

Fraction of a given amount

Find $\frac{2}{5}$ of £205

The bar represents the whole amount

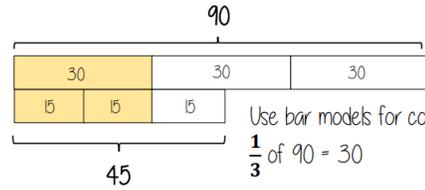


2 out of the 5 equal parts

$2 \times £41 = £82$

$£205 \div 5 = £41$

Each part of the bar model represents £41



Use bar models for comparisons

$\frac{1}{3}$ of 90 = 30

$\frac{2}{3}$ of 45 = 30

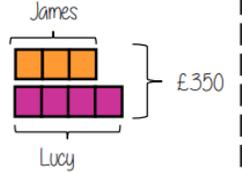
$\therefore \frac{1}{3}$ of 90 = $\frac{2}{3}$ of 45

Sharing a whole into a given ratio

James and Lucy share £350 in the ratio 3:4.
Work out how much each person earns

Model the Question

James: Lucy
3 : 4



Find the value of one part

Whole: £350

7 parts to share between
(3 James, 4 Lucy)

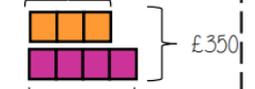
$£350 \div 7 = £50$

□ = one part = £50

Put back into the question

James: Lucy
(x50) 3 : 4 (x50)
£150 : £200

James = 3 x £50 = £150

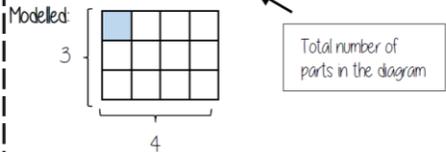


Lucy = 4 x £50 = £200

Multiplying unit fractions

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

Parts shaded

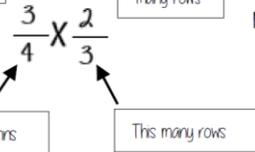


Total number of parts in the diagram

Multiplying non-unit fractions

Shade in 3 parts

Repeat it on this many rows

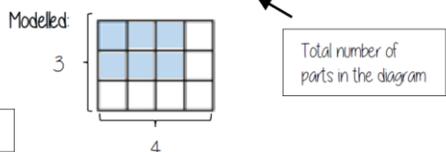


This many columns

This many rows

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

Parts shaded



Total number of parts in the diagram

Quick Multiplying and Cancelling down

$\frac{3}{5} \times \frac{4}{9}$

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

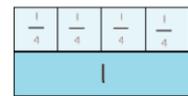
Reciprocals for division

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

$5 \times 4 = 20$

Multiplying by a reciprocal gives the same outcome

Dividing an integer by a 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

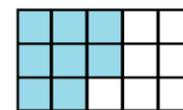
Remember to use reciprocals

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

Multiplying by a reciprocal gives the same outcome

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

Represented



$= \frac{8}{15}$

Add/Subtract unit fractions

Same denominator

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

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

With the same denominator ONLY the numerator is added or subtracted

Add/Subtract fractions

Same denominator

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

Sequences

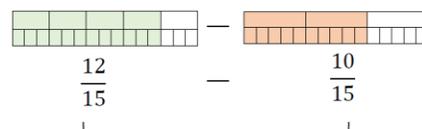
$\frac{1}{3}, 1, 1\frac{2}{3}, 2\frac{1}{3}, 3, \dots$



Represent this on a number line to help

Add/Subtraction any fractions

$\frac{4}{5} - \frac{2}{3} = \frac{2}{15}$

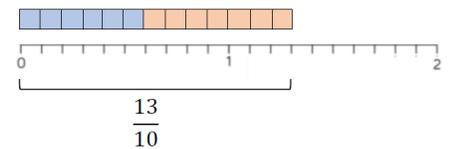


Use equivalent fractions to find a common multiple for both denominators

Add/Subtraction fractions (common multiples)

$\frac{3}{5} + \frac{7}{10}$
 $\frac{6}{10} + \frac{7}{10}$

Addition/Subtraction needs a common denominator



Add/Subtraction fractions (improper and mixed)

