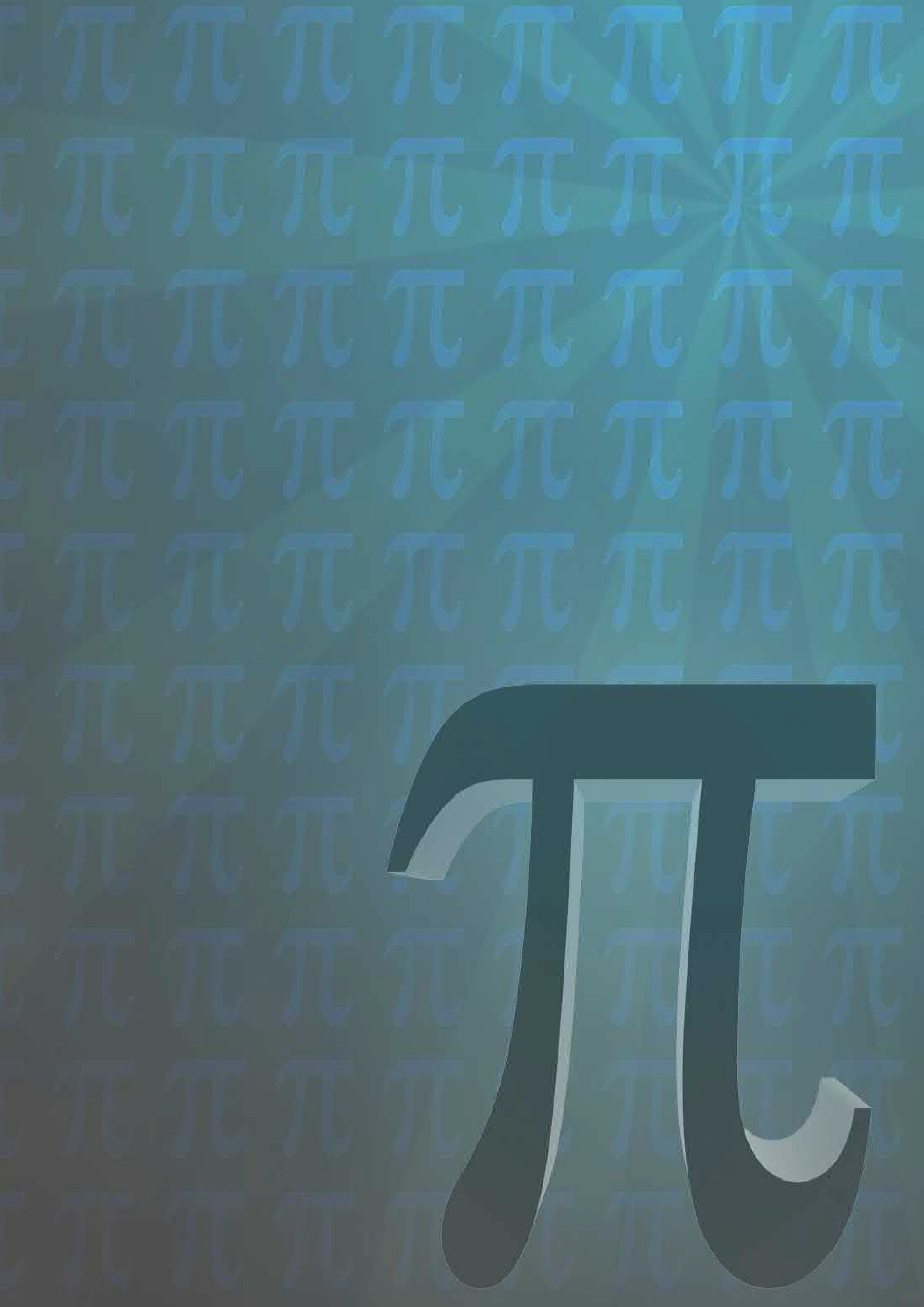
Exmouth Community College

KS4 Knowledge Organisers

MATHEMATICS

Units 1 - 10

HIGHER



Unit 2 Higher Algebra

Corbett Maths video links: V7 V13 V288

n^{th} term:

Example: For the following sequence, the first term (n = 1) is 2.
The 2nd term (n = 2) is 5.

Positions (n numbers) →	1	2	3	4	5	6	. . . . n
TERMS →	2	5	8	11	14	17	. . . . .

+3 +3 +3 +3 +3

So we try rule: $n^{th\ term} = 3n$. Testing the rule with n = 1 (1st term) gives 3, and we know 1st term should be 2, so we need an extra correction to rule of -1

So rule is: $\boxed{t_n = 3n - 1}$ 67th term is $t_{67} = 3 \times 67 - 1$
$= 200$

Simplifying expressions:

Gather together like terms, eg. **3e** + *2* + **4e** – *8* = **7e** + *6*

Solving equations:

BALANCE METHOD:

You can use this on any equation, whether the unknown is on one side, or both

You can do whatever to like, so long as you do the *same* to both sides:

$$4f + 3 = 2f + 23$$

4f + 3	=	2f + 23	[take 2f from each side]
2f + 3	=	23	[take 3 from each side]
2f	=	20	[divide both sides by 2]
f	=	10	

If you want to get rid of something negative, ADD that same amount to both sides

Substitution:

Just like in sport, *substitution* means *swapping* one thing for another – but instead of a fresh player for a tired player, it's swapping a number for a letter.

