Knowledge organisers

Year 9

Community • Creativity • Achievement

Contents:

Maths

YEAR 9 – REASONING WITH ALGEBRA...

Straight Line Graphs

@what.o_maths

What do I need to be able to do?

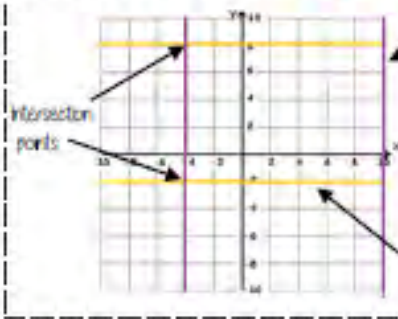
By the end of this unit you should be able to:

- Compare gradients
- Compare intercepts
- Understand and use $y = mx + c$
- Find the equation of a line from a graph
- Interpret gradient and intercepts of real life graphs

Keywords

Gradient: the steepness of a line
Intercept: where two lines cross. The y-intercept: where the line meets the y-axis.
Parallel: two lines that never meet with the same gradient
Co-ordinate: a set of values that show an exact position on a graph
Linear: linear graphs (straight line) – linear common difference by addition/ subtraction
Asymptote: a straight line that a graph will never meet.
Reciprocal: a pair of numbers that multiply together to give 1
Perpendicular: two lines that meet at a right angle

Lines parallel to the axes (R)



All the points on this line have a x coordinate of -10

'x' can be any positive or negative value including 0

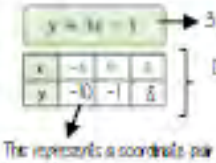
Lines parallel to the y axis take the form x = a and are vertical

Lines parallel to the x axis take the form y = a and are horizontal

All the points on this line have a y coordinate of -2

e.g. (3, -2) (7, -2) (-2, -2) all lay on this line because the y coordinate is -2

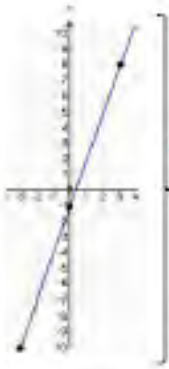
Plotting y = mx + c graphs (R)



3 x the x coordinate then – 1

Draw a table to display the information

This represents a coordinate pair (-3, -10)



You only need two points to form a straight line

Plotting more points helps you decide if your calculations are correct (if they do make a straight line)

Remember to join the points to make a line

Compare Gradients

$y = mx + c$

The coefficient of x (the number in front of x) tells us the gradient of the line.

The greater the gradient – the steeper the line.

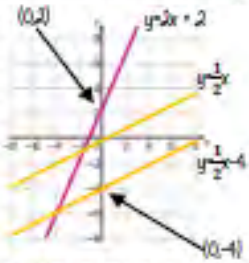
Parallel lines have the same gradient

Positive gradients

Negative gradients

Compare Intercepts

$y = mx + c$ ← The value of c is the point at which the line crosses the y-axis: Y intercept



The coordinate of a y intercept will always be (0,c)

Lines with the same y-intercept cross in the same place

y = mx + c

The coefficient of x (the number in front of x) tells us the gradient of the line.

$y = mx + c$ ← The value of c is the point at which the line crosses the y-axis: Y intercept

y and x are coordinates

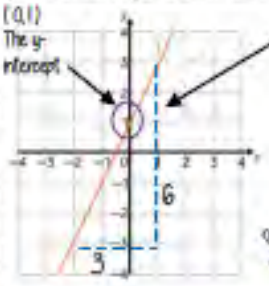
The equation of a line can be rearranged. E.g.

$y = c + mx$

$c = y - mx$

Identify which coefficient you are identifying or comparing

Find the equation from a graph



$y = 2x + 1$

The direction of the line indicates a positive gradient

Positive gradients

Negative gradients

Real life graphs

A plumber charges a £25 call out fee, and then £12.50 for every hour. Complete the table of values to show the cost of hiring the plumber.

Time (h)	0	1	2	3	4
Cost (£)	£25				£100

The y-intercept shows the minimum charge. The gradient represents the price per mile

In real life graphs like this values will always be positive because they measure distances or objects which cannot be negative.

Direct Proportion graphs: To represent direct proportion the graph must start at the origin.

When you have 0 pens the has 0 cost. The gradient shows the price per pen.

A box of pens costs £2.50. Complete the table of values to show the cost of buying boxes of pens.

Boxes	0	1	2	3	4
Cost (£)		£2.50			

Maths

YEAR 9 – REASONING WITH ALGEBRA...

Forming and Solving Equations

@whsto_maths

What do I need to be able to do?

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

- Solve inequalities with negative numbers
- Solve equations with unknowns on both sides
- Solve inequalities with unknowns on both sides
- Substitute into formulae and equations
- Rearrange formulae

Keywords

Inequality: an inequality compares who values showing if one is greater than, less than or equal to another

Variable: a quantity that may change within the context of the problem

Rearrange: Change the order

Inverse operation: the operation that reverses the action

Substitute: replace a variable with a numerical value

Solve: find a numerical value that satisfies an equation

Solve equations with brackets (R)

$3(2x + 4) = 30$

Expand the brackets

$6x + 12 = 30$

$-12 \quad -12$

$6x = 18$

$\div 6 \quad \div 6$

$x = 3$

Form and solve inequalities (R)

Two more than treble my number is greater than 11

Find the possible range of values

$3x + 2 > 11$

Solve

$x \leftarrow \div 3 \leftarrow -2 \leftarrow 11$

$x > 3$

Inequalities with negatives

Method 1 Make x positive first

$2 - 3x > 17$

$+3x \quad +3x$

$2 > 17 + 3x$

$-17 \quad -17$

$-15 > 3x$

$\div 3 \quad \div 3$

$-5 > x$

x is true for any value smaller than -5

Smaller ← → Bigger

-7 -5 -3

CHECK IT!

$2 - 3(-6) = 20$

TRUE/ CORRECT

Method 2 Keep the negative x

$2 - 3x > 17$

$-2 \quad -2$

$-3x > 15$

$\div -3 \quad \div -3$

$x > -5$

x is true for any value bigger than -5

This cannot be true....

$x < -5$

When you multiply or divide x by a negative you need to reverse the inequality

Equations with unknown on both sides

$4x + 5 = 3x + 24$

$-3x \quad -3x$

$x + 5 = 24$

$-5 \quad -5$

$x = 19$

Inequalities with unknown on both sides

Solving inequalities has the same method as equations

$5(x + 4) < 3(x + 2)$

$5x + 20 < 3x + 6$

$2x + 20 < 6$

$2x < -14$

$x < -7$

Check it!

$5(-8 + 4) < 3(-8 + 2)$

$5(-4) < 3(-6)$

$-20 < -18$

✓ -20 IS smaller than -18

Formulae and Equations

Formulae – all expressed in symbols

Substitute in values

Equations – include numbers and can be solved

Rearranging Formulae (one step)

$x = y + z$

Rearrange to make y the subject

$y = x - z$

$y \longrightarrow +z \longrightarrow x$

$y \longleftarrow -z \longleftarrow x$

Using inverse operations or fact families will guide you through rearranging formulae

Rearranging can also be checked by substitution

Language of rearranging....

