

Beginning Term 2, 2010	Maths	Number: Understand Operations	Class: Upper Primary / Secondary
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This document assumes that relevant diagnostic tasks for Understand Operations have been completed. Judgements can then be made on the appropriate activities to select below, as these aim to assist teachers in helping students to consolidate and develop new understandings. You are strongly encouraged to read the background notes from page 87 – 94 in Book 2 of First Steps, as they help classify problems, as well as representations of problems.

### Curriculum Framework Outcomes

7. Understand Operations: students understand the meaning, use and connections between addition, multiplication, subtraction and division.

<b>Key Understanding 2</b> Partitioning numbers into part-part-whole helps us relate addition and subtraction and understand their properties.		Relevant ANTT Tasks (to be filled in)	
Mathematical Focus	Activities / Tasks	Focus Questions	AEW Involvement
Partitioning numbers into part-part-whole helps us relate addition and subtraction and understand their properties.	'Long Jump' FS p 19 Have the class use real data they have collected (eg. their height, long jump, shotput or javelin distances etc). Pose questions to students. 'Long Jump' again FS p26 Use part-part-whole models to explain why different operations are equivalent.	Eg. Person A jumped 325cm and person B jumped 238cm. How much longer does B's jump need to be to match A? (see other examples on p19).  How can we use the diagram to show $325 - 238 = \underline{\quad}$ How can we use it to show $238 + \underline{\quad} = 325$ Is there another one? Do all these number sentences answer the question? Why/why not?	<b>Some</b> possible roles and responsibilities AEWs for all these tasks can take include: - running part of a lesson - working with a group - working with a particular student - running a game - acting as a translator - preparing resources - asking focus questions - assessing students <i>(These roles should be negotiated between teacher and AEW in advance)</i>
Partitioning numbers into part-part-whole helps us relate addition and subtraction and understand their properties.	Which Operation? FS p25 Present the students with a range of number stories involving change, combine, compare and equalise situations. Use part-whole diagrams to represent the stories.  Backwards and Forwards FS p25	Which numbers are being joined? Which numbers are being separated? Which are the parts/whole? If you don't know the whole, which operation can you use? If you don't know a part, which operation can you use?	

<p>Using the inverse relationship between addition and subtraction to solve algebraic problems</p> <p>Using the inverse relationship between addition and subtraction to solve algebraic problems</p>	<p>Following on from previous activity, represent number stories on a number line.</p> <p>Focus on Operations FS p27 / Attachment A Extend students to use real data (such as the attached list of countries by area or population to compare using the part-part-whole model. They can create number stories (and sentences) based on this such as: Greenland is 601 986 square km more than this country... (Mongolia)</p> <p>Paul Swan Calculator Activities / Attachment B</p> <p>Maths 300 – Number Charts / Attachment C</p>	<p>Do the numbers represent the parts or the whole? Do you need to move forwards or backwards? Which operation tells you to move forwards/backwards? Can you write it in a number sentence? What are the different number sentences you could use to compare the two countries? What does this number sentence tell us about the countries?</p> <p>How will you approach the problem? What could you try first? Which operations will you use to help you?</p> <p>As per lesson plan</p>	
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<b>Key Understanding 3</b> Multiplying numbers is useful when we: <ul style="list-style-type: none"> <li>• repeat equal quantities</li> <li>• use rates</li> <li>• make ratio comparisons</li> <li>• make arrays and combinations</li> <li>• need products of measures</li> </ul>		Relevant ANTT Tasks (to be filled in)	
Mathematical Focus	Activities / Tasks	Focus Questions	AEW Involvement
Multiplying numbers is useful when we make arrays.  Multiplying numbers is useful when we make arrays and combinations.  Multiplying numbers is useful when we: repeat equal quantities, use rates.  Multiplication facts/ probability/problem solving	Calculating Area – FS p35 Use grid paper to allow students to make the connection between arrays and area  Combination Problems – FS p34 Students can draw the problem first before linking combinations to multiplication. ie. For every coloured shirt there are three different pants you can wear to make a new outfit. So four groups (shirts) of three (pants) is 12 different outfits. (See ANTT tasks for more examples of combination problems, but do be sure to change the context/numbers when you use them for lessons).  Cooking lesson Have students multiply a recipe (making it afterwards is always a good incentive) so that it serves a greater (or smaller) number of people. Eg. a pancake recipe that serves 4 needs to be multiplied by 2 to serve eight. So 2 cups of flour becomes 4 cups of flour and so on. See: Changes in ratio FS p34  Maths 300 – Multo / Attachment D  Investigation: 8000 Kimbis (Nappies) /Attachment E	How can you show the area on the grid paper? Where are the __ groups of __? What could 4 x 9 show the area of?  What are the groups? What are the objects? What is the number sentence associated with this?  How are we going to make enough for __? What happens when it's not an easy situation? (eg. making a recipe that serves 4, to serve 6) How can we make the recipe for less people?  As per lesson plan  As per lesson plan, and more, such as: Which operation will we need to use to calculate this part of the problem? Why? What do you think will	

