Year 7 Knowledge Organisers

Spring Term 2

Fractions

Unit 10: Adding & Subtracting Fractions

Unit 11: Multiplying & Dividing Fractions

FRACTIONS...

Unit 10: Adding and Subtracting Fractions

What do I need to be able to do?

By the end of this unit you should be able to:

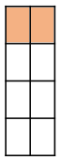
- Convert between mixed numbers and fractions
- Add/Subtract unit fractions (same denominator)
- Add/Subtract fractions (same denominator)
- Add/Subtract fractions from integers
- Use equivalent fractions
- Add/Subtract any fractions
- Add/Subtract improper fractions and mixed numbers
- Use fractions in algebraic contexts

Keywords

Numerator : the number above the line on a fraction. The top number. Represents how many parts are taken
Denominator: the number below the line on a fraction. The number represent the total number of parts
Equivalent: of equal value
Mixed numbers: a number with an integer and a proper fraction
Improper fractions: a fraction with a bigger numerator than denominator
Substitute: replace a variable with a numerical value
Place value: The value of a digit depending on its place in a number. Each place is 10 times bigger than the place to its right

Representing Fractions

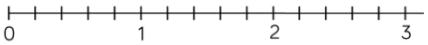
$\frac{1}{4}$ is represented in all the images



$1 \div 4$

Mixed numbers and fractions

$\frac{7}{5}$ Improper fraction



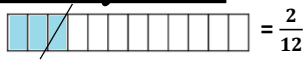
In this model 5 parts make up a whole

$1\frac{2}{5}$ Mixed number

Fractions can be bigger than a whole

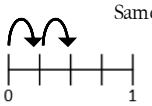
Add/Subtract unit fractions

$\frac{1}{12} + \frac{1}{12} - \frac{1}{12} = \frac{2}{12}$



Same denominator

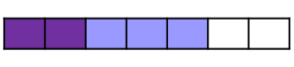
$\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$



With the same denominator ONLY the numerator is added or subtracted

Add/Subtract fractions

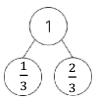
$\frac{2}{7} + \frac{3}{7} = \frac{5}{7}$



Same denominator

Sequences

$\frac{1}{3}, 1, 1\frac{2}{3}, 2\frac{1}{3}, 3, \ldots$



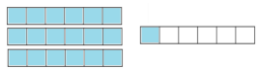
$+\frac{2}{3}$ $+\frac{2}{3}$

Represent this on a number line to help

Add/Subtract from integers

$1 - \frac{2}{6} = \frac{4}{6}$

$3 + \frac{1}{6} = 3\frac{1}{6}$

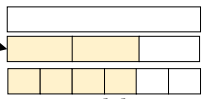


The denominator indicates the number of parts a whole is made up of

Equivalent fractions

$\frac{2}{3} = \frac{4}{6}$

$\frac{1}{3} = \frac{2}{6}$



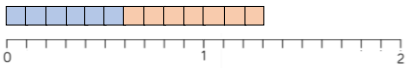
Numerator and denominator have the same multiplier

Add/Subtraction fractions (common multiples)

Addition/Subtraction needs a common denominator

$\frac{3}{5} + \frac{7}{10}$

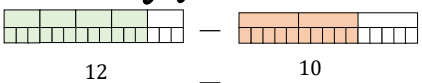
$\frac{6}{10} + \frac{7}{10}$



$\frac{13}{10}$

Add/Subtraction any fractions

$\frac{4}{5} - \frac{2}{3}$



$= \frac{2}{15}$

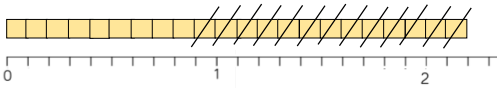
$\frac{12}{15} - \frac{10}{15}$

Use equivalent fractions to find a common multiple for both denominators

Add/Subtraction fractions (improper and mixed)

$2\frac{1}{5} - 1\frac{3}{10}$

$2\frac{2}{10}$



$\frac{22}{10} - \frac{13}{10} = \frac{9}{10}$

- Convert to an improper fraction
- Calculate with common denominator

Partitioning method

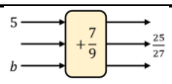
$2\frac{1}{5} - 1\frac{3}{10} = 2\frac{2}{10} - 1\frac{3}{10} = 2\frac{2}{10} - 1 - \frac{3}{10} = 1\frac{2}{10} - \frac{3}{10} = \frac{9}{10}$

Fractions in algebraic contexts

$k - \frac{5}{8} = 2$

Apply inverse operations

$k = 2 + \frac{5}{8}$



Form expressions with fractions

$b + \frac{7}{9}$ $b + \frac{7}{9}$

$p = 5 \quad m = 2$

$\frac{p}{8} + \frac{1}{m}$

Substitution

$\frac{5}{8} + \frac{1}{2}$

Fractions and decimals

$\frac{1}{10} = 0.1$

$\frac{1}{100} = 0.01$

Example

$\frac{6}{10} + 0.3$ → $0.6 + 0.3$

$\frac{6}{10} + \frac{3}{10}$

Remember to use equivalent fractions and common denominators

FRACTIONS...

