

## Unit 6 Part 1

### Handling data

Five daily lessons

*National*  
**Numeracy Strategy**

**Year 6**  
**Autumn term**

### Unit Objectives

**Year 6**

- Use the language associated with probability to discuss events, including those with equally likely outcomes.
- **Solve a problem by representing, extracting and interpreting data in tables, graphs, charts** and diagrams, including those generated by a computer, for example; line graphs, bar charts with grouped discrete data.
- Find the mode and range of a set of data.
- Begin to find the median and mean of a set of data.

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### Link Objectives

**Year 5**

- Discuss the chance or likelihood of particular events.
- Solve a problem by representing and interpreting data in tables, charts, graphs and diagrams, including those generated by a computer.
- Find the mode of a set of data.

**Year 7**

- Use vocabulary and ideas of probability drawing on experience.
- **Understand and use the probability scale from 0 to 1; find and justify probabilities based on equally likely outcomes in simple contexts;** identify all the possible mutually exclusive outcomes of a single event.

(Key objectives in bold)

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:

- Resource sheet 6 Part 1.1
- Resource sheet 6 Part 1.2
- OHT 6 Part 1.1
- OHT 6 Part 1.2
- OHT 6 Part 1.3
- OHT 6 Part 1.4
- OHT 6 Part 1.5
- OHT 6 Part 1.6
- OHT 6 Part 1.7
- OHT 6 Part 1.8
- OHT 6 Part 1.9
- OHT 6 Part 1.10
- Likelihood cards
- Bag and coloured bricks
- NNS ICT pack
- Squared paper
- Counting stick
- Sticky labels
- Related Key Stage 2 national test questions

department for  
**education and skills**

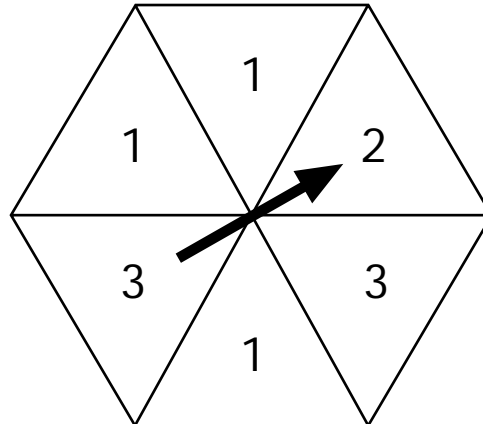
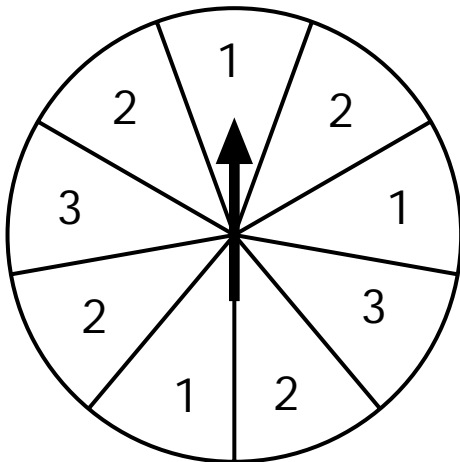
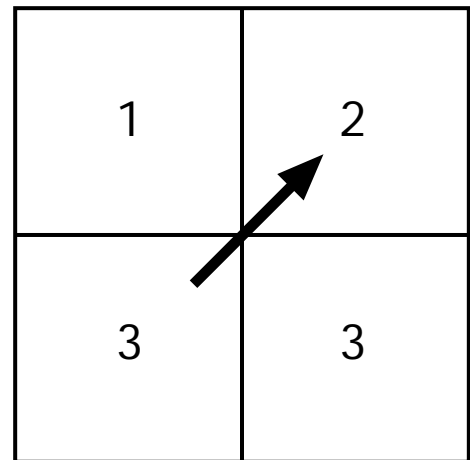
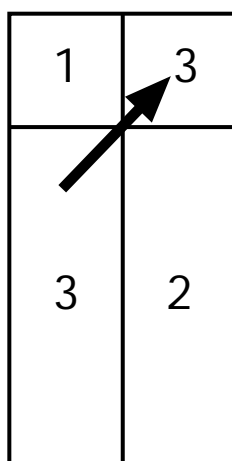
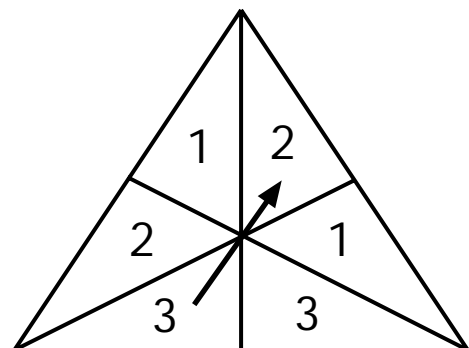
Planning sheet	Day One	Unit 6 Part 1 <i>Handling data</i>	Term: <i>Autumn</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Use the language associated with probability to discuss events, including those with equally likely outcomes.</p> <p>VOCABULARY likelihood event likely unlikely certain uncertain impossible</p> <p>RESOURCES Tables test Likelihood cards</p>	<ul style="list-style-type: none"><li>Give the class a quick test of mental arithmetic questions (40 questions). Get the children to mark each other's work, total the marks. Collect the papers for the next lesson.</li><li>Divide class into small groups. Give each group a set of the cards with words: impossible, unlikely, uncertain, likely, certain. Discuss the meanings of the words very likely and ask each group to put the words into a sentence. Take feedback.</li></ul> <p>Read out the children's statements such as:</p> <ul style="list-style-type: none"><li>I will eat a packet of crisps today;</li><li>Next year there will be 54 Fridays;</li><li>I will not leave the classroom through the door;</li><li>The sun will rise tomorrow in the east;</li><li>I will sleep tonight.</li></ul> <p>Ask each group to discuss the likelihood of each event and display the appropriate card.</p>	<p>Use the language associated with probability to discuss events, including those with equally likely outcomes.</p> <p>VOCABULARY probability outcomes equally likely equal chance even chance fair fifty-fifty chance</p> <p>RESOURCES Bag and coloured bricks OHT 6 Part 1.1</p>	<ul style="list-style-type: none"><li>Introduce events which have two equally likely outcomes:<ul style="list-style-type: none"><li>new baby is equally likely to be a boy or a girl;</li><li>if I drop a picture postcard there is an even chance it will land picture side up;</li><li>if I roll a dice there is a fifty-fifty chance it will be an even number.</li></ul>Discuss these events and the language used. Introduce cases where there are more than two equally likely outcomes (such as picking a card from a full set of cards) and challenge children to give their own examples.</li></ul> <div>Q What does 'fair' as in a 'fair game' mean?</div> <ul style="list-style-type: none"><li>Introduce the use of numbers on the probability scale:<div>Impossible      Evens      Certain 0                      1/2                      1</div>Establish the idea that a probability of 1 means certain, 0 means impossible and that 1/2 means evens (1 in 2). Establish that 'equally likely' and 'evens' do not mean the same, because 'equally likely' could mean, for example, an equally likely one in three chance; 'evens' is always a one in two chance.</li><li>Show children an empty bag. Put in 6 red, 3 blue, 1 green bricks. Shake the bag and say if I pick out a red brick I win, a green brick the class wins.</li></ul> <div>Q Is this 'fair'? How would you make the outcomes for the game equally likely? Is there more than one way?</div> <p>Encourage the children to use the language of probability when they explain their ideas.</p> <p>Display OHT 6p1.1 with pictures of different spinners each of which has the numbers 1, 2 and 3 on them.</p> <div>Q Which number is most likely on spinner A?</div> <div>Q Is the chance of getting a 1 on spinner D the same as getting a 2?</div> <p>Discuss events that are certain, impossible or equally likely, using the other spinners.</p>	<ul style="list-style-type: none"><li>Check understanding by asking:<div>Q When rolling a fair dice numbered one to six, what is the probability of getting a two; one or two; three or six; an even number; a prime number; a square number?</div></li></ul> <p>Ask children to discuss their answers in pairs using appropriate vocabulary to justify their answer.</p> <p>Record children's answers on the board and prompt class to identify appropriate use of vocabulary.</p> <p>Draw up a probability scale and encourage children to use it to express their answer.</p> <div>By the end of the lesson children should be able to:<ul style="list-style-type: none"><li>Use the language and ideas of probability to give clear statements about likelihood and chance;</li><li>Understand the use of a scale to represent degrees of probability.</li></ul>(Refer to supplement of examples, section 6, page 113.)</div>

