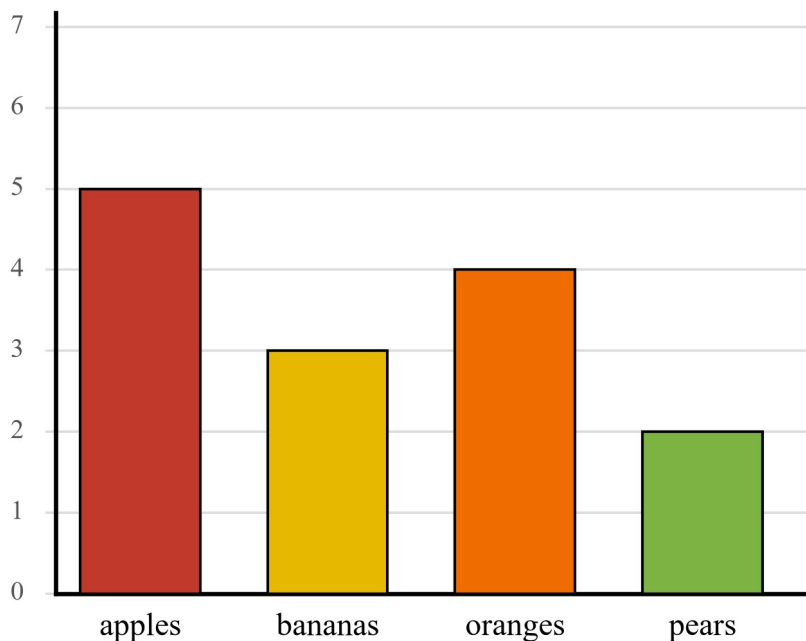


A picture graph of favourite pets where each vote is one picture: cats 4, dogs 5, fish 2 and birds 4.

- How many votes for dogs? ☐
- Which pet has the most votes? ☐
- Which pet has the least votes? ☐

Q3. Look at the column graph of fruit.

Fruit in our lunchboxes



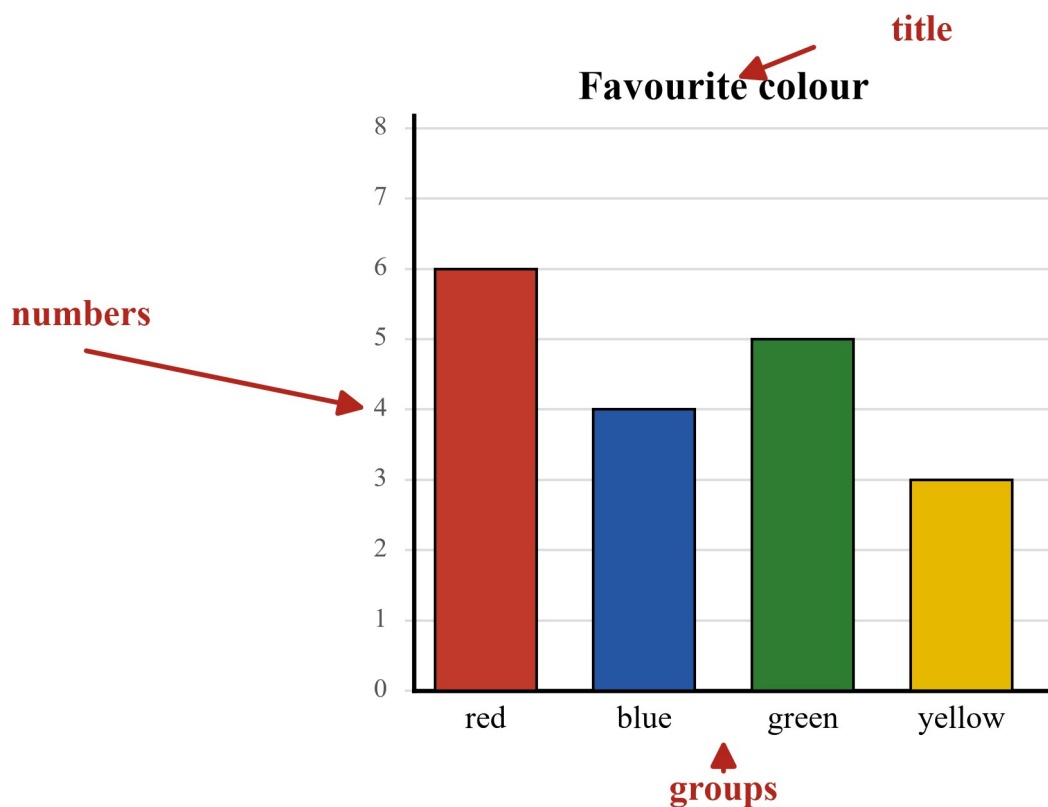
A column graph of fruit in lunchboxes with numbers in ones up the side: apples 5, bananas 3, oranges 4 and pears 2.

