WorkBook

FRACTIONS
An introduction

WorkNotes

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FRACTIONS

Definitions

There are several sets of fractions. They include

- Fractions
  - Proper fractions
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- Decimals
  - Terminating
  - Non terminating
- Percentages
- Ratios

Fraction

A fraction expresses the number of parts out of the total number of parts when a quantity is divided into to equal parts.

Examples;

$\frac{1}{2}$	Half	1 of 2 equal parts
$\frac{3}{4}$	Three quarters	3 of 4 equal parts
$\frac{3}{10}$	Three tenths	3 of 10 equal parts
$\frac{5}{12}$	Five twelths	5 of 12 equal parts

Numerator and denominator

- The bottom part of a fraction is called the denominator. The denominator represents the number of equal parts into which a quantity is divided.
- The top part of a fraction is called the numerator. The numerator represents the number of equal parts being considered.

Proper fractions

- A proper fraction is a fraction where the numerator is smaller than the denominator.
- A mixed number is a fraction with a whole number part and a fraction part. A mixed number is an improper fraction expressed with a whole number part and a fraction part.

Improper fractions and mixed numbers

- An improper fraction is a fraction where the numerator is larger than the denominator.
- A mixed number is a fraction with a whole number part and a fraction part.
- A mixed number is an improper fraction expressed with a whole number part and a fraction part.

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Examples of improper fractions converted to mixed numbers with language.

$\frac{7}{4}$	Seven quarters	7 of 4 equal parts	$1\frac{3}{4}$	One and three quarters	1 whole and 3 of 4 equal parts
$\frac{23}{10}$	Twenty three tenths	23 of 10 equal parts	$2\frac{3}{10}$	Two and three tenths	2 wholes and 3 of 10 equal parts
$\frac{17}{12}$	Five twelths	17 of 12 equal parts	$1\frac{5}{12}$	One and five twelths	1 whole and 5 of 12 equal parts

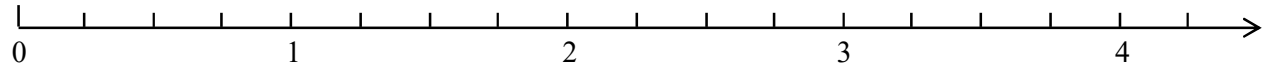
Decimals, Percentages and Ratios are dealt with in a different unit.

Number line

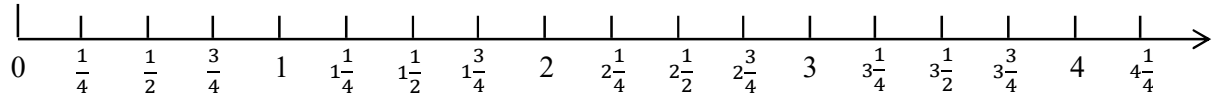
A Number Line showing fractions is drawn below. These number lines are difficult to construct and it is not advisable to get students to contruct their own. They should, however, be used for students to understand the relative size of each fraction. In the same way that fractions should be introcuced in groups of denominatotors the number line should be used accordingly.

Halves and quarters

You cand see 4 equal parts between the whole numbers. This number line shows that $\frac{1}{2}=\frac{2}{4}$.



Number line showing fractional parts. This number line also shows that $\frac{1}{2}=\frac{2}{4}$.



Comparing fractions - Greater Than and Less Than

- When comparing the size of fractions it is advised to convert the fractions to have the same denominator.
- Comparing the size of fractions is good to use for introducing the process for changing the denominator of fractions. This provides a simple exercise to practise the process.

