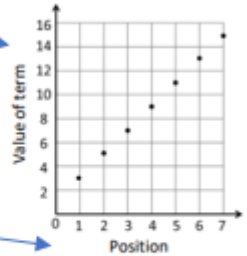
KNOWLEDGE ORGANISER: Year 7 Unit 1 - Sequences

Name	Definition	Example	Non-example
Term	a single number or variable, or numbers and variables multiplied together	5 a 5g d^2 c^3 $3a^4$ -5r	5+12 2a+3 $6-4x^2$ 17-2r
Pattern	A series of terms, objects or colours that repeat themselves	a, b, c, a, b, c, a, b, c… 1, 2, 1, 2, 1, 2, 1, 2… m, t, w, t, f, s, s, m, t, w, t, f, s, s…	1, 2, 3, 4, 5… (π) 3.141519… $\sqrt{2}$ = 1.41421…
Sequence	A succession of terms generated by following a rule	1, 3, 5, 7, 9… 2, 4, 6, 8, 10… 1, 4, 9, 16, 25, 36…	1, 2, 3, 1, 2, 3, 1, 2, 3… Red, blue, red, blue…
Position	Where a number is in the sequence	In the sequence 5, 10, 15, 20, 25… The first (1st) number/position is 5 The fourth (4th) number/position is 20	
Common Difference Or Term-to-term rule	The difference between any two consecutive terms in a sequence	The common difference of 1, 4, 7, 10 is 3	1, 4, 5, 8, 9, 12, 13… has no common difference
General Rule Or n^{th} term	An algebraic expression giving the rule to find any number in the sequence	The nth term of 3, 7, 11, 15 is 4n-1	1, 4, 5, 8, 9, 12, 13… add three then add 1 is not a general rule
Linear Or Arithmetic	A sequence that has a constant common difference	3, 6, 9, 12, 15 is an arithmetic/linear sequence as it goes up by 3 every time 100, 95, 90, 85 is an arithmetic/linear sequence as it decreases by 5 every time	
Non-linear	A sequence that does not have a constant term-to-term rule, including quadratic, Fibonacci and geometric sequences	2, 8, 18, 32, 50… 2, 5, 7, 12, 19, 31… 3, 12, 48, 192…	See linear examples
Ascending	A set of numbers that increase in size	1, 2, 3, 4, 5…	-1, 0, 1, 0, -1, 0, 1…
Descending	A set of numbers that decrease in size	5, 1, -3, -7…	10, 9, 8, 7, 8, 9
Fibonacci	A sequence where the next term is generated by adding the previous two terms together	1, 1, 2, 3, 5, 8, 13 The next term will be 21, because 8+13=21	1, 2, 2, 4, 8, 32
Geometric	A sequence where the term-to-term rule involves multiplying or dividing by the same number each time	1, 3, 9, 27, 81… each term is multiplied by 3 to get the next term 100, 50, 25, 12.5… each term is divided by 2 to get the next term	
Quadratic	A sequence where the second common difference is always the same	1, 4, 9, 16, 25… the sequence +3 +5 +7 +9 first differences +2 +2 +2 second differences	

KNOWLEDGE ORGANISER: Year 7 Unit 2 – Understanding and using algebraic notation

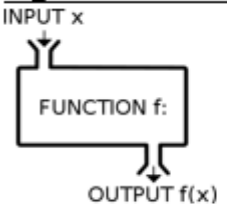
Vertical axis is called the y-axis

Horizontal axis is called the x-axis



"**Ascending**" means to go up
"**Descending**" means to go down

Algebraic Notation 1

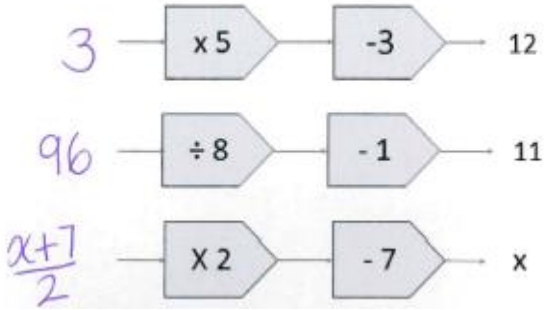


A "**Function**" machine takes an **input**, applies a rule(operation) then delivers an answer, **output**.

The four basic **operations** are + - x ÷

Finding the INPUT

2. Find the missing inputs for these function machines

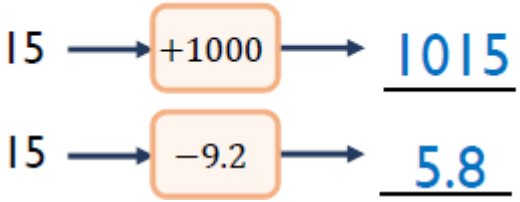


Linear functions result in a straight line graph

Linear

Two step function machine has two operations

Find the output in each of these function machin when the input is 15



Sequences

Sequence:

3, 5, 7, 9, ...

1st term, 2nd term, 3rd term, 4th term

three dots means goes on forever (infinite)

A "**Sequence**" is a succession of terms formed according to a rule

"**Terms**" are the numbers in a sequence

Substitution:

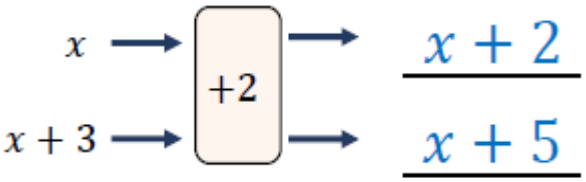
- Replace letters with values
- Always apply BIDMAS
- Use brackets for powers
- Fractions? Work out the top and bottom separately.

If p = 5, What is the value of 2p + 9?

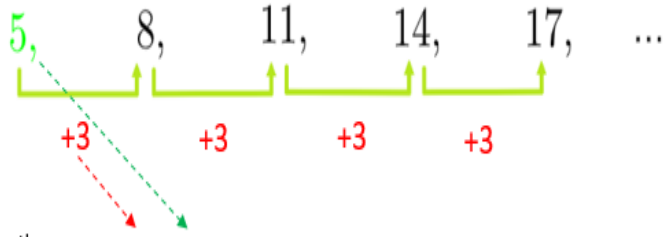
ANSWER-

2 X 5 + 9 = 19

Algebra and function machines



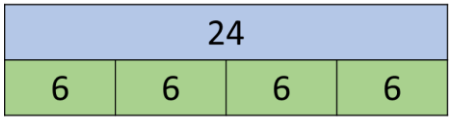
Find the nth term of the linear sequence: 8, 11, 14, 17, ...



n^{th} term = 3n + 5

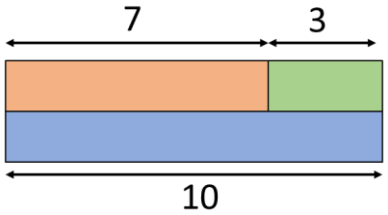
KNOWLEDGE ORGANISER: Year 7 Unit 3 – Equality & Equivalence

Bar Models and Fact Families



Fact family for this bar model:

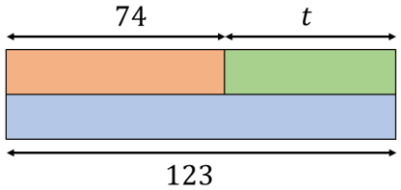
$6 \times 4 = 24 \quad 24 = 6 \times 4$
$4 \times 6 = 24 \quad 24 = 4 \times 6$
$24 \div 4 = 6 \quad 6 = 24 \div 4$



Fact family for this bar model:

$7 + 3 = 10 \quad 10 = 7 + 3$
$3 + 7 = 10 \quad 10 = 3 + 7$
$10 - 7 = 3 \quad 3 = 10 - 7$
$10 - 3 = 7 \quad 7 = 10 - 3$

Equations



Ellie thinks of a number.
She adds 15.
The answer is 87.

The bar model shows this equation:

$$74 + t = 123$$

The solution is:

This can be written as an equation:

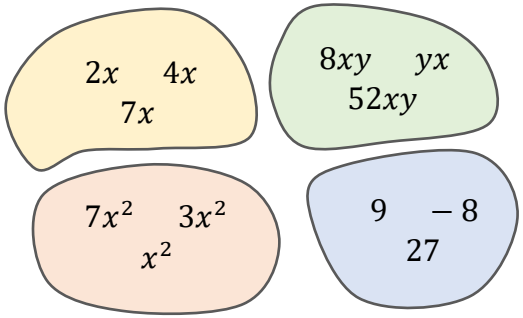
$$n + 15 = 87$$

Like terms

Each group contains related terms – **like terms**.

Can you see which group each of these terms would go in:

$5x \quad 3xy \quad x$



KEY WORDS & DEFINITIONS

equality, equals, equal to	The same. eg. $16 - 3 = 13,\ 5 + 6 = 8 + 3$
equation	A fact which can be solved to find a mystery number e.g. $x + 5 = 9$ has solution $x = 4$
fact family	A group of connected number facts e.g. 5 + 3 = 8 and 8 – 3 = 5 are connected.
like terms	Terms that are the same type. e.g. 5a and 3a, 9 and 7, $3x^2$ and $4x^2$
substitute	replace the letter with a number e.g. if $g = 5$ then $2g = 2 \times 5 = 10$
identity	A mathematical statement that is *always* true. e.g. $5x + 2x = 7x$ is true whatever value x has. We often use this special symbol for an identity: ≡
simplify	Write in the simplest possible way e.g. $h + h + h$ can be simplified to $3h$

Collecting like terms

Expressions can be simplified by collecting like terms together. Here are some examples:

$$a + a + a + a = 4a$$

$$2a + a + 3b + b = 3a + 4b$$
$$5x + 7x - 2x = 10x$$
$$2h + 5 + h + 6 = 3h + 11$$
$$3p^2 + 4p - p^2 = 2p^2 + 4p$$

Substitution

The letter (unknown) is replaced with a value.

e.g. if $k = 3$ then:

$$k + 5 = 3 + 5 = 8$$
$$2k = 2 \times 3 = 6$$
$$10 - k = 10 - 3 = 7$$
$$k^2 = 3^2 = 3 \times 3 = 9$$

YEAR 7 POWER PACK 1

KNOWLEDGE IS POWER!

Seven times tables

1 x 7 = 7
2 x 7 = 14
3 x 7 = 21
4 x 7 = 28
5 x 7 = 35
6 x 7 = 42
7 x 7 = 49
8 x 7 = 56
9 x 7 = 63
10 x 7 = 70
11 x 7 = 77
12 x 7 = 84

Sequences

A "**Sequence**" is a succession of terms formed according to a rule

"**Terms**" are the numbers in a sequence

"**Term to term rule"** lets you find the next term in a sequence if you know the previous term

"**Difference**" is the numerical difference between two numbers

e.g. difference in between 8 and 5 is 8 – 5= 3

A **linear sequence (arithmetic sequence)** is a number pattern which increases (or decreases) by the same amount each time. The amount it increases or decreases by is known as the **common difference.**

A **non-linear sequence** is a number pattern which does not increases (or decreases) by the same amount .