- How many oranges are there? ☐
- Which fruit has the most? ☐
- How many more apples than pears? Write the number sentence. ☐

Q4. Make a tally chart. The votes for favourite colour are: red, blue, red, yellow, blue, red.

- How many votes for red? ☐
- How many votes for blue? ☐
- How many votes for yellow? ☐

Q5. Look at the parts of the column graph.



The parts of a column graph: the title at the top, the numbers down the side, and the groups along the bottom.

Use the words in the box.

box: title · groups · numbers

- The name of the graph, at the top, is the ☐.
- The things we count, along the bottom, are the ☐.
- The things that go up the side, in 1s, are the ☐.

Q6. Make a picture graph. The tally chart shows the votes for favourite shape.

Favourite shape

Shape	Tally	Number
stars		5
hearts		3
circles		4
squares		2

A tally chart of favourite shapes with tally marks and numbers: stars 5, hearts 3, circles 4 and squares 2.

Draw one shape for each vote. Draw the pictures in rows, one row for each shape.

- Which shape has the most votes? ☐
- How many votes altogether? ☐

On your own

Q7. The favourite-colour votes are written as a list: red 6 · blue 4 · green 5 · yellow 3.

- Which colour has the most votes? ☐
- How many votes altogether? ☐
- Make a tally chart for these votes.

Q8. Look at the column graph of fruit again.

- How many pieces of fruit are there altogether? ☐
- Which fruit has the least? ☐
- How many more oranges than bananas? Write the number sentence. ☐

Q9. Look at the picture graph of pets again.

- How many votes are there altogether? ☐
- Which two pets have the same number of votes? ☐
- How many more dogs than fish? Write the number sentence. ☐

Q10. Make a picture graph. The votes for favourite shape are: stars 5, hearts 3, circles 4, squares 2. Draw one shape for each vote.

Q11. Make a column graph. The votes for favourite drink are: milk 4, water 6, juice 3. The numbers go up the side in 1s.

- Which drink has the most votes? ☐
- Give your graph a title. Write it here: ☐

Q12. Ruby says: “In a picture graph, the longest row has the most votes.” Is Ruby right? Why?

Q13. Tom says: “A column graph shows each vote, one by one.” Is Tom right? Which graph does show each vote one by one?

Q14. The votes for favourite pet are: cats 3, dogs 3, fish 5, birds 2.

- Draw a picture graph of these votes.
- Draw a column graph of these votes.
- Which graph lets you find the biggest group faster? Why?

Maths in real life

Q15. A bus tour at Werribee Open Range Zoo

Werribee Open Range Zoo is a real zoo in Victoria. You go on a bus tour to see the animals. On the tour, you might see giraffes, zebras, ostriches and camels.