Unit 11: Multiplying and Dividing Fractions

What do I need to be able to do?

By the end of this unit you should be able to:

- Carry out any multiplication or division using fractions and integers.
- Solutions can be modelled, described and reasoned

Keywords

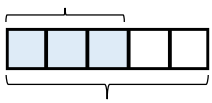
Numerator : the number above the line on a fraction. The top number.
Denominator: the number below the line on a fraction.
Whole: a positive number including zero without any decimal or fractional parts.
Commutative: an operation is commutative if changing the order does not change the result.
Unit Fraction: a fraction where the numerator is one
Non-unit Fraction: a fraction where the numerator is larger than one.
Dividend : the amount you want to divide up.
Divisor: the number that divides another number.
Quotient: the answer after we divide **dividend ÷ divisor = quotient**
Reciprocal: a pair of numbers that multiply together to give 1.

Representing a fraction

Numerator / Denominator

Number of parts represented
Numerator

$\frac{3}{5}$



Number of parts to make up the whole
Denominator

ALL PARTS of a fraction are of equal size

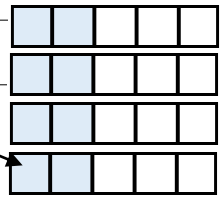
Repeated addition = multiplication by an integer

$4 \times \frac{2}{5} \rightarrow \frac{2}{5} + \frac{2}{5} + \frac{2}{5} + \frac{2}{5}$

When adding fractions with the same denominator = add the numerators

Integer (Whole number)

Each part represents $\frac{1}{5}$

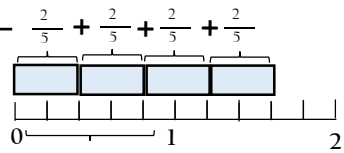


How many parts are shaded?

What each part represents

$= \frac{8}{5}$

$= 1\frac{3}{5}$



Each whole is split into the same number of parts as the denominator

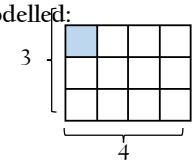
Multiplying unit fractions

$\frac{1}{4} \times \frac{1}{3} = \frac{1}{12}$

Parts shaded

Total number of parts in the diagram

Modelled:



Multiplying non-unit fractions

Shade in 3 parts

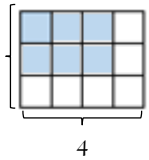
Repeat it on this many rows

$\frac{3}{4} \times \frac{2}{3}$

This many columns

This many rows

Modelled:



$\frac{3}{4} \times \frac{2}{3} = \frac{6}{12}$

Parts shaded

Total number of parts in the diagram

Quick Multiplying and Cancelling down

$\frac{\cancel{3}^{1}}{5} \times \frac{4}{\cancel{9}_{3}}$

The 3 and the 9 have a common factor and can be simplified

Quick Solving
Multiply the numerators
Multiply the denominators

$\frac{1 \times 4}{5 \times 3} = \frac{4}{15}$

The reciprocal

When you multiply a number by its reciprocal the answer is always 1

$3 \times \frac{1}{3} = 1$

$\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1$

The reciprocal of 3 is $\frac{1}{3}$ and vice versa

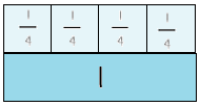
Reciprocals for division

e.g $5 \div \frac{1}{4} = 20$

$5 \times 4 = 20$

Multiplying by the reciprocal gives the same outcome

Dividing an integer by an unit fraction



$1 \div \frac{1}{4} = 4$

How many quarters are in 1?

"There are 4 quarters in 1 whole. Therefore, there are 20 quarters in 5 wholes"

$5 \div \frac{1}{4} = 20$

Dividing any fractions

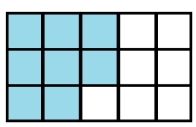
Remember to use reciprocals

$\frac{2}{5} \div \frac{3}{4}$

$\frac{2}{5} \times \frac{4}{3}$

Multiplying by a reciprocal gives the same outcome

Represented



$= \frac{8}{15}$