Geometric sequences multiply (or divide) by the same value each time.

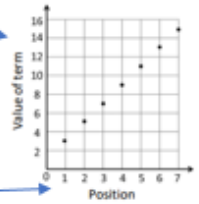
Fibonacci sequences are formed by adding the previous two terms.

"**Ascending**" means to go up

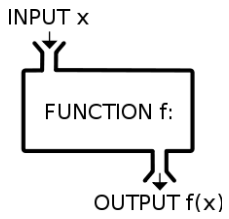
"**Descending**" means to go down

Vertical axis is called the y-axis

Horizontal axis is called the x-axis



Algebraic Notation 1



A "**Function**" machine takes an **input**, applies a rule(operation) then delivers an answer, **output**.

The four basic **operations** are + - x ÷

To **square** a number is to multiply a number by itself e.g. The square of 5 is $5\times5 = 5^2 = 25$

Inverse operations are the opposite operations e.g. the inverse of multiplication is division

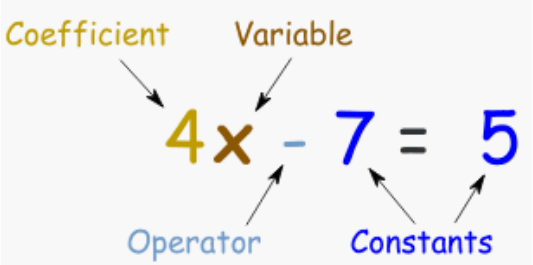
"Expressions" are made up of terms which may include letters, number and operators

e.g. ab^2, ab + 5 and 4d -5

Variable is a quantity that can take on a range of values, often denoted by a letter, x, y etc.

Coefficient is the number in front of a variable

Constant is a number or quantity that does not vary



Algebraic Notation 2

Commutative is where a calculation can be done in any order to give the same result
e.g. 5 x 4 = 4 x 5 6 + 3 = 3 + 6

Substitute is where we replace a letter with a number.
Evaluate means to calculate the value of.
e.g. if y = 7 evaluate 5y . Answer 5 x 7 = 35

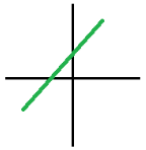
Brackets are used in pairs to group things together e.g. 2(x + 1) is two lots of x + 1

Equation is a statement that two things are equal, it contains expressions on both sides of the equal sign. e.g. 5 = 2x + 1

Two step function machine has two operations

Consecutive numbers are numbers which follow in order without gaps. e.g. 12, 13, 14…

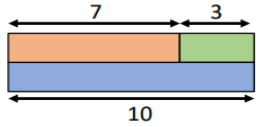
Linear functions result in a straight line graph



Equality and Equivalence

Equality means having the same value
e.g. 1minute = 60 seconds

Fact families are a group of maths facts using the same numbers



7 + 3 = 10
7 = 10 – 3
10 – 7 = 3

Unknown is another word for a variable, a value we don't know yet. The Unknown has one distinct value

When we **solve** an equation we find the value of the unknown
e.g. solve x + 5 = 8 answer x = 3
In the above example x = 3 is the **solution** (answer)

We solve equations by doing the **inverse** operation

Terms in algebra are single numbers, variables or product of several numbers and variables

Product is the result when you multiply one number by another. Product of 4 and x is 4x.

Equality and Equivalence 2

Like terms contain the same variable
e.g. 4a and -2a or 8 and 13 or $9m^2$ and $3m^2$
Unlike terms do not contain the same variable e.g. 4y and 3x are unlike terms

Equivalent ≡ means of equal value
e.g. 2x + 3x ≡ 5x is true for all values of x

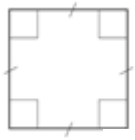
We can **simplify** an expression by **collecting** like terms. e.g. 7a + 5b – 2a + b ≡5a + 6b

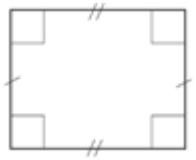
A mathematical **convention** is an agreed way of doing something in maths e.g. we write 3 × y as 3y not y3

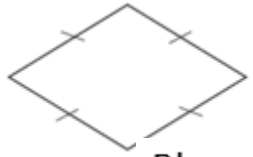
The **Index** of a number tells you how many times to multiply the number by itself
e.g. y^3 means $y \times y \times y$.
We say y^3 as "y to the power of 3" or y cubed

m^2 Index

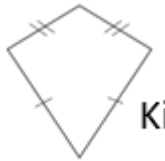
Indices is the plural of index

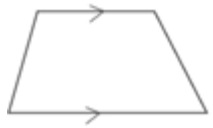

Square


Rectangle

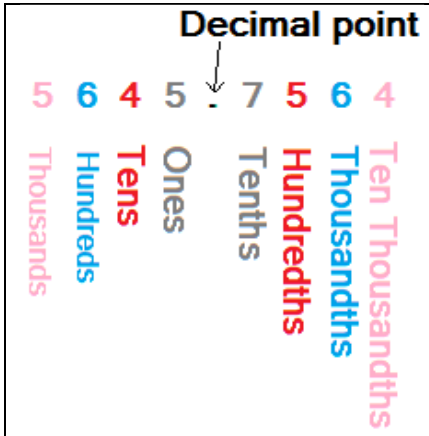

Rhombus


Parallelogram


Kite


Trapezium

KNOWLEDGE ORGANISER: Year 7 Unit 4 – Place value and ordering



Place value

10 000	1000	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$

Multiplying

X 10 digits move LEFT **1** space
X 100 digits move LEFT **2** spaces
X 1000 digits move LEFT **3** spaces

Dividing

÷ 10 digits move RIGHT **1** space
÷ 100 digits move RIGHT **2** spaces
÷ 1000 digits move RIGHT **3** spaces

Multiplying/Dividing by powers of 10

3.4×100

100	10	1	$\frac{1}{10}$
		3	4
3	4	0	

Integer: a whole number e.g. 5, -2, 300

Decimal: A number that contains a point.

Ascending: From smallest to biggest

Descending: From biggest to smallest

Multiplying and Dividing by powers of 10. e.g. 67 x 10 = 670

7600 ÷ 1000 = 7.6

When you multiply by a number less than one, the number gets smaller. e.g. 8 x 0.5 = 4

1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
0	3	4	

$= \frac{34}{100}$

Ordering Decimals

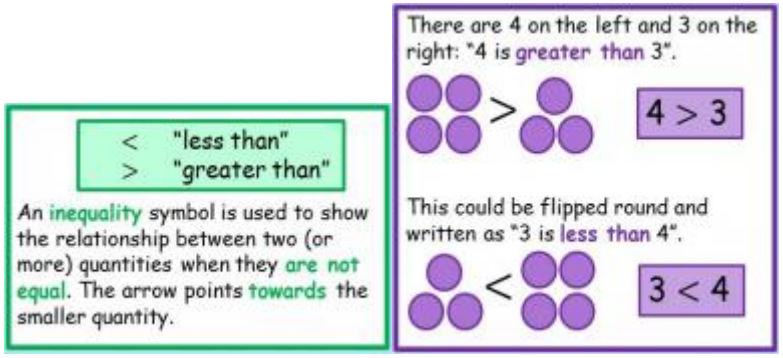
0.3, 0.21, 0.305, 0.38, 0.209

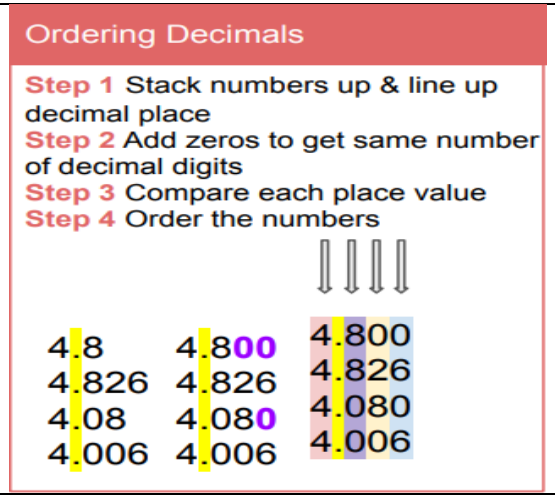
Add zero's so that they all have the same number of decimal places.

0.300, 0.210, 0.305, 0.380, 0.209

Then they can be placed in order:

0.209, 0.21, 0.3, 0.305, 0.38





YEAR 7 – PLACE VALUE AND PROPORTION...

FDP equivalence

What do I need to be able to do?

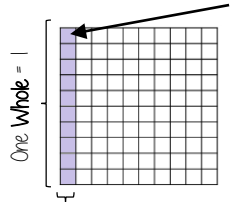
By the end of this unit you should be able to:

- Convert fluently between fractions, decimals & percentages

Keywords

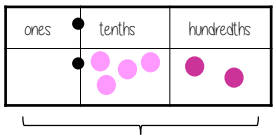
Fraction: how many parts of a whole we have
Decimal: a number with a decimal point used to separate ones, tenths, hundredths etc.
Percentage: a proportion of a whole represented as a number between 0 and 100
Place value: the numerical value that a digit has decided by its position in the number
Placeholder: a number that occupies a position to give value
Interval: a range between two numbers
Tenth: one whole split into 10 equal parts
Hundredth: one whole split into 100 equal parts
Sector: a part of a circle between two radius (often referred to as looking like a piece of pie)
Recurring: a decimal that repeats in a given pattern

Tenths and hundredths



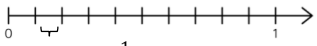
One **hundredth** (one whole split into 100 equal parts) = $\frac{1}{100}$ = 0.01

One **tenth** (one whole split into 10 equal parts) = $\frac{1}{10}$ = 0.1



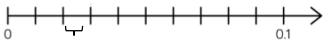
0 ones, 5 tenth and 2 hundredths
0 + 0.1 + 0.1 + 0.1 + 0.1 + 0.1 + 0.01 + 0.01
= 0 + 0.5 + 0.02
= **0.52**

