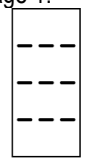
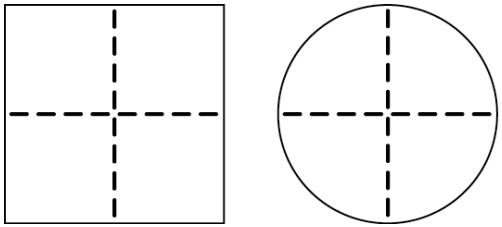
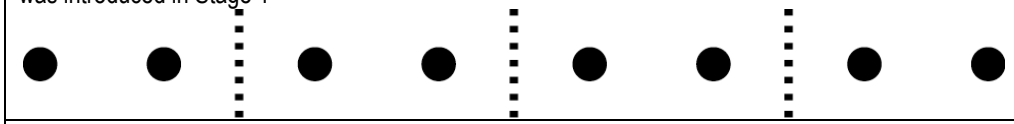
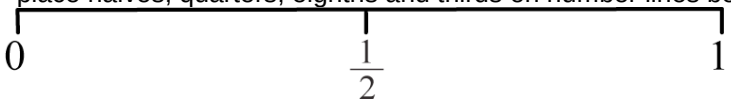
Booragul Public School NSW Syllabus for the Australian Curriculum – Number and Algebra

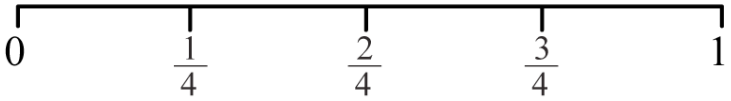
Stage 2 – Fractions and Decimals 1			
Outcome	Teaching and Learning Activities	Notes/ Future Directions/Evaluation	Date
Stage 2 A student: › uses appropriate terminology to describe, and symbols to represent, mathematical ideas MA2-1WM › checks the accuracy of a statement and explains the reasoning used MA2-3WM › represents, models and compares commonly used fractions and decimals MA2-7NA		**Language** Students should be able to communicate using the following language: whole, part, equal parts, half, quarter, eighth, **third**, **fifth**, **one-third**, **one-fifth**, **fraction**, **denominator**, **numerator**, **mixed numeral**, **whole number**, **fractional part**, **number line**. When expressing fractions in English, the numerator is said first, followed by the denominator. However, in many Asian languages (eg Chinese, Japanese), the opposite is the case: the denominator is said before the numerator.	
Ignition Activity **Counting** Skip counting by ¼ ½ and 1/3 using a number line ensuring we extend beyond one. **Sharing** Students form groups of 8 and share a slice of 'bread' (picture) so that each person gets the same amount and there is none left over. Each group discusses how they shared the bread and names the pieces 'eighths'. Students regroup into groups of 4, and then into groups of 2, and repeat the activity, naming the pieces 'quarters' or 'halves'. Students compare the relative sizes of the fractions and then order them according to their size. This can also be repeated for fifths and thirds. Students record their findings.			
Explicit Mathematical Teaching At this Stage, 'commonly used fractions' refers to those with denominators 2, 4 and 8, as well as those with denominators 3 and 5. Students apply their understanding of fractions with denominators 2, 4 and 8 to fractions with denominators 3 and 5. Fractions are used in different ways: – to describe equal parts of a whole – to describe equal parts of a collection of objects – to denote numbers eg is midway between 0 and 1 on the number line – as operators related to division eg dividing a number in half. What are fractions? What do 1/2 2/4 and 4/8 have in common? What is a denominator? The total number of equal parts. What is the numerator? The number of equal parts selected.			Critical and creative thinking Literacy Information and communication technology capability

