

Fractions and Decimals 1

Fractions and Decimals 1		
Stage 3 Outcome		
<p>A student:</p> <ul style="list-style-type: none"> › describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions MA3-1WM › selects and applies appropriate problem-solving strategies, including the use of digital technologies, in undertaking investigations MA3-2WM › gives a valid reason for supporting one possible solution over another MA3-3WM › compares, orders and calculates with fractions, decimals and percentages MA3-7NA 	<p>Language: Students should be able to communicate using the following language: whole, equal parts, half, quarter, eighth, third, sixth, twelfth, fifth, tenth, hundredth, thousandth, one-thousandth, fraction, numerator, denominator, mixed numeral, whole number, number line, proper fraction, improper fraction, decimal, decimal point, digit, place value, decimal places.</p>	
Teaching and Learning Activities	Notes/ Future Directions/Evaluation	Date / LAC Icons
<p>Ignition Activity Number Between: Classroom Game Number Between is a good game for individuals and pairs. The teacher writes a pair of numbers far apart on the board (smallest on the left) and calls on a student to write a number in between the pair. If a correct answer is given (it does not have to be the midpoint), another student is called on to write a number between the new number and one of the earlier endpoints. A dice could be thrown to decide whether it is to be larger or smaller than the new value, or you could have a simple rule – e.g. alternate between the larger and smaller sides, always go for the smaller etc. Continue as the number line is divided into smaller and smaller segments. Stop when interest wains. Dividing the students into teams, to take turns writing a number and to challenge the correctness of the answers of the other teams, creates a competition if desired</p>		Critical and creative thinking
<p>Explicit Teaching</p> <p>FRACTION TYPES There are 3 different types of fractions:</p> <ul style="list-style-type: none"> • Proper Fractions Numerator < Denominator Proper fractions have the nominator part smaller than the denominator part, 		

for example $\frac{1}{2}$, $\frac{2}{5}$ or $\frac{19}{20}$.

- **Improper Fractions** Numerator > Denominator or Numerator = Denominator,
Improper fractions have the nominator part **greater or equal** to the denominator part,

for example $\frac{5}{5}$ or $\frac{7}{2}$.

Mixed Fractions

Mixed fractions have a **whole number plus a fraction**, for example $2\frac{1}{5}$ or $123\frac{19}{20}$.

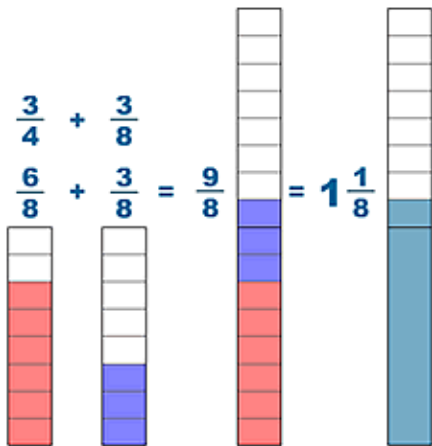
What is a Fraction?

<http://www.jamit.com.au/htmlFolder/FRAC1001.html>

- **What Is a Fraction.**
- **Fraction Examples.**
- Fraction Parts: **Numerator, Denominator, Vinculum.**
- Fraction Types: **Proper Fractions, Improper Fractions, Mixed Fractions.**
- **Play the Practice Game**

Explicit Teaching – Addition of Fractions using Diagrams and Models

Addition



Model and represent strategies to add proper fractions with the same denominator

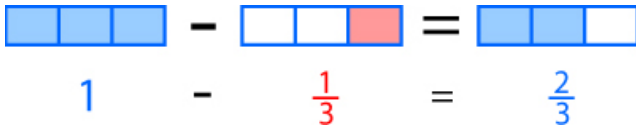
Model and represent a whole number added to a proper fraction

eg.
 $4 + \frac{2}{3} = 4 \frac{2}{3}$

Model and represent adding mixed numerals with the same denominator

eg.
 $2 \frac{1}{8} + 1 \frac{7}{8} = 4$

Subtraction



Subtract proper fractions from other proper fractions with the same denominator

Maths fraction Word Problems – Scroll down to ‘Fraction Challenge Problems’