On a number line



One whole – split into 10 equal parts

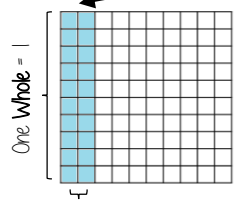
One tenth = $\frac{1}{10}$ = 0.1

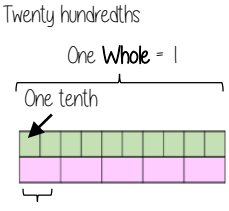


One tenth – split into 10 equal parts

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

Fifths



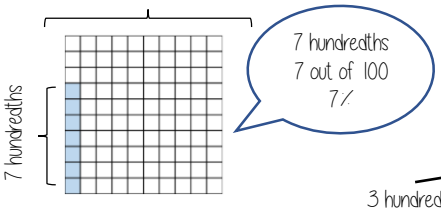


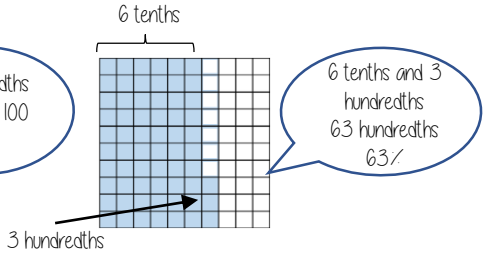
Two tenths = one fifth

One **fifth** (one whole split into 5 equal parts) = $\frac{1}{5}$ = 0.2

Percentages on a hundred grid

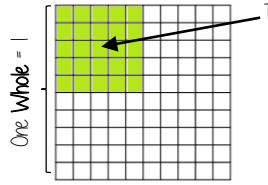
100% = a whole = 100 hundredths

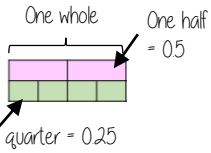




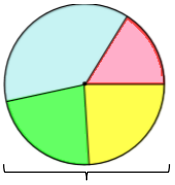
Quarters

One **quarter** (one whole split into 4 equal parts) = $\frac{1}{4}$ = 0.25





Simple pie charts



A pie chart has 360° so all FDP calculations are out of 360

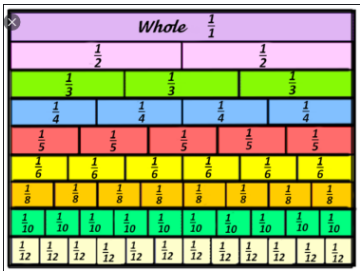
Split into 10 parts = 10% = 36°

Split into 2 parts = 50% = 180°

Split into 5 parts = 20% = 76°

Equivalent fractions

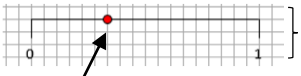
Represent equivalence with fraction walls



Fractions – on a diagram

The denominator is represented by EQUALLY sized parts – this is split into quarters

Fractions – on a number line

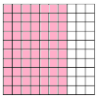


One whole split into 18 equal parts
18 is the **denominator**

This point is at the 6th part
6 is the **numerator**

$\frac{6}{18} \leftarrow \frac{3}{9} \leftarrow \frac{1}{3}$

Convert FDP

$\frac{70}{100}$ → This also means 70 ÷ 100 → 70 out of 100 squares → 70 "hundredths" = 7 "tenths" 0.7 →  → 70 hundredths = 70%

Using a **calculator**

→ S⇔D → Convert to a decimal

This will give you the answer in the simplest form

→ × 100 converts to a percentage

Be careful of recurring decimals

eg $\frac{1}{3}$ = 0.3333333 = $0.\dot{3}$

The dot above the 3

YEAR 7 POWER PACK 2

KNOWLEDGE IS POWER!

Six times tables

1 x 6 = 6
2 x 6 = 12
3 x 6 = 18
4 x 6 = 24
5 x 6 = 30
6 x 6 = 36
7 x 6 = 42
8 x 6 = 48
9 x 6 = 54
10 x 6 = 60
11 x 6= 66
12 x 6 = 72

Digit is one of the symbols from 0,1,2,3,4,5,6,7,8,9.

Integers are whole numbers, e.g. 4, 270, -6. They are not decimals or fractions.

Place Value is the value of the digit that is related to it's position on a number line.

Place Holder The zero number is used as a place holder to show that a place value is zero. E.g. 502 without a place holder to show there are no tens would be mistaken for 52.

Billion = 1 000 000 000

Intervals are **spaces** on a number line which are split through **equal division.**

Round is when we write a number to a required degree of accuracy e.g. 543 rounded to the nearest 10 is 540. The **convention** in Maths is to round up if we are **halfway** e.g. 25 to the nearest 10 is 30 because 25 is halfway between 20 and 30.

Convention means a way in which something is usually done.

Approximate is a number that is not exact but close to the actual number for it to be useful.

= Equal
≠ Not equal
> Greater than
≥ Greater than or equal to
< Less than
≤ Less than or equal to
≡ Identical to

Leading digit is the first digit in a number e.g. the number 3042 has the leading digit of 3.

One significant figure means have just one leading digit for a number. Leading zero's are not significant.

Difference is the result of subtracting one number from another e.g. the difference between 8 and 17 is 9 (17-8=9).

Greatest number is the largest number.
Least number is smallest number.

Range is difference between the largest and smallest values.

Median is the middle number when all the numbers are arranged in ascending order. Median is an example of an **average.**

10^5 means 10 to the power 5 which is 10 x 10 x 10
x 10 x 10. The 5 is called the **index**.

*H***Standard form** is a way of writing numbers so that they are between 1 and 10 and multiplied by a
power of 10 e.g. 8000 is 8 x 10^3

*H***Scientific Notation** is another word for Standard
form. Standard form is used in science to express
very large or very small numbers.

Percent is a fraction out of a hundred
e.g. 15% is $\frac{15}{100}$

Equivalent means the same value
e.g. $\frac{1}{4} = \frac{2}{8}$

Convert means to change from one quantity to another, e.g. convert fractions to percentages.

Recurring: a decimal that repeats in a given pattern

Tenth = $\frac{1}{10} = 0.1 = 10\%$
Hundredth = $\frac{1}{100} = 0.01 = 1\%$

Fifth = $\frac{1}{5} = 0.2 = 20\%$
Quarter = $\frac{1}{4} = 0.25 = 25\%$
*H*Eighth = $\frac{1}{8} = 0.125 = 12.5\%$

The **numerator** is the top number in a fraction. It tells us how many parts we have.

The **denominator** is the bottom number in a fraction. It shows how many parts the item has been split into.

$$\frac{3}{5}$$

3 ← numerator
5 ← denominator

Dividend is the number that is being divided.

Divisor it the number that you are dividing by.

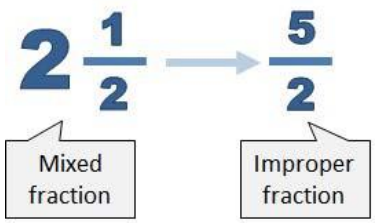
Quotient is the result of a division.

6 ← quotient
4) 24 ← dividend
↑ divisor

Interval: a range between two numbers.

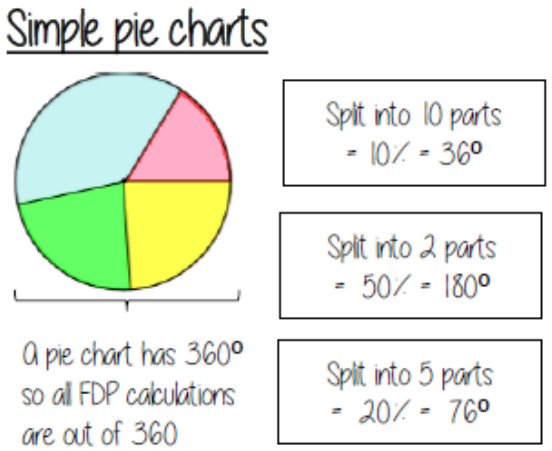
Improper fractions have a numerator greater than the denominator.

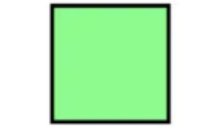
Mixed fractions contain a whole number and a fraction.



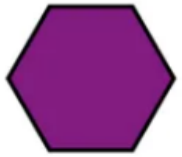
A **Pie Chart** is a type of graph in which a circle is divided into sectors that each represent a proportion of the whole.

Sector is a part of a circle between two radius (often referred to as looking like a piece of pie)

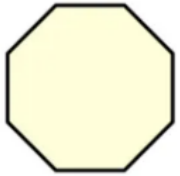



quadrilateral
4 Sides


pentagon
5 Sides


hexagon
6 Sides


heptagon
7 Sides


octagon
8 Sides

YEAR 7 — APPLICATION OF NUMBER

Solving problems with addition and subtraction

@whisto_maths

What do I need to be able to do?

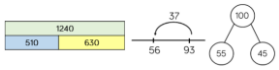
By the end of this unit you should be able to:

- Understand properties of addition/ subtraction
- Use mental strategies for addition/subtraction
- Use formal methods of addition/Subtraction for integers
- Use formal methods of addition/Subtraction for decimals
- Solve problems in context of perimeter
- Solve problems with finance, tables and timetables
- Solve problems with frequency trees
- Solve problems with bar charts and line charts

Keywords

Commutative: changing the order of the operations does not change the result
Associative: when you add or multiply you can do so regardless of how the numbers are grouped
Inverse: the operation that undoes what was done by the previous operation. (The opposite operation)
Placeholder: a number that occupies a position to give value
Perimeter: the distance/ length around a 2D object
Polygon: a 2D shape made with straight lines
Balance: in financial questions — the amount of money in a bank account
Credit: money that goes into a bank account
Debit: money that leaves a bank account

Addition/ Subtraction with integers



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

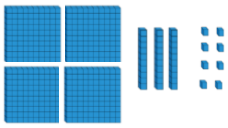
Remember the place value of each column. You may need to move 10 ones to the ones column to be able to subtract

Addition/ Subtraction with 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

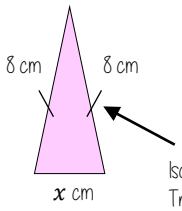


If  represents 1 instead of 100

$5.43 + \frac{8}{10}$

Revisit Fraction — Decimal equivalence
5.43 + 0.8

Solve problems with perimeter



Isosceles Triangle notation

Perimeter is the length around the outside of a polygon

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

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

Solve problems with finance

Profit= Income - Costs

Credit — Money coming into an account

Debit — Money leaving an account

Money uses a two decimal place system. 14.2 on a calculator represents £14.20

Check the units of currency — work in the same unit

Tables and timetables

Distance tables

	London	Cardiff	Glasgow	Belfast
London		211	556	518
Cardiff	211		493	392
Glasgow	556	493		177
Belfast	518	392	177	

This shows the distance between Glasgow and London. It is where their row and column intersects

Bus/ Train timetables

Harton	1005	1045	1130
Bridge	1024	1106	1147
Aville	1051	1133	1205
Ware	1117	1202	1233

Each column represents a journey, each row represents the time the 'bus' arrives at that location

TIME CALCUALTIONS — use a number line

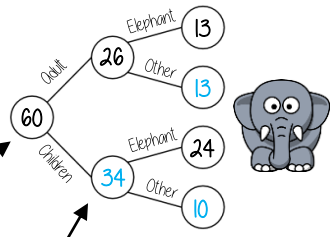
Two-way tables

	H	T
H	HH	HT
T	TH	TT

Where rows and columns intersect is the outcome of that action

Frequency trees

60 people visited the zoo one Saturday morning.
26 of them were adults. 13 of the adult's favourite animal was an elephant. 24 of the children's favourite animal was an elephant.

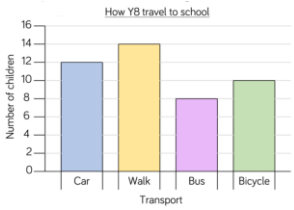


The overall total "60 people"

A frequency tree is made up from part-whole models. One piece of information leads to another

Probabilities or statements can be taken from the completed trees
e.g. 34 children visited the zoo

Bar and line charts



Use addition/ subtraction methods to extract information from bar charts.

e.g. Difference between the number of students who walked and took the bus. Walk frequency — bus frequency

When describing changes or making predictions.

