Summer Block 5

Statistics

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Small steps

Step 1	Interpret pictograms
Step 2	Draw pictograms
Step 3	Interpret bar charts
Step 4	Draw bar charts
Step 5	Collect and represent data
Step 6	Two-way tables

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Interpret pictograms

Notes and guidance

In this small step, children learn to read and interpret information presented in pictograms, building on their learning from Year 2

Children ask and answer questions about information presented in both horizontal and vertical pictograms. Encourage them to think carefully about why a particular symbol has been chosen and its relationship to the data being presented. It is important that children understand the value of each symbol and what it means when a half, quarter or three-quarter symbol is used. An understanding of the key is therefore a crucial element of understanding the data.

Children revisit and extend their knowledge of constructing their own pictograms in the next step.

Things to look out for

- Children may use one-to-one correspondence between the number of symbols in the pictogram and the value of the data without considering the value of each symbol as presented in the key.
- Similarly, children may count half symbols as $\frac{1}{2}$ rather than as half the value of a full symbol.

Key questions

- What information is shown in the pictogram?
- What symbols are used in the pictogram?
- What does the key tell you?
- What is the value of each symbol?
- What is the value of half/quarter of a symbol?
- What is the value of the symbols for _____?
- Why do the symbols need to be the same size?

Possible sentence stems

- One symbol is equal to _____, so _____ symbols are equal to _____
- If one symbol is equal to _____, then half a symbol is equal to _____

National Curriculum links

- Interpret and present data using bar charts, pictograms and tables
- Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables

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Interpret pictograms

Key learning

- Dani draws a pictogram to show the fruit that the children in her class eat at break time.

Fruit	Number of children
apple	●●●●●●●●●●
pear	●●●●●●
orange	●●●●
banana	●●●●●●●●●

Key

● = 1 child

What can you tell by looking at the pictogram?

Talk about it with a partner.

- Four classes are recording how many books they read in a week.

Here are the results from last week.

Class	Books read
Class 1	■■■■
Class 2	■■■
Class 3	■■■■
Class 4	■■■■■

Key

■ = 5 books

- Which class read the most books?
- Which class read the fewest books?
- How many more books did Class 4 read than Class 2?

What other questions could you ask about the pictogram?

- Amir and Brett are looking for different kinds of flowers in the park.

Here is what they found.

Flower	Number found
dandelion	✿✿✿✿
rose	✿
tulip	✿✿
daisy	✿✿✿

Key

✿ = 4 flowers

Use the pictogram to answer the questions.

- What kind of flower did they find the most of?
- How many more daisies did they find than roses?
- Which kind of flower did they find 14 of?
- How many tulips did they find?
- Is the statement true or false? How do you know?

> Amir and Brett found the same number of tulips as daisies.

What can you tell by looking at the pictogram?

What could you find out?

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Interpret pictograms

Reasoning and problem solving

Whitney draws a pictogram to show how many chocolate eggs each class won at the school fair.

Key = 5 eggs

Class	Number of eggs
1	
2	
3	
4	
5	
6	

Tom shows the same information in another pictogram.

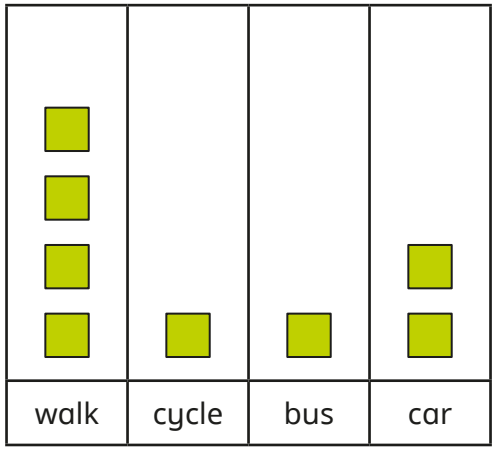
In his key, he uses a picture of one egg to represent 10 eggs.