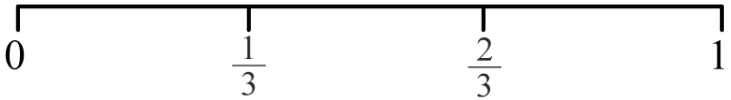
In most cases, there are differences in the meaning of fraction and ordinal terms that use the same word eg 'tenth' (fraction) has a different meaning to 'the tenth' (ordinal). Demonstrate and explain that the denominator tells us the number of equal parts a whole has been divided into - the bigger the denominator, the smaller the piece of fraction. Interpret the numerator as the number of equal fractional parts, eg 3/8 means 3 equal parts of 8. Show students how to write the fractions from 1/5 to 5/5. Do students know that 5/5 is one whole?		
In Stage 2 Fractions and Decimals 1, fractions with denominators of 2, 3, 4, 5 and 8 are studied. Denominators of 6, 10 and 100 are introduced in Stage 2 Fractions and Decimals 2. Fractions are used in different ways: to describe equal parts of a whole; to describe equal parts of a collection of objects; to denote numbers (eg is midway between 0 and 1 on the number line); and as operators related to division (eg dividing a number in half). A unit fraction is any proper fraction in which the numerator is 1, eg Three Models of Fractions *Continuous model, linear* – uses one-directional cuts or folds that compare fractional parts based on length. Cuts or folds may be either vertical or horizontal. This model was introduced in Stage 1.  or  *Continuous model, area* – uses multi-directional cuts or folds to compare fractional parts to the whole. This model should be introduced once students have an understanding of the concept of area in Stage 2.  *Discrete model* – uses separate items in collections to represent parts of the whole group. This model was introduced in Stage 1 		
Count by quarters, halves and thirds, including with mixed numerals; locate and represent these fractions on a number line (ACMNA078) • identify and describe 'mixed numerals' as having a whole-number part and a fractional part • rename $\frac{2}{2}, \frac{3}{3}, \frac{4}{4}, \frac{5}{5}$ and as 1		

• count by halves, thirds and quarters, eg $0,\ \frac{1}{3},\ \frac{2}{3},\ 1,\ 1\frac{1}{3},\ 1\frac{2}{3},\ 2,\ 2\frac{1}{3},\ \ldots$

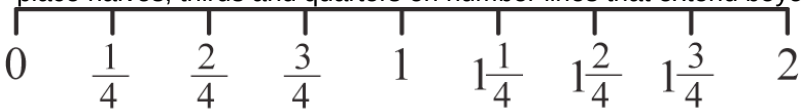
• place halves, quarters, eighths and thirds on number lines between 0 and 1, eg







• place halves, thirds and quarters on number lines that extend beyond 1, eg



• compare unit fractions using diagrams and number lines and by referring to the denominator, eg 1/8 is less than 1/2

.· recognise and explain the relationship between the value of a unit fraction and its denominator (Communicating, Reasoning)

Whole Class Teaching Activities

Related Fractions-One half, one-quarter and one- eighth

1. Write the fractions one half(1/2), one-quarter(1/4) and one-eighth(1/8) on the board.
Hold up a paper streamer approximately 90 cm long. ***"Using this paper streamer, how could you make one of these fractions***?" Allow the students some time to think about the question. **"*Which of these fractions will be the easiest to make? Why?*** Focus the questions on : ***How do you know that you have one half? (or one-quarter or one-eighth)?***

2.Fold the paper streamer in half and then fold one half in half. Unfold the streamer and display it to the class. Point to each part in turn and ask ***"What fraction of the streamer is this part? How do you know?"***

3***."If I fold one-quarter in half, what will I have?"***Fold the quarter in half and, as before, point to each part in turn and ask ***"What fraction of the streamer is this part? How do you know?"***Emphasise reversibility**:"If I fold the quarter in half I get two-eighths and two-eighths is the same as one quarter."**

4. ***"Which is the biggest part? Which is the smallest part? Can anyone see two fractions that would be the same as another fraction?"***