- Extract information from your data source
- Make comparisons of difference or sum of values.
- Put into the context of the scenario

KNOWLEDGE ORGANISER: Year 7 Unit 7 – Solving problems with multiplication and division

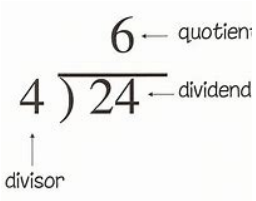
KEYWORDS

Product: To multiply

Quotient: The answer to a division

Divisor: The value you are dividing by

Dividend: The value being divided



Inverse: To opposite operation e.g. multiply is the inverse of divide

Factor: An integer that can be divided into a value

Multiple: An integer that is in a values times table

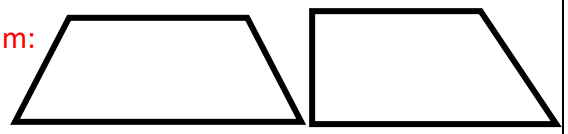
Integer: A whole number

Perpendicular: 2 straight lines that meet at 90° {at right angles}

Parallel: 2 straight lines that never meet

Parallelogram:

Trapezium:



Mean: Add all the data and divide by the amount of pieces of data

Mode: The most common piece of data

Fraction: Part of a whole number

Numerator: The number on the top of a fraction

Denominator: The number on the bottom of the fraction

Percentage: out of 100

Coefficent: The number multiplying a letter e.g 3x – 3 is the coefficient

FRACTION OF AMOUNT

{ ÷ by the bottom
X by the top }

e.g $\frac{5}{7}$ of 42 42 ÷ 7 = 6

6 x 5 = **30**

PERCENTAGE OF AMOUNT

10% : ÷10

5%: half 10%

20%: double 10%

50%: ÷2

25%: ÷4

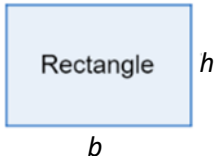
75%: 50% + 25%

e.g. 16% of 300 = 48

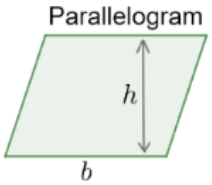
10%= 300 ÷ 10 =30

5% =30 ÷ 2 = 15

1%= 300 ÷ 100 = 3



Area = base x height
= b x h
= bh



Area = base x perpendicular height
= b x h

LCM

Lowest Common Multiple

List the multiples,

e.g. 3: 3 6 9 (12) 15

4: 4 8 (12)

HCF

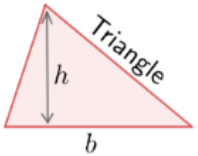
Highest Common Factor

List all the factors, following a logical pattern

e.g. 12: 1 2 3 (4) 6 12

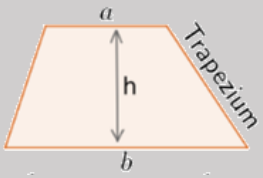
32: 1 2 (4) 8 16 32

AREA FORMULAE



Area = base x perpendicular height

= $\frac{b \times h}{2}$



Area = $\frac{(a + b)h}{2}$

1} Add the parallels
2} Multiply by the difference between
3} ÷ 2

MEAN

Add and divide

e.g. 3 5 6 6 7 8

3 + 5 + 6 + 6 + 7 + 8 = 36

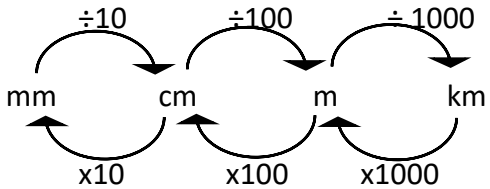
36 ÷ 6 = 6

UNITS

1cm = 10mm 1kg = 1000g

1m = 100cm

1km = 1000km



DECIMALS

MULTIPLYING

Don't put decimals in column multiplication, x10, x100, x1000 etc. first, then at the end divide.

e.g. 0.32 x 0.4

x100 x10 = x1000 *CAN BE MULTIPLE VALUES*

32 x 4 = 128

128 ÷ 1000 = 0.128

DIVIDING

Don't put decimals outside the bus-stop

e.g. 0.32 x 0.8

x100 x100 *MUST BE SAME VALUES*

32 ÷ 80 = 0.4

YEAR 7 POWER PACK 3

KNOWLEDGE IS POWER!

Eight times tables

1 x 8 = 8
2 x 8 = 16
3 x 8 = 24
4 x 8 = 32
5 x 8 = 40
6 x 8 = 48
7 x 8 = 56
8 x 8 = 64
9 x 8 = 72
10 x 8 = 80
11 x 8= 88
12 x 8 = 96

Sum is the total of **adding** two or more numbers e.g The sum of 8 and 3 is 11 (8+3=11)

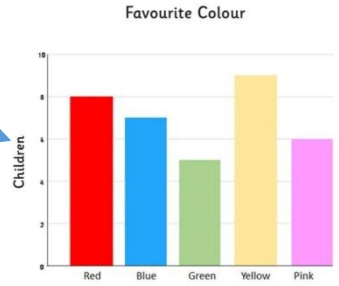
Difference is the result of **subtracting** one number from another e.g. the difference between 8 and 17 is 9. (17 8=9)

Commutative:
Adding is commutative because 2 + 7 = 9 and 7 + 2 = 9
It doesn't matter which way round you add
Subtracting is not commutative because 5 – 2 2 = 3
but 2 – 5 = -3

Associative means we can complete the calculation in any order (4 + 7) + 1 = 4 + (7 + 1)
11 + 1 = 4 + 8

Bar charts
The height of the bar chart tells you the frequency. Bars must be of equal widths and have equal gaps between them

Frequency on the vertical axis



Data categories on the horizontal axis

Credit is money going into a bank account.

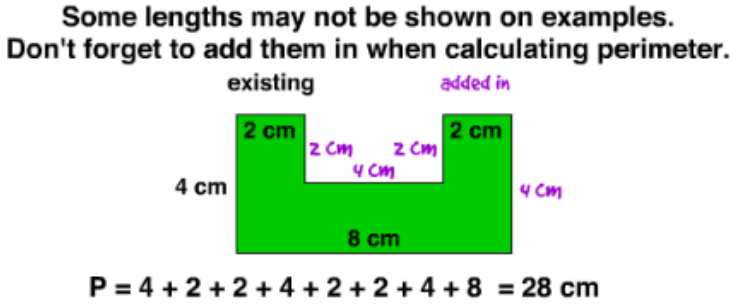
Debit is money going out of a bank account

Balance is how much money is in an account

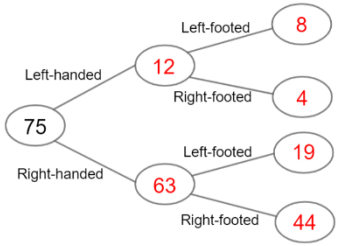
Profit: Sam bought a car for £3000 and sold it for £4000. He made a £1000 profit (4000 3000 = 1000)

Loss: Sam bought a car for £3000 and sold it for £2000. He made a £1000 loss (2000 3000 = 1000)

Perimeter is the distance around the outside of a shape.



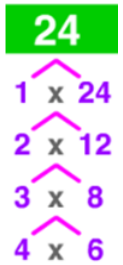
A **frequency tree** is a part whole model.
One piece of information leads to another.



Product: When you multiply two or more numbers the answer is the product.

Multiplication is **commutative** and **associative**.
6 x 4 = 24 4 x 6 = 24 , (7 x 2) x 3 = 7 x (2 x 3)

When a number can written as a product of two numbers, these are **factors** .
Eg factors of 24



Highest common factor (HCF) is the common factor of two or more numbers which has the highest value

Multiples of a number are found by multiplying that number by an integer.
Lowest common multiple (LCM) is the common multiple of two or more numbers which has the least value.

The **mean** is an average.
The mean is the total of all the scores or amounts, divided by, how many scores or amounts there were.

Metric units are units that use powers of ten.

Prefix is a word at the front of another word that changes its meaning.

Units of **Length**
Millimetre (mm)-thickness of a credit card
Centimetre (cm)-width a paper clip
Metre (m) - width of a school desk
Kilometre (km) -around the length of ten football pitches.

Units of **weight**
Gram (g) - about the weight one paper clip
Kilogram (g) - weight of a bag of sugar**.**

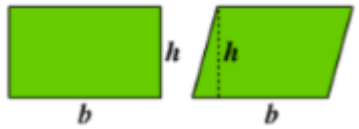
Units of **capacity**
Millilitre (ml) -tip of a teaspoon
Litre (L) - approximately two pints of milk

Prefix	Meaning
Milli	$\frac{1}{1000}$
Centi	$\frac{1}{100}$
Deci	$\frac{1}{10}$
Deca	10
Hecto	100
Kilo	1000

The **area** of a shape is the space inside it. It is measured in square units. (mm^2, cm^2, m^2, km^2)

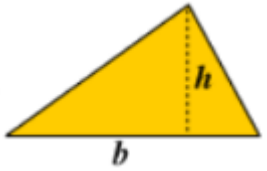
Rectangle and Parallelogram

$A = b \times h$



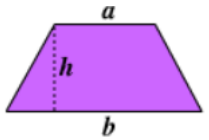
Triangle

$A = \frac{1}{2} b \times h$

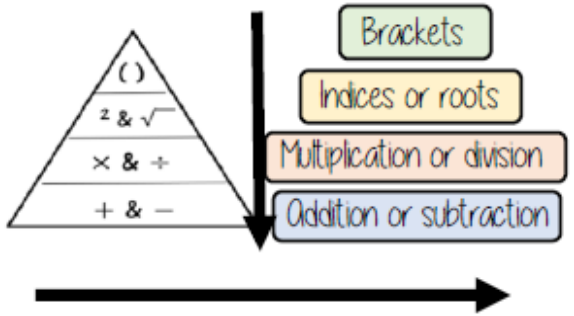


H **Trapezium**

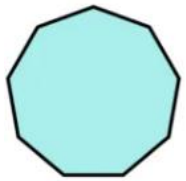
$A = \frac{(a+b) \times h}{2}$

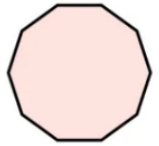


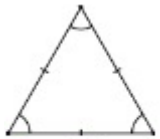
The **order of operations** is the convention for which part of calculations we complete first.



If there are multiple operations from the same tier, work left to right.