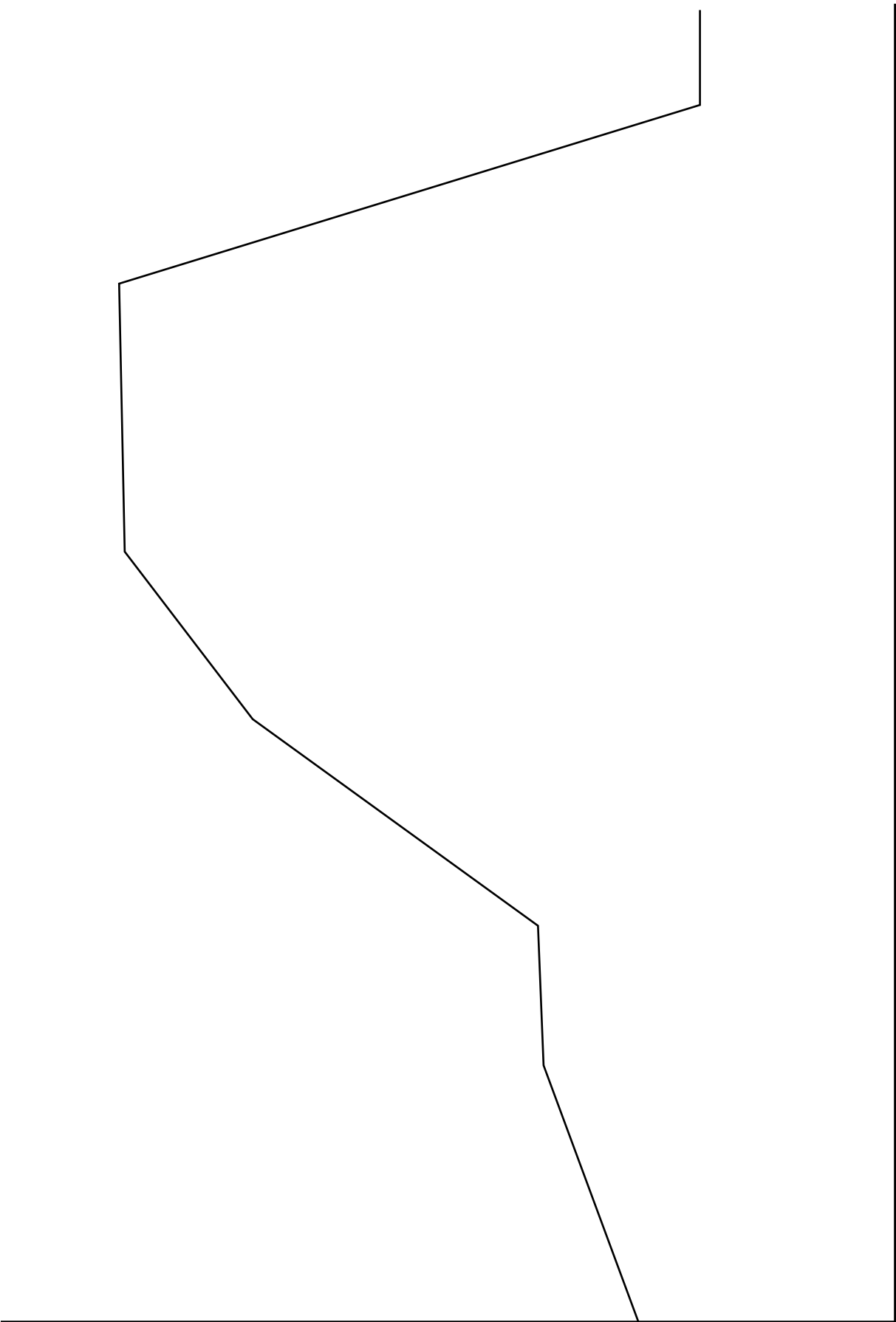
Planning sheet	Day Two	Unit 6 Part 1 <i>Handling data</i>	Term: <i>Autumn</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Interpreting data represented as a graph, for example; line graphs.</p> <p>VOCABULARY graph axes slope increase decrease</p> <p>RESOURCES OHT 6 Part 1.2</p>	<ul style="list-style-type: none"> <li>Show the class OHT 6p1.2 which is a line graph on which both axes are unmarked. Explain that the graph represents the water level in a barrel over a few months. In pairs children have 3 minutes to prepare a story to match the graph. Get a pair to tell their story. Ask the rest of the class to see how this compares to their story. Highlight important features on the graph and encourage the children to use the correct vocabulary.</li> <li>Tell the children that the graph now represents the use of electricity over a day in a small town. Repeat the story telling exercise. Emphasise how important it is to know the context of graphs in order to make sense of them and to interpret them properly.</li> </ul>	<p>Solve a problem by representing, extracting and interpreting data in tables, graphs, charts and diagrams.</p> <p>VOCABULARY range continuous discrete data distribution class intervals bar chart</p> <p>RESOURCES Children's test score Squared paper OHTs 6 Part 1.3, 6 Part 1.4</p>	<ul style="list-style-type: none"> <li>Explain that the story graph showed data that was continuous. The water test could take any value from empty to full and it was not restricted to intervals. Say that they are now going to work with discrete data, data that is in whole numbers only.</li> </ul> <div>Q Is it likely that most of the children will get between 30 and 35 marks out of 40 in the tables test? How can we make a good prediction?</div> <p>Ask the children to discuss the question in pairs and develop further questions.</p> <ul style="list-style-type: none"> <li>Take feedback. Ask children what data they will need to collect to answer the question. Say you have the test marks from previous lessons (ensure that there is a good range of scores and include those from the previous lesson). Distribute Resource sheet 6 Part 1.1 and ask how it can best be used.</li> </ul> <p>Explain that this data is discrete and has a range of values. Highlight the need to organise the data.</p> <div>Q What is the range of this data?</div> <ul style="list-style-type: none"> <li>Ask children to work in pairs to think how the data might be organised and put on a graph. Discuss children's ideas.</li> <li>Explain that putting that data into groups might help but too many or too few groups will make interpretation difficult. Invite children to suggest appropriate groupings – call these class intervals.</li> </ul> <p>Ask children to work in pairs and group the data in their own way. Ensure that different intervals are covered. With the whole class, look at different groupings and check totals.</p> <ul style="list-style-type: none"> <li>Remind children how to construct a bar chart. Show and discuss OHT 6 Part 1.3. Emphasise that the bars are labelled with the range not the divisions between the bars.</li> </ul> <div>Q Did most children get between 30 and 35 marks?</div> <p>Discuss children's responses.</p> <ul style="list-style-type: none"> <li>Give out squared paper and ask pairs of children to draw bar charts for their groupings.</li> </ul>	<p>Display the raw data OHT 6 Part 1.3 of some children's test scores with a total of 40 marks and bar chart OHT 6 Part 1.4 of results of a different test, with a total of 60 marks.</p> <div>Q Which is easier to interpret?</div> <p>Compare bar charts with different intervals.</p> <div>Q What difference does this make?</div> <p>Emphasise the need to use enough but not too many intervals.</p> <p>Ask the children to consider the following question in pairs:</p> <div>Q What if we practise recalling tables every day for 5 minutes and took the same test – What will happen to the mark? How will these marks be distributed? Can you sketch the likely bar chart?</div> <p>Take feedback and encourage children to explain their predictions.</p> <div> <p><b>By the end of the lesson children should be able to:</b></p> <ul style="list-style-type: none"> <li><b>Present and interpret data on a bar chart, with grouped discrete data.</b></li> </ul> <p>(Refer to supplement of examples, section 6, page 115.)</p> </div>