Example	Notation	Notation
$\frac{1}{4}$ is less than $\frac{3}{4}$	$\frac{1}{4}<\frac{3}{4}$	1 share is less than 3 shares
$\frac{5}{8}$ is greater than $\frac{3}{8}$	$\frac{5}{8}>\frac{3}{8}$	5 shares is greater than 3 shares
$\frac{1}{3}$ is less than $\frac{1}{2}$	$\frac{1}{3}<\frac{1}{2}$	If a quantity is divided then 1 of 3 equal parts would clearly be less than 1 of 2 equal parts. Also, $\frac{1}{3}=\frac{2}{6}$ and $\frac{1}{2}=\frac{3}{6}$, and 2 shares is less than 3 shares

$\frac{1}{3}$ is greater than $\frac{1}{5}$	$\frac{1}{3} < \frac{1}{2}$	If a quantity is divided then 1 of 3 equal parts would clearly be greater than 1 of 5 equal parts. Also, $\frac{1}{3} = \frac{5}{15}$ and $\frac{1}{5} = \frac{3}{15}$, and 5 shares is greater than 3 shares

Lowest Common Denominator

The Lowest Common Denominator is the lowest common multiple of the denominators being considered. That is, it is the smallest number that all the denominators being compared will divide into wholly. Examples;

Denominators are relatively prime (There are no numbers that divide wholly into the denominators)		
$\frac{3}{4}$ and $\frac{2}{3}$	The denominators are 3 & 4 so 3 × 4 = 12. $\frac{3}{4}\ \frac{\times 3}{\times 3} = \frac{9}{12}$ and $\frac{2}{3}\ \frac{\times 4}{\times 4} = \frac{8}{12}$	$\frac{3}{4} > \frac{2}{3}$
$\frac{3}{4}$ and $\frac{4}{5}$	The denominators are 4 & 5 so 4 × 5 = 20. $\frac{3}{4}\ \frac{\times 5}{\times 5} = \frac{15}{20}$ and $\frac{4}{5}\ \frac{\times 4}{\times 4} = \frac{16}{20}$	$\frac{3}{4} < \frac{4}{5}$
Denominators have a common multiple that is less than their product.		
$\frac{3}{4}$ and $\frac{5}{6}$	The denominators are 4 & 6 so 4 × 6 = 24. However the LCD is 12. 12 ÷ 4 = 3 and hence $\frac{3}{4}\ \frac{\times 3}{\times 3} = \frac{9}{12}$ 12 ÷ 6 = 2 and hence $\frac{5}{6}\ \frac{\times 2}{\times 2} = \frac{10}{12}$	$\frac{3}{4} < \frac{5}{6}$
$\frac{3}{4}$ and $\frac{4}{5}$	The denominators are 4 & 6 so 4 × 6 = 24. However the LCD is 12. 12 ÷ 4 = 3 and hence $\frac{3}{4}\ \frac{\times 3}{\times 3} = \frac{9}{12}$ 12 ÷ 6 = 2 and hence $\frac{5}{6}\ \frac{\times 2}{\times 2} = \frac{10}{12}$	$\frac{3}{4} < \frac{4}{5}$

Comparing mixed numbers - Greater Than and Less Than

Different mixed numbers. If the whole number part of a mixed number is greater than the mixed number is greater, etc.		
$5\frac{1}{4}$ and $2\frac{3}{4}$	Since 5 > 2 then	$5\frac{1}{4} > 2\frac{3}{4}$
$2\frac{4}{5}$ and $3\frac{3}{5}$	Since 2 < 3 then	$2\frac{4}{5} < 3\frac{3}{5}$
Same whole number.		
$2\frac{3}{4}$ and $2\frac{5}{6}$	The denominators are 4 & 6 so 4 × 6 = 24. However the LCD is 12. 12 ÷ 4 = 3 and hence $\frac{3}{4}\ \frac{\times 3}{\times 3} = \frac{9}{12} \therefore 2\frac{3}{4} = 2\frac{9}{12}$ 12 ÷ 6 = 2 and hence $\frac{5}{6}\ \frac{\times 2}{\times 2} = \frac{10}{12} \therefore 2\frac{5}{6} = 2\frac{10}{12}$ **Note:** You may wish to convert each number to an improper fraction, although, this is really not necessary.	$2\frac{3}{4} < 2\frac{5}{6}$