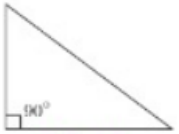

nonagon
9 Sides


decagon
10 Sides

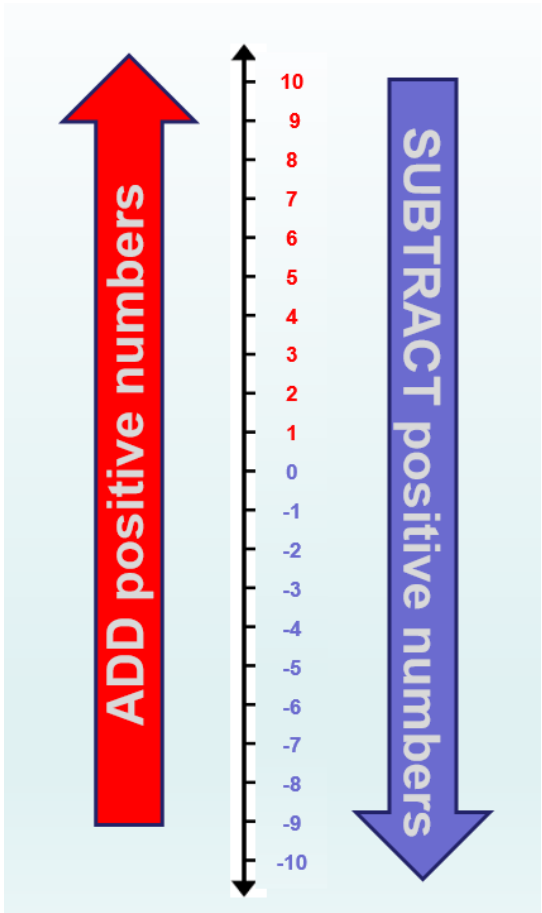

Equilateral Triangle

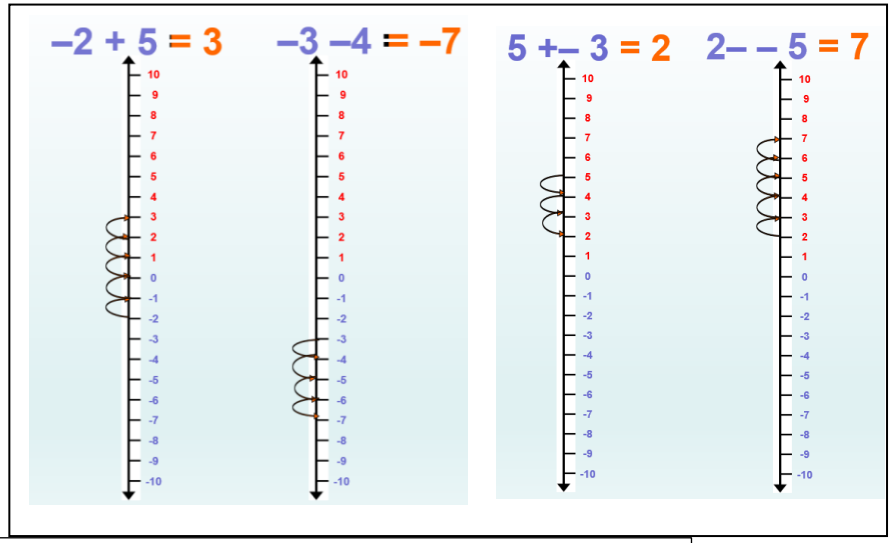

Isosceles Triangle


Scalene Triangle


Right Triangle

KNOWLEDGE ORGANISER: Year 7 Unit 8 – Directed Number





Substitution:

- Replace letters with values
- Always apply BIDMAS
- Use brackets for powers
- Fractions? Work out the top and bottom separately.

Key Words:

Positive – numbers greater than zero
Negative – numbers less than zero
Increase – gets bigger
Decrease – gets smaller
Sum – add the numbers together
Difference – subtract the smallest from the biggest
Product – multiply the numbers together

e.g **Evaluate** (find the **value** of) the expressions, given that:

$a = 2, \quad b = 3, \quad c = -5$

1. $4b = 4 \times 2 = \mathbf{8}$
2. $7b - 3c = (7 \times 3) - (3 \times -5) = 21 -^{-} 15 = 21 + 15 = \mathbf{36}$
3. $5b^2 + 1 = 5 \times (3)^2 + 1 = 5 \times 9 + 1 = 45 + 1 = \mathbf{46}$
4. $2c^3 = 2 \times (-5)^3 = 2 \times -125 = \mathbf{-250}$
5. $\frac{3ac}{2b} = \frac{3 \times 2 \times -5}{2 \times 3} = \frac{-30}{6} = \mathbf{-5}$

Multiplying and Dividing Directed Numbers

×	−2	−1	0	1	2
−2	4	1	0	-1	-4
−1	2	1	0	-1	-2
0	0	0	0	0	0
1	-2	-1	0	1	2
2	-4	-2	0	2	4

Negative x Negative = Positive
Positive ÷ Negative = Negative

Negative x Positive = Negative
Negative ÷ Positive = Negative

Positive x Negative = Negative
Negative ÷ Negative = Positive

Positive x Positive = Positive
Positive ÷ Positive = Positive

Simplifying expressions (adding/subtracting)

- Can only simplify like terms.
- Be sure to include the sign before the term

e.g. $2a + 3b - a + 4b = a + 7b$

$2a - a = a \qquad + 3b + 4b = +7b$

KNOWLEDGE ORGANISER: Year 7 Unit 9 – Addition & Subtraction of Fractions

$\frac{3}{5}$ ← numerator ← denominator

Linked Prior Topics

Equivalent fractions, Improper fractions,
Times table facts, Mixed numbers,
Lowest common multiples.

Adding and Subtracting	• The denominators must be the same. • In order to do this find the lowest common multiple for each denominator. • Remember to multiply the numerator and denominator by the same number. • Then add the fractions together.

$$\frac{2}{3} - \frac{2}{11}$$

The LCM of 3 and 11 is 33

$$\frac{2}{3} = \frac{?}{33} \quad (\times 11) \qquad 2 \times 11 = 22$$

$$\frac{2}{11} = \frac{?}{33} \quad (\times 3) \qquad 2 \times 3 = 6$$

$$\frac{22}{33} - \frac{6}{33} = \frac{16}{33}$$

Remember to simplify your answers

$$\frac{1}{7} + \frac{4}{7} = \frac{5}{7}$$

$$\frac{4}{5} - \frac{1}{5} = \frac{3}{5}$$

When calculating with mixed numbers, you must convert them to improper fractions first.

Mixed numbers to improper fractions	• Multiply the number by the denominator • Add this to the numerator	Then add. $4\frac{1}{3} = \frac{13}{3}$ Multiply.
Improper fractions to mixed numbers	• Divide the numerator by the denominator • The remainder is now the numerator	$\frac{15}{7} \rightarrow 7\overline{)15}$ $7\overline{)15} \rightarrow 7\overline{)15}$ = 2, −14, 1 Answer = $2\frac{1}{7}$

$$\frac{13 \times 2}{12 \times 2} + \frac{17 \times 3}{8 \times 3} = \frac{26}{24} + \frac{51}{24}$$

$$3\frac{2}{5} + 1\frac{4}{7} = \frac{17}{5} + \frac{11}{7}$$

change to improper fractions

$$= \frac{17 \times 7}{5 \times 7} + \frac{11 \times 5}{7 \times 5} = \frac{119}{35} + \frac{55}{35}$$

change to the LCD of 35

$$= \frac{119 + 55}{35} = \frac{174}{35}$$

YEAR 7 POWER PACK 4

KNOWLEDGE IS POWER!

9 times tables

1 x 9 = 9
2 x 9 = 18
3 x 9 = 27
4 x 9 = 36
5 x 9 = 45
6 x 9 = 54
7 x 9 = 63
8 x 9 = 72
9 x 9 = 81
10 x 9 = 90
11 x 9= 99
12 x 9 = 108

Positive numbers are greater than zero
Negative numbers are less then zero

Directed numbers have a direction as well as a size.
Eg –7, +10
We say +5 and –5 are reflections of each other as they are equal distance from the zero line.
Two things that are symmetrical are reflections of each other.

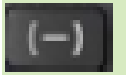
Ascending is when you order numbers from smallest to largest
Descending is when you order numbers from largest to smallest

Difference is the result of subtracting one number from another. E.g. the difference in –2 and 3 is 5

Increase means growing larger
Decrease means growing smaller

Zero pair are two numbers that combine to make zero. Eg 1 and –1
make 0

This button on a calculator changes the sign of a number.



Product - When you multiply two or more numbers the answer is the product.
e.g 5 x 7 = 35 35 is the product.

To **partition** a number is to split into its component parts. Eg 6 is made from 5 and 1.

Inverse operations are the opposite operation.
Eg the inverse of adding is subtracting.

To **evaluate** an expression means to find a numerical value for it, to 'work it out'

To **simplify** an expression means to remove brackets, unnecessary terms and numbers

To **simplify** a fraction to its simplest form means to reduce the numerator and denominator in a fraction to the smallest numbers possible

Estimate is when you find an approximate answer to a calculation (normally by rounding numbers to 1 significant figure)

To **calculate** means you will have to do a sum either with or without a calculator.

Expression can contain letter and number terms along with symbols
e.g. 7 + 3, a2 + 2b

Equation is a statement showing two expressions are equal. The expressions are linked with a = sign
e.g. 7—2 = 4 + 1 , 5x = 10

Solution is a value that can take place of a variable to make an equation true. e.g. x + 5 = 7, when we put x as 2 it makes the equation true

To **solve** is to find the solution of an equation

When we **balance** an equation we do the same operations on both sides of the equal sign.

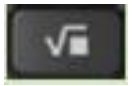
Function Machine can input, applies a rule and delivers the answer as an output. We can use a function machine to solve an equation

Inverse operations are used to solve equations. Addition and subtraction, multiplication and division are inverse operations.

10^4 means 10 to the **power** 4 which is 10 x 10 x 10 x 10.

The **Square** of a number is the product of the number with itself.
Eg the square of 5 is 5 x 5 = 25

Squ**are root** is a number who's square is equal to a given number. Eg square root of 25 is 5 because the square of 5 is 25.

√ means square root. On a calculator the button is 

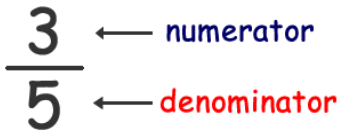
Square and square root are the **inverse** of each other.

Cube is the result of multiplying to the power 3. Four cubed is 4 x 4 x 4 = 64. This can be written as 4^3.

The symbol √ is called a **radical**.

Exponent is another word for index or power
Eg n^4 4 is the exponent

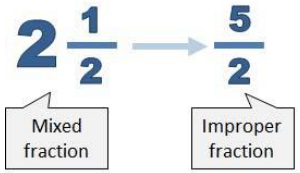
The **numerator** is the top number in a fraction. It tells us how many parts we have.



The **denominato**r is the bottom number in a fraction. It shows how many parts the item has been split into.

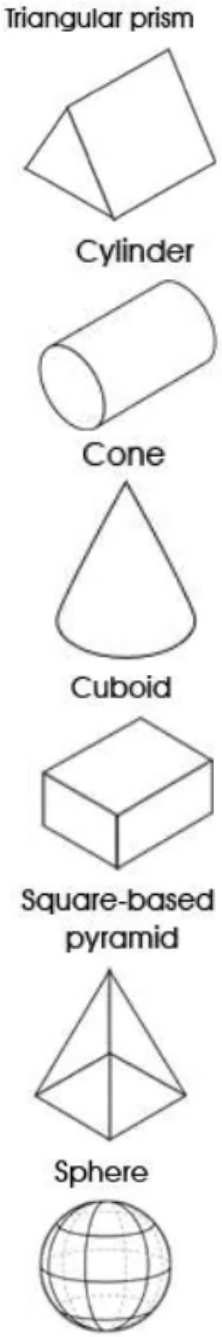
Improper fractions have a numerator greater than the denominator.

