

Unit 13

Handling data

Five daily lessons

National
Numeracy Strategy

Year 4
Autumn term

Unit Objectives

Year 4

- Solve a problem by collecting quickly, organising, representing and interpreting data in tables, charts, graphs and diagrams, including those generated by a computer, for example:

tally charts and frequency tables,
pictograms – symbol representing 2, 5, 10 or 20 units,
bar charts – intervals labelled in 2s, 5s, 10s or 20.

Pages 114-117

This Unit Plan is designed to guide your teaching.

You will need to adapt it to meet the needs of your class.

Resources needed to teach this unit:

- Activity sheet 13.1
- Activity sheet 13.2
- Activity sheet 13.3
- OHT 13.1
- OHT 13.2
- OHT 13.3
- OHT 13.4
- Counting stick
- Counters
- Number fans
- Charts and graphs from newspapers
- Handy Graph program or Bar Chart animation from NNS Using ICT to support mathematics in primary schools' pack

Year 3

Link Objectives

Year 5

- **Solve a given problem by organising and interpreting numerical data in simple lists, tables and graphs.**

For example:

simple frequency tables,
pictograms – symbol representing two units,
bar charts – intervals labelled in ones then twos.


































































































































(Key objectives in bold)

- Solve a problem by representing and interpreting data in tables, charts, graphs and diagrams, including those generated by a computer, for example:

bar line charts, vertical axis labelled in 2s, 5s, 10s, 20s, 100s, first where intermediate points have no meaning (e.g. scores on a dice rolled 50 times), then when they may have meaning (e.g. room temperature over time);

- Find the mode of a set of data.

Planning sheet	Day One	Unit 13 <i>Handling data</i>	Term: <i>Autumn</i>	Year Group: 4										
Oral and Mental		Main Teaching		Plenary										
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions										
<p>To know by heart multiplication facts for 2, 3, 4, 5 and 10.</p> <p>To derive quickly division facts corresponding to 2, 3, 4, 5 and 10 times tables.</p> <p>RESOURCES Counting stick</p>	<ul style="list-style-type: none">Using counting stick count in 5s from 0 to 50 forwards and backwards and randomly repeat with 2, 3, 4 as appropriate.Explain to the children that they are going to play ‘Call back’. Start with 5 times table. Say that you are going to say the answer from the 5 times table and the children have to shout out the number that would go with 5 to get the answer, e.g. for 30 children shout 6. <p>Relate this to models of ‘division’ calculations , e.g. $30 \div 5 = ?$</p> <p>Repeat with other tables.</p>	<p>To solve a problem by collecting, organising, representing, extracting and interpreting data in tables, graphs and charts.</p> <p>VOCABULARY data tally represent table</p>	<ul style="list-style-type: none">Show the children a tally chart like the one below:<table><tr><th>colour</th><th></th></tr><tr><td>red</td><td> </td></tr><tr><td>silver</td><td> </td></tr><tr><td>green</td><td> </td></tr><tr><td>black</td><td> </td></tr></table><p>Ask the children questions like:</p><div>Q What name is given to this type of chart?</div><div>Q What do we mean by ‘tally’?</div><p>Get the children to discuss in pairs questions like:</p><div>Q What could this chart be representing?</div><div>Q What could the title of the chart be?</div><div>Q How many of each colour are there?</div><div>Q Who might need this information?</div><p>Ask the children to think of other information that could be collected by tally charts. Take feedback from the children.</p><p>Establish this tally chart shows the colour of cars that passed my house between 8pm and 8.15pm last night.</p><ul style="list-style-type: none">Tell the children another way of showing this information is by a pictogram. In this example a car picture could represent each car.<p>Discuss how the car picture could represent 2 cars or 5 cars.</p><p>Ask the children to draw the pictogram using car pictures.</p><p>Discuss any difficulties that arise, e.g. how to represent 1, 3 or 4 cars.</p>Pose the question: What is your favourite animal out of these? hamster dog cat tiger dolphin elephant snake <p>Ask the class to vote. Say they can each have 2 votes. Work out how many votes there should be altogether. Collect the results using a tally chart.</p> <p>Discuss what symbol will represent the animals and how many animals the symbol represents.</p> <p>Ask the children to draw the pictogram.</p>	colour		red		silver		green		black		<ul style="list-style-type: none">Refer to the completed pictogram of cars and ask the children to think of 2 questions you could ask about it. Children discuss in pairs. <p>Ask the children to think of a title for the chart.</p> <div>Q Why do we present information like this?</div> <p>Emphasise the ease of reading information and speed with which we can make decisions about the most/least popular choices and so on.</p> <div><p>By the end of the lesson the children should be able to:</p><ul style="list-style-type: none">Find the answer to a question by using data collected in another subject or at home;Make a pictogram, where the symbol represents several units.<p>(Refer to supplement of examples, section 6, page 114.)</p></div>
colour														
red														
silver														
green														
black														