Make XXX the subject

Change the subject

Rearrange

Rearranging Formulae (two step)

In an equation (find x)

$4x - 3 = 9$

$+3 \quad +3$

$4x = 12$

$\div 4 \quad \div 4$

$x = 3$

In a formula (make x the subject)

$xy - s = a$

$+s \quad +s$

$xy = a + s$

$\div y \quad \div y$

$x = \frac{a + s}{y}$

The steps are the same for solving and rearranging

Rearranging is often needed when using $y = mx + c$

e.g. Find the gradient of the line $2y - 4x = 9$

Make y the subject first $y = \frac{4x + 9}{2}$

Gradient $= \frac{4}{2} = 2$

Maths

YEAR 9 — REASONING WITH ALGEBRA...

Testing conjectures

@whsto_maths

What do I need to be able to do?

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

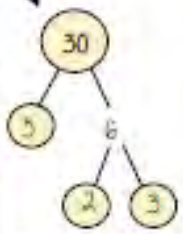
- Use factors, multiples and primes
- Reason True or False
- Reason Always, sometimes never true
- Show that reasoning
- Make conjectures about number
- Expand binomials
- Make conjectures with algebra
- Explore the 100 grid

Keywords

Multiples: found by multiplying any number by positive integers
Factor: integers that multiply together to get another number
Prime: an integer with only 2 factors
HCF: highest common factor (biggest factor two or more numbers share)
LCM: lowest common multiple (the first time the times table of two or more numbers match)
Verify: the process of making sure a solution is correct
Proof: logical mathematical arguments used to show the truth of a statement
Binomial: a polynomial with two terms
Quadratic: a polynomial with four terms (often simplified to three terms)

Factors, Multiples and Primes

Multiplication part-whole models



All these prime factor trees represent the same decomposition

HCF – Highest common factor

HCF of 18 and 30

18: 1, 2, 3, 6, 9, 18

30: 1, 2, 3, 5, 6, 10, 15, 30

Common factors are factors two or more numbers share

LCM – Lowest common multiple

LCM of 9 and 12

9: 9, 18, 27, 36, 45, 54

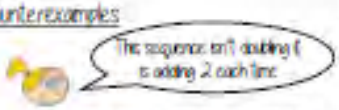
12: 12, 24, 36, 48, 60

Common multiples are multiples two or more numbers share

True or False?

Conjecture:
A pattern that is noticed for many cases

Counterexamples



Only one counterexample is needed to disprove a conjecture

Always, Sometimes, Never true

Always — Every value always supports the statement

Sometimes — Examples show the statement being true and counter examples to show when it is false

Never — No example supports the statement

Examples to try:
- 0 and 1
- Fractions
- Negative numbers

Show that

Numerical verification — Show the stages to a solution with numerical values

Algebraic verification — Show algebraic properties of the solution. You may want to use pictorial images to support this

Proof — Simple proofs using algebra

Compare the left hand side of an equation with the right hand side – are they the same or different?

Conjectures

Even	Odd
$(2n)$	$(2n+1)$
Multiple of 2	One more than any even

Use numerical verification first
Use pictorial verification – The representations of numbers of odd and even

Exploring the 100 square

In terms of n is used to make *generalisations* about relationships between numbers

Positions of numbers in relation to n form expressions
E.g. one space to the right of n
$n + 1$

E.g. One row below n
$n + 10$

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

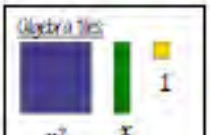
The size of the grid for generalisation changes the relationship statements

Expanding binomials

$2(x+2) \equiv 2x+4$

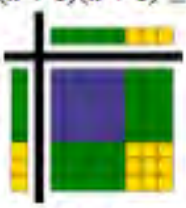
Algebra tiles can represent a binomial expansion that has two terms

Algebra tiles:



Positive values

$(x+3)(x+3) \equiv x^2+6x+9$



This is a quadratic. It has four terms which simplified to three terms

The order of the binomial has no impact on the outcome.
e.g. $(x+3)(3+x)$

Maths

YEAR 9 – CONSTRUCTING IN 2D/3D...

3D Shapes

@what.to_maths

What do I need to be able to do?

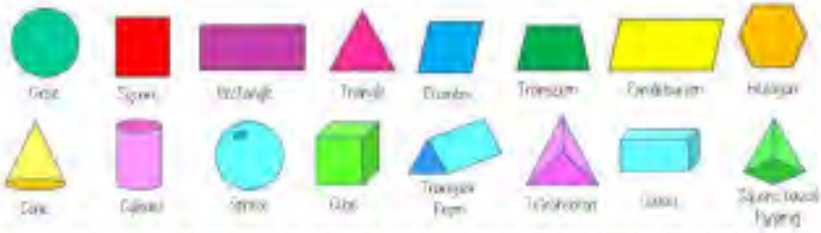
By the end of this unit you should be able to:

- Name 2D & 3D shapes
- Recognise Prisms
- Sketch and recognise nets
- Draw plans and elevations
- Find areas of 2D shapes
- Find Surface area for cubes, cuboids, triangular prisms and cylinders
- Find the volume of 3D shapes

Keywords

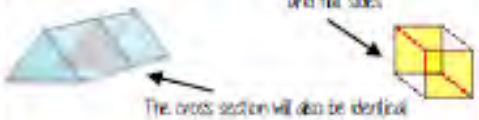
2D: two dimensions to the shape e.g. length and width
3D: three dimensions to the shape e.g. length, width and height
Vertex: a point where two or more line segments meet
Edge: a line on the boundary joining two vertex
Face: a flat surface on a solid object
Cross-section: a view inside a solid shape made by cutting through it
Plan: a drawing of something when drawn from above (sometimes birds eye view)
Perspective: a way to give illustration of a 3D shape when drawn on a flat surface

Name 2D & 3D shapes



Recognise prisms

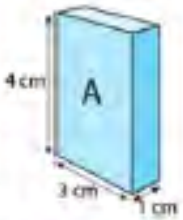
A solid object with two identical ends and flat sides

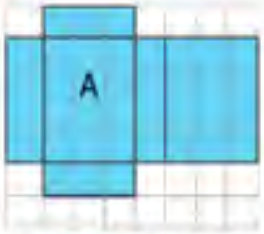


The cross section will also be identical to the end faces

A cylinder although with very similar properties does not have flat faces so is not categorised as a prism

Nets of cuboids

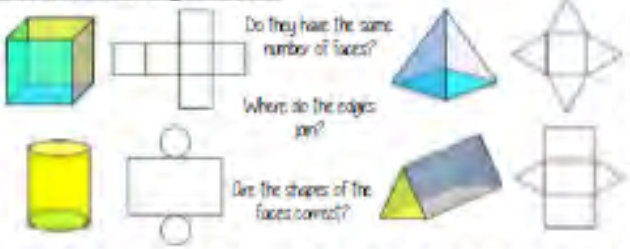




1cm grids help to draw accurately

Visualise the folding of the net. Will it make the cuboid with all sides touching

Sketch and recognise nets

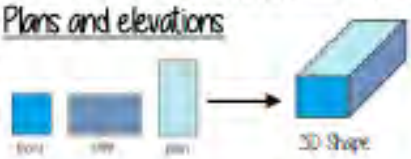


Do they have the same number of faces?

Where do the edges join?

Are the shapes of the faces correct?