How many eggs does Tom need to draw for Class 6?

3 and a half

There are 32 children in Class 3

The pictogram shows how the children of Class 3 get to school.



How many children walk to school?

Write some questions about the pictogram for a partner to answer.

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Draw pictograms

Notes and guidance

In this small step, children construct their own pictograms using given data on a range of topics.

Children need to think carefully about how the data could be presented using a pictogram. Initially, it may be beneficial for children to use counters and printed grids to present data before moving on to choose their own appropriate symbols to match the topic of the data. They need to select a symbol that is easily replicated and be able to divide it into half, quarter and three-quarter symbols. Remind them that they always need to show the numerical value of a full symbol in a key. Children should practise presenting data both horizontally and vertically.

Things to look out for

- Children may always want to use a symbol to represent one item, rather than reducing the number of symbols by using multiples.
- Children may choose a symbol that is not easily shown as a half or quarter.
- Children may draw larger symbols for greater numbers, rather than keeping the symbols a consistent size.

Key questions

- What is this data about? How could you represent it?
- What symbol are you going to use? Why?
- What value will each symbol have?
- Can you use half a symbol? What value would this have?
- Why do you need to include a key?

Possible sentence stems

- One symbol represents _____ items, so _____ symbols represents _____ × _____ = _____ items.
- One symbol represents _____ items, so half a symbol represents _____ ÷ _____ = _____ items.
- I will make one symbol represent _____ items because ...

National Curriculum links

- Interpret and present data using bar charts, pictograms and tables
- Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables

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Draw pictograms

Key learning

- Class 3A have been finding out people's favourite crisp flavour.

  The table shows what they found.

Flavour	salt and vinegar	ready salted	roast chicken	prawn cocktail	tangy cheese
Number	6	8	8	2	4

  - Use the data and counters to create a pictogram where 1 counter = 1 child.
  - Create a second pictogram where 1 counter = 2 children.

- Complete the pictogram using the information.
  - Group 2 collected 40 apples.
  - Group 4 collected half as many apples as group 1

Group	Apples
1	●●●●
2	
3	●◖
4	

Key

● = 8 apples

  - How many apples did each group collect?
  - How many apples did they collect altogether?

- Class 3B are recording the weather during the summer term.

Weather	sunny	cloudy	rainy	windy	snowy
Number of days	12	16	8	6	0

  Draw a vertical pictogram for the data.

  Use one symbol to represent 4 days.

- Class 3C are counting the colours of cars that pass the school.

Colour	red	blue	black	silver	white	other
Number	12	6	14	10	14	2

  Draw a pictogram to show their findings.

- Eva has carried out a survey in the playground, asking children their favourite sport.

  The table shows her results.

Sport	basketball	running	football	tennis	do not like sport
Number	12	24	32	4	16

  Eva draws 1 circle to represent 8 people.

  How many circles does she need to draw for each category?

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Draw pictograms

Reasoning and problem solving

The pictogram shows the goals scored in six football matches.

Match	Number of goals
1	
2	⚽⚽⚽
3	⚽
4	
5	⚽⚽⚽⚽
6	⚽

Key ⚽ = 2 goals

Some paint has spilt on the pictogram.

Use the clues to complete the pictogram.

- Match 1 had 1 more goal than match 3
- Match 6 had 1 less goal than match 2
- Match 4 had twice as many goals as match 3