Mixed fractions contain a whole number and a fraction.



Equivalent fractions have the same value. Eg $\frac{3}{6} = \frac{1}{2} = \frac{5}{10}$

To add or subtract fractions the denominators must be the same. If they are not you will have to find equivalent fractions.



KNOWLEDGE ORGANISER: Year 7 Unit 10 – Constructing and Measuring

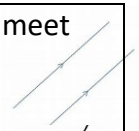
Geometric terms:
Line: a collection of points that go on forever on both directions

Line Segment: part of a line that has two endpoints

Angle: Formed when two lines intersect (cross)

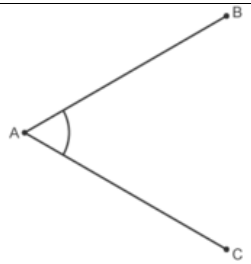
Vertex: a corner of point where two lines meet

Parallel lines: lines that will never meet



Perpendicular lines: Lines that intersect at 90°.

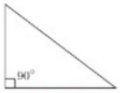
Labelling sides and angles
Letters can be used to measure angles.
AB and AC are line segments and they meet at point A. A is a **vertex**.
AB joins the points A and B.
The angle between AB and AC is labelled BAC.
It can also be written as B$\hat{A}$C or <BAC.



Types of angles.
Acute: Less than 90°
Right: Exactly 90° (quarter turn)
Obtuse: More than 90° but less than 180°.
Straight line: Exactly 180° (half turn)
Reflex: More than 180° but less than 360°.
Full turn: Exactly 360°

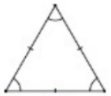
Types of triangles

Scalene – no sides or angles are the same
Right angled – contains a 90° angle.



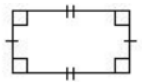
Isosceles – two sides the same length and two angles the same

Equilateral – all sides the same length and all angles the same size

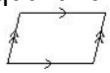


Types of quadrilaterals (4 sides)
Square – all sides the same, all angles are 90°. Two pairs of opposite sides are parallel.

Rectangle – two pair of equal parallel sides. All angles are 90°.

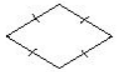


Parallelogram – Opposite sides are equal and parallel, Opposite angles are equal

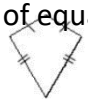


Trapezium – One pair of equal, parallel sides.

Rhombus –four sides equal. Two pairs of parallel sides. Two pairs of opposite equal angles.

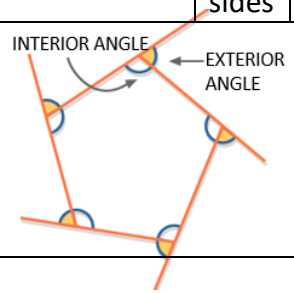


Kite – Adjacent sides are equal size. One pair of equal opposite angles.

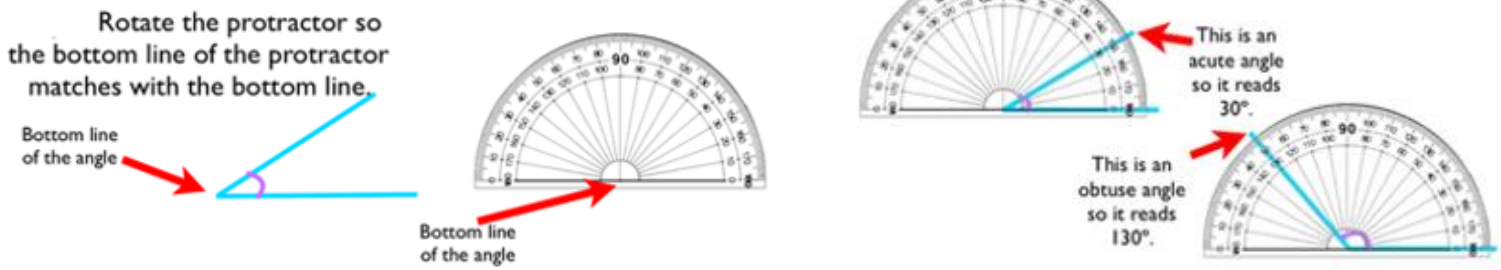


Names of polygons:
Regular polygons – all sides and interior angles are the same.
Irregular polygons – sides and angles can be different sizes.

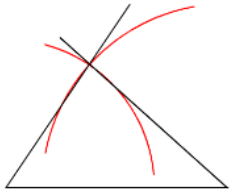
3 sides	Triangle	7 sides	Heptagon
4 sides	Quadrilateral	8 sides	Octagon
5 sides	Pentagon	9 sides	Nonagon
6 sides	Hexagon	10 sides	Decagon



Measuring an angle

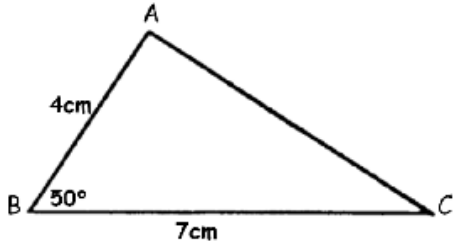


SSS – SIDE, SIDE, SIDE



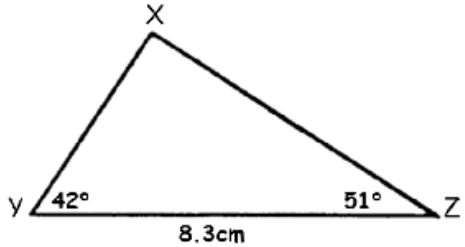
1. Draw the base of the triangle using a ruler.
2. Open a pair of compasses to the width of one side of the triangle.
3. Place the point on one end of the line and draw an arc.
4. Repeat for the other side of the triangle at the other end of the line.
5. Using a ruler, draw lines connecting the ends of the base of the triangle to the point where the arcs intersect.

SAS – SIDE ANGLE SIDE



1. Draw the base of the triangle using a ruler.
2. Measure the angle required using a protractor and mark this angle.
3. Remove the protractor and draw a line of the exact length required in line with the angle mark drawn.
4. Connect the end of this line to the other end of the base of the triangle.

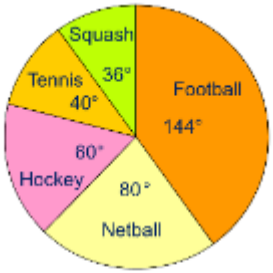
ASA – ANGLE SIDE ANGLE



1. Draw the base of the triangle using a ruler.
2. Measure one of the angles required using a protractor and mark this angle.
3. Draw a straight line through this point from the same point on the base of the triangle.
4. Repeat this for the other angle on the other end of the base of the triangle.

When drawing a pie chart, **divide 360° by the total frequency**. This will tell you how many degrees to use for the frequency of each category.

Remember to **label** the category that each sector in the pie chart represents.



If there are 40 people in a survey, then each person will be worth 360÷40=9° of the pie chart.

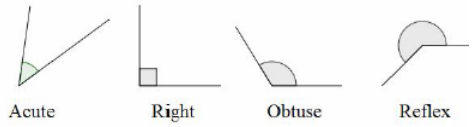
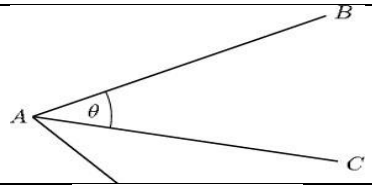
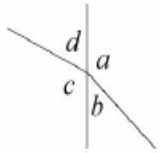
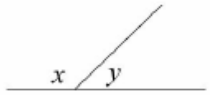
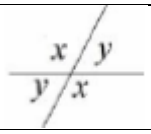
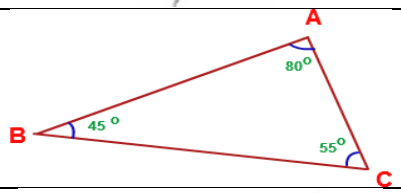
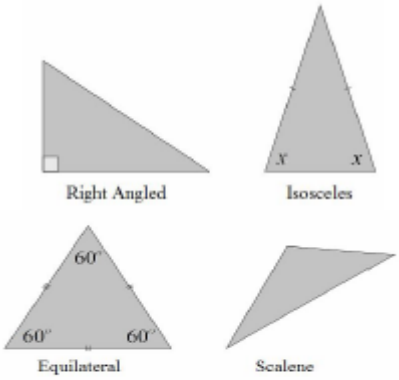
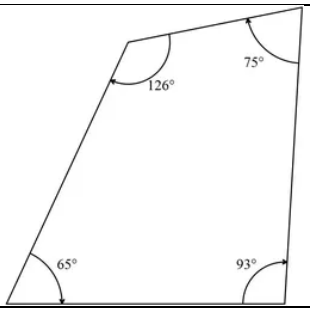
You can write the proportion of each section by writing the angle as a fraction of 360.

EG. Tennis is $\frac{40}{360} = \frac{1}{9}$

If we knew there were 20 people who played tennis then we could work out the total frequency for the whole pie chart.

If $\frac{1}{9} = 20$ then 20 x 9 = 180 gives the total frequency as 180 people

KNOWLEDGE ORGANISER: Year 7 Unit 11 – Geometric Reasoning

Topic/Skill	Definition/Tips	Example
1. Types of Angles	**Acute angles** are less than 90°. **Right angles** are exactly 90°. **Obtuse angles** are greater than 90° but less than 180°. **Reflex angles** are greater than 180° but less than 360°.	
2. Angle Notation	Can use **one lower-case** letters, eg. θ or x Can use **three upper-case** letters, eg. BAC	
3. Angles at a Point	**Angles around a point add up to 360°**.	 $a+b+c+d=360^o$
4. Angles on a Straight Line	**Angles around a point on a straight line add up to 180°**.	 $x+y=180^o$
5. Opposite Angles	**Vertically opposite angles are equal**.	
6. Angles in a Triangle	**Angles in a triangle add up to 180°.**	
7. Types of Triangles	**Right Angle** Triangles have a **90°** angle in. **Isosceles** Triangles have **2 equal sides** and **2 equal base angles**. **Equilateral** Triangles have **3 equal sides** and **3 equal angles (60°)**. **Scalene** Triangles have **different sides** and **different angles**. **Base angles in an isosceles triangle are equal.**	
8. Angles in a Quadrilateral	**Angles in a quadrilateral add up to 360°.**	

YEAR 7 POWER PACK 5

KNOWLEDGE IS POWER!

12 times tables

1 x 12 = 12
2 x 12 = 24
3 x 12 = 36
4 x 12 = 48
5 x 12 = 60
6 x 12 = 72
7 x 12 = 84
8 x 12 = 96
9 x 12 = 108
10 x 12 = 120
11 x 12 = 132
12 x 12 = 144

To find the **fraction of** a given amount
1) Divide the amount by the denominator
2) Multiply the result by the numerator

A **Percentage** is a rate, number, or amount in each hundred.