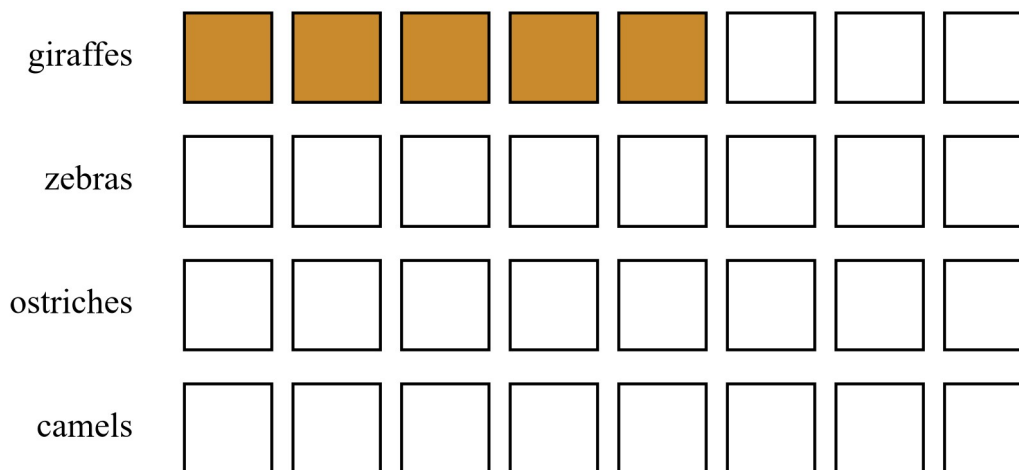
Source: Zoos Victoria, Werribee Open Range Zoo, zoo.org.au/werribee, retrieved 2026-08-20. Source: Wikipedia, “Werribee Open Range Zoo”, retrieved 2026-08-20.

The numbers in this story are small ones, chosen for Year 2.

Ruby goes on the bus tour. She counts the animals she sees: giraffes 5, zebras 7, ostriches 3, camels 4.

- Make a tally chart of Ruby’s counts.
- Make a picture graph. Use one square for each animal. Here is a start:

Animals on the bus tour



One square stands for one animal.

A started picture graph of zoo animals. The giraffe row is done, with five squares. The rows for zebras, ostriches and camels are empty.

- Which animal did Ruby see the most? ☐ Which one did she see the least? ☐
- How many more zebras than camels did Ruby see? Write the number sentence. ☐
- Look at your tally chart and your picture graph. Say one thing that is the same, and one thing that is different.

What comes next

Next year you will graph numbers, not just groups of things (VC2M3ST01), and you will start to learn about what might happen (VC2M3P01, VC2M3P02).

Answers

Q1. a. tally chart b. column graph c. picture graph d. list.

Q2. a. 5 b. dogs c. fish.

Q3. a. 4 b. apples c. $5 - 2 = 3$.

Q4. a. 3 b. 2 c. 1.

Q5. a. title b. groups c. numbers.

Q6. a. stars b. 14.

Q7. a. red b. 18 c. tally chart with red 6, blue 4, green 5, yellow 3.

Q8. a. 14 b. pears c. $4 - 3 = 1$.

Q9. a. 15 b. cats and birds c. $5 - 2 = 3$.

Q10. picture graph with stars 5, hearts 3, circles 4, squares 2.

Q11. a. water b. titles will be different; check that the title says what the graph is about.

Q12. Yes. Each picture stands for one vote, so more votes make a longer row.

Q13. No. The picture graph shows each vote one by one. The column graph shows each group as one column.

Q14. a. picture graph with cats 3, dogs 3, fish 5, birds 2 b. column graph of the same votes c. answers will be different; the column graph is a good answer, because you can see the tallest column fast.

Q15. a. tally chart with giraffes 5, zebras 7, ostriches 3, camels 4 b. picture graph of the same counts c. zebras; ostriches d. $7 - 4 = 3$ e. answers will be different; both show the same counts, and the picture graph shows each animal while the tally chart shows marks.

All the working

Q1. A tally chart counts with marks, in bundles of five. A column graph uses one column for each group, going up to the number of votes. A picture graph uses one picture for each vote. A list writes the groups and their numbers in a line.

∴ a. tally chart b. column graph c. picture graph d. list.

