# MATHS SPRING 1 KNOWLEDGE ORGANISERS

# Year 5 Unit 3 — Multiplication and Division A

| Product | The result when two numbers are multiplied. | $6 \times 3 = 18$ Factor Factor Product |
| --- | --- | --- |
| Factor | Numbers we can multiply together to get another number. | |
| Multiple | The result of multiplying a number by a positive whole number | 6, 12, 18, 20, 24 ..... are all multiples of 6 |
| Square Number | To square a number: just multiply it by itself. 4 squared is 4 × 4 = 16. Often shown with a little 2 in the corner like this: $4^2 = 16$ that is said "4 squared equals 16" | 4    $2^2$ or 2 x 2 = 4<br>9    $3^2$ or 3 x 3 = 9 |
| Cube Number | The result of using a whole number in a multiplication three times. | 5 x 5 x 5 = 125 so $5^3$ = 125 |
| Prime Numbers | A whole number greater than 1 that can not be made by multiplying other whole numbers. They only have 2 factors; one and themselves | prime number<br>1 2 3 4 5 6 7 8 9 10 |

## Multiplying by 10

| Th | H | T | O |
| --- | --- | --- | --- |
| | | 7 | 8 |

| Th | H | T | O |
| --- | --- | --- | --- |
| | 7 | 8 | 0 |

$78 \times 10 = 780$

| Th | H | T | O |
| --- | --- | --- | --- |
| 7 | 8 | 0 | 0 |

$78 \times 100 = 7,800$

## Prime numbers

2

- Integer
- Only has 2 factors
- and itself

The first prime number
The only even prime number

Learn or how-to quick recall...

2, 3, 5, 7 , 11, 13, 17, 19, 23, 29...

## Dividing by 10

| TTh | Th | H | T | O |
| --- | --- | --- | --- | --- |
| 4 | 7 | 0 | 0 | 0 |

| TTh | Th | H | T | O |
| --- | --- | --- | --- | --- |
| | 4 | 7 | 0 | 0 |

$47,000 \div 10 = 4,700$

| TTh | Th | H | T | O |
| --- | --- | --- | --- | --- |
| | | 4 | 7 | 0 |

$47,000 \div 100 = 470$

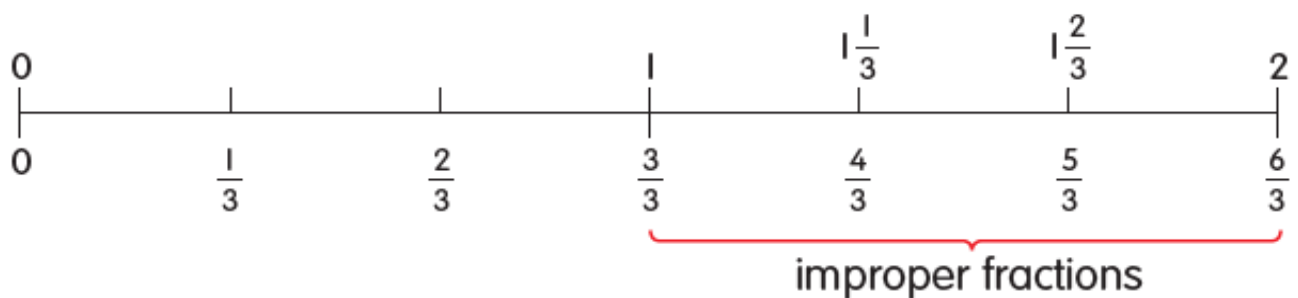| TTh | Th | H | T | O |
| --- | --- | --- | --- | --- |
| | | | 4 | 7 |

$47,000 \div 1,000 = 47$

# Year 5 Unit 4—Fractions

| Equivalence | Having the same value  | Improper Fraction | A fraction greater than one whole  $\frac{8}{5}$ |
|---|---|---|---|
| Proper Fraction | A fraction smaller than one whole  $\frac{2}{3}$   $\frac{3}{10}$ | Mixed Number | Written as a whole number and a proper fraction  $1\frac{3}{4}$   $\frac{7}{4}$ |



$\frac{3}{3}, \frac{4}{3}, \frac{5}{3}$ and $\frac{6}{3}$ are equal to or greater than 1.
They are called **improper fractions**.