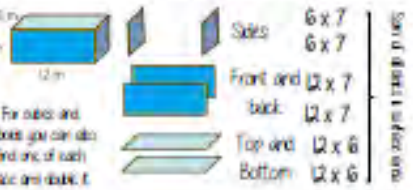
Plans and elevations



The direction you are considering the shape from determines the front and side views

Surface area

Sketching nets first helps you visualise all the sides that will form the overall surface area



For cubes and cuboids you can also find one of each face and double it

For other shapes - not all the sides are the same, so calculate the individually

Volumes

Volume is the 3D space it takes up – also known as capacity if using liquids to fill the space

Counting cubes:
Some 3D shape volumes can be calculated by counting the number of cubes that fit inside the shape

Cubes/ Cuboids = base x width x height

Remember multiplication is commutative

Cross section

Cross section

Prisms and cylinders = area cross section x height

Height can also be described as depth

Area of 2D shapes

R

Rectangle
Base x Height

Triangle
½ x Base x Perpendicular height

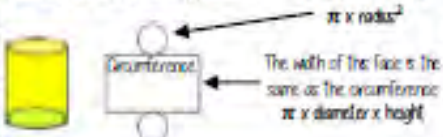
Parallelogram/ Rhombus
Base x Perpendicular height

Area of a trapezium
$\frac{1}{2}(a+b)\times h$

Area of a circle
$\pi \times \text{radius}^2$

Surface area - cylinders

The area of the circle
$\pi \times \text{radius}^2$



The width of the face is the same as the circumference
$\pi \times \text{diameter} \times \text{height}$

$2 \times \pi \times \text{radius}^2 + \pi \times \text{diameter} \times \text{height}$

Areas – square units
Volumes – cube units

Areas and volumes can be left in terms of π π

Maths

YEAR 9 – CONSTRUCTING IN 2D/3D...

Constructions & congruency

@whsto_maths

What do I need to be able to do?

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

- Draw and measure angles
- Construct scale drawings
- Find locus of distance from points, lines, two lines
- Construct perpendiculars from points, lines, angles
- Identify congruence
- Identify congruent triangles

Keywords

Protractor: piece of equipment used to measure and draw angles
Locus: set of points with a common property
Equidistant: the same distance
Discorectangle: (a stadium) – a rectangle with semi circles at either end
Perpendicular: lines that meet at 90°
Arc: part of a curve
Bisector: a line that divides something into two equal parts
Congruent: the same shape and size

Draw and measure angles

R

Draw a 35° angle

Make a mark at 35° with a pencil and join to the angle point (use a ruler)

The angle

Make sure the cross is at the end of the line (where you want the angle)

Scale drawings

R

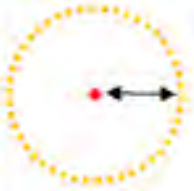
A picture of a car is drawn with a scale of 1:30

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

The car image is 10cm

	Image	Real life
×30	1cm	30cm
	10cm	300cm

Locus of a distance from a point



All points are equidistant (the same distance) from the fixed point in the middle

Equipment needed: The radius is the distance from the fixed point

If the point is in the corner it can only make a quarter circle

Locus of a distance from a straight line

All points are equidistant (the same distance) from line

The ends of the line are fixed points

Equipment needed: The line is straight so a ruler is used for the straight lines parallel to your original line

Locus equidistant from two points

Also a perpendicular bisector

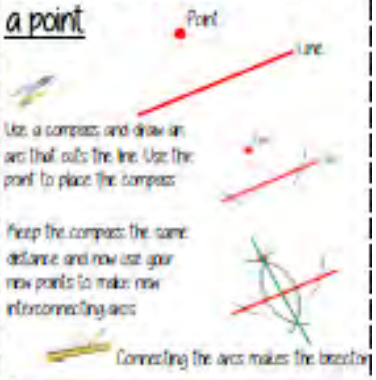
Because if the points are joined, the new line intersects it at a 90°

Join the intersections with a ruler

All points on this line are equidistant from both points

Keep the compass the same size and draw two arcs from each point

Construct a perpendicular from a point



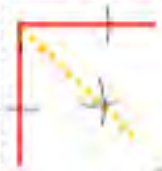
Use a compass and draw an arc that cuts the line. Use the point to place the compass

Keep the compass the same distance and now use your new points to make new interconnecting arcs

Connecting the arcs makes the bisector

If it is a point on the line the steps are the same

Locus of a distance from two lines



Also an angle bisector. This cuts the angle in half

From the angle vertex draw two arcs that cut the lines forming the angle

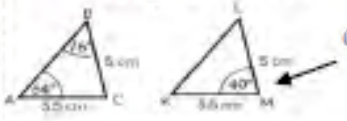
Keep the compass the same size and use the new arcs as centres to draw intersecting arcs in the middle

Join the vertex to the intersection

Congruent figures

Congruent figures are identical in size and shape – they can be reflections or rotations of each other

Congruent shapes are identical – all corresponding sides and angles are the same size



ABC = MLK

Because all the angles are the same and ABC=MLK triangles ABC and MLK are congruent

Congruent triangles

Side-side-side

All three sides on the triangle are the same size

Angle-side-angle

Two angles and the side connecting them are equal in two triangles

Side-angle-side

Two sides and the angle in-between them are equal in two triangles (it will also mean the third side is the same size on both shapes)

Right angle-hypotenuse-side

The triangles both have a right angle, the hypotenuse and one side are the same

Constructing Triangles

Unit to steps

R

Side, Angle, Angle

Side, Angle, Side

Side, Side, Side

Maths

YEAR 9 – REASONING WITH NUMBER...

Numbers

@whsto_maths

What do I need to be able to do?

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

- Identify integers, real and rational numbers
- Work with directed number
- Solve problems with number
- Find HCF/ LCM
- Add/ Subtract fractions
- Multiply/ Divide fractions
- Write numbers in standard form

Keywords

Integer: a whole number that is positive or negative
Rational: a number that can be made by dividing two integers
Irrational: a number that cannot be made by dividing two integers
Inverse operation: the operation that reverses the action
Quotient: the result of a division
Product: the result of a multiplication
Multiples: found by multiplying any number by positive integers
Factor: integers that multiply together to get another number

Integers, real and rational numbers

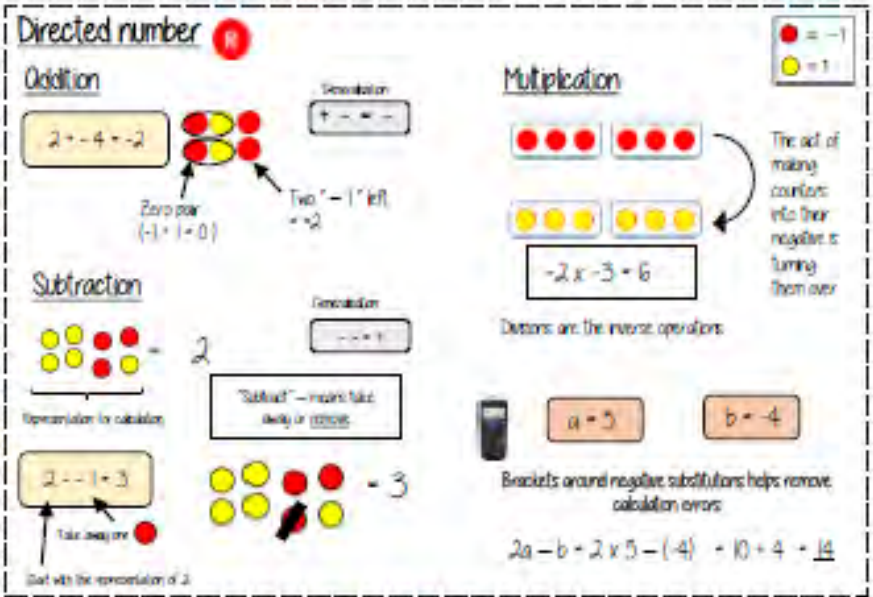
Rational – root word: ratio

Real numbers: $\frac{2}{3}$ stems from 2 ($\frac{2}{3}$ of the whole)