Planning sheet	Day Three	Unit 6 Part 1 <i>Handling data</i>	Term: <i>Autumn</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Halve: whole numbers up to 1000; decimal fractions; amounts of money to two decimal places.</p> <p>Divide whole numbers by 10.</p> <p>Express simple fractions such as <math>\frac{1}{2}</math>, <math>\frac{3}{4}</math>, <math>\frac{1}{10}</math>, as percentages.</p> <p>VOCABULARY halve decimal places decimal fractions</p>	<ul style="list-style-type: none"> <li>Select a three-digit even number and ask children to keep halving it as far as they can. Ensure children understand that a quarter is half of a half etc. Practise finding halves and tenths of given decimal fractions and sums of money.</li> <li>Ask children to state equivalences between simple fractions and percentages, such as <math>\frac{1}{2}</math> is 50%, <math>\frac{1}{4}</math> is 25%, <math>\frac{3}{4}</math> is 75%, <math>\frac{1}{10}</math> is 10%, <math>\frac{1}{100}</math> is 1%.</li> </ul>	<p>Solve a problem by representing, extracting and interpreting data in tables, graphs, charts and diagrams.</p> <p>VOCABULARY pie chart sector proportion fraction percentage</p> <p>RESOURCES Pie charts (OHTs 6 Part 1.5, 6 Part 1.6)</p>	<ul style="list-style-type: none"> <li>Show children the first pie chart on OHT 6 Part 1.5. Explain that the data is represented by sectors. The circle represents all the data. Tell the children the size of each sector represents the proportion, (fraction or percentage) of items in that sector.</li> </ul> <div> <p>Q What fraction, percentage of items does sector A represent?</p> <p>Q What fractions, percentages do B and C represent?</p> </div> <p>Explain that the pie chart represents 64 children who choose one of 3 drinks. Ask how many children like each drink. Discuss strategies children used to answer questions.</p> <ul style="list-style-type: none"> <li>Repeat the exercise with the other two pie charts on OHT 6 Part 1.5. Choose different contexts for each chart for the children to interpret.</li> <li>Tell children you are now going to compare and interpret two pie charts. Display OHT 6 Part 1.6 which shows Pie Charts for Towns A and B.</li> </ul> <div> <p>Q Why do you think the two charts are different in size?</p> </div> <p>Emphasise that the size is irrelevant, as the size of the sector represents the proportion of people. However, they should remember, that the size of the town may be different.</p> <ul style="list-style-type: none"> <li>In pairs get children to make observations about the ages of the residents of the two towns; and to pose questions they would ask about the data for example, which town has a greater percentage of residents who are under 18, etc.</li> </ul> <p>NOTE – Activity 7 in the NNS pack: <i>Using ICT to support mathematics in the primary schools: handling data</i>, offers a complementary approach to teaching children how to extract and interpret data represented in the form of a pie chart.</p>	<ul style="list-style-type: none"> <li>Discuss the children's observations. Invite groups to ask the class one of their questions.</li> </ul> <p>Encourage development of questions that make inferences from the data e.g. What type of housing might Town A have given its age profile? Is Town B likely to be a more established town or a newly developed town? Why?</p> <ul style="list-style-type: none"> <li>Summarise key points in interpreting data in simple pie charts.</li> </ul> <div> <p><b>By the end of lesson children should be able to:</b></p> <ul style="list-style-type: none"> <li>Interpret simple pie charts;</li> <li>Understand that the size of each sector represents the proportion of items.</li> </ul> <p>(Refer to supplement of examples, section 6, page 115.)</p> </div>