## Equivalent Fractions

$\frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12}$
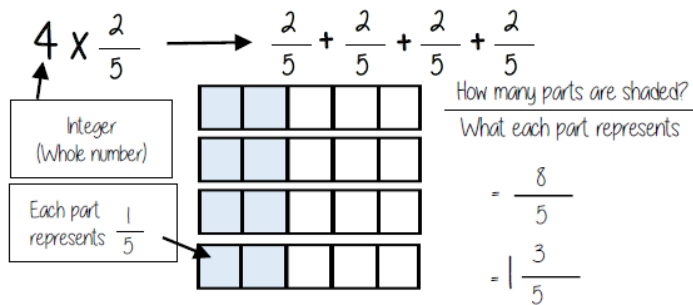


$\frac{6}{9}$

$\frac{8}{12}$



$\frac{1}{3} = \frac{2}{6}$  (×2)

Then add.

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

$= \frac{3}{6}$

$\frac{1}{2} = \frac{4}{8}$  (×4)

Then subtract.

$\frac{1}{2} - \frac{3}{8} = \frac{4}{8} - \frac{3}{8}$

$= \frac{1}{8}$
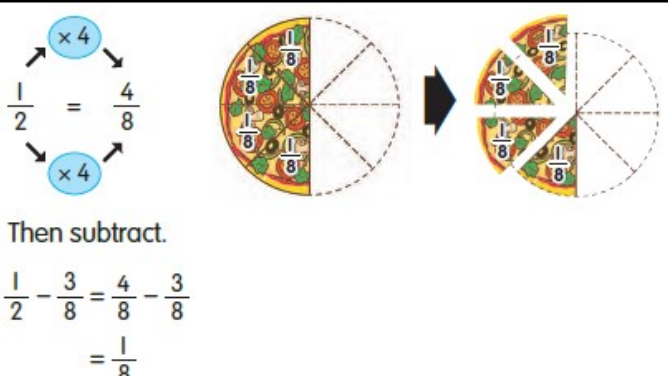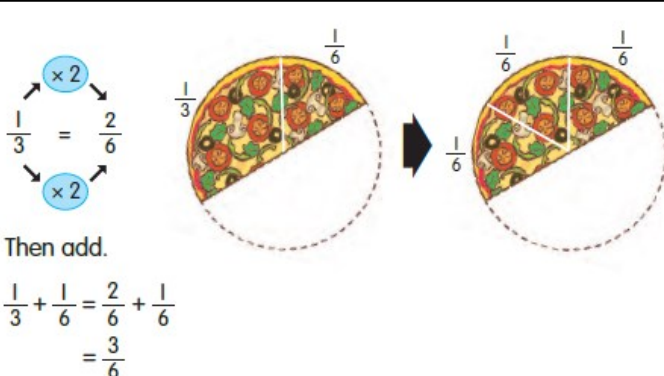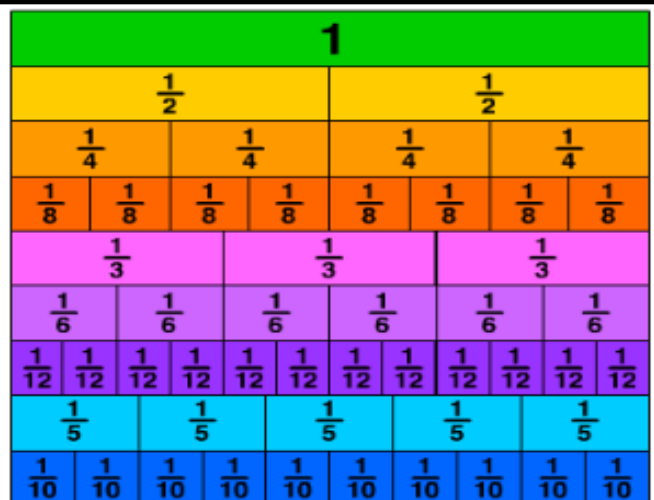
# Year 6  Unit 4
# Fractions B

## Multiplying by an integer=repeated addition

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

Integer (Whole number)

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

How many parts are shaded?
What each part represents

$= \frac{8}{5}$

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

## 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

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

Parts shaded

Total number of parts in the diagram

3

4

## Dividing a fraction by an integer

There is $\frac{9}{10}$ of a pizza left and we need to share it equally between 3 people.