Percent means per 100

A **fraction** is a numerical quantity that is not a whole number

Whole means entire or all

The **original** means present or existing from the beginning; the first or earliest.

Place Value is the numerical value that a digit has because of its position in a number.

A **decimal** is a system of numbers and arithmetic based on the number ten, tenth parts, and powers of.

To find **50%** you divide the 100% value by 2.
To find **10%** you divide the 100% value by 10.
To find **20%** you divide the 100% value by 5.
To find **25%** you divide the 100% value by 4.
To find **1%** you divide the 100% value by 100.

Line: a collection of points that go on forever on both directions.

Line Segment: part of a line that has two endpoints.

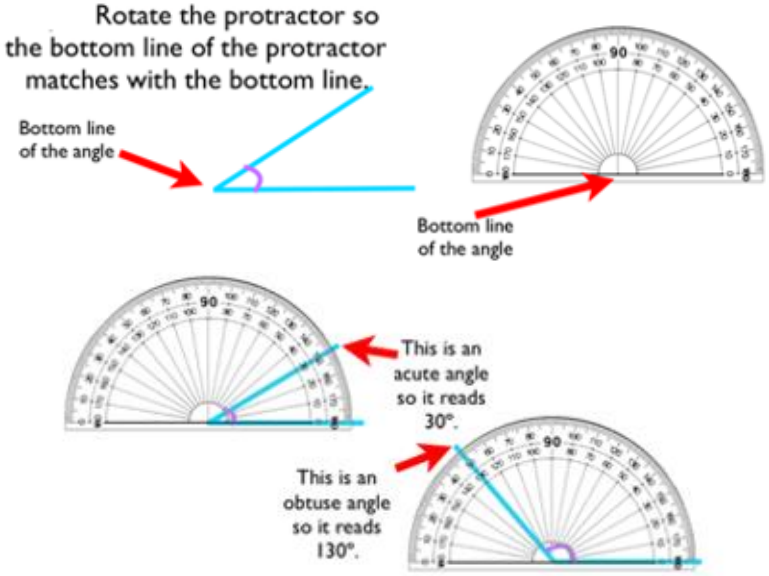
Angle: Formed when two lines intersect (cross)

Vertex: a corner of point where two lines meet.

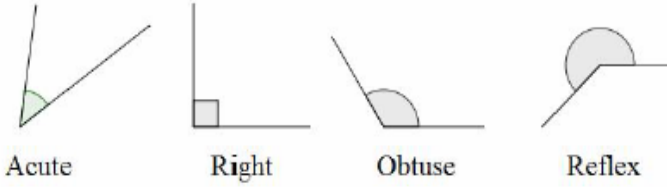
Parallel lines: lines that will never meet.

Perpendicular lines: Lines that intersect at 90º.

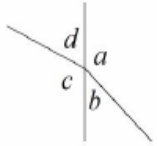
Measuring an angle



Acute angles are less than 90°.
Right angles are exactly 90°.
Obtuse angles are greater than 90° but less than 180°.
Reflex angles are greater than 180° but less than 360°.

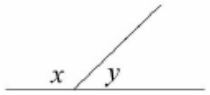


Angles around a **point** add up to 360°.



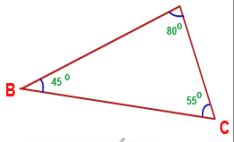
$a+b+c+d=360^o$

Angles on a **straight line** add up to 180°.

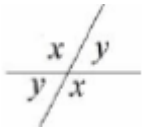


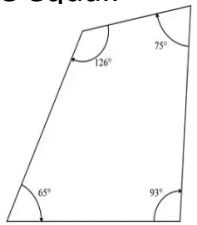
$x+y=180^o$

Angles in a **triangle** add up to 180°.



Vertically opposite angles are equal.





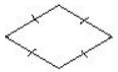
Angles in a **quadrilateral** add up to 360°.

Types of triangles
Scalene – no sides or angles are the same

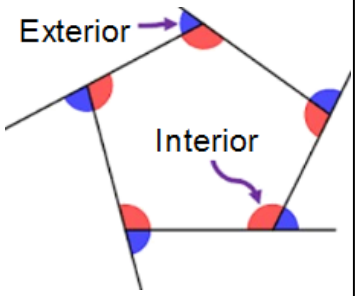
Right angled – contains a 90º angle.

Isosceles – two sides the same length and two angles the same

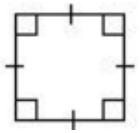
Equilateral – all sides the same length and all angles the same size.

Names of polygons:
Regular polygons – all sides a  ior angles are the same.
Irregular polygons – sides and angles can be different sizes.

3 sides	Triangle
4 sides	Quadrilateral
5 sides	Pentagon
6 sides	Hexagon
7 sides	Heptagon
8 sides	Octagon
9 sides	Nonagon
10 sides	Decagon



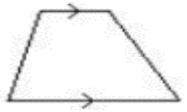
Types of **quadrilaterals** (4 sides)
Square – all sides the same, all angles are 90o. Two pairs of opposite sides are parallel.



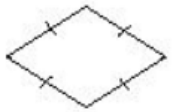
Rectangle – two pair of equal parallel sides. All angles are 90º.

Parallelogram – Opposite sides are equal and parallel, Opposite angles are equal

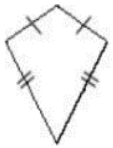
Trapezium – One pair of equal, parallel sides.



Rhombus –four sides equal. Two pairs of parallel sides. Two pairs of opposite equal angles.



Kite – Adjacent sides are equal size. One pair of equal opposite angles.



$\frac{1}{100}$ = 0.01 = 1%
$\frac{1}{20}$ = 0.05 = 5%
$\frac{1}{10}$ = 0.1 = 10%
$\frac{1}{5}$ = 0.2 = 20%
$\frac{1}{4}$ = 0.25 = 25%
$\frac{1}{3}$ = 0.3 = 33.3%
$\frac{1}{2}$ = 0.5 = 50%
$\frac{2}{3}$ = 0.6 = 66.7%
$\frac{3}{4}$ = 0.75 = 75%
1 = 100%

10mm = 1cm
100cm = 1m
1000m = 1km

1000g = 1kg

1000ml = 1 litre

YEAR 7 – REASONING WITH NUMBER

@whisto_maths

Developing number sense

What do I need to be able to do?

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

- Know and use mental addition/ subtraction
- Know and use mental multiplication/ division
- Know and use mental arithmetic for decimals
- Know and use mental arithmetic for fractions
- Use factors to simplify calculations
- Use estimation to check mental calculations
- Use number facts
- Use algebraic facts

Keywords

Commutative: changing the order of the operations does not change the result
Associative: when you add or multiply you can do so regardless of how the numbers are grouped
Dividend: the number being divided
Divisor: the number we divide by
Expression: a maths sentence with a minimum of two numbers and at least one math operation (no equals sign
Equation: a mathematical statement that two things are equal
Quotient: the result of a division

Mental methods for addition/ subtraction

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

Mental methods for multiplication/ division

Multiplication is commutative

2 × 4 = 4 × 2

The order of multiplication does not change the result

Partitioning can help multiplication

24 x 6 = 20 x 6 + 4 x 6
= 120 + 24
= 144

Division is not associative

Chunking the division can help 4000 ÷ 25
"How many 25's in 100" then how many chunks of that in 4000.

Mental methods for decimals

Multiplying by a decimal < 1 will make the original value smaller e.g x 0.1 = ÷ 10

Methods for multiplication 1.2 x 0.03

1.2 × 3 = 36
1.2 × 3 = 3.6
1.2 × 0.3 = 0.36
1.2 × 0.03 = 0.036

12 × 3 = 36
÷ 10 ÷ 100 ÷ 1000
1.2 × 0.03 = 0.036

Methods for addition 2.3+2.4

2 + 2 = 4
0.3 + 0.4 = 0.7
4 + 0.7 = 4.7

Methods for division 1.5 ÷ 0.05

Multiply by powers of 10 until the divisor becomes an integer

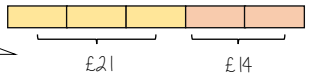
1.5 ÷ 0.05
x100 x100
150 ÷ 5 = 30

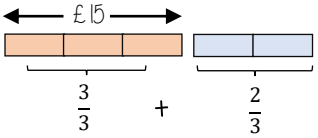
Mental methods for fractions

Use bar models where possible

I've spent $\frac{2}{5}$ of my money. I have £21 left

How much did they have to begin with?





What is $\frac{5}{3}$ of £15?

Using factors to simplify calculations

30 x 16

10 x 3 x 4 x 4
2 x 5 x 3 x 2 x 2 x 2 x 2
10 x 3 x 2 x 8
16 x 10 x 3

Multiplication is commutative
Factors can be multiplied in any order

Estimation

Estimations are useful – especially when using fractions and decimals to check if your solution is possible.

Most estimations round to 1 significant figure

Estimations are useful – especially when using fractions and decimals to check if your solution is possible.

210 + 899 < 1200

This is true because even if both numbers were rounded up, they would reach 300 + 900.

The correct estimation would be 200 + 900 = 1100.

Number facts

Use 124 x 5 = 620

For multiplication, each value that is multiplied or divided by powers of 10 needs to happen to the result

620 ÷ 124 = 50

For division you must consider the impact of the divisor becoming smaller or bigger.
Smaller – the answer will be bigger
(It is being shared into less parts)
Bigger – the answer will be smaller
(It is being shared into more parts)

Algebraic facts

2a + 2b = 10 — Everything x 2

0.1a + 0.1b = 0.5 — Everything ÷ 10

a + b = 5

Add 2 to the total

a + b + 2 = 7

The unknown quantity isn't changing but the variables change what is done to give the result

YEAR 7 – REASONING WITH NUMBER

@whisto_maths

Sets and probability

What do I need to be able to do?