Planning sheet	Day Four	Unit 6 Part 1 <i>Handling data</i>	Term: <i>Autumn</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Interpreting data represented as a bar chart.</p> <p>VOCABULARY bar chart mode frequency</p> <p>RESOURCES OHT 6 Part 1.7</p>	<ul style="list-style-type: none"> <li>Show the class OHT 6 Part 1.7 which shows a bar chart on which both axes are unmarked. Say that the graph represents the results from rolling a dice. Ask the children what the bar chart tells them. Say that the shortest bar represents the number of times 4 occurred.</li> </ul> <p><b>Q</b> What does the longest bar represent?</p> <p>Remind the children that the most common item, '6' in this case, is called the mode.</p> <ul style="list-style-type: none"> <li>Say that the dice was supposed to be fair.</li> </ul> <p><b>Q</b> Does the graph suggest the graph was fair or biased?</p> <p>Collect answers and identify what results the children would expect.</p> <p><b>Q</b> Can you tell whether this graph shows lots of throws, or just a few?</p> <p>Establish that as there is no scale we cannot tell, but the more times the dice is rolled, the more likely it is that the bars will be the same height.</p> <ul style="list-style-type: none"> <li>In pairs the children have 3 minutes to think of another context that the graph might represent. They have to make 2 statements about the bar chart for their context, one of which must include the word mode. Collect and review children's responses and their use the term of mode.</li> </ul>	<p>Find the mode and range of a set of data.</p> <p>Begin to find the median and mean of a set of data.</p> <p>VOCABULARY mean mode median range average</p> <p>RESOURCES NNS ICT pack Class set of calculators OHTs 6 Part 1.8, 6 Part 1.9</p>	<ul style="list-style-type: none"> <li>Use NNS ICT software Handy Graph to compile a bar chart from a simple predetermined data set. (Activity 5: <i>Using ICT to support mathematics in primary schools: handling data.</i>) Or use the <i>NNS Bar Chart animation</i>. Ask:</li> </ul> <p><b>Q</b> What is the mode of this data?</p> <p>Change data and pose questions about the changes.</p> <ul style="list-style-type: none"> <li>Show the class OHT 6 Part 1.8 which gives the average monthly rainfall in different locations round the world. Discuss the figures with the class.</li> </ul> <p><b>Q</b> How could you find the driest/wettest places? Which are they?</p> <ul style="list-style-type: none"> <li>Move on to discuss the range, to see which location has the greatest and least range in rainfall total each month.</li> </ul> <p>The chart gives the amount of rainfall each month.</p> <p><b>Q</b> How can I find the mean average rainfall each year, for the different locations?</p> <p>Write in the OHT a column on the right hand side with rainfall totals.</p> <p>With the children, divide each total by 12, and write in the average in another column. Discuss the figures. Remind the children that the mean average allows for the 'ups and downs'. It provides the figure you would get if the same amount of rain fell each month.</p> <ul style="list-style-type: none"> <li>Now hand out Resource sheet 6 Part 1.2, which gives average monthly temperatures. Ask the children to choose two locations, and find the range, and mean temperature. Collect results from different children, and write them in on the OHT copy of the sheet. Discuss results, comparing the information it gives for the different locations.</li> <li>Explain that another way to represent data is to find the median. Explain that to find the median, you line up all the data from smallest to largest, and then look at the middle figure (or halfway between the middle two). Look together at the rainfall in Cuba, and show how the median figure is found.</li> </ul> <p><b>Q</b> Which location would give a median that would <i>not</i> provide a very useful simplification?</p> <ul style="list-style-type: none"> <li>Demonstrate that data with sudden, large jumps (such as Goa) is unlikely to provide a useful median figure.</li> </ul>	<ul style="list-style-type: none"> <li>Look at the rainfall for Goa. The monsoon rains fall in July and August.</li> </ul> <p><b>Q</b> If the monsoon rains fail and the rain is only 12cm in both of these months, how will the mean alter? How will the median alter? Which is the more useful figure?</p> <ul style="list-style-type: none"> <li>Summarise the meanings of the range, mode, median and the mean. Set the terms in sentences about the countries and get the children to do the same.</li> </ul> <p><b>By the end of the lesson the children should be able to:</b></p> <ul style="list-style-type: none"> <li><b>Find the mode and range of a simple set of data;</b></li> <li><b>Begin to find the mean and median.</b></li> </ul> <p>(Refer to supplement of examples, section 6, page 117.)</p>

Planning sheet	Day Five	Unit 6 Part 1 <i>Handling data</i>	Term: <i>Autumn</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
Use read and write metric units.  Convert larger to smaller units.   				