match 1: $1\frac{1}{2}$ balls

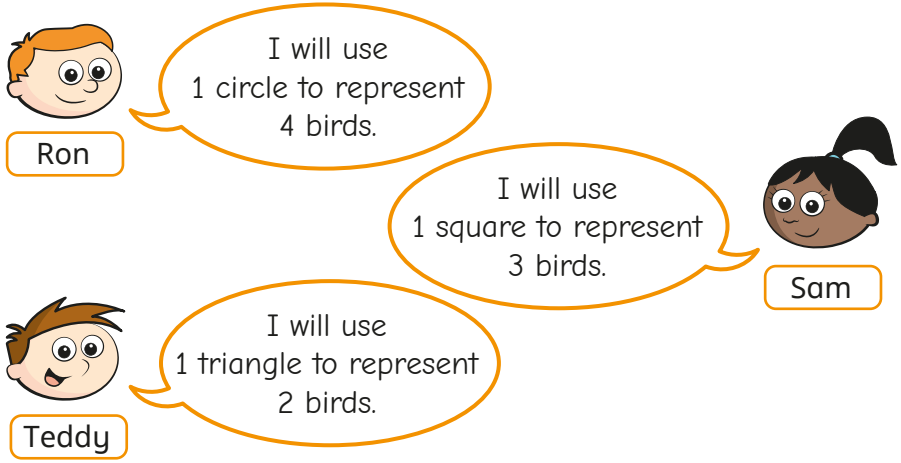
match 4: 2 balls

match 6: $2\frac{1}{2}$ balls

The table shows the number of birds spotted in the school playground.

Type of bird	robin	crow	sparrow	pigeon
Number	8	6	10	12

Ron, Sam and Teddy are designing pictograms to show the data.



Whose idea is the best?

Discuss as a class.

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Interpret bar charts

Notes and guidance

In this small step, children learn to interpret bar charts, making links to their knowledge of pictograms.

Although children encountered block diagrams in Year 2, this is the first time that they have been introduced to bar charts and care should be taken to ensure that children understand the scales. Use the links to pictograms and number lines to support children's understanding of bar charts, with scales limited to steps of 1, 2, 5 and 10

Spend some time closely examining bar charts before asking specific questions. Discuss what children can see, what they know and what they could find out, before considering specific questions that require reading the data more precisely.

The focus in this step is on reading and interpreting the data, before moving on to constructing bar charts in the next step.

Things to look out for

- Children may need support to interpret the value of the scale when it is labelled in multiples other than one.
- Children may misinterpret the axis scale when a value falls between two labelled values.

Key questions

- What can you see on the bar chart?
- What could you find out?
- What is the same about a pictogram and a bar chart? What is different?
- What do the labels on each axis of the bar chart tell you?
- What scale is being used on the axis?
- Where do you measure from?
- If the bar is halfway between two values on the axis, how can you work out the value of the bar?

Possible sentence stems

- The most/least popular item is _____
- The scale shows that 1 square is equal to _____ items.

National Curriculum links

- Interpret and present data using bar charts, pictograms and tables
- Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables

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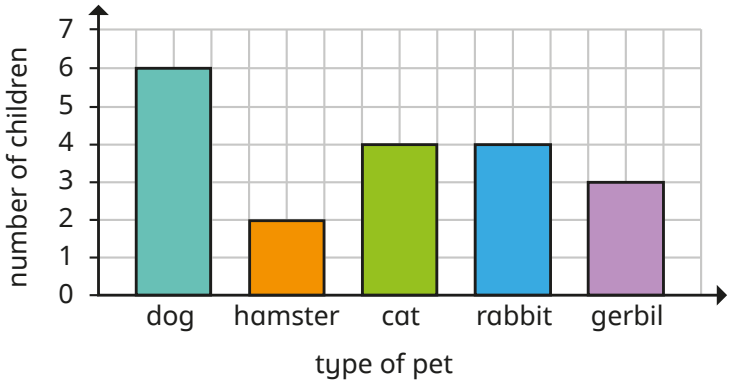
Interpret bar charts