Irrational numbers: $\sqrt{2}$ the solution is a decimal that never ends and does not repeat

The square root of a negative is not a real number and cannot be found

Directed number



HCF/LCM

1 is a common factor of all numbers

Common factors are factors two or more numbers share

HCF – Highest common factor

HCF of 18 and 30

18: 1, 2, 3, 6, 9, 18
30: 1, 2, 3, 5, 6, 10, 15, 30

HCF = 6

LCM – Lowest common multiple

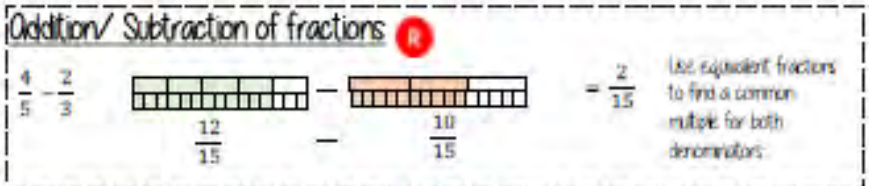
LCM of 9 and 12

9: 9, 18, 27, 36, 45, 54
12: 12, 24, 36, 48, 60

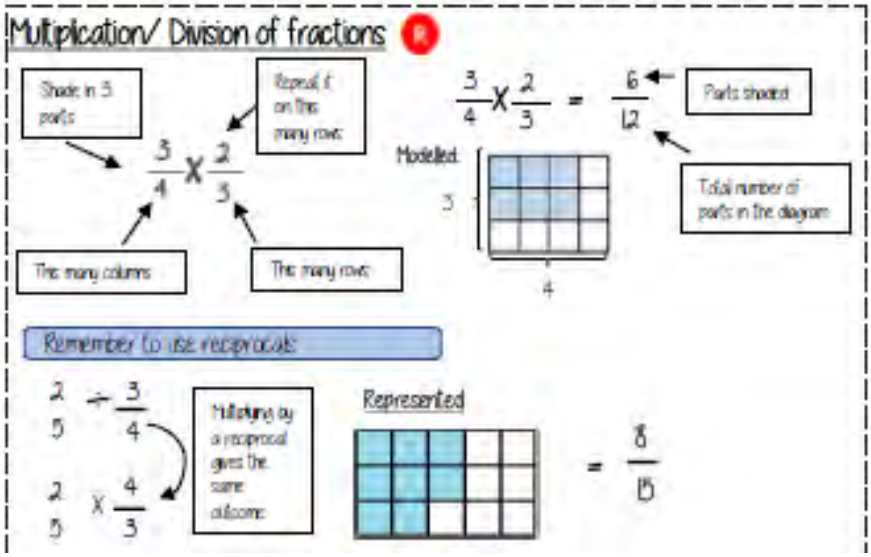
LCM = 36

The first time their multiples match

Addition/ Subtraction of fractions



Multiplication/ Division of fractions



Standard form

Any number between 1 and less than 10: A

Any integer: x 10^n

$6 \times 10^3 + 8 \times 10^5$

= 600000 + 800000
= 1400000
= 1.4×10^6

$(1.5 \times 10^3) \div (0.3 \times 10^5)$

$1.5 \div 0.3 \times 10^3 \div 10^5$
$= 5 \times 10^{-2}$

Maths

YEAR 9 — REASONING WITH NUMBER...

Using Percentages

@whsto_maths

What do I need to be able to do?

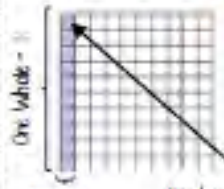
By the end of this unit you should be able to:

- Use FDP equivalence
- Calculate percentage increase and decrease
- Express percentage change
- Solve reverse percentage problems
- Solve percentage problems (calculator and non calculator problems)

Keywords

Percent: parts per 100 — written using the / symbol
Decimal: a number in our base 10 number system. Numbers to the right of the decimal place are called decimals
Fraction: a fraction represents how many parts of a whole value you have
Equivalent: of equal value
Reduce: to make smaller in value
Growth: to increase/ to grow
Integer: whole number, can be positive, negative or zero
Invest: use money with the goal of it increasing in value over time (usually in a bank)
Multiplier: the number you are multiplying by
Profit: the income take away any expenses/ costs

FDP Equivalence (R)



Percentage
100/ = a whole = 100 hundredths

10 hundredths
10 out of 100
10/

$\frac{10}{100} = \frac{1}{10} = 0.10$

ones	tenths	hundredths
	•	●

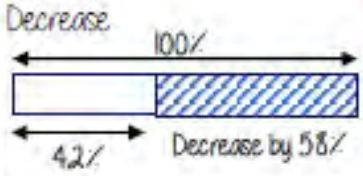
Converting FDP (R)

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

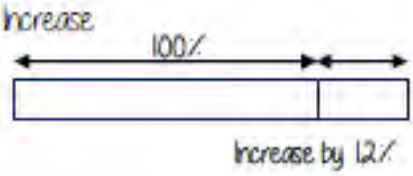
Using a calculator: ▪/□ → S⇌D → Convert to a decimal; × 100 converts to a percentage

Be careful of recurring decimals:
e.g. $\frac{1}{3}$ = 0.3333333
= 0.3
The dot above the 3

Percentage Increase/ Decrease (R)



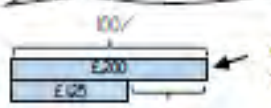
100 − 058 = 042 ← Multiplier: Less than 1



100/ + 12/ = 112/
100 + 0.12 = 1.12 ← Multiplier: More than 1

Percentage change (R)

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



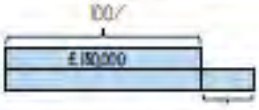
All values of change compare to the ORIGINAL value

Percentage loss

$\frac{75}{200} \times 100 = 37.5/$

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

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



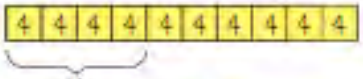
Percentage profit

Money made (profit value) → $\frac{36000}{180000} \times 100 = 20/$

Reverse Percentages

40/ of my number is 16
What am I thinking of?

Original Number (100/)

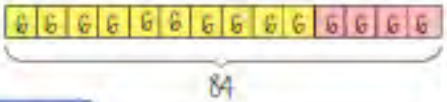


16

40/ = 16
10/ = 4
100/ = 40

140/ of my number is 84
What is the original number?

Original Number (100/)



84

140/ = 84
10/ = 6
100/ = 60

Try to scale down to 10/ or 1/ and then scale back up to 100/

Maths

YEAR 9 – REASONING WITH NUMBER...

Maths & Money

@whsto_maths

What do I need to be able to do?