As a fraction, how much pizza will each person receive?

$\frac{9}{10}$   $\frac{3}{10}$   $\frac{3}{10}$
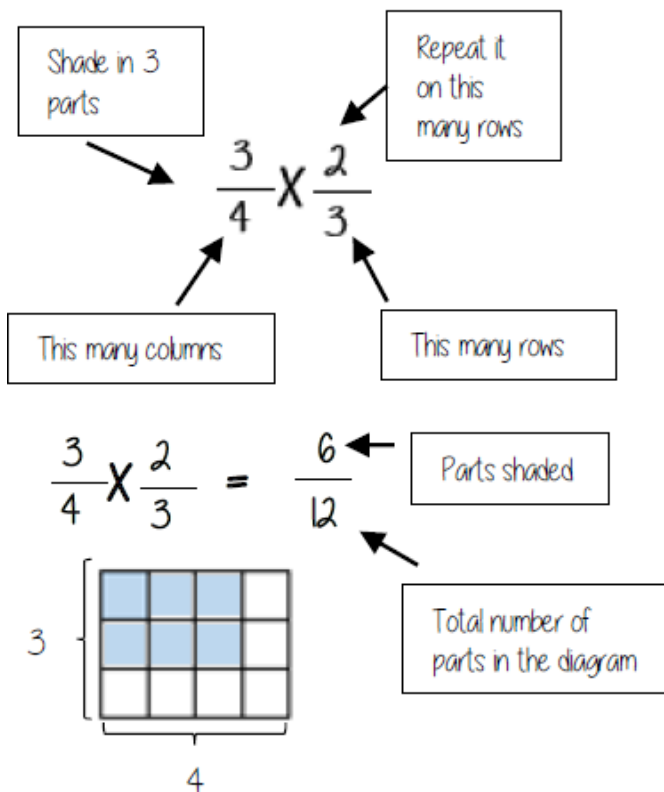
$\frac{3}{10}$
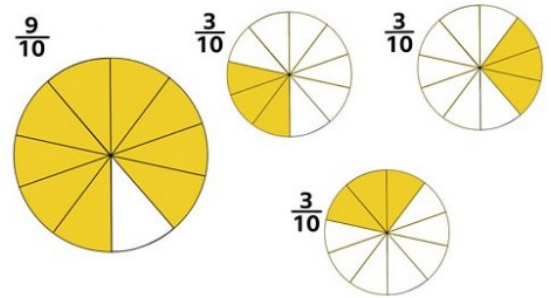
We started with $\frac{9}{10}$ and then shared out the $\frac{9}{10}$ to 3 people.