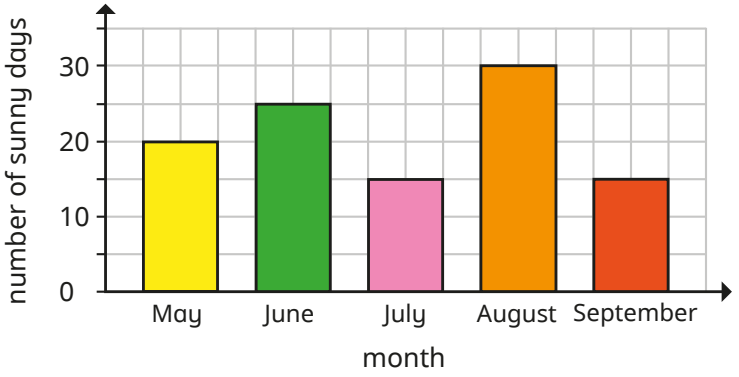
Key learning

- Here is a bar chart that shows the number of children who have different pets.



  - How many children have a dog?
  - How many children have a hamster?
  - What do you notice about the number of children who have a cat and the number of children who have a rabbit?
  - How many children have a gerbil or a rabbit?
  - How many more children have a dog than have a hamster?
  - Is it possible to work out how many children in total have a pet?
  - What else can you work out from the bar chart?

- The bar chart shows the number of sunny days between May and September.



  - Which month had the greatest number of sunny days?
  - There were 25 sunny days in June. How do you know?
  - How many sunny days were there in July?
  - How many more sunny days were there in August than in September?
  - How many sunny days were there in total in May and June?
  - Were there more sunny days between May and July or between August and September? How do you know?

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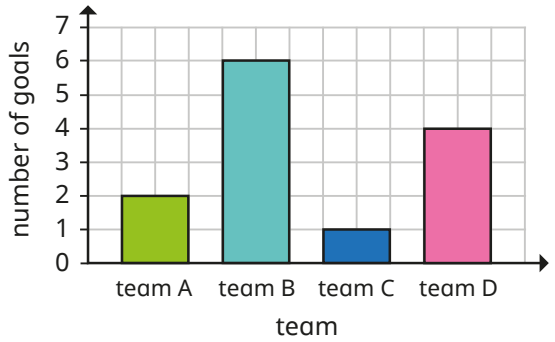
Interpret bar charts

Reasoning and problem solving

The pictogram and the bar chart show the number of goals scored by four football teams.

Team	Number of goals
team A	⚽
team B	⚽⚽⚽
team C	⚽
team D	⚽⚽

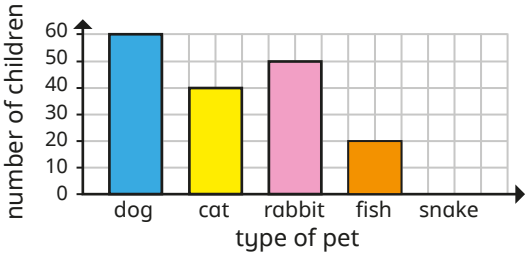
Key ⚽ = 2 goals

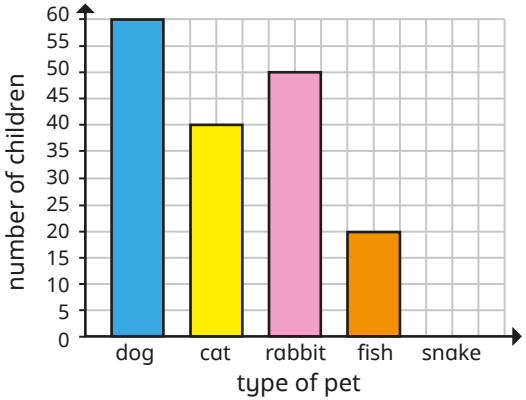


What is the same and what is different about the two charts?

Encourage children to notice that the same information is shown in different forms.

The bar charts show how many people have pets.





Do the bar charts show the same information?

Explain your answer.

Yes

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Draw bar charts

Notes and guidance

In this small step, children use information from tally charts, pictograms and tables to construct bar charts.