If ⚽ = 5

then: ⚽ + 4 = 5 + 4 = 9

6 x ⚽ = 6 x 5 = 30

⚽ / 5 = 5 ÷ 5 = 1

Rather than drawing a football every time, they'd just use the letter "f"

When the expressions or formulae become a bit more complicated, it's *essential* that you follow the rules of BODMAS/BIDMAS:

e.g. If g = 10: 5 + 3g = 5 + 3 x 10
= 5 + 30
= 35

Classic exam question:

Bob works shifts in a café, where he get £6 a hour, plus a £5 travel bonus each day.

(a) Write a formula to describe his pay P for a day's shift of h hours: P = 6h + 5
(b) Use this formula to find his pay for a 7 hour shift: P = 6h + 5 = 6 x 7 + 5 = 42 + 5 = £47

Factorising

expanding brackets

3 (2t + 5) → 6t + 15

factorising

Expanding (2a+3)(4a+2)

	2a	+3
4a	$8a^2$	+12a
+2	+4a	+6

$$8a^2 + 16a + 6$$

Unit 3 Higher   Data

Mean: add up the numbers and divide by how many there are

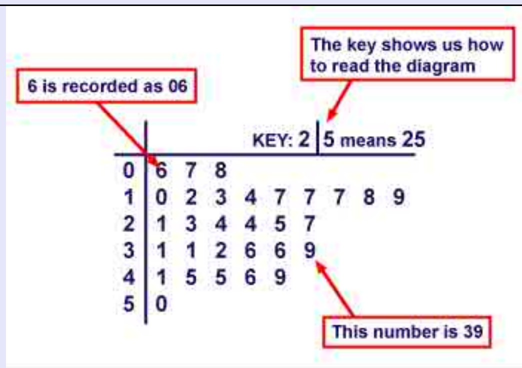
Median: the ‘middle’ number. Order the numbers from smallest to largest and it’s in the middle

Mode: the most commonly occurring number

Range: the difference between the largest and smallest numbers.

Stem & Leaf Diagram: a pictorial representation of grouped data

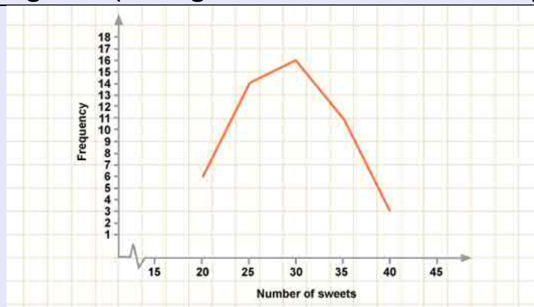
The stem and leaf diagram is formed by splitting the numbers into two parts - in this case, tens (stem) and units (leaves).
This information is given to us in the Key.
It is usual for the numbers to be ordered.



Frequency: the number of data points that fit into a category

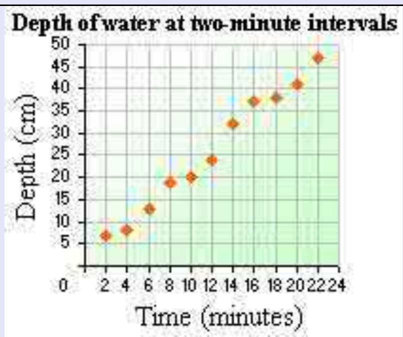
Correlation: a mutual relationship or connection between two or more things.
Can be positive (both go up at the same time) or negative (both go down at the same time).

Frequency polygon: a line graph that plots the frequency against the mid point of the group



Modal Class: the class/group that has the highest frequency

Medians in frequency tables: if the total frequency is n then the median point lies in the class containing the $\frac{n+1}{2}$

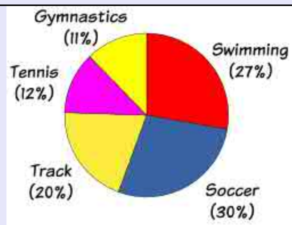


*Scatter graph: u*sed to represent and compare two sets of data. By looking at a scatter diagram, we can see whether there is any connection (correlation) between the two sets of data.

Line of best fit: A line of best fit is a straight line drawn through the center of a group of data points plotted on a scatter plot. Scatter plots depict the results of gathering data on two variables.

Outlier: a point which does not fit the overall pattern of a scatter graph.

Pie chart: a type of graph in which a circle is divided into sectors that each represent a proportion of the whole



Unit 4 Higher (Fractions, Ratio, %)

Exmouth Community College Academy Trust

Corbett Maths video links: V271 V239 V234

Fractions:

Reciprocal of n is $\frac{1}{n}$

To add and subtract mixed numbers, usually easier to convert them into *improper* (top-heavy) fractions, e.g.:

$$2\frac{1}{3} + 5\frac{1}{4} = \frac{7}{3} + \frac{21}{4}$$

(then use Battenburg method)

Ratio, simplifying:

Ratios can be simplified in the same way as fractions.
Divide both sides by the Highest Common Factor (HCF).

20 parts

Clowns:Ducks = 9:6 — 9 clowns for every 6 ducks.

÷ by 3

Equivalently

A Picture

Clowns:Ducks = 3:2 — 3 clowns for every 2 ducks.

Percentages of amounts

Calculator allowed?

Turn % into decimal (÷100) and "of" means "multiply".

e.g. 30% of £54 = 30 ÷100 x 54 = £16.20

e.g. 28% of £40 = 28 ÷100 x 40 = £11.20

Reverse percentages:

Use the logic of function machines, which can be run backwards.
You need to figure out the forwards multiplier first.

e.g. $30 dress reduced by 20%:

$30 → X 0.8 → $24

e.g. Sale price after 30% discount = £28

? → X 0.7 → £28

Original price £40 ← ÷ 0.8 ← £28

Calculator *not* allowed?