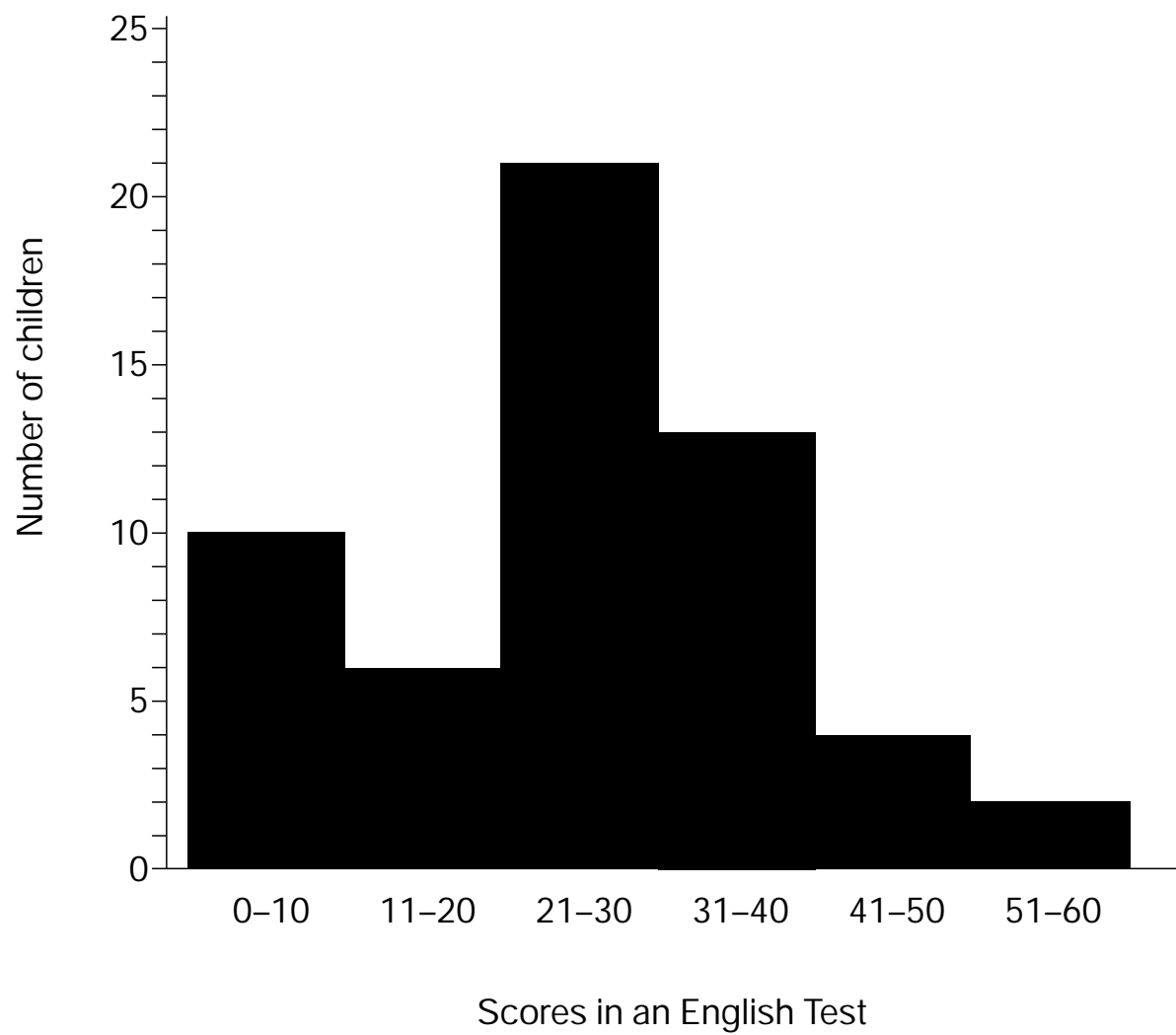
**Spinner A – a regular hexagon with six sections****Spinner B – a circle with nine sections****Spinner C – a square with four sections****Spinner D – a rectangle with four sections****Spinner E – an equilateral triangle with six sections**



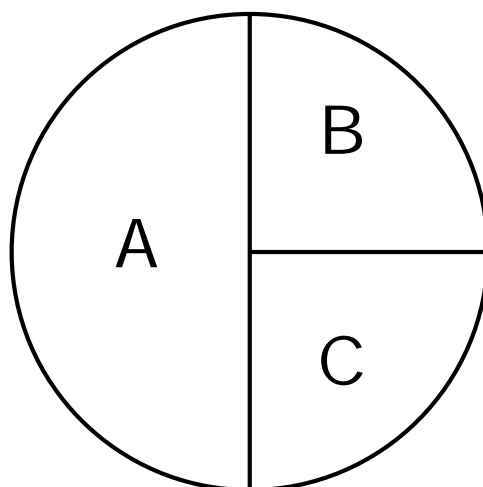


25	38	17	28	32
9	28	27	36	37
13	25	14	8	26
30	31	32	19	25
27	16	9	32	36
35	31	30	15	21
30	29	24	20	10
12	32	34	27	36
15	19	31	11	33
30	32	18	25	26