Q2. Read the picture graph. Each picture is one vote. The dog row has 5 pictures, so dogs have 5 votes. The dog row is the longest, so dogs have the most. The fish row is the shortest, with 2, so fish have the least.

∴ a. 5 b. dogs c. fish.

Q3. Read the column graph. The orange column goes up to 4. The apple column is the tallest, at 5, so apples have the most. Pears are at 2. $5 - 2 = 3$, so there are 3 more apples than pears.

∴ a. 4 b. apples c. $5 - 2 = 3$.

Q4. Read the list of votes and sort them. red, blue, red, yellow, blue, red. Count each colour: red 3, blue 2, yellow 1. Make one tally mark for each vote.

∴ a. 3 b. 2 c. 1.

Q5. The name at the top of a graph is the title. The things we count go along the bottom; they are the groups. The numbers that go up the side in 1s are the numbers.

∴ a. title b. groups c. numbers.

Q6. The tally chart shows stars 5, hearts 3, circles 4, squares 2. Draw one shape for each vote, in rows. Stars have the longest row, so stars have the most. Count all the votes: $5 + 3 + 4 + 2 = 14$.

∴ a. stars b. 14.

Q7. Read the list: red 6, blue 4, green 5, yellow 3. Red has the biggest number, so red has the most. Count all the votes: $6 + 4 + 5 + 3 = 18$. The tally chart has one mark for each vote: 6 marks for red, 4 for blue, 5 for green and 3 for yellow.

∴ a. red b. 18 c. tally chart with red 6, blue 4, green 5, yellow 3.

Q8. Count the fruit in the column graph: $5 + 3 + 4 + 2 = 14$. The pear column is the shortest, at 2, so pears have the least. Oranges are at 4 and bananas are at 3. $4 - 3 = 1$.

∴ a. 14 b. pears c. $4 - 3 = 1$.

Q9. Count the votes in the picture graph: $4 + 5 + 2 + 4 = 15$. Cats have 4 and birds have 4, so cats and birds have the same number. Dogs have 5 and fish have 2. $5 - 2 = 3$.

∴ a. 15 b. cats and birds c. $5 - 2 = 3$.

Q10. Draw one shape for each vote: 5 stars, 3 hearts, 4 circles and 2 squares. Put each shape in its own row, so the rows are easy to compare.

∴ picture graph with stars 5, hearts 3, circles 4, squares 2.

Q11. The numbers go up the side in 1s. Draw one column for each drink: milk goes up to 4, water goes up to 6, juice goes up to 3. Water has the tallest column, so water has the most votes. The title should say what the graph is about, like “Favourite drinks”.

∴ a. water b. titles will be different; check that the title says what the graph is about.

Q12. In a picture graph, each picture stands for one vote. A group with more votes has more pictures, so its row is longer. Ruby is right.

∴ Yes; more votes make a longer row, because each vote is one picture.

Q13. A column graph has one column for each group. The column goes up to the number of votes, but you cannot see each vote on its own. The picture graph shows each vote, one by one, because each vote is one picture. Tom is not right.

∴ No; the picture graph shows each vote one by one.

Q14. Draw one picture for each vote: cats 3, dogs 3, fish 5, birds 2. Then draw a column graph of the same votes, with the numbers in 1s up the side. The fish column is the tallest, at 5. In the column graph, you can see the tallest column fast, so many students find the biggest group faster there. In the picture graph, you can see each vote. Both graphs show the same data.

∴ a. picture graph with cats 3, dogs 3, fish 5, birds 2 b. column graph of the same votes c. answers will be different; the column graph is a good answer, because the tallest column is fast to find.

Q15. Sort Ruby’s counts into groups: giraffes 5, zebras 7, ostriches 3, camels 4. Make one tally mark for each animal. In the picture graph, one square stands for one animal: 5 squares for giraffes, 7 for zebras, 3 for ostriches, 4 for camels. Zebras have the most, at 7. Ostriches have the least, at 3. $7 - 4 = 3$, so Ruby saw 3 more zebras than camels. The tally chart and the picture graph both show the same counts; the picture graph shows each animal as one square, and the tally chart shows each animal as one mark.