5."***Show me two-eighths. Show me two-quarters. Show me two-halves."***

6.***"Draw the streamer and show how halves, quarters and eighths are related to each other."*** *Variation:* Students cut the folded strips into halves, quarters and eighths and order the strips from smallest to largest parts. They discuss their findings		
Lamingtons Lamingtons are pieces of sponge cake covered in chocolate icing and dipped in shredded coconut. Giving explicit instruction, distribute rectangular sheets of brown paper. Show by folding the piece of paper how you could make 4 lamington bars. Ask the students to fold their own piece of paper into 4. Check to see which way they have divided their paper. If they use different methods to form quarters ask them if each person would still get the same. Fold piece of paper into 8 smaller lamington bars. If I wanted to eat this much (show three quarters) how many of the smaller (1/8) lamington bars would this be equal to? Get them to discuss and explain the answer. **Fractions- Pikelets and Lamingtons** pg 37		
A Pikelet Recipe Students use sharing diagrams to operate on continuous models of fractions In this activity students explore dividing wholes into equal parts and use sharing diagrams to divide by fractions. 1.Place 4 identical empty cylindrical clear plastic tumblers near each other on a table(Have your students fill the tumblers to the desired amount if possible) Say "***I want to pour half a glass of drink. Who can show me where about on the glass I would need to fill it to?"*** Provide the student with a thin piece of masking tape to record his or her answer. A marking pen could also be used.***"Who thinks that this is the place we should fill the tumbler to get half a glass?"***Allow an opportunity for class discussion and if the student wishes, he or she can move the tape. ***"How can we know if we are right?"*** 2. Put out another transparent tumbler with vertical sides.**"Can you show me where I would have to fill this glass to get one-quarter of a glass?"** Attach a small piece of thin black tape at the indicated location***. "Does this look correct?"***Adjust as directed. Draw a sketch of the tumbler on the board. Ask one student to add a line to your diagram on the board to show one –quarter of a glass. *I have 6 cups of milk. A recipe needs $\frac{1}{2}$ of a cup of milk. How many times can I make the recipe before I run out of milk? Can you draw your answer?* *I have 6 cups of milk. A recipe needs one quarter (1/4)of a cup of milk. How many times can I make the recipe before I run out of milk? Can you draw your answer* **Fractions, Pikelets and Lamingtons** pg 32-34		
Number Line Fractions Disribute fraction cards e.g 1/8, 2/8, ¼, 3/8,4/8, 2/4, ½, 5/8, ¾, 1 ¼, 1 and ½ and place cards for 0 and 1. Discuss where to place ½, ¼ and 1/8 and have students peg cards on a string number line in the appropriate place and explain their reason why. Extend the activity with placing the other cards		

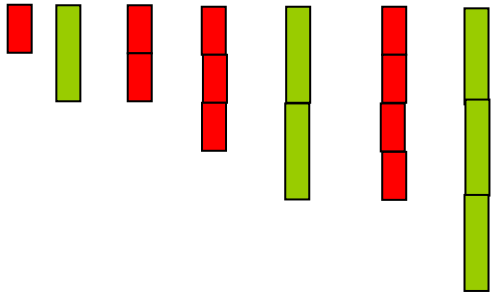
Fruit Salad Strategies- What strategies could we use to find ½ of 24? 12+12 =24. What strategies can we use to find a ¼ of 24? 24 and half again. Repeat this for 1/8? Students move about in an open space in a group of 24. The teacher asks the group to divide into halves, quarters or eighths. Any remaining students check the groupings. The activity should be repeated using groups of different sizes. **Note:** When there are more than 24 students they are responsible for helping the groups.		
Comparing and Ordering Model different ways to represent the same fraction as a whole class on the board. Students are provided with four sets of cards representing the same fractions. The first set has the fractions represented in fraction notation, the second set has the fractions represented in words, the third set has the fractions represented as shaded regions and the fourth set has the fractions represented as the shaded part of a collection. The cards are randomly distributed to students who must find other students with the same fraction represented. Students then place the sets of fraction cards in order.		
Counters As a whole class demonstrate equivalent fractions using 16 counters, Pose the questions Can I find ½ of of 16 (8/16) of 8 (4/8) of 4 (2/4) Repeat this for ¼ Discuss the relationship between 2/4 and 1/2. Varation: could also be used with 15 counters to show thirds and fifths.		
Is It Possible? Students are given 16 counters and need to determine whether it is possible to find , or .eg I can find ½ of 16 (8) ¼ of 16 (4) 1/8 of 16 (2). Students record their findings. The activity should be repeated using different numbers of counters and extended to include fractions with denominators of 3 and 5.		
Clothes Line Fractions Distribute fraction cards eg 1/5, 2/5, 3/5, 4/5,5/5, 1/10, 2/10, 3/10 etc and place cards for 0 and 1. Discuss where to place 1/5, 1/10 and have students peg cards on a string number line in the appropriate place and explain their reason why. *Mathematics Programming Support website Fraction Cards-see attached sheets*		
Comparisons of Fifths Ask students: When is one fifth not one fifth? Answer: When it is one fifth of different wholes! Eg. One fifth of a strip of paper is not the same size as one fifth of an apple. It is the proportion of the		

whole that is important not the comparison between different wholes. This is important as students will be using different sized 'wholes' to look at fractions.