$2\frac{1}{5} - 1\frac{3}{10}$
 $2\frac{2}{10} - 1\frac{3}{10}$
 $\frac{22}{10} - \frac{13}{10} = \frac{9}{10}$

- Convert to an improper fraction
- Calculate with common denominator

Partitioning method

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

Percentage change

I bought a phone for £200. A year later sold it for £125

100%
£200
£125

Percentage loss
 $\frac{75}{200} \times 100 = 37.5\%$

All values of change compare to the ORIGINAL value

$\frac{\text{Difference in value}}{\text{Original value}} \times 100$

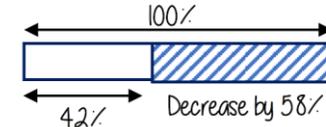
I bought a house for £180,000, I later sold it for £216,000

100%
£180,000

Percentage profit
 $\frac{36000}{180000} \times 100 = 20\%$

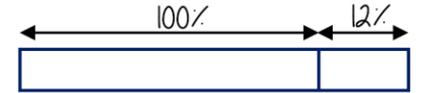
Money made (profit value)

Percentage decrease: Multipliers



$100\% - 58\% = 42\%$
 $100 - 0.58 = 0.42$ ← Multiplier Less than 1

Percentage increase: Multipliers

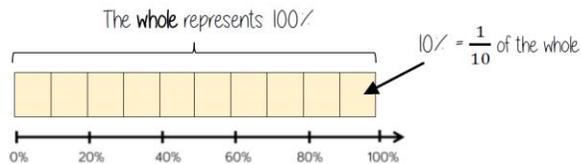


$100\% + 12\% = 112\%$
 $100 + 0.12 = 1.12$ ← Multiplier More than 1



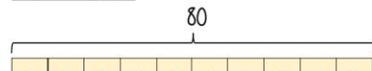
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Find the percentage of an amount (Mental methods)



$10\% = \frac{1}{10}$ of the whole $50\% = \frac{5}{10} = \frac{1}{2}$ of the whole
 $20\% = \frac{2}{10} = \frac{1}{5}$ of the whole $5\% = \frac{1}{20}$ of the whole

Find 65% of 80



Method 1
 $65\% = 10\% \times 6 + 5\%$
 $= (8 \times 6) + 4$
 $= 52$

Method 2
 $65\% = 50\% + 10\% + 5\%$
 $= 40 + 8 + 4$
 $= 52$

For bigger percentages it is sometimes easier to take away from 100%

Find the percentage of an amount (Calculator methods)



Using a multiplier

Find 65% of 80

$0.65 \times 80 = 52$

Fraction, decimal, percentage conversion

$65\% = \frac{65}{100} = 0.65$ ← The multiplier

Using the percent button

Find 65% of 80

Type 65

Press **SHIFT** **C** (%)

Press **×** 80 and then press =

This brings up the % button on screen. You will see 65%

You can also use the calculator to support non calculator methods and find 1% or 10% then add percentages together

"of" can represent 'x' in calculator methods

Simple Interest

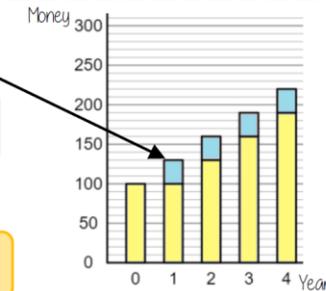
For each year of investment the interest remains the same

$\frac{\text{Principal amount} \times \text{Interest Rate} \times \text{Years}}{100}$

Principal amount is the amount invested in the account
e.g Invest £100 at 30% simple interest for 4 years

$\frac{100 \times 30 \times 4}{100} = £120$

This account earned £120 interest. At the end of year 4 they have £220



Compound Interest

Interest is added to the current value of investment at the end of each year so the next year's interest is greater.

$\text{Principal amount} \times \text{Multiplier}^{\text{Years}}$

e.g Invest £100 at 30% compound interest for 4 years

$100 \times 1.3^4 = £285.61$

This account has £285.61 in total at the end of the 4 years.