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

- Solve problems with bills and bank statements
- Calculate simple interest
- Calculate compound interest
- Calculate wages and taxes
- Solve problems with exchange rates
- Solve unit pricing problems

Keywords

Credit: money being placed into a bank account
Debit: money that leaves a bank account
Balance: the amount of money in a bank account
Expense: a cost/ outgoing
Deposit: an initial payment (often a way of securing an item you will later pay for)
Multiplier: a number you are multiplying by (Multiplier more than 1 = increasing, less than 1 = decreasing)
Per Annum: each year
Currency: the type of money a country uses
Unitary: one – the cost of one

Bills and Bank Statements

Bills – tell you the amount items cost and can show how much money you need to pay

Some can include a total

Look for different units (is it in pence or pounds)

Menu	Price
Milk	89p
Tea	£1.50

Bank Statements

Bank statement can have negative balances if the money spent is higher than the money coming into the account

Date	Description	Credit	Debit	Balance
19th Sept	Salary	£1500		£1500
19th Sept	Mortgage		£600	£900
25th Sep	Bday Money	£15		£915

Simple Interest

For each year of investment the interest remains the same

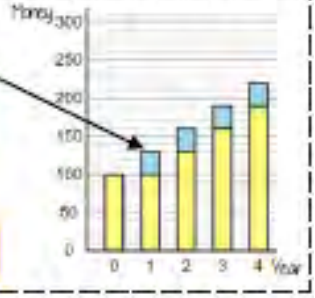
$$\frac{\text{Principal amount} \times \text{Interest Rate} \times \text{Years}}{100}$$

Principal amount is the amount invested in the account

e.g Invest £100 at 3% simple interest for 4 years

$\frac{100 \times 3 \times 4}{100} = £120$

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



Compound Interest

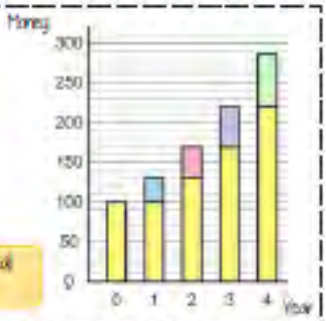
Interest is added to the current value of investment at the end of each year so the next year's interest is greater

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

e.g Invest £100 at 3% compound interest for 4 years

$100 \times 1.3^4 = £285.61$

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



Value Added Tax (VAT)

VAT is payable to the government by a business in the UK. VAT is 20% and added to items that are bought

Essential items such as food do not include VAT

Wages and Taxes

Salaries fall into tax brackets – which means they pay this much each month from their salary

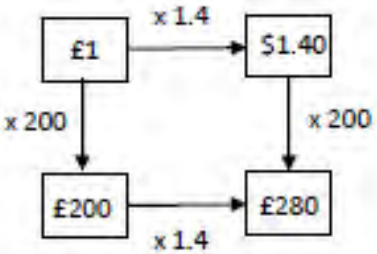
Taxable Income	Tax Rate
£12,501 to £50,000	20%
£50,001 to £150,000	40%
over £150,000	45%

Over time:

Time and a half – means 1.5 times their hourly rate

Double – 2 times their hourly rate

Exchange Rates



When making estimates it is also useful to use estimates to check if our solution is reasonable

Use inverse operations to reverse the exchange process

Common Currencies		
United Kingdom	£	Pounds
United States of America	$	Dollars
Europe	€	Euros

Unit Pricing

4 Oranges	5 cupcakes
£1	£1.20

4 = £1.00 ÷ 2 → 2 = £0.50 ÷ 2 → 1 = £0.25

5 = £1.20 ÷ 5 → 1 = £0.20

Cost per Unit

To calculate unit per cost you divide by the cost.

Cupcakes are the best value as one item has the cheapest value

There is a directly proportional relationship between the cost and number of units

Maths

YEAR 9 – REASONING WITH GEOMETRY...

Deduction

@whsfo_maths

What do I need to be able to do?

By the end of this unit you should be able to

- Identify angles in parallel lines
- Solve angle problems
- Make conjectures with angles
- Make conjectures with shapes

Keywords

Parallel: two straight lines that never meet with the same gradient
Perpendicular: two straight lines that meet at 90°
Transversal: a line that crosses at least two other lines
Sum: the result of adding two or more numbers
Conjecture: a statement that might be true but is not proven
Equation: a statement that says two things are equal
Polygon: a 2D shape made from straight edges
Counterexample: an example that disproves a statement

Alternate angles

Because alternate angles are equal the highlighted angles are the same size

Corresponding angles

Because corresponding angles are equal the highlighted angles are the same size

Co-interior angles

Because co-interior angles have a sum of 180° the highlighted angle is 110°

Co-angles on a line add up to 180° co-interior angles can also be calculated from applying alternate/ corresponding rules first

Solving angle problems

Angles on a straight Line
180°

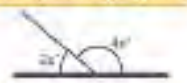
Vertically opposite angles
Equal

Angles around a point
360°

Triangles
Sum of angles is 180°

Isosceles have the same base angles

Link angle facts to algebra → **Form an equation** → **State the reason** → **Solve**

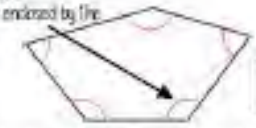


$2x + 4x = 180°$

The sum of angles on a straight line is 180°

$2x + 4x = 180°$
$6x = 180°$
$x = 30°$

Interior Angles
The angles enclosed by the polygon



(number of sides – 2) x 180

Making conjectures with angles

Proving a conjecture
A pattern is noticed for many cases

Disproving a conjecture
Only one counterexample is needed to disprove a conjecture

Apply the angle rules → **Test the theory** → **Make conjecture**

The sum of angles in a triangle is 180°

180 – 70 – 20 = 90
180 – 85 – 5 = 90
180 – 45 – 45 = 90

The angle that meets the circumference in a semi-circle is 90°

Making conjectures with shapes

Keywords and facts to recall with shape

Area: the amount of space inside a shape
Perimeter: the length around a shape
Regular Polygons: All sides and angles are equal

Quadrilateral Facts

Square
All sides equal size
All angles 90°
Opposite sides are parallel

Rectangle
All angles 90°
Opposite sides are parallel

Rhombus
All sides equal size
Opposite angles are equal

Parallelogram
Opposite sides are parallel
Opposite angles are equal
Co-interior angles

Kite
No parallel lines
Equal lengths on top sides
Equal lengths on bottom sides
One pair of equal angles

Maths

YEAR 9 – REASONING WITH GEOMETRY...

Rotation & Translation

@wirsto_maths

What do I need to be able to do?

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

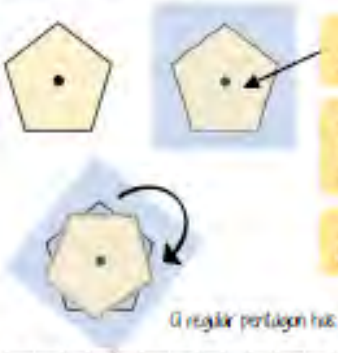
- Identify the order of rotational symmetry
- Rotate a shape about a point on the shape
- Rotate a shape about a point not on a shape
- Translate by a given vector
- Compare rotations and reflections

Keywords

Rotate: a rotation is a circular movement.
Symmetry: when two or more parts are identical after a transformation.
Regular: a regular shape has angles and sides of equal lengths.
Invariant: a point that does not move after a transformation.
Vertex: a point two edges meet.
Horizontal: from side to side.
Vertical: from up to down.