Ask students to make additional lengths of 2/5 and 3/5 from a third piece of streamer 60cm and use one piece of 1/5. From the initiating activity, use the tenths pieces to join them into 2/10, 3/10, 4/10 (or make these separately).

Place pieces (1/5, 2/5, 3/5, 1/10, 2/10, 3/10, 4/10) into ascending order (vertically) and notice which pieces are the same.

Eg. 1/10 1/5 2/10 3/10 2/5 4/10 3/5



Ask questions relating to the pieces, such as: "Is 3/10 bigger than 1/5?", "is 3/5 smaller than 4/10?" etc.

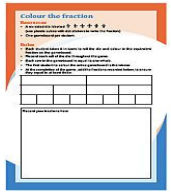
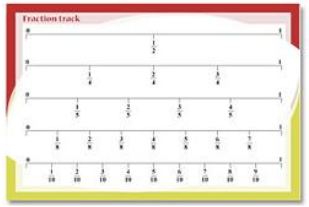
Now ask students to become more abstract by asking questions such as "is the fraction 4/5 bigger than or smaller than 5/10? Why?" "Can you give me a fraction that is bigger than 3/5? And another? And another?"
Ask students how they know that the fractions are bigger.

Clothes Line
Part A
The teacher provides cards each naming a different fraction with the same denominator. Students choose a card and peg it on a string number line in the appropriate place.
Students should also explain the relationship between the value of a unit fraction and its denominator.

Guided Group and Independent Activities

Circular Fractions
Students draw a circle on paper and imagine that it is the top view of a cake. They use pencils or popsticks to show where they would cut the cake to have two/ four/eight equal slices.

Cover Up
Students use a collection of objects eg counters, blocks, pegs. One student selects a number of objects and covers up half/quarter/eighth of the objects with their hand or piece of cardboard. Their partner is then asked:

How many counters are under my hand? *How many counters are there altogether?*		
Investigations The answer is ½. What might the question be? Give at least 10 examples. Is one eighth smaller or larger than one quarter? Explain your answer with examples		
Double Number Line-Fractions (halves, fifths and tenths) Each double number line is photocopied onto cardboard, cut out and folded along the middle line. A paper clip is used to estimate the position of a nominated fraction and the number line is flipped over to check the estimation. The activity can be an individual, paired or group activity. The side without the additional intervals is displayed and the paper clip used to indicate the nominated position on the scale. Once the estimation is made it can be checked on the other side with the paper clip acting as a marker for both sides. Discussion of strategies will enable students to improve their understanding and estimation.		
Colour the Fraction(halves, quarters, fifths ,eighths and tenths) Each student takes it in turns to roll the die and colour in the equivalent fraction on the gameboard. Record each roll of the die throughout the game. • Each row in the gameboard is equal to one whole. • The first student to colour the entire gameboard is the winner. • At the completion of the game, add the fractions recorded below, to ensure they equal to at least five.  **Programming mathematics support**		
Fraction Track 2- A gameboard task that replicates the computer task.  **Programming mathematics support**		
Fraction Card Games Students work in groups of three or four with fraction cards playing games like Old Maid, Concentration (Memory) or Fish		

Computer Learning Objects

Wishball

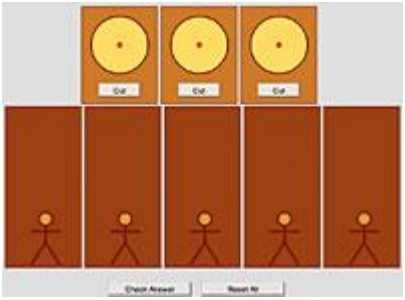
The wishball series of learning objects encourages thinking about place value. It also provides opportunities for mental addition and subtraction. Students try to reach a target number by adding or subtracting in fewer than 20 moves. The spinner randomly serves up a digit. Before students add or subtract they firs choose a place value to assign to the digit. So, if 2 is the digit served up, students can make it 2.0, 0.2, 0.02 or 0.002.

Click here to access Wishball

Fraction Track

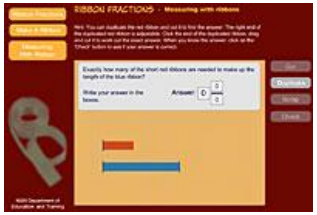
The object of the activity is to move all the red sliders across the track in the smallest number of moves. The students click on the playing card to identify the fraction and move one slider by the amount on the card, or move more than one slider as long as it equals and doesn't exceed the value of the fraction.