Children can use their knowledge of drawing pictograms to make comparisons with drawing bar charts, noting how they are the same and how they are different. They have the opportunity to draw bar charts using scales of 1, 2, 5 and 10, initially by being directed to the most appropriate scale and then by choosing the scale for themselves. Some children may benefit from having pre-drawn axes to work from.

Children need to label their bar charts accurately and align the top of each bar carefully. In this step, they use data given to them, focusing on how best to construct the bar chart. They will have the opportunity to collect and present their own data in the next step.

Things to look out for

- Children may not label their bar charts fully.
- Children may struggle to draw bars that lie between two values on a scale.
- Children may need support to choose an appropriate scale.

Key questions

- What is the same and what is different about a pictogram and a bar chart?
- What is the data showing?
- What equipment do you need to draw a bar chart?
- Which set of data are you going to put on the vertical/ horizontal axis?
- What scale do you think is best to use?
- How can you work out the height of each bar?
- How are you going to ensure that your chart is accurate?

Possible sentence stems

- The greatest value is _____

  I will mark the vertical axis in _____s.
- The top of the bar should line up with _____

National Curriculum links

- Interpret and present data using bar charts, pictograms and tables
- Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables

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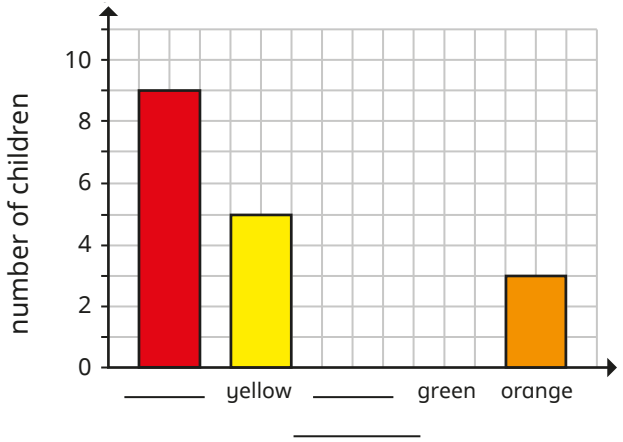
Draw bar charts

Key learning

- The table shows children's favourite colours.

Colour	red	yellow	pink	green	orange
Number	9	5	7	4	3

Complete the bar chart to show the information in the table.



- Use the information from the pictogram to draw a bar chart.

Group	Number of cupcakes eaten
1	
2	
3	
4	

Key

= 5 cupcakes

- The table shows how children in Year 3 travel to school.

Transport	walk	car	bus	bicycle	train
Number	18	10	13	9	2

Draw a bar chart to show the information.

Put the type of transport on the horizontal axis and the number of children on the vertical axis.

Use a scale of 0 to 20 going up in 2s.

- The tally chart shows the number of children in each sports club.

Sport	Tally	Total
football	𝍸 𝍸 𝍸	15
tennis	𝍸 𝍸 ||||	
rugby	𝍸 𝍸 𝍸 |||	
cricket	𝍸 𝍸 ||	
basketball	𝍸 |||	

Draw a bar chart to show the data.

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Draw bar charts

Reasoning and problem solving

The table shows how many skips some children did in 30 seconds.

Child	Number of skips in 30 seconds
Aisha	12
Huan	15
Scott	17
Esther	8

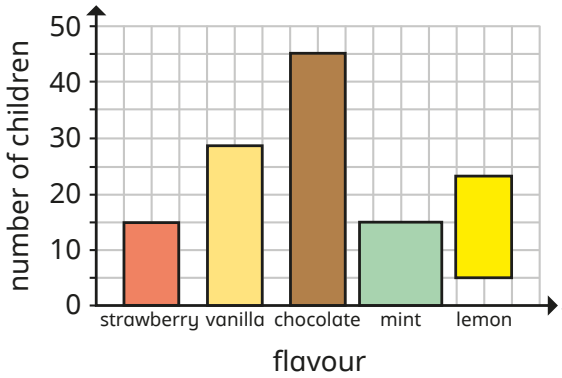
Would it be more suitable to show this information using a bar chart or a pictogram?