<p>Multiplying numbers is useful when we: repeat equal quantities, use rates.</p>	<p>Fundraising for an end of term trip/buying something for the class. There are lots of opportunities here for rate problems (How much fuel does the troopy/bus use per kilometre? How many kilometres to x? How much fuel will we need? How much does fuel cost per litre? How much money will we need? How much money can we make by doing/selling x? etc)</p>	<p>happen to the number?</p>	
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<b>Key Understanding 4:</b> Dividing numbers is useful when we: <ul style="list-style-type: none"> <li>• share or group a quantity into a give number of portions</li> <li>• share or group a quantity into portions of a given size</li> <li>• need the inverse of multiplication</li> </ul>		Relevant ANTT Tasks (to be filled in)	
Mathematical Focus	Activities / Tasks	Focus Questions	AEW Involvement
Dividing numbers is useful when we: share or group a quantity into a given number of portions, share or group a quantity into portions of a given size, need the inverse of multiplication	<p>Open questions 8,9,12,14 Peter Sullivan p51-2 Attachment F</p> <p>How Many Each / Catering Problem – FS p46</p> <p>Sharing/Grouping – FS p46 (You may want to avoid decimals, although money could be a good context for some stories)</p> <p>Arranging the Tables – Attachment G <a href="http://nrich.maths.org/public/viewer.php?obj_id=964">http://nrich.maths.org/public/viewer.php?obj_id=964</a></p> <p>Think Board (1) FS p47 Use a division / fraction that is more familiar such as 3 divided by 4.</p> <p>Maths 300 – Division boxes – Attachment H</p> <p>Maths 300 – Number Charts Attachment C again (modify the charts to use with multiplication and division)</p> <p>Make a model Have students build a scale model of their desk, classroom or other item. They could use a variety of materials. First</p>	<p>How can you work this out? How many answers are there? Is there a pattern to them?</p> <p>Why is it easier to pull out groups of 30?</p> <p>How do we know when it is sharing? Grouping? Which number tells us about how many groups? Which number tells us about how many in a group? How is <math>24 \div 6 = 4</math> different to <math>24 \div = 6</math>?</p> <p>What would happen if they were all on individual tables? What if all the tables were joined together?</p> <p>How are fractions and division related? Does this always work?</p> <p>As per lesson plan</p> <p>As per lesson plan</p> <p>Which operation do we need to use when we are reducing the size? Why? What if the numbers don't go nicely into each other? What could you</p>	

	have students decide how many times smaller they wish to make their model, then carry out the calculations and use them.	use to help? What would we divide by if we wanted to make it a quarter of the size?	
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<p><b>A culminating activity you may like to consider....</b></p>	<p>This substrand of the number outcome is all about students understanding the four operations: when to use them, how to use them, their properties and the links between them. Below is the suggestion of a creative project you may like to try with your students. It could be something you work towards throughout the term, or it could be an activity you introduce in the last couple of weeks of term.</p> <p><b>Operations on trial: A mathematical court case</b></p> <p>Allow students time and experiences to build their understanding of the purpose and properties of each of the operations. These could be recorded on posters, in journals or however you like. This will help you to see students' partial understandings or misconceptions, and decide on the experiences needed to move them on.</p> <p>Script and stage a court case where the four operations are suspects in a crime. The crime in this case would be an equation with the operation missing, such as <math>1250 \_ 50 = 25</math>. You may choose to have a series of equations (one where each operation is guilty), or to relate the numbers to a fictional crime.</p> <p>Have students act as each of the operations, the judge and the prosecutors. You may also like to assign a small group as the defence team for each of the operations.</p> <p>For each crime (equation), each operation must come to the stand, enter a plea and be cross examined. The defence team must help the operation to justify why it was/couldn't have been them that completed the crime.</p> <p>It would be fantastic to make this court case into a short film. The scripting process would be a rich learning activity for students to really work to explain what they understand about the operations. If you would like to discuss scripting ideas/suggestions, please contact Bex in the Broome office (9193 7591/ <a href="mailto:mathematics@westnet.com.au">mathematics@westnet.com.au</a>)</p>
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