10% is your starting point.
10% means "a tenth of the amount"
(because 10% = 10/100 = 1/10)

You can work out all the other percentages you need by scaling up or down from 10%

e.g. 30% of £54?

10% = £5.40 (a tenth of 54 = 54/10)
20% = £10.80 (20% is double 10%)
30% = £16.20 (30% = 10% + 20%)

e.g. 28% of £40?

10% = £4
1% = 40p (divide 10% by 10)
2% = 80p (double 1%)
5% = £2 (half 10%)
20% = £8 (double 10%)

28% = these 4 added together, = £11.20

Battenburg: adding

1. Draw the battenburg grid.
2. Put the fractions on the side, (left to right, top to bottom).
3. Eat the top left corner (cross it out).
4. Do the multiplications.
5. "**ADD** the peanut" (the yellow ones below).
6. Peanut answer is numerator, the remaining number is denominator.
7. Simplify the fraction, if possible.

$$\frac{1}{4} + \frac{1}{3} = \frac{7}{12}$$

	1	4
1	X	4
3	3	12

Divide top and bottom of fraction with the HCF that they share

Battenburg: subtracting

1. Draw the battenburg grid.
2. Put the fractions on the side, (left to right, top to bottom).
3. Eat the top left corner (cross it out).
4. Do the multiplications.
5. "**SUBTRACT** the peanut" (the yellow ones below).
6. Peanut answer is numerator, the remaining number is denominator.
7. Simplify the fraction, if possible.

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

	1	4
1	X	4
3	3	12

Divide top and bottom of fraction with the HCF that they share

Fractions, decimals, percentages conversion

Example:

numerator ÷ denominator

X 100

Fraction: **24/100 = 6/25**

decimal: **0.24**

percentage: **24%**

Write as fraction out of 10, 100, or 1000, and simplify

÷ 100

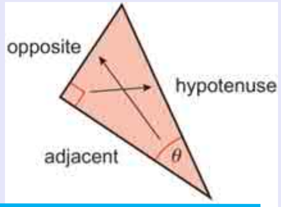
Some examples:

1/10 =	10/100 =	0.1 =	10%
1/5 =	20/100 =	0.2 =	20%
3/10 =	30/100 =	0.3 =	30%
9/20 =	45/100 =	0.45 =	45%

People often assume a % cannot be over 100, but it can (just like a fraction can be improper* and a decimal can be over 1)

*** top-heavy**

Unit 5 Higher Angles and Trigonometry



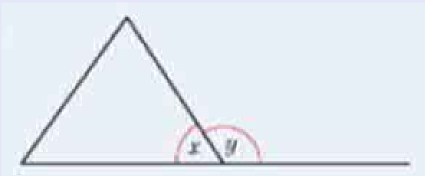
In a right-angled triangle, the longest side is called the hypotenuse and is opposite the right-angle.

The side opposite the angle θ is called the **opposite.**

The side that is next to angle θ is the **adjacent**.

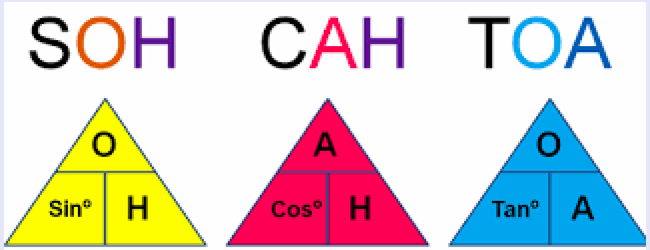
When one side of a triangle is extended at the vertex, it forms an **exterior** angle.
x is the **interior** angle.
y is the **exterior** angle.

$$x + y = 180^{o}$$



The sum of the interior angles of a polygon with n sides = (n-2) x 180°

The sum of the **exterior** angles of a polygon is always 360°

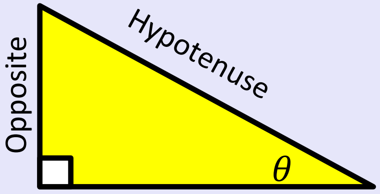


Sine Ratio

Opp = sinθ x *Hyp*

Hyp = $\frac{Opp}{\sin\theta}$

$\sin^{-1}\theta = \frac{Opp}{Hyp}$

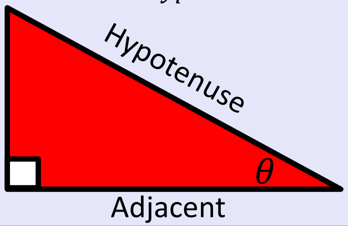


Cosine Ratio

Adj = cosθ x *Hyp*

Hyp = $\frac{Adj}{\cos\theta}$

$\cos^{-1}\theta = \frac{Adj}{Hyp}$

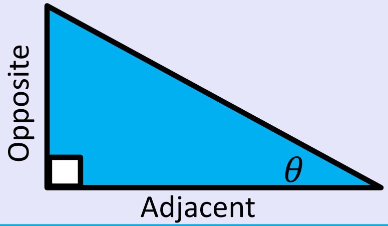


Tangent Ratio

Opp = tanθ x *Adj*

Adj = $\frac{Opp}{\tan\theta}$

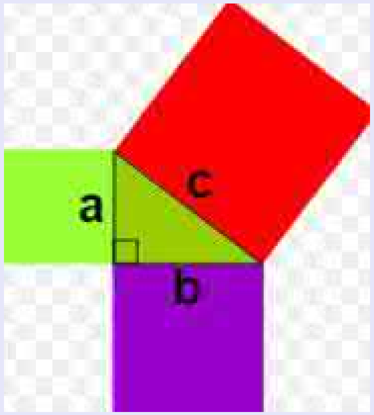
$\tan^{-1}\theta = \frac{Opp}{Adj}$



To get sin⁻¹ , cos⁻¹ and tan⁻¹ press shift on the calculator and then the corresponding ratio.