Explain your choice.

Discuss as a class.

Tiny has drawn a bar chart to show the information in the table.

Favourite ice cream flavour	Number
strawberry	20
vanilla	28
chocolate	38
mint	15
lemon	18



What mistakes has Tiny made?

Compare answers as a class.

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Collect and represent data

Notes and guidance

In this small step, children are encouraged to propose possible topics to investigate, carry out their own data collection and use the data to construct pictograms and bar charts. They need to consider what question(s) they will ask and how they will record responses (for example, using tallies) before representing the data as bar charts or pictograms.

When constructing pictograms, children need to think carefully about the key they are going to use, based on the numbers in their data collection. They then need to choose a suitable symbol that is easy to replicate and can be used to show fractions if necessary.

When constructing bar charts, children need to think carefully about the range of data collected and the appropriate scale to use.

Further challenge could be added by asking children to write accompanying questions for a partner to answer.

Things to look out for

- Children may need a reminder of how to use tallies.
- When constructing pictograms and bar charts, children may need reminders of all the features, such as key, symbols and scales.

Key questions

- What are you collecting data about?
- Who are you going to ask?
- What question(s) are you going to ask?
- How can you record the answers to your questions?
- How do you use tally marks?
- What type of chart could you draw?
- What can you find out from the information you have collected?

Possible sentence stems

- The greatest value is _____

  I will mark the vertical axis in _____s.
- One symbol represents _____ items, so _____ symbols represent _____ items.

National Curriculum links

- Interpret and present data using bar charts, pictograms and tables
- Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables

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Collect and represent data

Key learning

- Use the tally chart to collect information about how children in your class get to school.

Travel to school	Tally	Total
walk		
car		
bus		
bicycle		
other		

Show your results as a pictogram.

- Use the tally chart to collect information about people's favourite fruit.

Fruit	Tally	Total
apple		
orange		
banana		
grapes		
other		

How could you show your results as a bar chart?

Investigate surveys that involve counting amounts of things.

Examples could include but are not limited to:

- the number of cars, lorries, vans or buses that pass the window every 1/2/5/10 minutes
- the number of goals different teams score

Ask children to collect the data in a table and then choose the best way to represent the data.

Investigate surveys that involve asking for preferences, for example sport, types of film or ice cream flavours.

Ask children to collect the data in a table and then choose the best way to represent the data.

Ask children to suggest other topics that they could collect and represent information about.

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Collect and represent data

Reasoning and problem solving

Max and Jo are gathering data to draw a bar chart.

They have decided to ask the children in their class how old they are.

Why might this not be a suitable question to draw a bar chart?

What would be a better way to compare children's ages?

Ask the month of their birthday.

Children work in pairs to collect data on a topic of their choice.

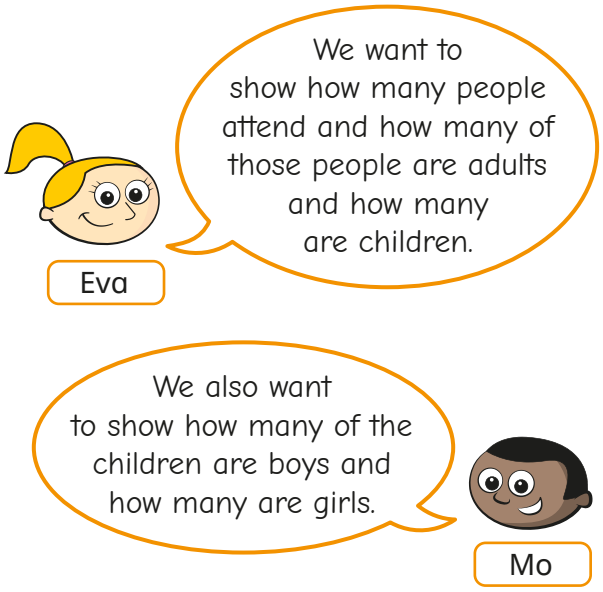
One partner shows the information in a bar chart and the other draws a pictogram.