Planning sheet	Day Two	Unit 13 <i>Handling data</i>	Term: <i>Autumn</i>	Year Group: 4																																	
Oral and Mental		Main Teaching		Plenary																																	
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions																																	
<p>To begin to relate fractions to division and find simple fractions such as $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{10}$ of numbers or quantities.</p> <p>To extend understanding of division and its relationship to subtraction.</p>	<ul style="list-style-type: none">Using number fans ask children to show half of even numbers less than 100, e.g. 16, 54. Discuss how they worked it out. Stress ‘another way of saying half a number is $\div 2$’. <p>Find half of odd numbers less than 100, e.g. 17, 29. Discuss how to do this, i.e. half a near even number then add or subtract a half.</p> <p>Find $\frac{1}{4}$ of even numbers. Stress another way of saying quarter of a number is $\div 4$. Mentally this can easily be done by halving and halving again.</p> <p>Give children some even two-digit numbers to practise finding half then a quarter.</p> <p>Extend by asking children to find $\frac{1}{10}$ of a number and doubling to find $\frac{2}{10}$.</p> <p>Use a visual image, e.g. fraction wall to show that $\frac{2}{10} = \frac{1}{5}$.</p>	<p>To solve a problem by collecting, organising, representing, extracting and interpreting data in tables, graphs and charts.</p> <p>VOCABULARY frequency table bar chart vertical horizontal</p> <p>RESOURCES OHT 13.1 OHT 13.2</p>	<ul style="list-style-type: none">Display the top half of OHT 13.1 showing the number of books read by reading groups over a term. <table><thead><tr><th>Reading group</th><th>No. of books read</th><th>Frequency</th></tr></thead><tbody><tr><td>Badgers</td><td> </td><td></td></tr><tr><td>Tigers</td><td> </td><td></td></tr><tr><td>Peacocks</td><td> </td><td></td></tr><tr><td>Elephants</td><td> </td><td></td></tr><tr><td>Pigs</td><td> </td><td></td></tr><tr><td>Spiders</td><td> </td><td></td></tr></tbody></table> <p>Get the children to find the frequency for each group, interpreting the tally marks. Explain that the frequency means how many and the table is called a frequency table.</p> <p>Show the children how to change this into a pictogram by using a symbol to represent 2 books.</p> <ul style="list-style-type: none">Ask the children: <div><p>Q How would we represent 8 books, 3 books, etc?</p></div> <p>Display the bottom part of OHT 13.1</p> <p>e.g.</p> <table><tbody><tr><td>Badgers</td><td>       </td></tr><tr><td>Tigers</td><td>           </td></tr><tr><td>Peacocks</td><td>           </td></tr><tr><td>Elephants</td><td> </td></tr><tr><td>Pigs</td><td></td></tr><tr><td>Spiders</td><td>      </td></tr></tbody></table> <p> represents two books</p> <div><p>Q Is this a good way to present this information?</p></div> <div><p>Q What other number could we suggest  stands for?</p></div> <p>Establish that if  stands for 4 we would have to draw fewer symbols but for 3 becomes more difficult and so on.</p> <p>Ask the children to work in pairs to find a symbol that could represent 5 books. How could it also show 4, 3, 2 or 1 book?</p> <p>Take feedback on the symbols children have devised and discuss how easy or difficult they are for others to understand.</p> <ul style="list-style-type: none">Encourage children to redraw the pictogram using a symbol for five books and compare results. <div><p>Q What makes a good choice for a pictogram symbol?</p></div> <ul style="list-style-type: none">Take feedback, establishing that a clear, simple picture that can easily be divided makes a good choice.	Reading group	No. of books read	Frequency	Badgers			Tigers			Peacocks			Elephants			Pigs			Spiders			Badgers	       	Tigers	           	Peacocks	           	Elephants	 	Pigs		Spiders	      	<p>Ask children to consider the difficulties of pictograms, e.g. which symbols to use, ensuring they are the same size.</p> <p>Display OHT 13.2 and discuss how a bar chart is a common way to display information.</p> <div><p>Q What is this bar chart about?</p></div> <div><p>Q Have you seen this information before?</p></div> <div><p>Q What is the difference between the pictogram and this bar chart?</p></div> <div><p>Q Which is easier to interpret?</p></div> <p>Tell children that tomorrow we will be working on bar charts in more detail.</p> <div><p>By the end of the lesson the children should be able to:</p><ul style="list-style-type: none">Answer a question or solve a problem by interpreting a pictogram where the symbol represents 2, 5...<p>(Refer to supplement of examples, section 6, page 114.)</p></div>
Reading group	No. of books read	Frequency																																			
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RESOURCES Number fans																																					