Pikelet Cutter-Sharing whole pikelets among different numbers of people.



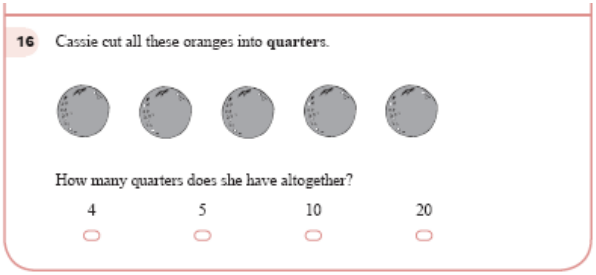
Ribbon Fractions

The RIBBON FRACTIONS is an interactive tool that can be used in strengthening students' sense of the size of fractions



Previous BST/ NAPLAN Questions

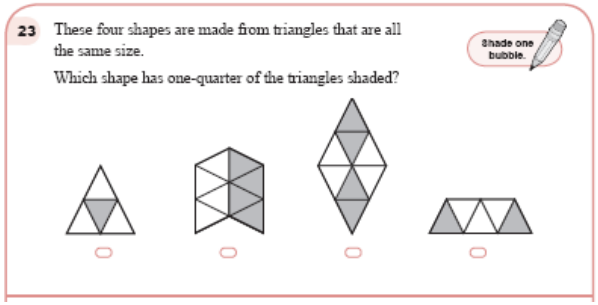
NAPLAN 2008-Yr 3



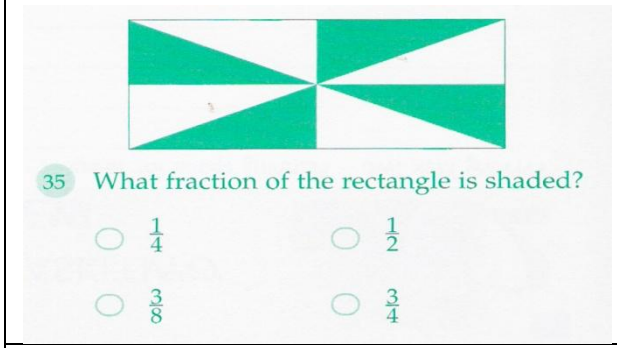
16 Cassie cut all these oranges into **quarters**.

How many quarters does she have altogether?

4 5 10 20



BST 2006 –Yr 3



Reflection

Questioning Ideas

Ask questions and encourage students to justify (explain) their answer such as:

How many digits after the decimal point?

How many hundredths?

How do we know the eight is in the hundredths place?

How does the position of the digits change the value of the decimal? Why?

What pattern do you notice?

Support incorrect answers by explaining the error and talking through their thinking using the think aloud strategy.

If a student says .03 is 3 tenths ask:

How many digits after the decimal point? (Point and count) 2 places

So what does the .03 tell us? — Hundredths

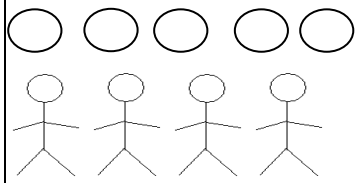
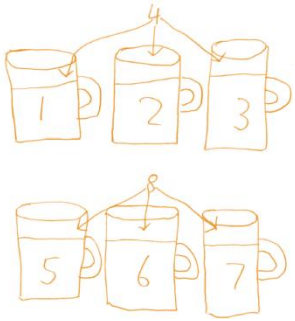
Check that students are using the correct pronunciation by saying the 'ths' on the end (ten**ths** and hundred**ths**) as this will avoid confusion when mixed numbers are introduced.

Planned assessment

Pre Assessment

Using 8 connected unifix cubes can you split it into halves, quarters and eighths.

How many different ways can you show the fraction xx ?

This assessment allows the students to show their understanding of fractions in a variety of ways. **Pikelet sharing problem** How would we share 5 pikelets between 4 people? Can you draw your answer?  Draw what will happen if I have 6 cups of milk and a recipe needs three-quarters ($\frac{3}{4}$) of a cup of milk. How many times can I make the recipe before I run out of milk?  **What fractions can you see?** Download the assessment proforma **Flags** Students design rectangular flags accordng to certain features. Download the assessment proforma		