

## SPRINGBOARD 6 LESSON 18 PROBLEM SOLVING 3

**TOTAL TIME****Objective:**

- Read scales to a suitable degree of accuracy and extract and interpret data from tables and charts to solve problems

**Vocabulary:**

- frequency
- survey
- sector

**By the end of the lesson children should be able to:**

- read scales from graphs and understand how data is represented on bar charts and pie charts.

**Resources:**

- counting stick
- OHT 18.1
- OHT 18.2
- Resource Sheet 18.1
- Resource Sheet 18.2

**ORAL AND MENTAL STARTER**

Show children a counting stick. Say that the stick represents the numbers from 0 to 100.

**Q: What steps might we count up in from 0 to 100?**

Count up and back in tens, fives, twenties, twenty-fives and fifties.

Demonstrate that the counting stick can be held horizontally or vertically to represent either one of the axes of a graph.

Show OHT 18.1. Explain that the lines represent 4 different scales. Point to a division on the first scale.

**Q: What number would be here? How did you work this out?**

Discuss the children's responses. Repeat this process using each scale. Ask the children to identify points that are on and between the divisions.

**MAIN TEACHING ACTIVITY**

Give out Resource Sheet 18.1.

**Q: What information does this bar chart show?**

Discuss responses and establish that the children can explain the meaning of the bar chart by referring to the labels and scales. Explain that this data is collected from page 12 of a book.

Use the following questions to develop children's understanding of the bar chart and the scale used.

**Q: How many Es are on page 12? How many more Is are there than Us?****Q: How many of the vowels on page 12 are not As?**

Refer children to the table below the bar chart and explain that the table is another way of representing the information in the bar chart but that it has not been completed.

**Q: What do we need to add to the table so that it represents the same information as the bar chart?**

Establish that the heading 'frequency' means 'how many' there are of each letter.

Get the children to work in pairs to complete the table and collect their answers.

Tell the children that the other table on Resource Sheet 18.1 gives information about the number of some other letters on page 13 of the same book.

**Q: How many Ts are there on page 13? How many more Ss than Ns are there?****Q: How can we represent this information as a bar chart?**

Establish that the bar chart would need to be completed as in the first example.

**Q: What will go on each of the axes?**

Establish that we need to show bars ranging in height from 9 to 23.

**Q: Would a scale from 0 to 100 be sensible?**

Agree that this would be too big and discuss alternative scales.

Ask the children to work in pairs to agree their scale and to draw the bar chart. Compare different bar charts and discuss the different scales used.

Give out Resource Sheet 18.2. Say that Sam and Jo carry out a survey of TV programmes that people watched.

Sam asked 120 people what TV programmes they watched and made a pie chart to show this information. Jo asked 72 people and recorded her information in a pie chart. Say the parts of the pie chart are called sectors. Get the children to estimate the fractional value represented by each sector of the pie charts. Use these estimates to find out how many people watched each programme. Ask the children to record their answers in the tables.

**Q: What must the numbers total in Sam's and Jo's tables?**

Agree that there were 120 people in Sam's survey and 72 people in Jo's survey.

**Q: In which survey did more people watch soaps?**

Establish that in Sam's survey more people watch soaps. Emphasise that even though the sector in Jo's pie chart is bigger, Sam asked more people.

**PLENARY**



Show OHT 18.2.

**Q: What is missing from the bar chart?**

Establish that the bar chart needs a title and a scale and that each of the bars needs a label.

Label one of the bars 'Crisps'.

**Q: What could the bar chart be representing now?**

Discuss possible labels for the other bars, the scale and the title of the bar chart. Agree on the names of the other bars, e.g. chocolate bars, cans of cola, etc. and that a title for the bar chart could be 'Number of items sold at the school fair'.

Say that the pie chart represents the same information.

Use the information above to discuss the sectors of the pie chart.

**Q: What will the largest sector of the pie chart represent?**

**Q: What will the smallest sector of the pie chart represent?**

**Remember:**

- A bar chart shows the frequency, or how many of each item there are by the length of the bars.
- Make sure you understand the scale on the bar chart.
- The sectors of a pie chart show how the total is divided up into different parts.

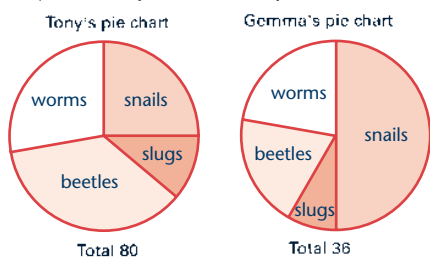
**LESSON 18 RELATED TEST QUESTION  
2000 TEST A (NON-CALCULATOR PAPER)**

17

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



They each made a pie chart of what they found.



(a) Estimate the number of worms that Tony found.

1 mark

Who found more snails?  
Circle Tony or Gemma

Tony / Gemma

(b) Explain how you know.

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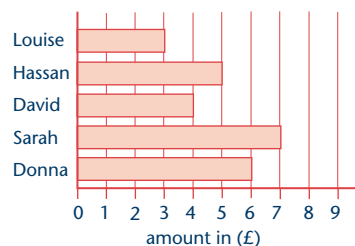
1 mark

**LESSON 18 RELATED TEST QUESTION  
1999 TEST A (NON-CALCULATOR PAPER)**

10



Five children collect money to plant trees.  
Here is a bar chart of the amounts they have raised so far.



Their target is £40 altogether.

How much more money do they need to reach the target?

Show your working. You may get a mark.

£

2 marks

**GUIDANCE FROM MARK SCHEME**

Question	Requirement	Additional Guidance	Question	Requirement	Additional Guidance
17a	An answer in the range 21 to 26 inclusive.	<b>NO MARK</b> is awarded for an answer which is not a whole number.	10	15	Accept £15.00 <b>or</b> £15.00p <b>or</b> £15 00 If the answer is incorrect, award <b>ONE</b> mark for evidence of appropriate working, e.g. $40 - (3 + 5 + 4 + 7 + 6) = \text{wrong answer}$ . Calculation must be performed for the award of <b>ONE</b> mark. Accept £1500p <b>or</b> £1500 as evidence of appropriate working for <b>ONE</b> mark.
17b	An explanation which recognises that Tony's snails are a quarter of 80 and that Gemma's snails are half of 36, so that Tony found more, e.g. • 'Tony found 20 and Gemma found only 18'; • 'Quarter of 80 is more than half of 36'.	No mark is awarded for circling the correct answer of 'Tony'. <b>DO NOT</b> accept vague or arbitrary explanations, e.g. • 'Tony found loads more'; • 'Gemma found more but Tony's amount is bigger'. Accept a correct, unambiguous explanation even if the wrong name is circled.			

**ANALYSIS OF CHILDREN'S ANSWERS**

- On Question 10, children working at level 3 often read the information correctly but miscalculated or did not subtract the £25 from the £40.
- When interpreting the pie charts on Question 17, children's estimates too often fell outside the range allowed. Half the children working at level 3 and 4 who answered the second part of the question chose Gemma, explaining that the sector on her pie chart was bigger. These children ignored the totals the two pie charts represented.

**IMPLICATIONS FOR PLANNING**

- Test questions, introduced into the main teaching activity, can be used to generate further questions that require multistep responses. For example, 'How much more did Louise and Hassan collect than Donna?'
- The interpretation of charts and tables should be included in the oral and mental starter and the plenary. Children need to be taught that the sector on a pie chart represents a proportion, and that the total number of items represented by the pie chart has to be known in order to calculate how many each sector represents.