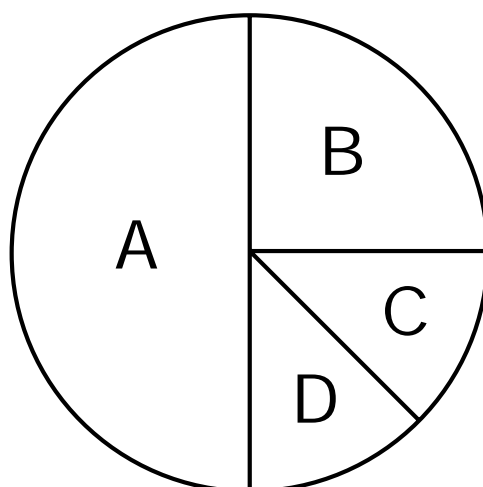
Group sizes	Tally	Frequency



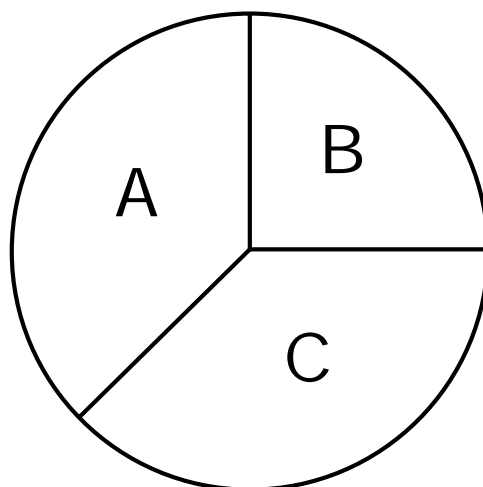
Pie Chart 1



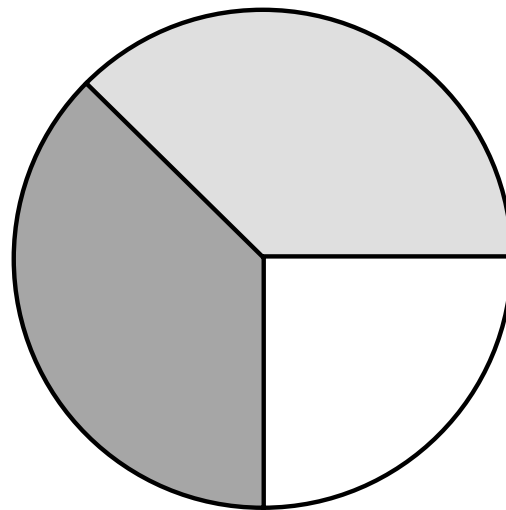
Pie Chart 2



Pie Chart 3



## Town A



### Ages



50 or over

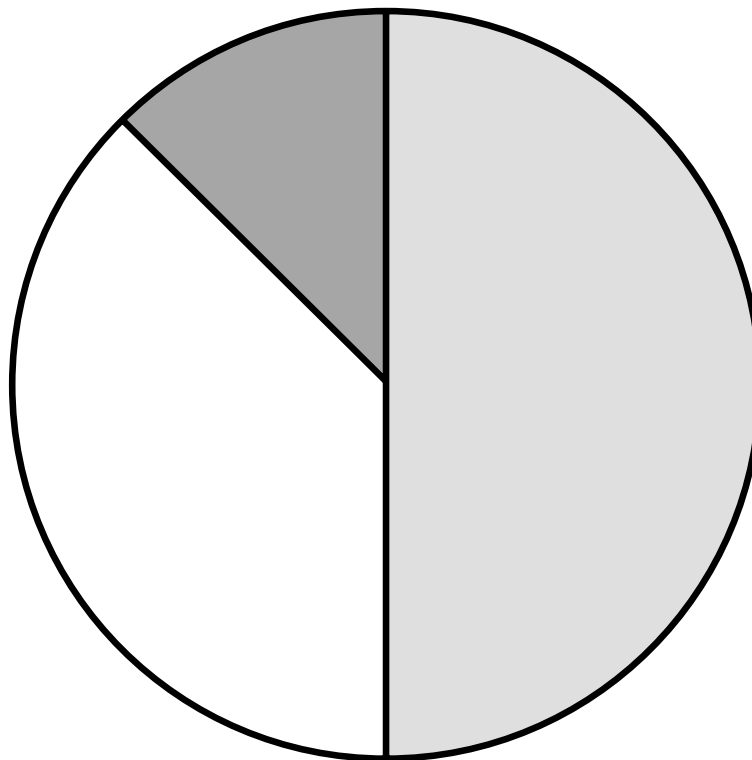


18 to 50



under 18

## Town B



# OHT 6 Part 1.7

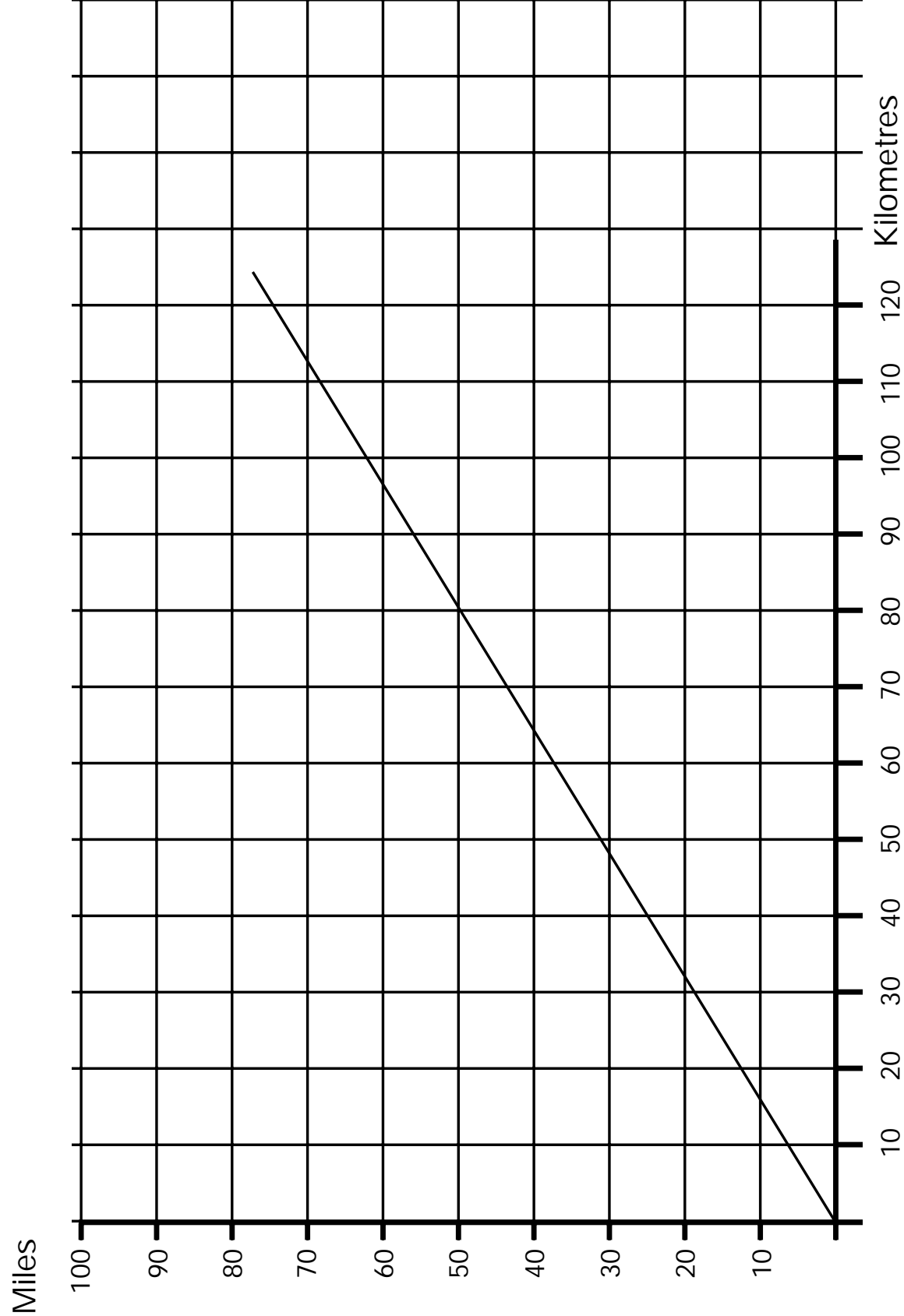
## NNS Unit Plans

## Average Monthly Rainfall (cm)

	Months											
Place	J	F	M	A	M	J	J	A	S	O	N	D
Brazil	8	11	15	30	30	23	19	12	9	10	13	12
Cuba	7	5	5	12	12	17	13	14	15	17	8	6
Cairo	5	2	3	1	0	0	0	0	0	1	2	5
Hong Kong	3	5	7.5	12	29	39	38	35	25	13	5	2
Florida	7	9	10	7	10	16	19	18	18	9	6	7
San Francisco	3	2	2	1	25	18	9	9	10	24	18	7
Jamaica	3	2	3	4	10	9	9	9	10	18	18	7
Mexico	1	0.5	0.5	0.5	0.5	15	28	28	28	13	1	1
Goa	0	0	0	2	3	58	77	30	27	12	2	3

