

Introducing Tape diagrams

Purpose

In this lesson we aim to teach a new diagram (strategy for solving a word problem) with a familiar mathematics concept

Outcomes

NS2.2 Uses mental and written strategies for addition and subtraction involving two-, three- and four-digit numbers

MA1- 5NA, MA2-5NA

NS2.3: Uses mental and informal strategies for multiplication and division

MA1- 6NA, MA2-6NA

Framework reference

This lesson links to PV Level 1 and 2, and M&D Level 3 and focuses on the tape diagram as a tool to develop non-count-by-ones strategies

Materials

Cardboard strips/ streamers/ paper

Tape diagram problems (Resource 1)

Teaching points

What we want students to think about is how the numbers in a problem relate to each other. To achieve this focus on the relationship we often encourage students to draw a diagram. Tape diagrams can be used to provide a common framework in using diagrams as thinking tools.


Once students become familiar with tape diagrams, you can increase the difficulty of the problems.



Suggested *Short, focussed, frequent* activity

	Outline	Questions
Introduction	Explain to students: We are learning about a new strategy to help us understand word problems – how the words of the problem relate to the mathematics. We will be working with familiar mathematics until we get used to using the new strategy.	
	Show students the problem: ‘Sally had some biscuits. Peter gave her 3 more biscuits. Then Sally had 10 biscuits. How many biscuits did Sally have at the start?’ Use coloured cardboard tape and blutack on blackboard to illustrate the tape diagram. Place two (different lengths) of cardboard on the board. One that is blank and one that has a 3 on it.	<div><div></div><div>3</div></div> <p><i>Which piece of cardboard represents the biscuits Peter gave Sally?</i></p>



	Outline	Questions
Concept development	<p>Now draw an arc and write the number 10.</p> <p>If students do not see that it means, how many biscuits Sally had altogether, tell them.</p> <p>Students may need prompting, (look for the question mark)</p> <p>How many biscuits did Sally have at the start?</p> <p>Students may say, '<i>something plus 3 gives us 10</i>'. Or '<i>She had 10 altogether, Peter gave her 3.. the 10 means something plus 3...</i> Or '<i>if she had 10, you could take away the 3 Peter gave her to work out how many she started with...</i></p>	<p><i>How do you know?</i> <i>What does the other piece of cardboard represent?</i> <i>How do you know?</i> <i>What could we write on the cardboard that represents Sally's biscuits?</i></p> <div data-bbox="1056 412 1359 555" data-label="Diagram"> </div> <p><i>What does the number 10 represent?</i></p> <p><i>What was the question asking us to find out?</i></p> <p><i>How can we use our diagram to find the answer?</i></p> <p><i>Do we need to add or subtract?</i></p> <p><i>What do we need to add/ subtract?</i></p> <p><i>What might the number sentence for this look like?</i></p>
Strengthening the concept	<p> You may need to do the second problem as a whole class. (You may have other problems that you would like to use instead of the Resource sheet)</p> <p>Model making the diagram using the coloured cardboard tapes (a student may be able to assist) – label the tape diagram, referring back to the words used in the problem regularly</p> <p>Read the question to the class.</p> <p>The questions used for these problems are based</p>	<p><i>Can someone come and make the tape diagram to represent the problem?</i> <i>How do we draw what Robyn had, and what Steven had?</i></p> <p><i>What is the problem asking us to find out?</i></p> <p><i>What would we do to work it out?</i> <i>What might the number sentence for</i></p>



Outline	Questions
<p>on Newman's question prompts.</p> <ol style="list-style-type: none"> 1. Choose a student to read the question to the class 2. What is the question asking us to do? 3. How are we going to find the answer? 4. Show me what to do to get the answer? 5. Write down the answer to the question <p>Students work individually, in pairs or small groups to solve the problems on the resource sheet. Again, you can use other problems of your choice. Remember to make the problems easy as we start using this new strategy.</p> <p>As the students develop competence in the strategy, increase the level of difficulty with the problems.</p> <ul style="list-style-type: none"> • Students work together, discuss the problem using Newman's prompts and draw a tape diagram to represent the problem on a large sheet of paper using textas <p>Choose two or three groups to report back to whole class by discussing how they constructed their tape diagram</p>	<p><i>this look like?</i></p> <p>Go with student responses and seek refinements from other students where needed.</p>