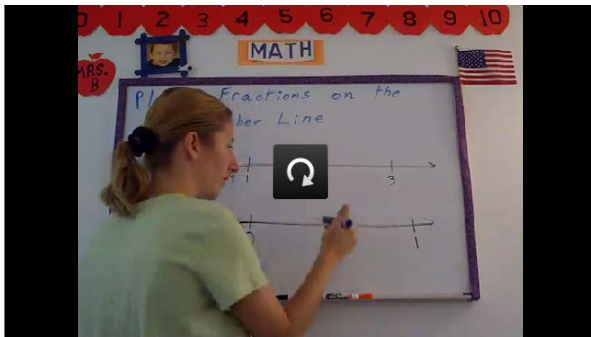
<http://www.mathplayground.com/wpdatabase/wpindex.html>

Placing Fractions on a Number Line

<http://www.sophia.org/tutorials/placing-fractions-on-the-number-line--10>

You can place fractions on a number line in a similar way you place whole numbers. In this tutorial, you will see how you can break down a number line into pieces to represent fractions such as halves, quarters, and eighths. See if you can find three-eighths on a number line, and you might never look at a ruler the same way again.

Placing Fractions on the Number Line



SOURCE: VIDEO CREATED BY MRS. B

Information and communication technology capability

Explicit Teaching -

CONVERTING BETWEEN DECIMAL NOTATION AND FRACTION NOTATION

Given decimal notation, we can convert to fraction notation as follows:

$$\begin{aligned} 9.075 &= 9 + \frac{0}{10} + \frac{7}{100} + \frac{5}{1000} \\ &= \frac{9}{1} \cdot \frac{1000}{1000} + \frac{0}{10} \cdot \frac{100}{100} + \frac{7}{100} \cdot \frac{10}{10} + \frac{5}{1000} \\ &= \frac{9000}{1000} + \frac{0}{1000} + \frac{70}{1000} + \frac{5}{1000} \\ &= \frac{9075}{1000} \end{aligned}$$

Decimal Notation	Fraction Notation
9.075	$\frac{9075}{1000}$
3 decimal places	3 zeros

To convert from decimal to fraction notation

Four and eight hundredths	4.08	
1. Count the number of decimal places	4. <u>08</u>	2 places
2. Move the decimal point that many places to the right to make a whole number.	408.	Moved 2 places
3. Write the answer over a denominator with a 1 followed by that number of zeros.	$\frac{408}{100}$	2 zeros

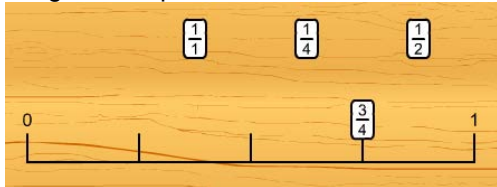
To convert from fraction notation to decimal notation when the denominator is 10, 100, 1000, 10,000 and so on.

Eighty and seventy-nine thousandths	$\frac{80079}{1000}$	$80\frac{79}{1000}$
1. Count the number of zeros in the denominator	$\frac{80079}{1000}$	3 zeros
2. Move the decimal point that number of places to the left. Leave off the denominator.	80.079	Move 3 places

Drag and Drop Fractions

http://www.bgfl.org/custom/resources_ftp/client_ftp/ks2/maths/fractions/level4.htm

Drag and drop the fractions onto their correct position on the number line.



Fractions on a Number Line – StudyLadder

<http://www.studyladder.com.au/learn/mathematics/activity/20560?retUrl=%2Flearn%2Fmathematics%2Ftopic%2Ffractions-and-decimals-444>

Place each fraction on the number line.