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

- Identify and represent sets
- Interpret and create Venn diagrams
- Understand and use the intersection of sets
- Understand and use the union of sets
- Generate sample spaces for single events
- Calculate the probability of a single event
- Understand and use the probability scale

Keywords

Set: collection of things
Element: each item in a set is called an element
Intersection: the overlapping part of a Venn diagram **(AND ∩)**
Union: two ellipses that join **(OR ∪)**
Mutually Exclusive: events that do not occur at the same time
Probability: likelihood of an event happening
Bias: a built-in error that makes all values wrong (unequal) by a certain amount, e.g. a weighted dice
Fair: there is zero bias, and all outcomes have an equal likelihood
Random: something happens by chance and is unable to be predicted

Identify and represent sets

The **universal set** has this symbol ξ – this means EVERYTHING in the Venn diagram is in this set

A set is a collection of things – you write sets inside curly brackets { }

ξ = {the numbers between 1 and 50 inclusive}

My sets can include every number between 1 and 50 including those numbers

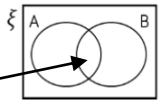
A = {Square numbers}
A = {1, 4, 9, 16, 25, 36, 49}

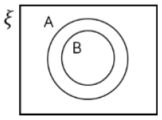
All the numbers in set A are square number and between 1 and 50

Interpret and create Venn diagrams

Mutually exclusive sets
The two sets have nothing in common
No overlap

Union of sets
The two sets have some elements in common – they are placed in the intersection

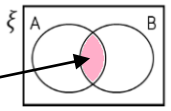




Subset
All of set B is also in Set A so the ellipse fits inside the set

The box
Around the outside of every Venn diagram will be a box. If an element is not part of any set it is placed outside an ellipse but inside the box

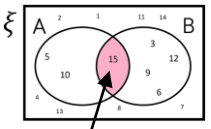
Intersection of sets



Elements in the intersection are in set A AND set B

The notation for this is $A \cap B$

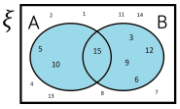
ξ = {the numbers between 1 and 15 inclusive}
A = {Multiples of 5} B = {Multiples of 3}



The element in $A \cap B$ is 15

In this example there is only one number that is both a multiple of 3 and a multiple of 5 between 1 and 15

Union of sets



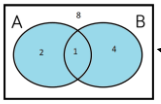
Elements in the union could be in set A OR set B

ξ = {the numbers between 1 and 15 inclusive}
A = {Multiples of 5} B = {Multiples of 3}

The elements in $A \cup B$ are 5, 10, 15, 3, 9, 6, 12

The notation for this is $A \cup B$

There are 7 elements that are either a multiple of 5 OR a multiple of 3 between 1 and 15



This Venn shows the **number of elements** in each set

Sample space – for single events

A sample space for rolling a six-sided dice is **S = {1, 2, 3, 4, 5, 6}**

A sample space for this spinner is **S = {Pink, Blue, Yellow}**

You only need to write each element once in a sample space diagram

- A Sample space represents a possible outcome from an event
- They can be interpreted in a variety of ways because they do not tell you the probability

Probability of a single event

Probability = $\frac{\text{number of times event happens}}{\text{total number of possible outcomes}}$

P(Blue) = $\frac{4}{10}$ = $\frac{2}{5}$

There are 4 blue sectors
There are 10 sectors overall

Probability notation
P (event)

Probability can be a fraction, decimal or percentage value

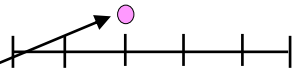
$\frac{4}{10} = \frac{40}{100} = 0.40 = 40\%$

Probability is always a value between 0 and 1

The probability scale

Impossible	Even chance	Certain
0 or 0%	0.5, $\frac{1}{2}$ or 50%	1 or 100%

The more likely an event the further up the probability it will be in comparison to another event
(It will have a probability closer to 1)



There are 2 pink and 2 yellow balls, so they have the same probability

There are 5 possible outcomes
So 5 intervals on this scale, each interval value is $\frac{1}{5}$

Sum of probabilities

Probability is always a value between 0 and 1

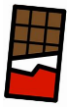
The probability of getting a blue ball is $\frac{1}{5}$
∴The probability of **NOT** getting a blue ball is $\frac{4}{5}$

The sum of the probabilities is 1

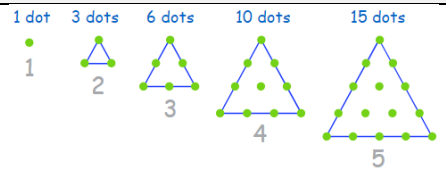
The table shows the probability of selecting a type of chocolate

Dark	Milk	White
0.15	0.35	

P(white chocolate) = 1 – 0.15 – 0.35
= 0.5



KNOWLEDGE ORGANISER: Year 7 Unit 14 – Prime Numbers and Proof

Name	Definition	Example	Non-example
Divisible	When an amount can be divided by a specified number	120 is divisible by 5 (=24)	204 is not divisible by 100
Divisor	The number we are dividing by	The divisor in the calculation 63 ÷ 9 = 7 is 9	
Factorise	Take out the common factors in an expression (to write the expression using brackets)	Factorising 2y+6 = 2(y+3)	
Product	The result of multiplying 2 or more terms together	The product of 3a and 5b is 15ab	
Highest Common Factor (HCF)	The largest number that can divide 2 or more given numbers	The HCF of 10, 15 and 50 is 5	The HCF of 6 and 8 is not 3
Lowest Common Multiple (LCM)	The lowest number that would appear the times tables of 2 or more given numbers	The LCM of 3, 8 and 10 is 120	
Prime number	A number that has exactly two factors, itself and one.	2, 3, 5, 7, 11, 13, 17, 19, 23, 29…	1 (only has 1 factor) Anything in the 2 times table (except 2)
Square numbers	The result of multiplying a number by itself	1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225…	
Triangle numbers	A number that can make a triangular dot pattern		
Express	Write the terms in a certain way	27 expressed as a product of prime numbers is 3x3x3 = 3^3	
Conjecture	A statement that could be true or false, is yet to be proved	"To find the area of a shape, multiply length by width"	
Counterexample	An example that proves another statement false	The area is found by multiplying the length by the width. A counterexample to this is the area of a triangle is base x height ÷ 2	
Proof	Logical mathematical arguments used to show the truth of a mathematical statement		

YEAR 7 POWER PACK 6

KNOWLEDGE IS POWER!

25 times tables

1 x 25 = 25

2 x 25 = 50

3 x 25 = 75

4 x 25= 100

5 x 25= 125

6 x 25 =150

7 x 25 = 175

8 x 25 = 200

9 x 25 = 225

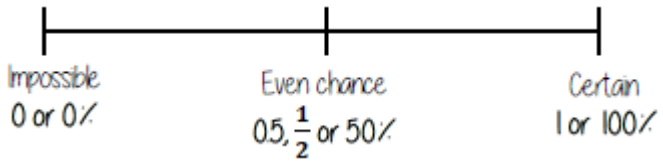
10 x 25 = 250

11 x 25 = 275

12 x 25 = 300

Probability is the likelihood of an event happening.

Probability can be measured on a **scale**.



The more **likely** an event the further up the probability it will be in comparison to another event. (It will have a probability closer to 1)

Probability is always a value between 0 and 1.

Probability can be a fraction, decimal or percentage value. (never write as a ratio)

P(A) refers to the probability that event A will occur.

Probability = $\frac{number\ of\ times\ an\ event\ happens}{total\ number\ of\ possible\ outcomes}$)

A **sample space** represents the **set of all possible outcomes** of an experiment.
A sample space for rolling a six-sided dice is
S = {1 , 2, 3, 4, 5, 6}.

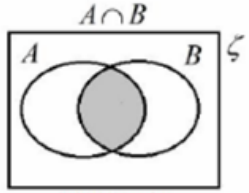
A **Venn** diagram is a diagram using circles or other shapes, to show the relationship between sets.

Set: collection of things. You write sets inside curly brackets { }.

Element: each item in a set is called an element.

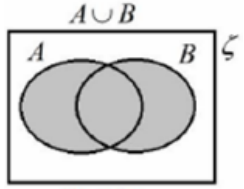
The **universal** set has this symbol ξ this means EVERYTHING in the Venn diagram is in this set.

Intersection: the overlapping part of a Venn diagram (AND ∩).



The Intersection
'A and B'

Union: two ellipses that join (OR ∪).



The Union
'A or B or Both'

Mutually Exclusive: events that do not occur at the same time.

Bias: a built-in error that makes all values wrong (unequal) by a certain amount, e.g. a weighted dice.

Fair: there is zero bias, and all outcomes have an equal likelihood.

Random: something happens by chance and is unable to be predicted.

Associative means we can complete the calculation in any order (4 + 7) + 1 = 4 + (7 + 1)

11 + 1 = 4 + 8

Commutative:
Adding is commutative because 2 + 7 = 9 and 7 + 2 = 9
It doesn't matter which way round you add
Subtracting is not commutative because 5 – 2 2 = 3 but 2 – 5 = -3

Multiples of a number are found by multiplying that number by an integer.

When a number can written as a product of two numbers, these are **factors** .
You can use factors to simplify calculations
e.g. 18 x 30 = (9 x 2) x (10 x 3)
= 9 x 3 x 2 x 10 = 540.
Perform the calculations by multiplying the factors in the easiest order.

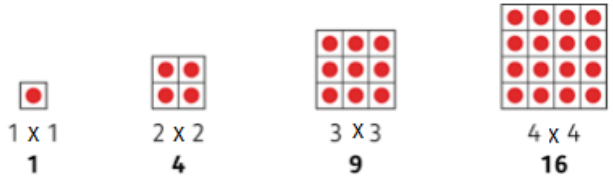
Most estimations mean you have to round numbers to 1 significant figure.

For division you must consider the impact of the **divisor** becoming smaller or bigger.
Smaller – the answer will be bigger.
Bigger – the answer will be smaller.

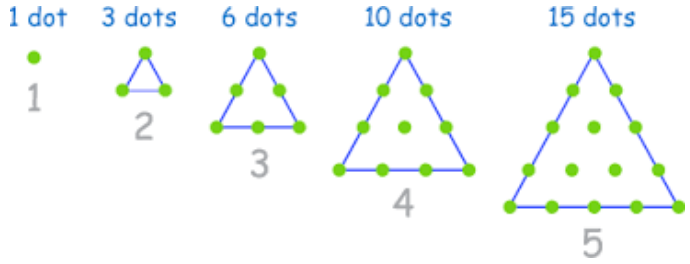
Prime number
A number that has exactly two factors, itself and one.

Prime numbers to 50 are:
2, 3, 5, 7, 11, 13, 17, 19, 23. 29. 31. 37, 41, 43, 47.

Square numbers
The result of multiplying a number by itself.
The first 10 square numbers are: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100.



Triangle numbers
A number that can make a triangular dot pattern. Each row is 1 more than the last row.



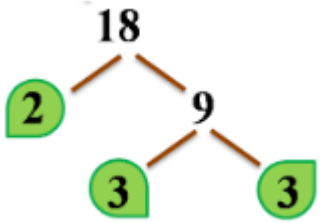
Two consecutive triangle numbers add to make a square number.

Lowest common multiple
The smallest number that is a multiple of two numbers e.g. **LCM** of 20 and 12 is 60.

Highest common factor
The largest number that is a factor of two numbers e.g. **HCF** of 20, and 12 is 4.

Prime factor decomposition
A number broken down into a multiplication sum that only uses primes e.g. 12 = 2 x 2 x 3 e.g. 18 = 2 x 3 x 3

You can use a **prime factor tree** to help find the prime factors



A **counter example** is an example that proves another statement false

A **conjecture** is a statement that could be true or false, is yet to be proved.

A **proof** is a logical mathematical argument used to show the truth of a mathematical statement.

1 minute = 60 seconds
1 hour = 60 minutes
1 day = 24 hours
1 week = 7 days
52 weeks = 1 year
12 months = 1 year
365 days = 1 year
(366 in a leap year)
A leap year every 4 years

♠ ♣ ♥ ♦

52 cards in a pack
4 suits in a pack
13 Spades (black)
13 Clubs (black)
13 Hearts (red)
13 Diamonds (red)
Suits contain:
Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King