## Average Monthly Temperature (°F)

	Months											
Place	J	F	M	A	M	J	J	A	S	O	N	D
Brazil	87	82	82	80	79	78	75	75	77	79	80	81
Cuba	78	78	80	84	86	85	87	89	88	86	81	78
Cairo	69	73	79	86	97	100	100	100	95	91	88	73
Hong Kong	64	63	67	75	82	85	87	87	85	81	74	68
Florida	71	73	78	82	84	88	89	87	85	83	75	71
San Francisco	56	66	67	82	85	83	83	82	81	81	70	60
Jamaica	84	85	85	87	87	89	90	90	88	87	86	86
Mexico	73	71	75	74	80	81	90	85	84	86	84	79
Goa	88	90	90	91	91	88	84	84	84	88	91	91
London	39	48	52	55	58	63	65	64	59	55	52	40

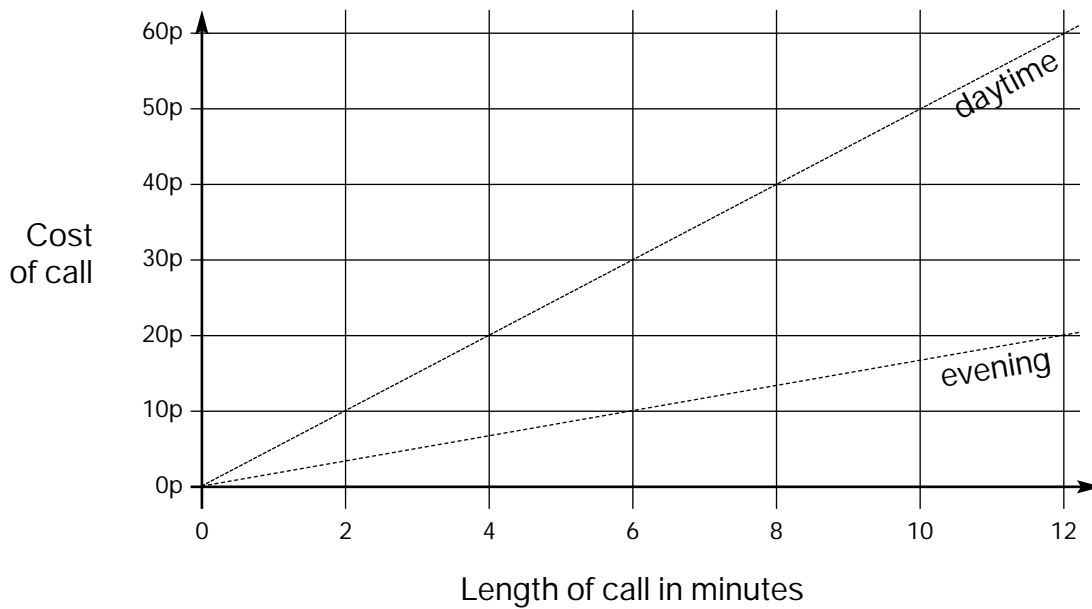




# Related Key Stage 2 national test questions:

10

This graph shows the cost of phone calls in the daytime and in the evening.



How much does it cost to make a **9 minute** call in the daytime?


 p

10a

1 mark

How much **more** does it cost to make a **6 minute** call in the **daytime** than in the **evening**?


 p

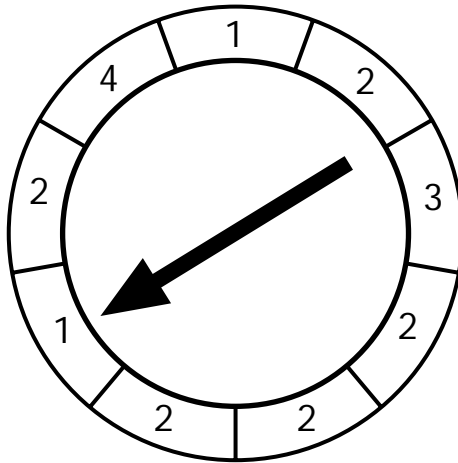
10b

1 mark

## Unit 6 Part 1 Year 6 (Autumn Term)

14

This spinner is divided into **nine** equal sections.



Which **two different numbers** on the spinner are equally likely to come up?



and

1 mark

14a

Meera says,

***'2 has a greater than even chance of coming up'.***

Explain why she is correct.



.....

.....

.....

1 mark

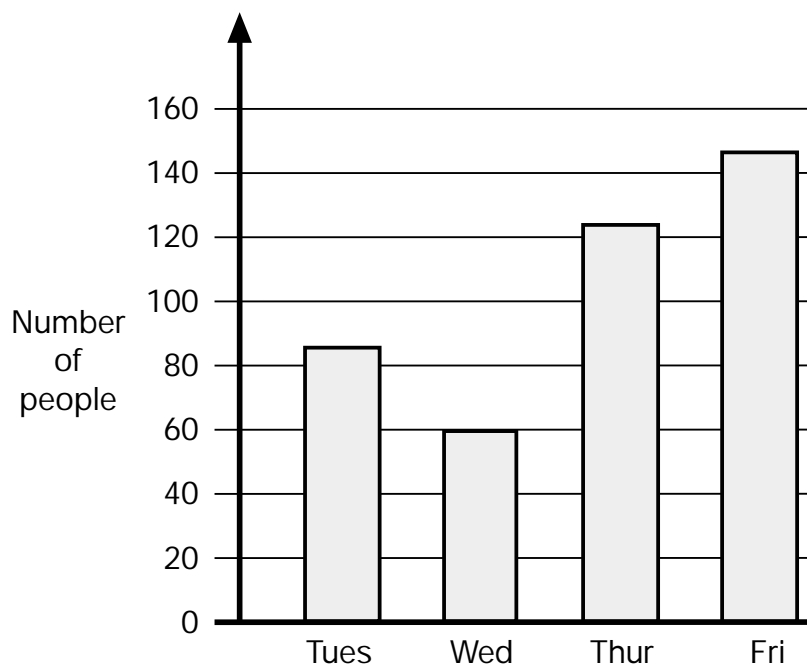
14b

Total

# 2000 Test B

10

This bar chart shows how many people went to a school play.