∴ a. tally chart with giraffes 5, zebras 7, ostriches 3, camels 4 b. picture graph of the same counts c. zebras; ostriches d. $7 - 4 = 3$ e. answers will be different; both show the same counts.

Test

Chapter 5 check

Name: _____ Date: _____

Answer every question. Use the things on your desk. Your teacher can read any question to you.

- **Time:** You can take as long as you need. Most children finish in about 15 minutes.
- **Marks:** This check is out of 10 marks.
- **Things you can use:** pencils, coloured pencils, counters and squared paper.
- **Calculators:** No calculators.

Q1. (3 marks) Ten children in a Year 2 class answer this question: *What is your favourite football team?* Each child answers one time. Here is the data as a list:

Collingwood, Carlton, Geelong, Collingwood, Richmond, Carlton, Collingwood, Geelong, Carlton, Collingwood

Source: AFL, AFL clubs (Carlton, Collingwood, Geelong, Richmond), afl.com.au, retrieved 2026-08-23.

- a. Sort the data into the table. Draw the tally marks and write the count. (1 mark)

Favourite football team	Tally	Count
Carlton		☐
Collingwood		☐
Geelong		☐
Richmond		☐

- b. Which team is the most popular? Which team is the least popular? (1 mark)
- c. How many more children chose Collingwood than Richmond? Write a number sentence. (1 mark)

Q2. (1 mark) You want to find out what kinds of birds come to the school garden. What is the best way to get the data?

- A. A survey
- B. An observation
- C. An experiment
- D. A tally chart

Write the letter of the best answer: ☐

Q3. (3 marks) A Year 2 class visits Melbourne Museum. They walk through the Forest Gallery. It is a real forest with live birds, frogs, lizards and turtles. The children count the animals they see. (*The numbers in this story are small ones, chosen for Year 2.*)

Source: Museums Victoria, Melbourne Museum, museums victoria.com.au, retrieved 2026-08-23.

Here are their counts as a list:

birds 5, lizards 3, frogs 2, turtles 1

- a. Draw a picture graph of the data in this table. Draw one ☐ for each animal. (1 mark)

Animal	Pictures
birds	
lizards	
frogs	
turtles	

- b. On squared paper, draw a column graph of the same data. The numbers go up the side in 1s. (1 mark)
- c. Give each graph a title. (1 mark)
 - Picture graph title: ☐
 - Column graph title: ☐

Q4. (3 marks) Look at your picture graph and your column graph from Q3.

- a. Write one thing that is the same about your two graphs. (1 mark)
- b. Write one thing that is different about your two graphs. (1 mark)
- c. Which graph lets you find the biggest group fastest? Why? (1 mark)

Total: 10 marks

End of check.

Solutions

Answer key

Q	Part	Answer	Marks
1	a	Carlton 3, Collingwood 4, Geelong 2, Richmond 1 (tally and count)	1
1	b	most popular: Collingwood; least popular: Richmond	1
1	c	$4 - 1 = 3$	1
2	—	B (an observation)	1
3	a	picture graph: birds 5, lizards 3, frogs 2, turtles 1; one $\square$ for each animal	1
3	b	column graph: one column for each animal — birds 5, lizards 3, frogs 2, turtles 1 — numbers up the side in 1s	1
3	c	a title on each graph that says what it shows	1
4	a	one true thing that is the same	1
4	b	one true thing that is different	1
4	c	a choice with a true reason	1
Total			10

All the working

Q1. Read the list one answer at a time and sort it. Carlton comes up 3 times. Collingwood comes up 4 times. Geelong comes up 2 times. Richmond comes up 1 time. Check the total: $3 + 4 + 2 + 1 = 10$, and 10 children answered ✓. The tally is 3 marks for Carlton, 4 marks for Collingwood, 2 marks for Geelong and 1 mark for Richmond. b. The biggest count is 4, so Collingwood is the most popular. The smallest count is 1, so Richmond is the least popular. c. Collingwood got 4 and Richmond got 1. $4 - 1 = 3$.