Pythagoras' Theorem

$a^2 + b^2 = c^2$



To find **hypotenuse**:
Square side a
Square side b
Add together
Square root

To find shorter side:
Square side c
Square side a or b
Subtract a or b from c
Square root

V257

θ	0°	30°	45°	60°	90°
$\sin\theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan\theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	

The exact **sine**, **cosine** and **tangent** of some angles are in this table.

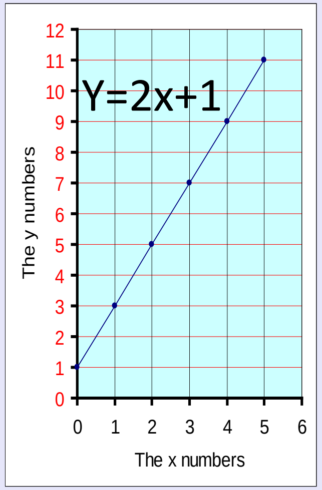
V329
V330
V331

Unit 6 Higher Graphs – Links: V191 V171 V197 V196

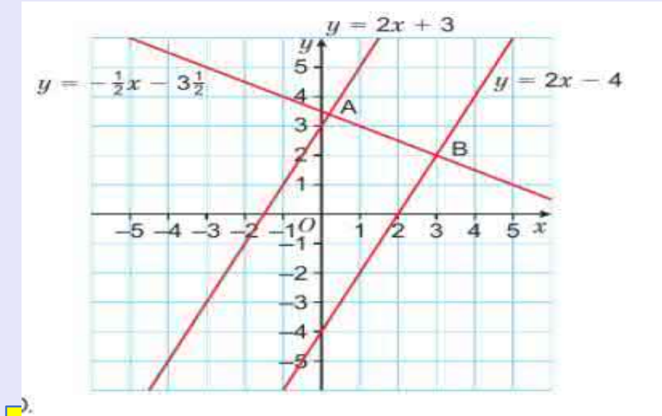
Linear Equations
Y = m*x* + c

where m is the gradient

C is where the graph crosses the y axis



Parallel lines have same gradient

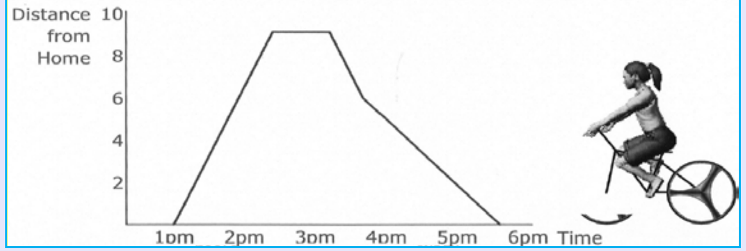


A distance – time graph represents a journey

The gradient is the speed

Try to draw a graph which reflects this cyclist's journey

At 1pm she starts off on a journey of 9 miles. She gets there by 2:30pm
She stays there for 45 minutes.
Then she travels for 3 miles in direction of home which takes 30 minutes.
The cyclist then gets a puncture and takes 2hrs to do the last 6 miles home.



Perpendicular lines have gradients that multiply to give -1

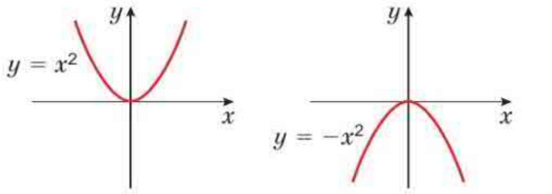
When a graph has gradient m, the perpendicular line to that will have gradient - $\frac{1}{m}$

Velocity- time graph
Straight line – means constant acceleration

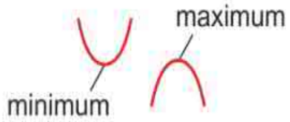
Direct proportion is shown by a straight line graph through the origin

The equation of a circle with centre (0,0) and radius r is $x^2 + y^2 = r^2$

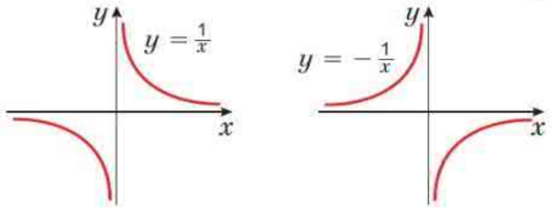
A **quadratic equation** contains a term in x^2 but no higher power of x. The graph of a quadratic equation is a curved shape called a **parabola**.



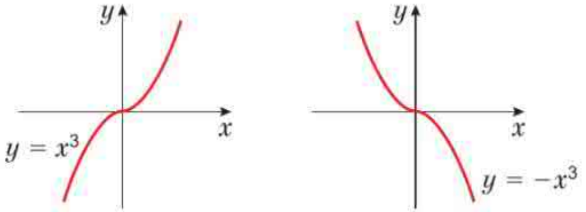
A quadratic graph has either a **minimum point** or a **maximum point** where the graph turns.



Reciprocal functions are in the form $\frac{k}{x}$ where k is a number.



A **cubic function** contains a term in x^3 but no higher power of x. It can also have terms in x^2 and x and number terms.