Rotational Symmetry

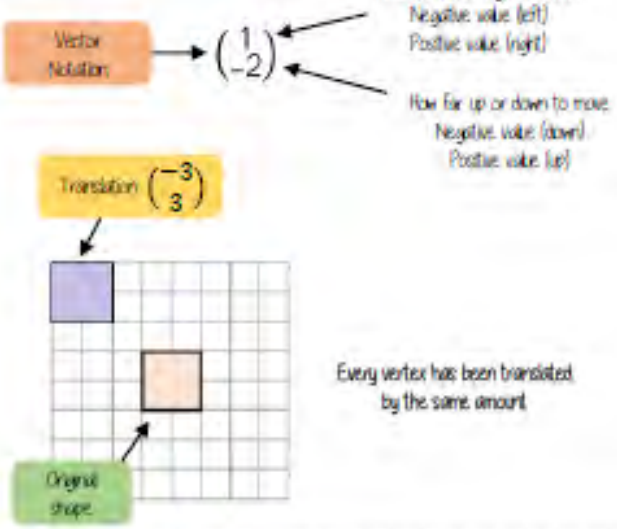
Tracing paper helps check rotational symmetry.



1. Trace your shape (mark the centre point)
2. Rotate your tracing paper on top of the original through 360°
3. Count the times it fits back into itself

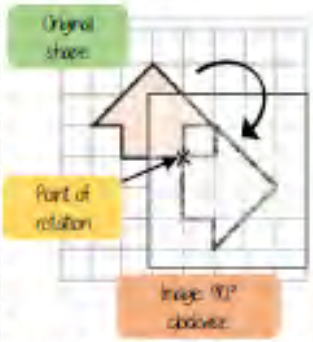
A regular pentagon has rotational symmetry of order 5

Translation and vector notation



Every vertex has been translated by the same amount

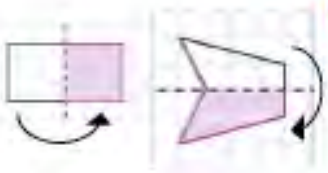
Rotate from a point (in a shape)



1. Trace the original shape (mark the point of rotation)
2. Keep the point in the same place and turn the tracing paper
3. Draw the new shape

Clockwise Anti-Clockwise

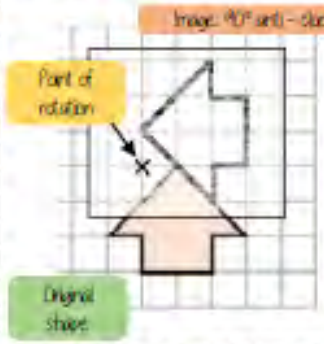
Compare rotations and reflections



R Reflections are a mirror image of the original shape.

Information needed to perform a reflection
- Line of reflection (Mirror line)

Rotate from a point (outside a shape)



1. Trace the original shape (mark the point of rotation)
2. Keep the point in the same place and turn the tracing paper
3. Draw the new shape

Rotations are the movement of a shape in a circular motion

Information needed to perform a rotation
- Point of rotation
- Direction of rotation
- Degrees of rotation

YEAR 9 — REASONING WITH GEOMETRY...

Pythagoras' theorem

@whats_maths

What do I need to be able to do?

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

- Use square and cube roots
- Identify the hypotenuse
- Calculate the hypotenuse
- Find a missing side in a Right angled triangle
- Use Pythagoras' theorem on axes
- Explore proofs of Pythagoras' theorem

Keywords

Square number: the output of a number multiplied by itself
Square root: a value that can be multiplied by itself to give a square number
Hypotenuse: the largest side on a right angled triangle. Always opposite the right angle.
Opposite: the side opposite the angle of interest
Adjacent: the side next to the angle of interest

Squares and square roots

This can also be written as 6^2

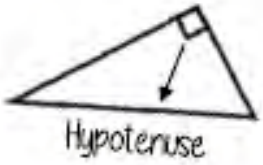
$\sqrt{\ }$ is the square root symbol

eg $\sqrt{64} = 8$
Because $8 \times 8 = 64$

1 × 1	2 × 2	3 × 3	4 × 4	5 × 5	6 × 6	7 × 7	8 × 8	9 × 9	10 × 10
1	4	9	16	25	36	49	64	81	100

Square numbers

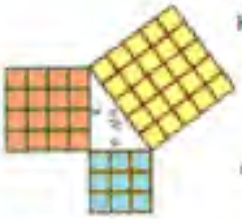
Identify the hypotenuse



The hypotenuse is always the longest side on a triangle because it is opposite the biggest angle.

Polygons can still have a hypotenuse if it is split up into triangles and opposite a right angle.

Determine if a triangle is right-angled



If a triangle is right-angled, the sum of the squares of the shorter sides will equal the square of the hypotenuse.

$a^2 + b^2 = \text{hypotenuse}^2$

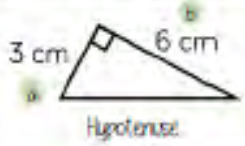
eg $a^2+b^2 = \text{hypotenuse}^2$

$3^2 + 4^2 = 5^2$

$9 + 16 = 25$

Substituting the numbers into the theorem shows that this is a right-angled triangle.

Calculate the hypotenuse



Either of the short sides can be labelled a or b

$a^2 + b^2 = \text{hypotenuse}^2$

1. Substitute in the values for a and b

$3^2+6^2 = \text{hypotenuse}^2$

$9 + 36 = \text{hypotenuse}^2$

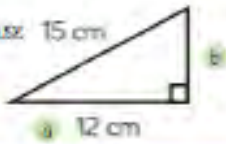
$45 = \text{hypotenuse}^2$

2. To find the hypotenuse square root the sum of the squares of the shorter sides

$\sqrt{45} = \text{hypotenuse}$

$6.71cm = \text{hypotenuse}$

Calculate missing sides



Either of the short sides can be labelled a or b

$a^2 + b^2 = \text{hypotenuse}^2$

$12^2+b^2 = 15^2$

1. Substitute in the values you are given

$144 + b^2 = 225$

$-144 \quad -144$

Rearrange the equation by subtracting the shorter square from the hypotenuse squared

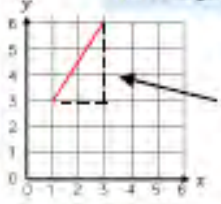
Square root to find the length of the side

$b^2 = 111$

$b = \sqrt{111} = 10.54\ cm$

Pythagoras' theorem on a coordinate axis

Find the length of the line segment



The segment can be made into a right-angled triangle by adding the sides on the diagram

The line segment is the hypotenuse

$a^2 + b^2 = \text{hypotenuse}^2$

The lengths of a and b are the sides of the triangle

Be careful to check the scale on the axes

YEAR 9 – REASONING WITH GEOMETRY...

Enlargement & Similarity

@whsto_maths

What do I need to be able to do?