Planning sheet	Day Three	Unit 13 <i>Handling data</i>	Term: <i>Autumn</i>	Year Group: 4																																								
Oral and Mental		Main Teaching		Plenary																																								
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions																																								
<p>To round any positive integer less than 1000 to the nearest 10 or 100.</p> <p>To identify near doubles using known doubles.</p>	<ul style="list-style-type: none">Using number fans give the children numbers to round up or down.Give the children target numbers like 31 and ask them to hold up their fans to show what whole number they would double to get near to 31. Discuss answers with the children and their strategies. <p>Pose other questions involving near doubles.</p> <div><p>Q I double 14 and subtract 1, what is my number?</p></div> <p>Reverse the question.</p> <div><p>Q Double a number add 1 is 17, what is the number?</p></div>	<p>To solve a problem by collecting, organising, representing, extracting and interpreting data in tables, graphs and charts.</p> <p>VOCABULARY</p> <p>label</p> <p>title</p> <p>vertical axis</p> <p>horizontal axis</p> <p>most common</p> <p>RESOURCES</p> <p>Activity sheet 13.1</p> <p>Activity sheet 13.2</p> <p>OHT 13.4</p>	<ul style="list-style-type: none">Show the children the frequency table on OHT 13.4 which shows the number of drinks sold in a school in one week. <table><tr><th>Day of week</th><th>No. of drinks</th></tr><tr><td>Monday</td><td>41</td></tr><tr><td>Tuesday</td><td>29</td></tr><tr><td>Wednesday</td><td>38</td></tr><tr><td>Thursday</td><td>7</td></tr><tr><td>Friday</td><td>11</td></tr></table> <p>Draw axes on board. Take the children through the following:</p> <p>Decide on a title for the bar chart.</p> <p>Ask:</p> <div><p>Q Where do we put ‘Days of week’?</p></div> <div><p>Q Where do we put ‘Number of drinks sold’?</p></div> <div><p>Q Where do we put ‘Monday, Tuesday, etc.’?</p></div> <p>Ask the children which of the following scales we should use on the vertical axis and why.</p> <table><tr><th>A</th><th>B</th><th>C</th><th>D</th></tr><tr><td>5</td><td>25</td><td>50</td><td>100</td></tr><tr><td>4</td><td>20</td><td>40</td><td>80</td></tr><tr><td>3</td><td>15</td><td>30</td><td>60</td></tr><tr><td>2</td><td>10</td><td>20</td><td>40</td></tr><tr><td>1</td><td>5</td><td>10</td><td>20</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr></table> <p>Emphasise that the best way to choose is to look at the biggest/ greatest frequency or the most common, i.e. 41. Since this is 41, the axis must be C or D, but D is too large.</p> <p>With the children, construct the bar chart on the board. Highlight the vertical scale, the gaps between the bars, and get children to interpret the resulting chart.</p> <ul style="list-style-type: none">Ask the children to complete the work on frequency tables in Activity sheet 13.1. They should then choose one table and complete the following task: <div><p>(a) construct a bar chart;</p><p>(b) think of a title;</p><p>(c) write two statements about the information.</p></div>	Day of week	No. of drinks	Monday	41	Tuesday	29	Wednesday	38	Thursday	7	Friday	11	A	B	C	D	5	25	50	100	4	20	40	80	3	15	30	60	2	10	20	40	1	5	10	20	0	0	0	0	<ul style="list-style-type: none">Refer back to the bar chart on drinks. Ask children questions and allow them to discuss the answer with a partner. <p>Ask questions like:</p> <div><p>Q Why do you think so few drinks were sold on Friday?</p></div> <div><p>Q If this information was collected in June, what might the graph look like if it was in December?</p></div> <p>Remind the children of key words learned today.</p> <p>HOMEWORK – Give the children Activity sheet 13.2 and ask them to complete it for homework.</p> <div><p>By the end of the lesson children should be able to:</p><ul style="list-style-type: none">Answer a question or solve a problem by interpreting a bar chart with the vertical axis marked in multiples of 2, 5, 10 or 20.<p>(Refer to supplement of examples, section 6, page 114.)</p></div>
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0	0	0	0																																									
RESOURCES																																												
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Planning sheet	Day Four	Unit 13 <i>Handling data</i>	Term: <i>Autumn</i>	Year Group: 4
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>To use the relationship between multiplication and division.</p>	<ul style="list-style-type: none"> Mystery Number. <div>Q I am thinking of a number. I double it and add 4, the answer is 54. What's my number?</div> <p>Ask the children to work this out in pairs.</p> <div>Q What are the steps needed to work this out?</div> <p>Repeat this activity.</p> <p>In pairs, ask the children to make up mystery number problems for each other.</p> <p>Ask some to say their mystery number problems for the class to solve.</p> <p>Get the children to explain their strategies for solving the problems.</p>	<p>To solve a problem by collecting, organising, representing, extracting and interpreting data in tables, graphs and charts.</p>	<ul style="list-style-type: none"> Discuss some of the sentences children wrote for homework. <div>Q What size steps are on the vertical scale?</div> <div>Q What could we write as a column heading instead of frequency?</div> <div>Q What do I need to think about and include when I draw a bar chart?</div> <p>Take feedback to establish that scale, labels, and a title are key features. Highlight gaps between the bars (as data is discrete, bars have no relationship to each other).</p> <ul style="list-style-type: none"> Explain that today's work will involve them collecting and presenting data about two statements. Ask for suggestions to ensure children are interested in finding out an answer, for example: <p>Many Y4 children have a dog as a pet.</p> <p>More Y4 children like fruit more than crisps or sweets.</p> <p>Encourage them to plan how they can collect data to help them decide.</p> <p>Model drawing a table, with up to six choices. Tally marks can then be added to the model table. This could be repeated to answer the second question.</p> <p>Direct the children to draw one bar chart. Remind them of how to construct bar charts. Let them choose the vertical axis scale.</p> <p>Children should ensure the chart has a title then write two statements and questions about the information on the chart.</p>	<ul style="list-style-type: none"> Choose children to read out their statements and questions from their charts. <div>Q What can we now say about our original statement?</div> <p>Ask the children to tell you what graphs and charts they might have seen in the 'real' world, on TV, in magazines, etc. Display some examples and discuss what they show.</p> <div> <p>By the end of this lesson the children should be able to:</p> <ul style="list-style-type: none"> Answer a question or solve a problem by interpreting a bar chart with the vertical axis marked in multiples of 2, 5, 10 or 20, noting the graph has a title and axes are labelled. <p>(Refer to supplement of examples, section 6, page 114.)</p> </div>