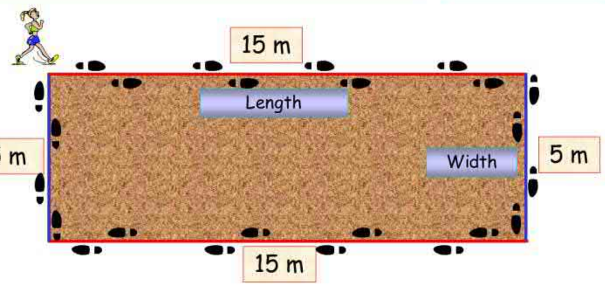
Knowledge Organiser: Unit 7 Higher (Area and Volume)

Corbett Maths video links: V312 V377 V358

Perimeter

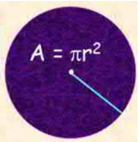
The perimeter of a shape is the distance around the outside.

Rectangles

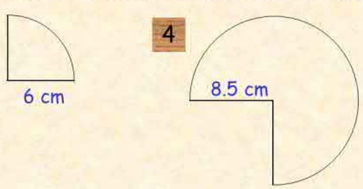


Perimeter = 15 m + 5 m + 15 m + 5 m = 40 m

The Area of a Circle



Find the area of the ¼ and ¾ circles.



3: $A = \frac{1}{4}\pi r^2$
$= \frac{1}{4} \times \pi \times 6^2$
$=$ 28.3 cm² (1 dp)

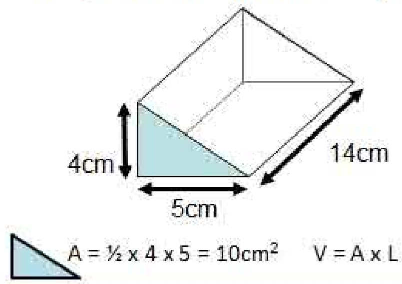
4: $A = \frac{3}{4}\pi r^2$
$= \frac{3}{4} \times \pi \times 8.5^2$
$=$ 170.2 cm² (1 dp)

Volume

VOLUME is how many cubic units fit **inside** a shape.

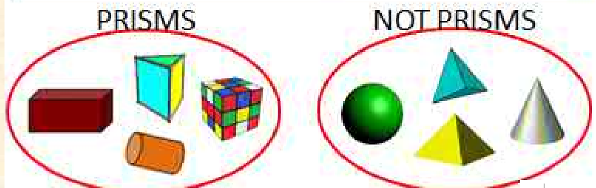
For a prism* Volume = Area x length

*a shape that is the same all the way along its length



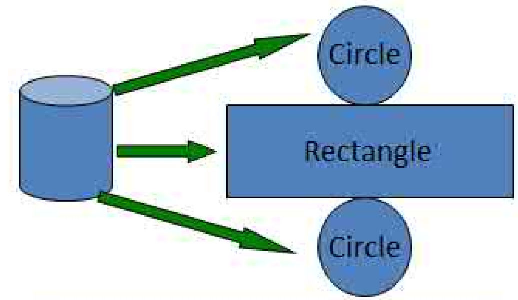
$A = \frac{1}{2} \times 4 \times 5 = 10\text{cm}^2$ $V = A \times L = 10 \times 14 = 140\text{cm}^3$

So, always start by working out the **area** on front of the shape – this has to be the same all the way along the length (i.e. it has to be a prism).



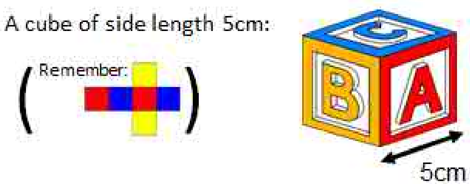
Surface Area

SURFACE AREA is how many square units fit onto the **outside** of a shape.



It's helpful to think of the net of the shape: the surface area is just the area of all the bits of the net added together.

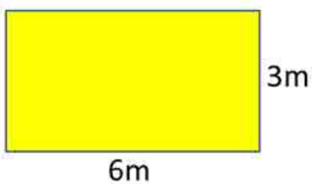
e.g. A cube of side length 5cm:



Area of one face = 5 x 5 = 25cm²

Total surface area = 25 x 6 = 150cm²

Error bounds:



The lengths have been measured to the nearest metre

What the minimum and maximum values that the base and height could be?

5.5 ≤ base < 6.5m 2.5 ≤ height < 3.5m

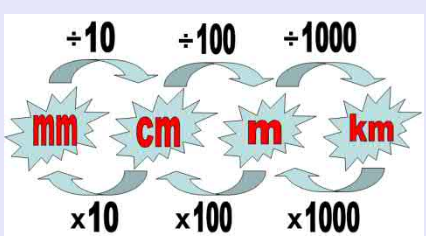
What the minimum and maximum values that the *perimeter* could be?

16m ≤ perimeter < 20m

What the minimum and maximum values that the *area* could be?

13.75m² ≤ area < 22.75m²

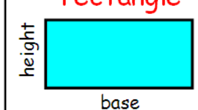
Metric conversions:



AREA

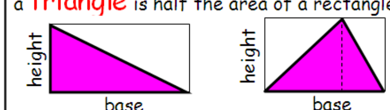
Always use the perpendicular height

rectangle



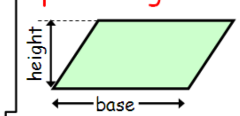
Area = base x height

a triangle is half the area of a rectangle

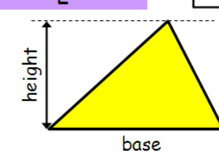


Area = $\frac{\text{base x height}}{2}$

parallelogram

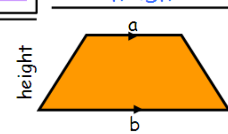


Area = base x height

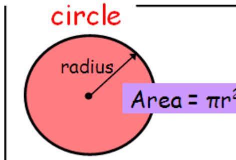


trapezium

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



circle



Area = πr^2

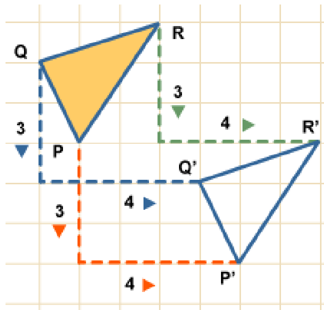
KS4 Knowledge Organiser

Higher Tier Unit 8: Transformations & Constructions

Exmouth Community College

Translation: V325

To translate means to move a shape. The shape does not change size or orientation.