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

- Recognise enlargement and similarity
- Enlarge a shape by a positive SF
- Enlarge a shape from a point
- Enlarge a shape by a fractional SF
- Work out missing sides and angles in a pair of similar shapes

Keywords

Similar Shapes: shapes of different sizes that have corresponding sides in equal proportion and identical corresponding angles

Scale Factor: the multiple describing how much a shape has been enlarged

Enlarge: to change the size of a shape (enlargement is not always making a shape bigger)

Corresponding: objects (or sides) that appear in the same place in two similar situations

Image: the picture or visual representation of the shape

Recognise enlargement & similarity

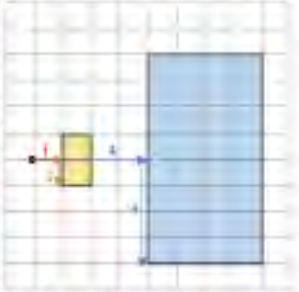
Shapes are similar if all pairs of corresponding sides are in the same ratio

These shapes are similar because all sides are increased by the same ratio

Enlargements are similar shapes with a ratio other than 1

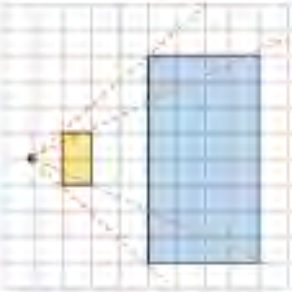
Enlarge a shape from a point

Scaled distances method



Scale the distance between the point of enlargement and each corresponding vertex

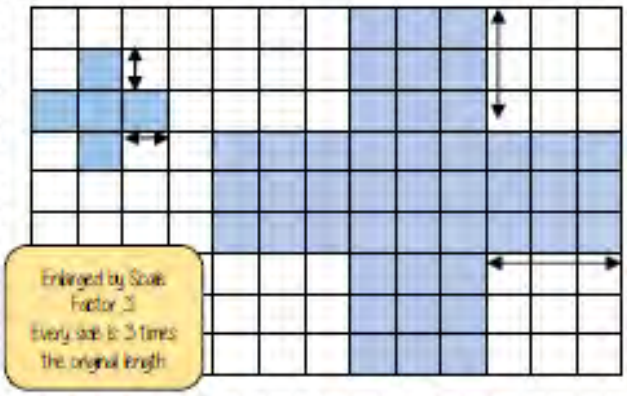
Rays method



Multiply the distance from the centre of corresponding vertex by the scale factor along the ray

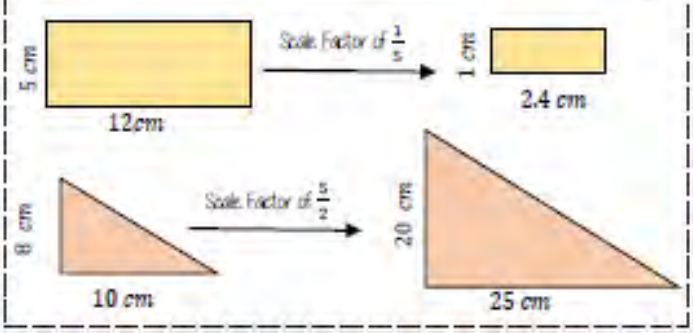
Enlarge by a positive scale factor

With a scale factor larger than 1 it makes the shape bigger



Positive fractional scale factor

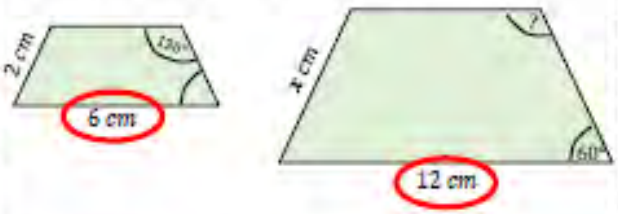
With a scale factor between 0 and 1 it makes the shape smaller



Calculations in similar shapes

Don't forget that properties of shapes don't change with enlargements or in similar shapes

The two trapezium are similar. Find the missing side and angle



Corresponding sides identify the scale factor

$\frac{12}{6} = 2$ Scale Factor = 2

Calculate the missing side

Length (corresponding side) x scale factor

$2cm \times 2$

$x = 4cm$

Enlargement does not change angle size

Calculate the missing angle

Corresponding angles remain the same

130°

Maths

YEAR 9 – REASONING WITH GEOMETRY...

Solving ratio & proportion problems

@whsto_maths

What do I need to be able to do?

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

- Solve problems with direct proportion
- Use conversion graphs
- Solve problems with inverse proportion
- Solve ratio problems
- Solve 'best buy' problems

Keywords

Proportion: a comparison between two numbers

Ratio: a ratio shows the relative size of two variables

Direct proportion: as one variable is multiplied by a scale factor the other variable is multiplied by the same scale factor

Inverse proportion: as one variable is multiplied by a scale factor the other is divided by the same scale factor

Direct Proportion

As one variable changes the other changes at the same rate

4 cans of pop = £2.40

4 cans of pop = £2.40 → (×5) → 20 cans of pop = £12.00 (×5)

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

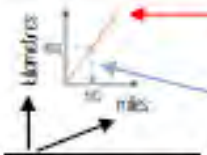
This is a multiplicative change

4 cans of pop = £2.40 → (×3) → 12 cans of pop = £7.20 (×3)

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

Conversion Graphs

Compare two variables



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

Labelling of both axes is vital

To make conversions between units you need to find the point to compare – then find the associated point by using your graph.

Using a ruler helps for accuracy

Showing your conversion lines help as a "check" for solutions

Inverse Proportion

As one variable is multiplied by a scale factor the other is divided by the same scale factor

Examples of inversely proportional relationships:

Time taken to fill a pool and the number of taps running

Time taken to paint a room and the number of workers

T is inversely proportional to G. When T=2 then G=20

T	1	2	8
G	40	20	5

(÷2, ×4 between 1 and 2; ×2, ÷4 between 2 and 8)

Best Buys

Have a directly proportional relationship

To calculate best buys you need to be able to compare the cost of one unit, or units of equal amounts

	Shop A	Shop B
	4 cans for £1.20	3 cans for £0.93
	£1.20 ÷ 4	£0.93 ÷ 3
Cost per item	1 can is £0.30 Or 30p	1 can is £0.31 Or 31p

Shop A is the best value as it is 1p cheaper per can of pop

	Shop A	
	4 cans for £1.20	3 cans for £0.93
	4 ÷ £1.20	3 ÷ £0.93
Cost per pound	£1 buys 3.333 cans of pop	£1 buys 3.23 cans of pop

Shop A is still shown as being the best value but pay attention to the unit you are calculating per item or per pound

Best value is the most product for the lowest price per unit

Sharing a whole into a given ratio

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

Model the Question

James : Lucy
3 : 4

Find the value of one part

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

£350 ÷ 7 = £50

□ = one part = £50

Put back into the question

James : Lucy
(×50) 3 : 4 (×50)
£150 £200

James: 3 x £50 = £150

Lucy: 4 x £50 = £200

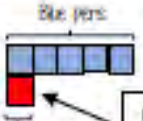
Finding a value given 1n (or n:1)

Inside a box are blue and red pens in the ratio 5:1
If there are 10 red pens how many blue pens are there?

Model the Question

Blue : Red
5 : 1

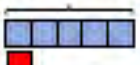
□ = one part = 10 pens



Put back into the question

Blue : Red
(×10) 5 : 1 (×10)
50 : 10

Blue pens = 5 x 10 = 50 pens



Red pens = 1 x 10 = 10 pens

There are 50 Blue Pens

Maths

YEAR 9 – REASONING WITH GEOMETRY...

Rates

@whsfo_maths

What do I need to be able to do?