$9 \div 3 = 3$ so each person gets $\frac{3}{10}$

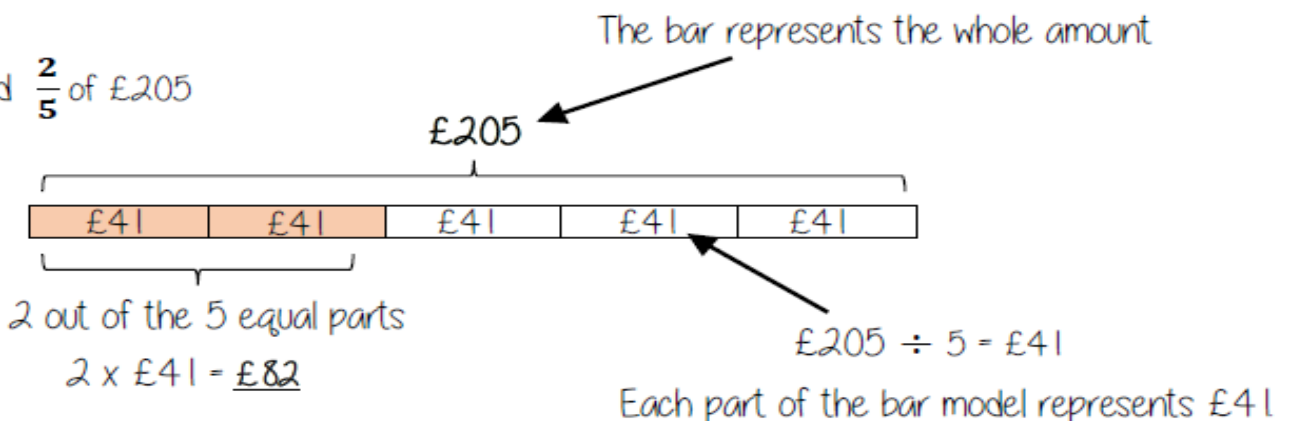Does $\frac{1}{2} \div 3$ really equal $\frac{1}{6}$ ?

| A Half: | Divided by 3: |
|---------|---------------|
|         | Answer: $\frac{1}{6}$ |

## Finding a fraction of a given amount

The bar represents the whole amount

Find $\frac{2}{5}$ of £205

£205

| £41 | £41 | £41 | £41 | £41 |

2 out of the 5 equal parts

2 x £41 = £82

£205 ÷ 5 = £41

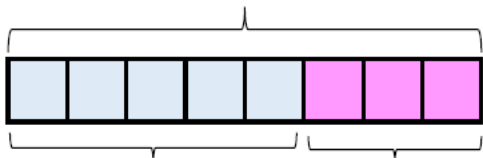Each part of the bar model represents £41

# Year 6 Unit 5 —Ratio

## What is a ratio?

For every 5 Blues there are 3 pinks

This is the 'whole' - blues and pinks together

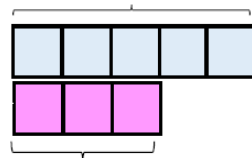This represents the 5 blues

5:3

This is the 'whole' - blues and pinks together

This represents the 5 blues    This represents the 3 pinks

This represents the 3 pinks

## Simplifying a ratio

Cancel down the ratio to its lowest form
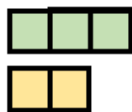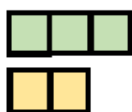
"For every 6 days of rain there are 4 days of sun"
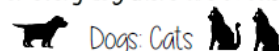
6:4

÷ by 2

3:2

rain        sun

Find the biggest common factor that goes into all parts of the ratio

For 6 and 4 the biggest factor (number that multiples into them is 2)

"For every 3 days of rain there are 2 days of sun" — when this happens twice the ratio becomes 6:4

## Order is important

"For every dog there are 2 cats"

Dogs: Cats

1:2

The ratio has to be written in the same order as the information is given

@whisto_maths

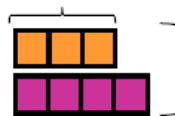## Dividing into a given ratio

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

**Model the Question**

James: Lucy

3 : 4

James

£350

Lucy

**Find the value of one part**

Whole: £350
7 parts to share between
(3 James, 4 Lucy)

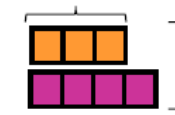£350 ÷ 7 = £50

☐ = one part
   = £50

**Put back into the question**

James: Lucy

(x 50  3 : 4  x 50)

£150:£200

James = 3 x £50 = £150

£350

Lucy = 4 x £50 = £200

## Ratio and fractions

Trees

Trees: Flowers

3 : 7
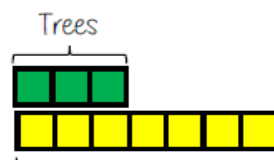
Flowers

Ratio

There are 3 parts for trees

Fraction of trees

$\dfrac{\text{Number of parts of in group}}{\text{Total number of parts}}$    $\dfrac{3}{10}$