Ask children which is the better representation for this data?

Would it be different if they collected data about a different topic?

Compare answers as a class.

Eva and Mo have been investigating how many people attend the park run each Saturday at their local park.



How could they show this information?

For example, they could have separate bar charts for adults and children, and for boys and girls.

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Two-way tables

Notes and guidance

In this small step, children interpret information from simple two-way tables.

It is useful for children to spend time understanding how this type of table works, considering each row and column in turn, before answering specific questions about it. As with the previous steps on reading pictograms and bar charts, time spent asking, "What can you see?", "What do you know already?" and "What could you find out?" supports children's understanding of the context in greater depth.

Once they are confident in how the tables work and can identify which cell shows what information, children progress to using their calculation skills and understanding of the context to answer one- and two-step problems. Encourage children to pose additional questions of the form "How many more/fewer...?"

Things to look out for

- Children may confuse the information shown in the rows and the columns of the table.
- Children may add all the values in the cells together to find the overall total, which will lead to an incorrect answer that is double the actual total.

Key questions

- What is the information in the table showing?
- What is shown in the rows?
- What is shown in the columns?
- What can you find out from the table?
- Which cell shows you the number of _____?
- If you want to know how many more/fewer _____, which cells do you need to look at?

  What calculation do you need to do?
- How can you find the total number of _____?

Possible sentence stems

- The information in the rows tells me ...
- The information in the columns tells me ...
- Where the rows and columns meet tells me ...

National Curriculum links

- Interpret and present data using bar charts, pictograms and tables
- Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables

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Two-way tables

Key learning

- Here is a two-way table showing children's ages in Year 3

	Girls	Boys
Age 7	8	5
Age 8	10	7

  - How many girls are 8 years old?
  - How many boys are 7 years old?
  - How many children are 8 years old?
  - How many boys are there?
  - How many more girls are there than boys?

  What other questions could you ask?

  Create a table showing the ages of the children in your class.

- Complete the two-way table.

	Girls	Boys	Total
Glasses	12	9	
No glasses	15	14	
Total			

  How did you work out the total number of children?

- Children in Year 3 and Year 4 were asked if they preferred strawberry- or chocolate-flavoured ice cream.

  The table shows the results.

	Year 3	Year 4
Strawberry	17	12
Chocolate	10	15

  - How many Year 3 children prefer chocolate?
  - Which year group likes chocolate more?
  - How many children are there in Year 4?
  - How many children altogether prefer strawberry?
  - How many fewer children altogether prefer chocolate to strawberry?

- The table shows how many children in two classes prefer football or tennis.

	Class 3A	Class 3B
Football	25	15
Tennis	5	12

  What can you find out?

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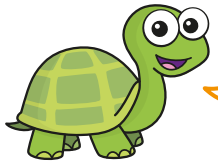
Two-way tables

Reasoning and problem solving

Tiny creates a table to show how many boys and girls took part in after-school clubs last week.

	Boys	Girls
Monday	1	9
Tuesday	8	2
Wednesday	3	1
Thursday	8	8
Friday	9	7



112 children took part in after-school clubs last week.

Is Tiny correct?

Explain your answer.

No

Jo and Max are playing a game.

They each have two turns at the game and record their scores in a table.

	1st turn	2nd turn
Jo		
Max	34	

Jo

I scored 43 points on my second turn.

I scored 7 points more than Jo on my first turn.

Max

Altogether, Jo and Max scored 140 points.

Complete the table.

Jo: 27, 43

Max: 34, 36

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