Column Vector:

In a column vector, the top number moves left (-) or right (+) and the bottom number moves up (+) or down (-)

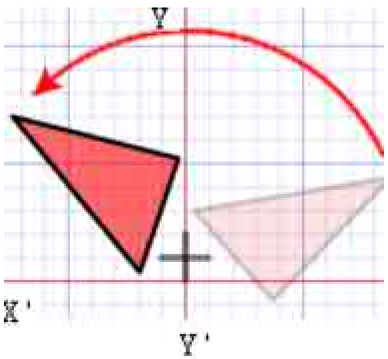
$\begin{pmatrix}2\\3\end{pmatrix}$ means '2 right, 3 up'

$\begin{pmatrix}-1\\-5\end{pmatrix}$ means '1 left, 5 down'

Rotation: V275

The size does not change, but the shape is turned around a point. (Use tracing paper).

Rotate the triangle 90° anti-clockwise about (0,1).

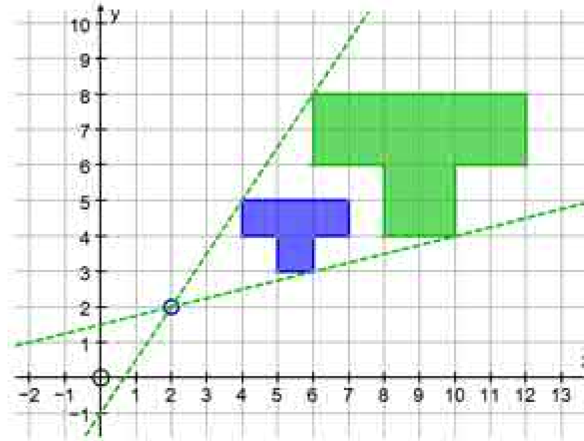


Enlargement:

The shape will get **bigger** or **smaller**. Multiply each side by the **scale factor**.

Scale Factor = 3 means '3 times larger = multiply by 3'

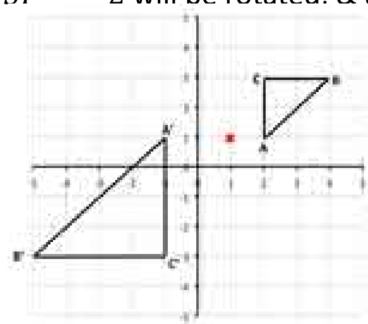
Scale Factor = ½ means 'half the size = divide by 2'



V104
V105
V106

V107 V108

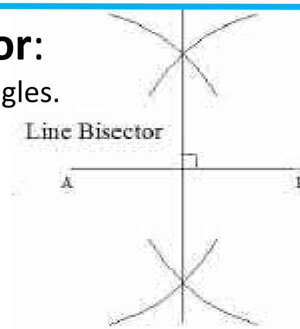
Negative Scale Factor Enlargements will look like they have been rotated. $SF = -2$ will be rotated. & also twice as big. Enlarge ABC by scale factor -2, centre (1,1)



Perpendicular Bisector:

Cuts a line in half and at right angles.

V78



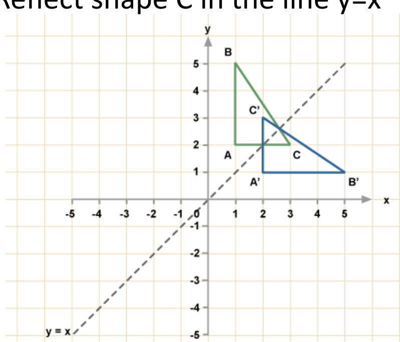
Reflection:

The size does not change, but the shape is '**flipped**' like in a **mirror**.

Line **x=?** is a **vertical line.**
Line **y=?** is a **horizontal line.**
Line **y=x** is a **diagonal line.**

V272 V273 V274

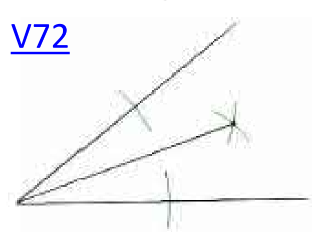
Reflect shape C in the line y=x



Angle Bisector:

Cuts the angle in half.

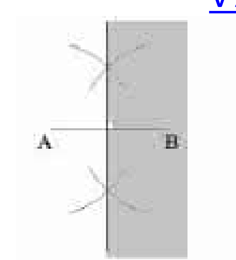
V72



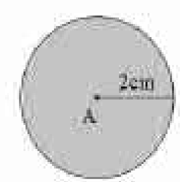
Angle Bisector

Loci: A locus is a path of points that follow a rule.