Fraction

Tree parts 3 + Flower parts 7 = 10

**scale ratio of the size of shapes A and B**

1:1    1:2    1:3    1:4
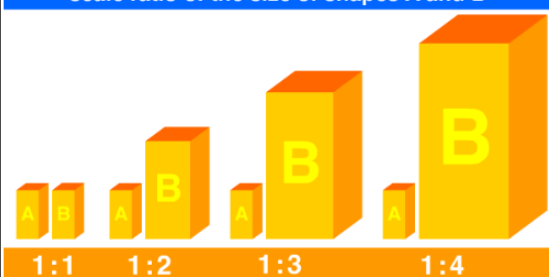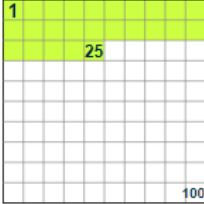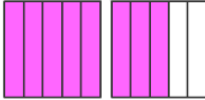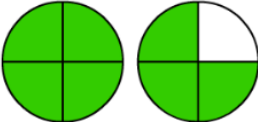
# Year 7 –Unit 5
# Fraction, Decimal and Percentage Equivalence

| Equivalence | Having the same value |  |
|---|---|---|
| Percentage | Percent come from the Latin term 'per centum' meaning per hundred. | Parts per 100<br><br>The symbol is %<br><br>Example: 25% means 25 per 100 (25% of this box is green) |
| Proper Fraction | A fraction smaller than one whole | $\frac{2}{3}$    $\frac{3}{10}$ |
| Improper Fraction | A fraction greater than one whole | $\frac{8}{5}$ |
| Mixed Number | A number written as a whole number and a proper fraction | $1\frac{3}{4}$   $\frac{7}{4}$ |



| | | |
|---|---|---|
| 1 | 1·0 | 100% |
| $\frac{3}{4}$ | 0·75 | 75% |
| $\frac{2}{3}$ | 0·$\dot{6}$ | 66⅔% |
| $\frac{1}{2}$ | 0·5 | 50% |
| $\frac{1}{3}$ | 0·$\dot{3}$ | 33⅓% |
| $\frac{1}{4}$ | 0·25 | 25% |
| $\frac{1}{5}$ | 0·2 | 20% |
| $\frac{1}{8}$ | 0·125 | 12½% |
| $\frac{1}{10}$ | 0·1 | 10% |
| $\frac{1}{100}$ | 0·01 | 1% |
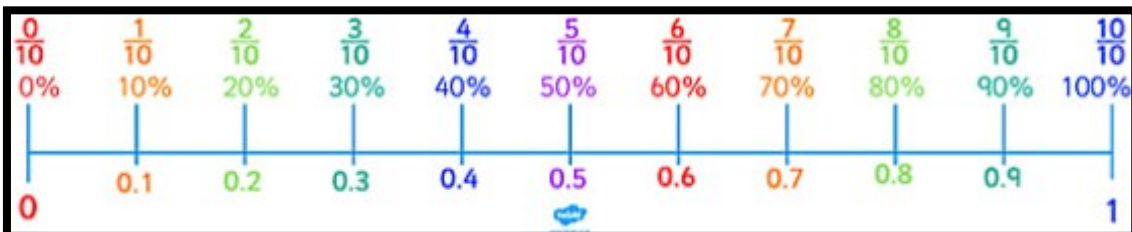
Thousands | Hundreds | Tens | Ones | Decimal Point | Tenths | Hundredths | Thousandths