$4\frac{1}{2}$	$6\frac{1}{4}$	$\frac{1}{2}$	$3\frac{6}{8}$	$\frac{3}{4}$
$3\frac{1}{8}$	$8\frac{4}{8}$	$8\frac{1}{3}$	$6\frac{7}{8}$	$1\frac{1}{4}$

CHECK MY ANSWERS

Information and communication technology capability

Information and communication technology capability

Converting Improper Fractions to Mixed Numbers – StudyLadder
<http://www.studyladder.com.au/learn/mathematics/activity/4512?retUrl=%2Flearn%2Fmathematics%2Ftopic%2Ffractions-and-decimals-444>

Change the improper fraction to a mixed number.

$$\frac{31}{9} = \square \frac{\square}{\square}$$

Check my answer

Information and communication technology capability

Decimal numbers between
Open-ended task

Ask students to write down 15 numbers between 3.1 and 3.4

Some students will claim that there are only two numbers 3.2 and 3.3, while others will appreciate that 3.18 is between 3.1 and 3.2. Encourage students to share their answers and to explain why their numbers are between 3.1 and 3.4, using models and diagrams to support their explanation. It is essential that students have a model to refer to which will resolve any disputes. **Linear Arithmetic Blocks (LAB)** is a model which has proven to be very useful in assisting students to improve their conceptual understanding of decimal notation. (Instructions are provided for making this model from washers and tubing which are inexpensive to buy and available from any hardware store.)

Critical and creative thinking


Less than - more than

Ask students to fill the boxes with some of the digits 0, 1, 2, ...8, 9 to make the following true. The digits do not have to be the same and can be reused.

Task 1

$$\square.\square\square < 3.\square$$

Critical and creative thinking

<p>Task 2</p> <p>$\square.\square\square > 8.\square$</p> <p>These are open-ended tasks with many correct answers. Encourage students to describe the range of answers in general terms. For example, in the first case, if the digit in the ones place (in the number on the left) is 0, 1 or 2, then the digits in the next two places (tenths and hundredths) can be anything (because it is always true that $0.XX < 3.X$, and $1.XX < 3.X$, and $2.XX < 3.X$). However, if the digit in the ones place (in the number on the left) is 3, then the digits in the tenths place need to be considered carefully; the tenths digit on the left needs to be smaller than the tenths digit on the right.</p> <p>It is important to review the students' answers carefully, as those students using incorrect strategies such as <i>longer-is-larger</i> or <i>shorter-is-larger</i>, need to know that they have something to learn.</p>		
<p>Linear Arithmetic Blocks</p> <p>Linear Arithmetic Blocks are a simple model for decimal numbers, which can be purchased commercially or made from simple materials. The size of a decimal number is modelled by length, which is conceptually simpler than other material such as multi-base arithmetic blocks (MAB) which represent size by volume.</p> <p>Linear Arithmetic Blocks can be used to compare numbers, as well as to demonstrate arithmetic operations in a similar way to MAB.</p>		
<div style="border: 1px solid black; padding: 5px;"> <p>Comparing numbers in Decimal Form</p> <p>To compare two numbers in decimal notation, start at the left and compare corresponding digits</p> <p>moving from left to right. If two digits differ, the number with the larger digit is the larger of the two numbers. To ease the comparison, extra zeros can be written to the right of the last decimal place.</p> </div>		 Critical and creative thinking

Example 1

Which of the two numbers is larger: 2.109 or 2.1

Number	<i>Think</i>
2.109	2.109
2.1	2.100

There is a tie in the ones place; a tie in the tenths; a tie in the hundredths; however $9 > 0$.
Thus, $2.109 > 2.1$

Example 2

Which of the two numbers is larger: 2.04 or 2.039

Number	<i>Think</i>
2.04	2.040
2.039	2.039

There is a tie in the ones place; a tie in the tenths; however, $4 > 3$.

$2.04 > 2.039$