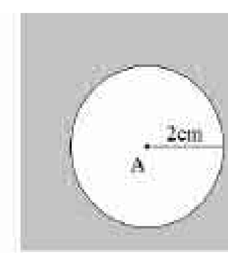
V75 V76 V77



Points Closer to B than A



Points less than 2cm from A



Points more than 2cm from A

Higher Tier Unit 9: Equations & Inequalities

Exmouth Community College Academy Trust

Quadratic: V325

A quadratic expression is of the form **$ax^2 + bx + c$**
where a, b and c are numbers, **$a \neq 0$**
Examples of quadratic expressions: **x^2 or $8x^2 - 3x + 7$**

Factorising Quadratics: V118 V119

When a quadratic expression is in the form $x^2 + bx + c$ find the 2 numbers that add to give b & multiply to give c.
e.g. $x^2 + 7x + 10 = (x+5)(x+2)$
(because 5 and 2 add to give 7 and multiply to give 10)

Difference of Two Squares V120

An expression of the form a^2-b^2 can be factorised to give $(a+b)(a-b)$.
e.g. $x^2 – 25 = (x+5)(x-5)$ or $16x^2 – 81 = (4x+9)(4x-9)$

Solving Quadratics ($ax^2 = b$)

Isolate the x^2 term and square root both sides.
e.g. $2x^2 = 98$
$x^2 = 49$
$x = \pm 7$

Remember there will be a positive and a negative solution.

Solving Quadratics ($ax^2 + bx = 0$) V266

Factorise and then **solve = 0**

e.g. $x^2 - 3x = 0$
$x(x-3) = 0$
$x = 0$ or $x = 3$

e.g. Solve $x^2 + 3x – 10 = 0$
Factorise: $(x+5)(x-2) = 0$
$x=-5$ or $x=2$

Simultaneous Equations:

A set of two or more equations, each involving two or more variables (letters).
The solutions to simultaneous equations satisfy both/all of the equations.
e.g. $2x + y = 7$
$3x – y = 8$
$x=3$, $y=1$

V295 V296 V297

Factorising Quadratics when a ≠ 1 V266

When a quadratic is in the form **$ax^2 + bx + c$**
1. Multiply a by c = ac
2. Find two numbers that add to give b and multiply to give ac.
3. Re-write the quadratic, replacing bx with the two numbers you found.
4. Factorise in pairs – you should get the same bracket twice
5. Write your two brackets – one will be the repeated bracket, the other will be made of the factors outside each of the two brackets.

Completing the Square V267a V371

A quadratic in the form **$ax^2 + bx + c$** can be written in the form **$(x + p)^2 + q$**
1. Write a set of brackets with x in and half the value of b.
2. Square the bracket.
3. Subtract $(b/2)^2$ and add c.
4. Simplify the expression.

Solving Quadratics using the Quadratic Formula: V267

A quadratic in the form **$ax^2 + bx + c$** can be solved using the formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

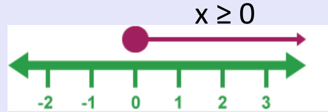
Use the formula if the quadratic does not factorise easily.

Inequality symbols: V176 V177 V178 V179

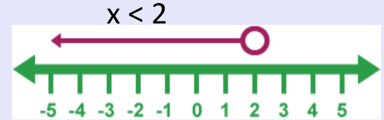
x>2 means x is **greater than** 2
x<3 means x is **less than** 3
x≥1 means x is **greater than or equal to** 1
x≤6 means x is **less than or equal to** 6

Inequalities can be shown on a number line.
Open circles are used for numbers that are **less than or greater than** (< or >)
Closed circles are used for numbers that are **less than or equal or greater than or equal** (≤ or ≥)

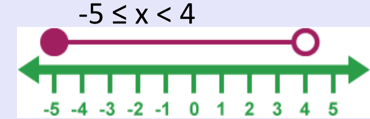
$x \geq 0$



$x < 2$



$-5 \leq x < 4$



Unit 10 Higher (Probability)

Corbett Maths video links: V244 V250 V247

TECHNICAL LANGUAGE:

P("something") means *probability of "something" happening*

"Mutually exclusive" means that if one thing happens, the other cannot. E.g. being alive and dead are mutually exclusive states!

"Bias" = unfairness. It would be biased to roll a die that has 2 sixes on it and no zeroes in a normal dice game.

If outcomes A and B are mutually exclusive, P(A) + P(B) = 1 or 1-P(A) = P(B)

E.g. If there is no draw allowed, and P(win) = 0.7, B(lose) must be 0.3

Sometimes bias is difficult to spot in experiments. If you flip a coin 100 times, you expect 50 heads and 50 tails, but does that mean your coin is biased if you get 60:40? What about 90:10?? What about 99:1????

On fair dice, opposite faces *should* add up to 7.

COMBINING PROBABILITIES:

If you want to find the probability of 2 things happening, MULTIPLY the individual probabilities.

One of the reasons why fractions are convenient for probability is That they are so easy to multiply; ½ x ⅝ = 5/16

Multiply numerators, multiply denominators

Remember to simplify whenever possible

Example:

P(win) = 2/5 P(win) = 3/10 P(win both) = 2/5 x 3/10 = 6/50 = 3/25

The LANGUAGE of probability:

P("something") means *probability of "something" happening*

Eg. When tossing a coin P(heads) = 0.5 or ½

P(tails) = 0.5 or ½

P(heads or tails) = 1 (certain)

P(coin flying off into outer space) = 0 (impossible)

It's often easiest to write probabilities as **fractions***, especially if you want to combine probabilities in tree diagrams...