RESOURCES
Examples of
graphs/charts from
newspapers etc.

Planning sheet	Day Five	Unit 13 <i>Handling data</i>		Term: <i>Autumn</i>	Year Group: 4														
Oral and Mental		Main Teaching			Plenary														
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities		Teaching Activities / Focus Questions														
To begin to know multiplication facts for 6 times table.	<ul style="list-style-type: none">Count up/down in multiples of 6 using counting stick. <p>Ask questions such as:</p> <p>What is 3×6?</p> <p>How many 6s in 30?</p> <p>How could you work out 8×6 if you know $4 \times 6 = 24$?</p> <p>Give children a blank 3×3 grid and tell them to fill in numbers 1–10 or multiples of 6.</p> <p>Ask multiplication and division questions from the 6 times table.</p> <p>Children cover the correct answers with counters, or cross them out. When a child has covered all his squares, he must repeat the last calculation in a sentence.</p>	<p>To solve a problem by collecting, organising, representing, extracting and interpreting data in tables, graphs and charts.</p> <p>VOCABULARY</p> <p>axes</p> <p>label</p> <p>title</p> <p>vertical</p> <p>horizontal</p> <p>RESOURCES</p> <p>Activity sheet 13.3</p> <p>OHT 13.3</p>	<ul style="list-style-type: none">Show the children Activity sheet 13.3 / OHT 13.3. <table><tr><td>?</td><td>35</td></tr><tr><td>Tuesday</td><td>?</td></tr><tr><td>Wednesday</td><td>10</td></tr><tr><td>?</td><td>20</td></tr><tr><td>Friday</td><td>45</td></tr><tr><td>Saturday</td><td>?</td></tr><tr><td>?</td><td>70</td></tr></table> <p>Children work in pairs to complete the chart and the graph. Ask them to:</p> <p>Decide what information can be gained from each display;</p> <p>give the graph a title;</p> <p>make up true/false statements for the graph.</p> <ul style="list-style-type: none">Encourage children to use ICT programs to construct their bar chart, for example 'Handy Graph' from the NNS ICT pack or the NNS animation 'Bar Chart' or a similar graphing program.		?	35	Tuesday	?	Wednesday	10	?	20	Friday	45	Saturday	?	?	70	<div>Q What could these graphs show?</div> <p>Discuss the true/false statements.</p> <p>Can children identify the false statements?</p> <p>Recap work to ensure children understand key words discussed this week.</p> <div><p>By the end of this lesson the children should be able to:</p><ul style="list-style-type: none">Answer a question or solve a problem by interpreting a bar chart with the vertical axis marked in multiples of 2, 5, 10 or 20, noting the graph has a title and axes are labelled.<p>(Refer to supplement of examples, section 6, page 114.)</p></div>
?	35																		
Tuesday	?																		
Wednesday	10																		
?	20																		
Friday	45																		
Saturday	?																		
?	70																		
RESOURCES	Counters																		

Reading group	No. of books read	Frequency
Badgers		
Tigers		
Peacocks		
Elephants		
Pigs		
Spiders		