∴ a. Carlton 3, Collingwood 4, Geelong 2, Richmond 1 b. most popular: Collingwood, least popular: Richmond c. $4 - 1 = 3$.

Q2. Birds cannot answer a question, so a survey will not work. We are not trying anything to see what happens, so it is not an experiment. A tally chart records data, but it does not get data. We watch the garden and write down the birds we see. That is an observation.

∴ B

Q3. The data is: birds 5, lizards 3, frogs 2, turtles 1. a. In the picture graph, one $\square$ stands for one animal. Draw 5 $\square$ next to birds, 3 $\square$ next to lizards, 2 $\square$ next to frogs and 1 $\square$ next to turtles. Check: $5 + 3 + 2 + 1 = 11$ animals. b. In the column graph, the numbers go up the side in 1s, from 0 to 5. Draw one column for each animal. The birds column goes up to 5, the lizards column goes up to 3, the frogs column goes up to 2 and the turtles column goes up to 1. c. A good title says what the graph is about, like *Animals in the Forest Gallery*.

∴ a. picture graph with birds 5, lizards 3, frogs 2, turtles 1 b. column graph of the same data, numbers in 1s c. a title for each graph that says what it shows.

Q4. a. Things that are the same: both graphs show the same 11 animals. Birds have the most in both graphs, and turtles have the least in both. b. Things that are different: the picture graph shows each animal one by one, and the column graph shows each group as one column with a number. c. The column graph — you can see the tallest column fast. The picture graph is also a fair answer if the reason is true, like *I can count the $\square$ in each row.*

$\therefore$ a. any true same thing b. any true different thing c. a choice with a true reason.

Marking guide

Both CDs carry the same achievement-standard extract in the authority file (maths_2.json): “Students use a range of methods to collect, record, represent and interpret categorical data in response to questions.” (VC2M2ST01, VC2M2ST02.) The guide below is written in that language and scores the strategy as well as the answer (TOC section 7).

What you can see the student do	Words from the achievement standard	Q	Marks
Picks watching (an observation) as the way to get the bird data	collect	Q2	1
Sorts all 10 answers into the right rows with tally marks and matching counts	collect, record	Q1a	1
Reads the table to name Collingwood (most) and Richmond (least)	interpret	Q1b	1
Writes ‘how many more’ as a horizontal number sentence: $4 - 1 = 3$	interpret	Q1c	1
Draws one ☐ for each animal, in rows of 5, 3, 2 and 1	represent	Q3a	1
Draws each column to the right height, with numbers up the side in 1s	represent	Q3b	1
Gives each graph a title that says what it shows	represent	Q3c	1
Writes one true thing that is the same about the two displays	interpret	Q4a	1
Writes one true thing that is different about the two displays	interpret	Q4b	1
Chooses a graph and gives a true reason	interpret	Q4c	1

Marking notes:

- **Strategy counts.** In Q1c the mark goes to the number sentence, not to a bare “3”. In Q4c the mark goes to the reason, not to which graph was chosen — either graph scores with a true reason.
- **Working carried forward.** Score Q4 on the graphs the student actually drew in Q3. A student whose Q3 heights are wrong but whose Q4 answers are true of their own graphs still scores Q4.
- **Whole parts.** Q1b needs both the most and the least popular for its 1 mark. Q3a and Q3b score on the one-to-one rule — one ☐ for each animal in the picture graph, one step up for each animal in the column graph; tidy drawing is not scored.
- **MC.** Q2 scores 1 for B and 0 for any other answer; no part marks.

Coverage and caps (TOC section 7): VC2M2ST01 is scored by Q1–Q2 (4 marks) and VC2M2ST02 by Q3–Q4 (6 marks), so every CD the chapter owns has its own scored items. MC is 1 mark of 10, within the one-quarter cap.