

Year 8 Maths - Autumn 2023



Proportional Reasoning 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. Represents how many parts are taken.

Denominator: the number below the line on a fraction. The number represents the total number of parts.

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 and denominator a positive integer.

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.

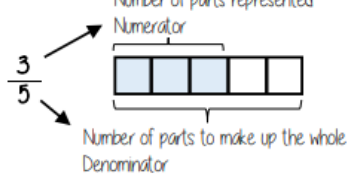
Quotient: the answer after we divide one number by another. e.g. dividend ÷ divisor = quotient

Reciprocal: a pair of numbers that multiply together to give 1.



Representing a fraction

Numerator
Denominator



ALL PARTS of a fraction are of equal size.

Repeated addition = multiplication by an integer

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

Integer (Whole number) How many parts are shaded? What each part represents

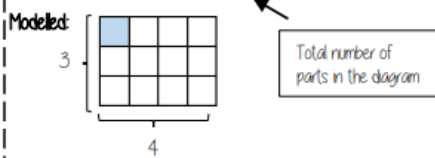
$= \frac{8}{5}$

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

Revisit
When adding fractions with the same denominator - add the numerators

Multiplying unit fractions

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



Multiplying non-unit fractions

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

Shade in 3 parts Repeat it on this many rows

This many columns This many rows

Modelled:

Parts shaded

Total number of parts in the diagram

Quick Multiplying and Cancelling down

$$\frac{1}{5} \times \frac{4}{9} = \frac{4}{45}$$

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

Quick Solving

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

Multiply the denominators

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

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

$5 \times 4 = 20$

Multiplying by a 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

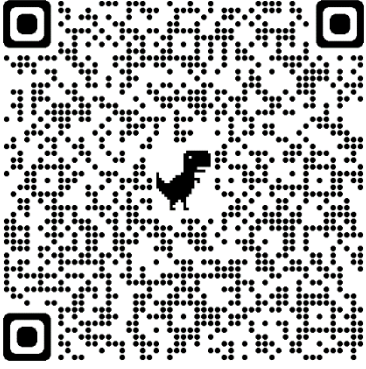
Remember to use reciprocals

$$\frac{2}{5} \div \frac{3}{4} = \frac{2}{5} \times \frac{4}{3} = \frac{8}{15}$$

Multiplying by a reciprocal gives the same outcome

Represented

$= \frac{8}{15}$



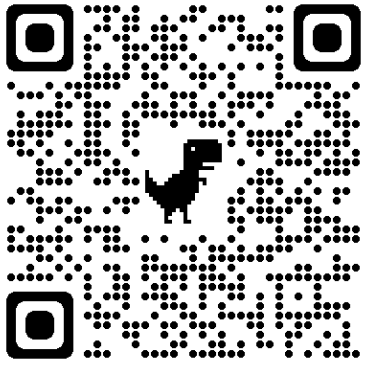
Multiply fractions by
an integer



Divide fractions by an
integer



How to multiply
fractions



How to divide
fractions