# Year 7 Unit 6
# Applying Addition and Subtraction

| | | |
|---|---|---|
| Addition | The joining of two or more numbers or quantities. | In addition two or more numbers are joined to get one number which is the sum or the total . |
| Sum    Total | The result of adding; the whole amount | |
| Subtraction | When one quantity is taken away from another | 80 subtract 30 is 50. The difference between 80 and 30 is 50 |
| Difference | The result of subtracting one number from another | |
| Commutative | Numbers can be added in any order, but in subtraction the order is important. | $a + b = b + a$ $6 + 2 = 8$ or $2 + 6 = 8$ |
| Associative | In addition, no matter how numbers are grouped, the answers will be same. | $(6 + 3) + 4$   =   $6 + (3 + 4)$ |
| Inverse | The reverse or opposite of an operation. | $4 + 2 = 6$ $2 + 4 = 6$   $6 - 4 = 2$ $6 - 2 = 4$ |
| Perimeter | The distance around a polygon. | Perimeter = 2L + 2W Same as:  L + L + W +W |
| Profit | Profit occurs when an item is sold for more than it cost to purchase. | Bakery Income   Expenses   Profit |
| Loss | Loss occurs when an item is sold for less than it cost to purchase. | |

## Addition and Subtraction

@whisto_maths
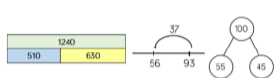
Modelling methods for addition/ subtraction
- Bar models
- Number lines
- Part/ Whole diagrams

Addition is commutative

$6 + 3 = 3 + 6$

The order of addition does not change the result

Subtraction the order has to stay the same

$360 – 147 = 360 – 100 – 40 – 7$

- Number lines help for addition and subtraction
- Working in 10's first aids mental addition/ subtraction
- Show your relationships by writing fact families

Formal written methods

| | H | T | O |
|---|---|---|---|
| | | 1 | 8 | 7 |
| + | 5 | 4 | 2 |
| | | | |

| | H | T | O |
|---|---|---|---|
| | 4 | 2 | 7 |
| − | 2 | 4 | 9 |
| | | | |

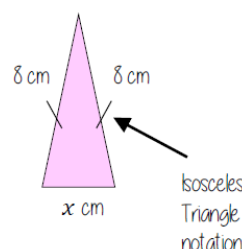Remember the place value of each column. You may need to move 10 ones to the ones column to be able to subtract

## Addition and Subtraction of decimals

| 4 | . | 3 | 8 | |
|---|---|---|---|---|
| 7 | . | 9 | 0 | + |

0 can be used to fill empty places with value

The decimal place acts as the placeholder and aligns the other values

## Perimeter problems

Perimeter is the length around the outside of a polygon

8 cm    8 cm

$x$ cm

Isosceles Triangle notation

The triangle has a perimeter of 25cm Find the length of $x$

$8cm + 8cm + xcm = 25cm$
$16cm + xcm = 25cm$
$xcm = 9cm$

# Year 8 Unit 7—Ratio and Scale

## What is a ratio?

"For every 5 boys there are 3 girls"

This is the "whole" — boys and girls together

This represents the 5 boys    This represents the 3 girls

5:3

This represents the 5 boys

This represents the 3 girls

This is the "whole" — boys and girls together

## Simplifying a ratio

Cancel down the ratio to its lowest form

"For every 6 days of rain there are 4 days of sun"

6:4

÷ by 2

3:2

rain    sun

Find the biggest common factor that goes into all parts of the ratio

For 6 and 4 the biggest factor (number that multiples into them is 2)

"For every 3 days of rain there are 2 days of sun" – when this happens twice the ratio becomes 6:4

## Writing a ratio in form 1:n
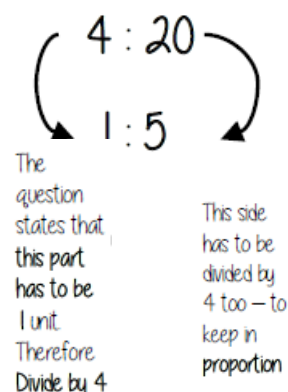
4 : 20

1 : 5

The question states that this part has to be 1 unit Therefore Divide by 4

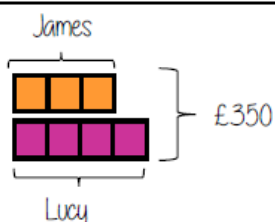This side has to be divided by 4 too – to keep in proportion