Estimate the number of people who went there on **Thursday** and **Friday** altogether.




1 mark

10a

Each person paid **£2.25** for a **ticket** to get in.

How much **ticket money** was collected on **Wednesday**?



Show your **method**.  
You may get a mark.

£

2 marks

10b

# 2000 Test A

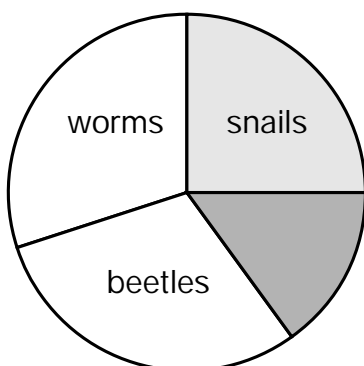
17

Tony and Gemma looked for snails, worms, slugs and beetles in their gardens.



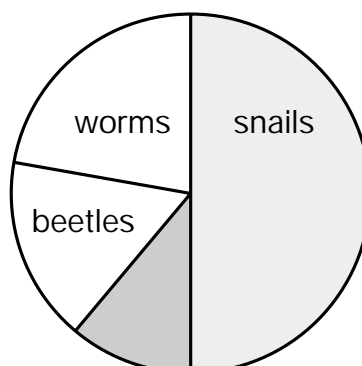
They each made a pie chart of what they found.

Tony's pie chart



Total 80

Gemma's pie chart



Total 36

**Estimate** the number of **worms** that **Tony** found.




17a

1 mark

Who found more **snails**?  
Circle Tony or Gemma.



Tony / Gemma

Explain how you know.



.....

.....

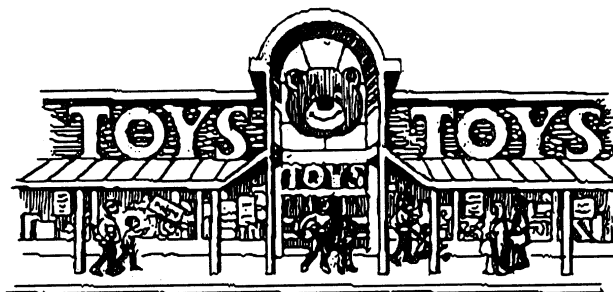
.....

17b

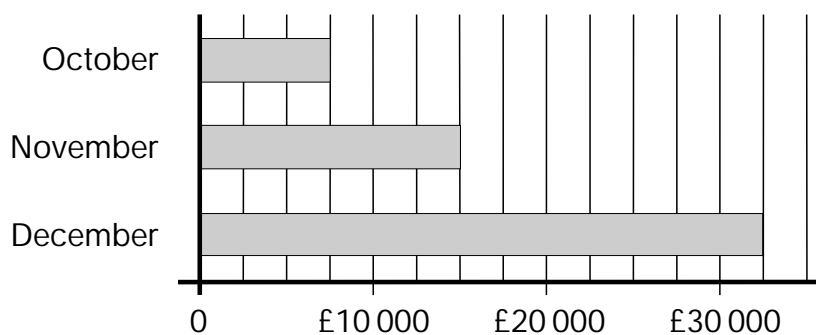
1 mark

2001 Test B

22



The chart shows the amount of money spent in a toy shop in three months.



How much **more** money was spent in the shop in **December** than in **November**?



£

22a

1 mark

Stepan says,

*'In November there was a 100% increase on the money spent in October'.*

Is he correct?  
Circle Yes or No.



Yes / No

Explain how you can tell from the chart.



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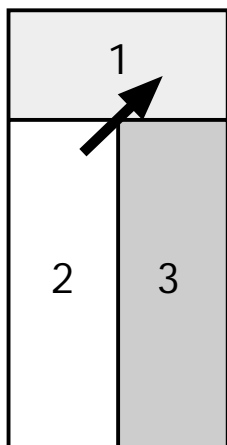
22b

1 mark

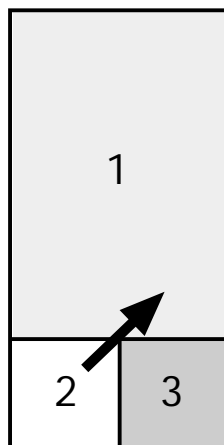
# 2000 Test B

22

Katie made two spinners, **A** and **B**.



spinner A



spinner B

She says,

***'Scoring a 1 on spinner A is just as likely as scoring a 1 on spinner B'.***

Explain why Katie is correct.



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.....

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22

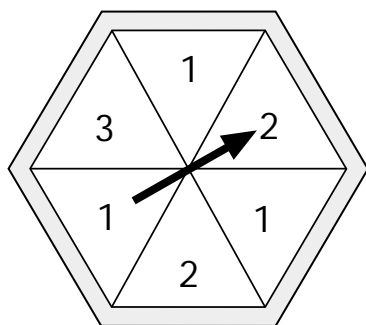
1 mark

# 2001 Test A

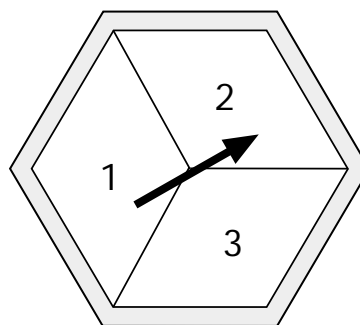
15

Here are two spinners, A and B.

Each one is a regular hexagon.



A



B

For each statement, put a **tick (✓)** if it is **true**.

Put a **cross (x)** if it is **not true**.



Scoring '1' is **more likely** on A than on B.

Scoring '2' is **more likely** on A than on B.

Scoring '3' is **as equally likely** on A as on B.

☐
☐
☐

15a

1 mark

Zara spins both spinners.

The score on A is added to the score on B.

She says,

**'The sum of the scores on both spinners is certain to be less than 7'.**

Is she correct?

Circle Yes or No.



Yes / No

Explain how you know.



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15b

1 mark