Badgers



Tigers



Peacocks



Elephants



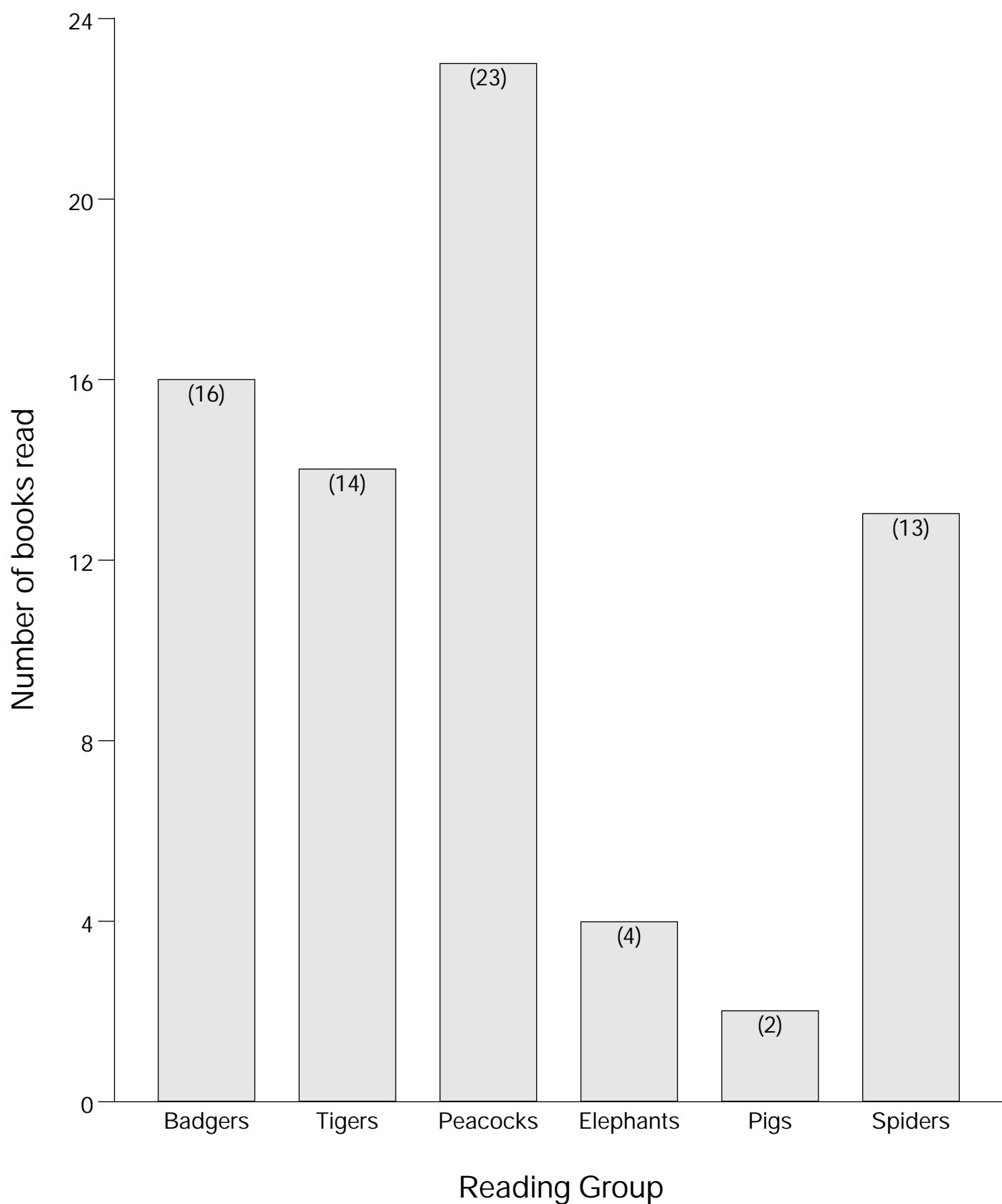
Pigs



Spiders



represents two books



Bar chart showing the number of books read by each reading group.

Day of week	No. of drinks
Monday	41
Tuesday	29
Wednesday	38
Thursday	7
Friday	11

Colour	Frequency
Red	3
Purple	20
Green	5
Yellow	9
Orange	13
Blue	6

Scale of vertical axis:
.....

Food	Frequency
Salad	2
Ice Cream	16
Hamburger	18
Chips	28
Chocolate	39

Scale of vertical axis:
.....

Now choose one table and draw a bar-chart to represent the information.

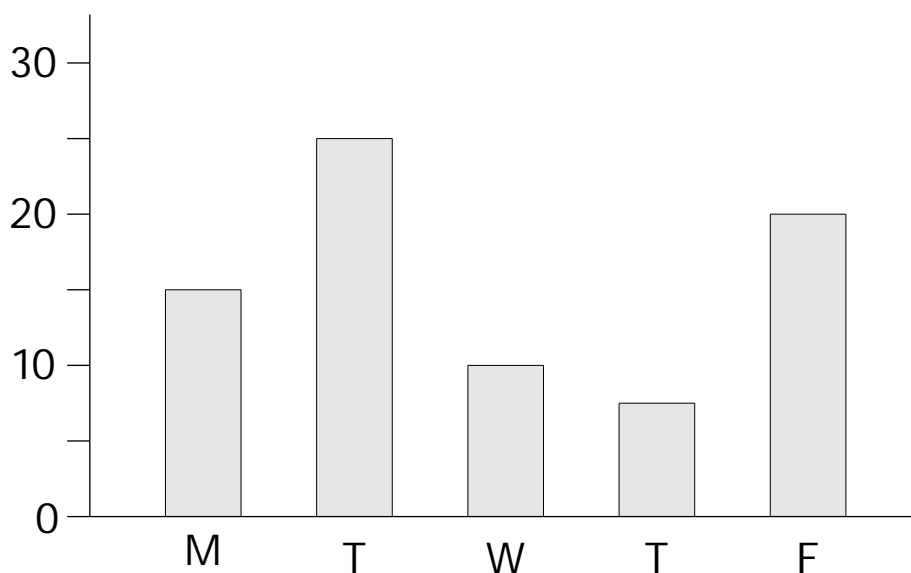
Football Team	Points
Blank Town	49
Neutral County	45
Zero United	32
Nought City	25
Blankside United	23
Onesburg City	14
Doublish Town	6

Scale of vertical axis:
.....

Day	No. of visitors
Monday	0
Tuesday	46
Wednesday	32
Thursday	51
Friday	63
Saturday	98
Sunday	75

Scale of vertical axis:
.....

School days



In a school, all the Year 4 children were asked which day at school was the best.

The bar chart shows their answers. Fill in the frequency table to show how many children chose each day.

Day	Frequency
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

Write 3 sentences saying what you notice about the bar chart.

?	35
Tuesday	?
Wednesday	10
?	20
Friday	45
Saturday	?
?	70