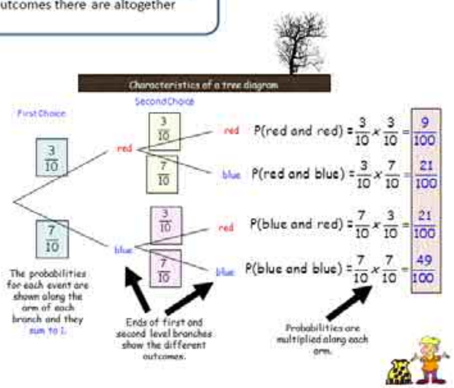
$* \ \dfrac{\text{how many ways it can happen}}{\text{How many outcomes there are altogether}}$

Sample Space Diagrams:
Often used to find all the possible combinations of 2 events being combined:

Roll a die

Roll a die	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

If we're adding, The value in the (6,6) box of the SSD would be 12



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You can use two-way tables to help solve probability problems:

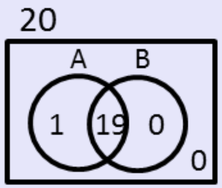
	France	Holland	Elsewhere	Total
June	6	18	5	29
July	10	19	2	31
August	15	15	10	40
Total	31	52	17	100

What is the probability that a person selected at random:

1. Went to Holland on holiday?	52/100
2. Went on holiday in July?	31/100
3. Went to France in August?	15/100
4. Did not visit either France or Holland?	17/100
5. Went on holiday in June?	29/100

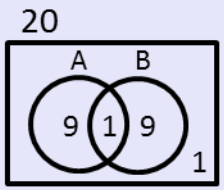
VENN DIAGRAMS

$$P(A \cap B) = \frac{19}{20}$$



20 people chose A, and 19 chose B.

$$P(A \cup B) = \frac{19}{20}$$



1 person opts out of choosing either A or B.

Unit 1 Higher Number

HCF and LCM V219 V218

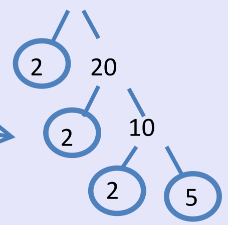
(Highest Common Factor and Lowest Common Multiple)

HCF - this is largest number that divides exactly into 2 or more numbers. E.g. HCF or 12 and 20 = 4
LCM - this is the smallest number that is in the times table of 2 or more numbers. E.g. LCM of 12 and 20 = 60

Product of Prime Factors V219

This is finding all the prime numbers that would multiply to give our number. It is often shown using a factor tree ('tree thingy'). V223
Eg. 40 as a product of prime factors

40 = 2 x 2 x 2 x 5



We are looking for the prime numbers that go into our number

We can then multiply our prime numbers together to get our original number

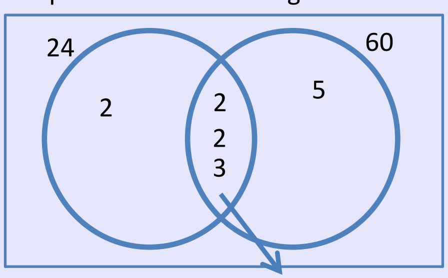
Using product of prime factors to find our HCF and LCM

Example: Find the HCF and LCM of 24 and 60

Step 1:
24 = 2 x 2 x 2 x 2
60 = 2 x 2 x 3 x 5

Write each number as a product of prime factors

Step 2: Draw a Venn Diagram V224



Place you prime factors into your Venn diagram

The HCF of 24 and 60 = 2 x 2 x 3 = 12

Multiply the common prime factors

The LCM of 24 and 60 = 2 x 2 x 2 x 3 x 5 = 120

Multiply all the prime factors

Laws of Indices V17

3^3

Index/power

base

When multiplying indices with the same base, you ADD the indices

Multiplying Indices

$y^3 \times y^3 = y \times y \times y \times y \times y \times y = y^6$

Dividing Indices

$y^6 \div y^4 = \dfrac{y \times y \times y \times y \times y \times y}{y \times y \times y \times y} = y^2$

When dividing indices with the same base, you SUBTRACT the indices

Power to another power (brackets)

$(y^3)^2 = (y \times y \times y)^2$
$= y \times y \times y \times y \times y \times y = y^6$

With brackets just MULTIPLY your indices

Zero Indices

$y^0 = 1$

Anything to the power of 0 always equals 1

Negative Indices V175

$y^{-1} = \dfrac{1}{y}$

$y^{-2} = \dfrac{1}{y^2}$

e.g. $5^{-2} = \dfrac{1}{5^2} = \dfrac{1}{25}$

The negative sign means 'one over' the base number

Fractional Indices

$\boldsymbol{y^{\frac{2}{3}} = (\sqrt[3]{y})^2}$

$\boldsymbol{8^{\frac{2}{3}} = (\sqrt[3]{8})^2 = 4}$

The denominator of the fractional power becomes a root and the numerator becomes a power

V173

Standard Form

V300 V301 V302 V303

A number is in standard form when it is in the form A x 10^n, $where\ 1 \le A < 10$.

For example, 63000 = 6.3 x 10^4. This is in standard form because 6.3 is between 1 and 10. 63 x10^4 is not in standard form as 63 is not between 1 and 10.

Examples
45 000 000 000 = 4.5 x 10^{10}
0.0000000000091 = 9.1 x 10^{-12}

Standard form is used so very large or very small numbers can be written out easily.

Surds

A surd is a number written exactly using square or cube roots.
For example $\sqrt{3}$ and $\sqrt{5}$ are surds. $\sqrt{4}$ and $\sqrt[3]{27}$ are not surds, because $\sqrt{4} = 2$ and $\sqrt[3]{27} = 3$.

Multiplying Surds

$\sqrt{m} \times \sqrt{n} = \sqrt{m \times n} = \sqrt{mn}$
E.g. $\sqrt{3} \times \sqrt{2} = \sqrt{3 \times 2} = \sqrt{6}$

Dividing Surds

$\sqrt{m} \div \sqrt{n} = \sqrt{\dfrac{m}{n}}$

E.g. $\sqrt{12} \div \sqrt{3} = \sqrt{\dfrac{12}{3}} = \sqrt{4} = 2$

V305 V306 V307 V308