## Dividing 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

James: Lucy

3 : 4

£350

Lucy

**Find the value of one part**

Whole: £350
7 parts to share between
(3 James, 4 Lucy)

£350 ÷ 7 = £50

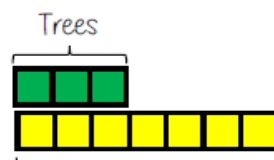☐ = one part
 = £50

**Put back into the question**

James = 3 x £50 = £150

James: Lucy

$\left( \text{x 50} \; 3 : 4 \; \text{x 50} \right)$

£150:£200

£350

Lucy = 4 x £50 = £200
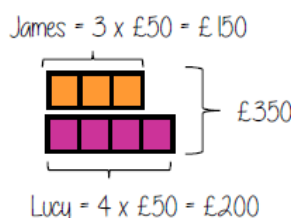
## Ratio and fractions

Trees: Flowers

3 : 7

Trees

Flowers

Ratio

There are 3 parts for trees

Number of parts of in group
———————————————
Total number of parts

Fraction of trees

$\frac{3}{10}$

Fraction

Tree parts 3 + Flower parts 7 = 10

## Order is important

"For every dog there are 2 cats"

Dogs: Cats

1:2

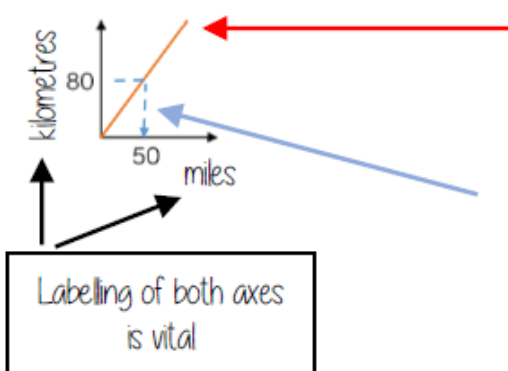The ratio has to be written in the same order as the information is given

@whisto_maths

# Year 8 Unit 8 Multiplicative Change

| Proportion | A statement that links two ratios |
|---|---|
| Variable | A part where the value can be changed |
| Scale Factor | The multiple that increases or decreases a shape in size |
| Conversion | The process of changing one variable to another |

## Conversion Graphs



This is always a straight line because as one variable increases so does the other at the same rate

Labelling of both axes is vital

To make conversions between units you need to find the point to compare – then find the associated point by using your graph
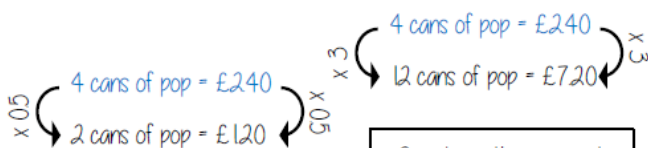Using a ruler helps for accuracy
Showing your conversion lines help as a "check" for solutions

## Direct Proportion

As one variable changes the other changes at the same rate

4 cans of pop = £240

4 cans of pop = £240
×0.5 ⤵ 2 cans of pop = £120 ×0.5

4 cans of pop = £240
×3 ⤵ 12 cans of pop = £720 ×3

This multiplier is the same In the same way that this would be for ratio

Sometimes this is easiest if you work out how much one unit is worth first
e.g. 1 can of pop = £0.60

## Ratio in similar shapes



Angles in similar shapes do not change. e.g. if a triangle gets bigger the angles can not go above 180°

The two rectangles are similar.
3 m      4.5 m
8 m       ? m
Corresponding sides

÷3 ⤵ 3m : 4.5m / 1m : 1.5 m ÷3

×8 ⤵ 8m : 12m / 1m : 1.5 m ×8

@whisto_maths

## Interpreting Scale Drawings

A picture of a car is drawn with a scale of 1:30

For every 1cm on my image is 30cm in real life

The car image is 10cm

Image : Real life
÷10 ⤵ 1cm : 30cm / 10cm : 300cm ×10

The car in real life is 210cm

Image : Real life
÷7 ⤵ 1cm : 30cm / 7cm : 210 cm ×7