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

- Solve speed, distance, time questions
- Use distance time graphs
- Solve density, mass, volume problems
- Solve flow problems
- Use flow graphs
- Interpret rates of change and their units

Keywords

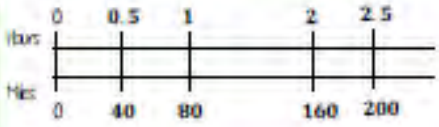
Convert: change
Mass: a measure of how much matter is in an object. Commonly measured by weight.
Origin: the coordinate (0, 0)
Volume: the amount of 3D space a shape takes up
Substitute: putting numbers where letters are – replacing numbers into a formula

Speed, Distance, Time

"per" for every
e.g. 80 miles per hour (mph)
Travel 80 miles every hour

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

You can use a double number line to help you calculate distance



e.g. A boat travels at a constant speed for 2.5 hours
It travels 300 miles

Bar models can help to calculate mph

Each part is half an hour
Each part is 60 miles

Speed, Distance, Time

÷ 60 (minutes → hours)
× 60 (hours → minutes)

Before calculations – make sure you are working in the same units as the speed

Learn or learn how to rearrange the formular for speed, distance and time

Substitute in the variables given

$$\text{time} = \frac{\text{distance}}{\text{speed}}$$

$$\text{distance} = \text{speed} \times \text{time}$$

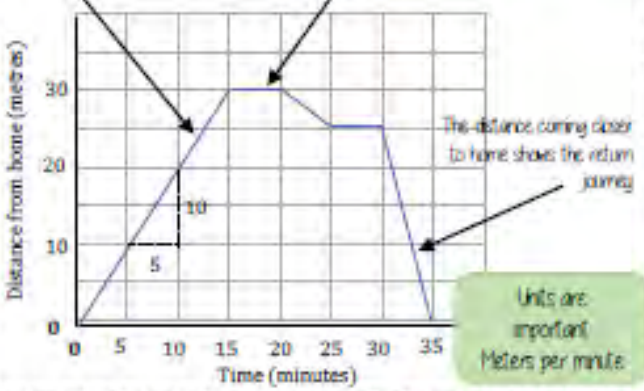
Distance – Time graphs

Gradient = speed

The steeper a gradient the faster the speed

$\frac{10}{5}$ = 2 metres per min

Horizontal lines represent staying still



The distance coming closer to home shows the return journey

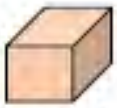
Units are important
Meters per minute

Density, Mass, Volume

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

$$\text{volume} = \frac{\text{mass}}{\text{density}}$$

$$\text{mass} = \text{volume} \times \text{density}$$



volume of prism = Area of cross section × Depth

R

Flow problems & graphs

This will fill at a constant rate, then as the space decreases it will speed up and the neck of the bottle fill at a faster constant speed

The cylinder will fill at a constant speed

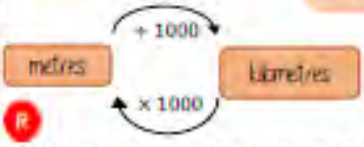
Units are important
Ensure any volume calculations are the same unit as the rate of flow

Rates of change & units

Common rates of change relationships

Revisit your conversions between units of length and capacity

Speed: miles per hour
Exchange rates: euros per pounds
Density: mass per volume



R

Maths

YEAR 9 — REPRESENTATIONS...

Probability

@whsto_maths

What do I need to be able to do?

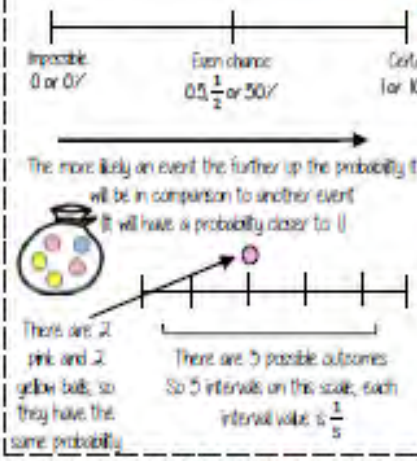
By the end of this unit you should be able to:

- Find single event probability
- Find relative frequency
- Find expected outcomes
- Find independent events
- Use diagrams to work out probabilities

Keywords

Probability: the chance that something will happen
Relative Frequency: how often something happens divided by the outcomes
Independent: an event that is not effected by any other events
Chance: the likelihood of a particular outcome
Event: the outcome of a probability – a set of possible outcomes
Biased: a built in error that makes all values wrong by a certain amount

The probability scale



Single event probability

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	0.55	

P(White chocolate) = 1 – 0.15 – 0.30
= 0.5

Relative Frequency

$$\frac{\text{Frequency of event}}{\text{Total number of outcomes}}$$

Remember to calculate or identify the overall number of outcomes!

Colour	Frequency	Relative Frequency
Green	6	0.3
Yellow	12	0.6
Blue	2	0.1
	20	

Relative frequency can be used to find expected outcomes

e.g. Use the relative probability to find the expected outcome for green if there are 100 selections

Relative frequency x Number of times
$0.3 \times 100 = 30$

Expected outcomes

Expected outcomes are estimations. It is a long term average, rather than a prediction

Dark	Milk	White
0.15	0.35	0.5

The sum of the probabilities is **1**

An experiment is carried out **400** times.
Show that dark chocolate is expected to be selected **60** times

$0.15 \times 400 = 60$

Independent events

The rolling of one dice has no impact on the rolling of the other. The individual probabilities should be calculated separately.

Probability of event 1 × Probability of event 2

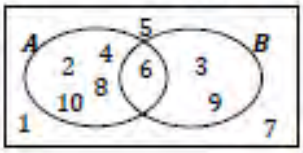
$P(5) = \frac{1}{6}$ $P(R) = \frac{1}{4}$

Find the probability of getting a 5 and a red

$P(5 \text{ and } R) = \frac{1}{6} \times \frac{1}{4} = \frac{1}{24}$

Using diagrams

Recap Venn diagrams, Sample space diagrams and Two way tables



	Car	Bus	Walk	Total
Boys	15	24	14	53
Girls	6	20	21	47
Total	21	44	35	100

The possible outcomes from rolling a dice

The possible outcomes from tossing a coin	1	2	3	4	5	6
H	1H	2H	3H	4H	5H	6H
T	1T	2T	3T	4T	5T	6T

Maths

YEAR 9 – REPRESENTATIONS...

Algebraic Representation

@whsto_maths

What do I need to be able to do?

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

- Draw quadratic graphs
- Interpret quadratic graphs
- Interpret other graphs including reciprocals
- Represent inequalities

Keywords

Quadratic: a curved graph with the highest power being 2. Square power
Inequality: makes a non equal comparison between two numbers
Reciprocal: a reciprocal is 1 divided by the number
Cubic: a curved graph with the highest power being 3. Cubic power
Origin: the coordinate (0, 0)
Parabola: a 'u' shaped curve that has mirror symmetry

Quadratic Graphs

$y = x^2 + 4x + 3$

If x^2 is the highest power in your equation then you have a quadratic graph

It will have a parabola shape

Intersection with the y axis

Substitute the x values into the equation of your line to find the y coordinates

x	−4	−3	−2	−1	0	1
y	3	0	−1	0	3	8

Coordinate pairs for plotting $(-3, 0)$

Plot all of the coordinate pairs and join the points with a curve (freehand)

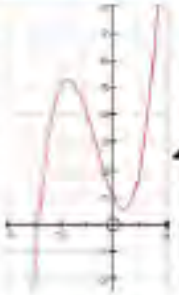
Quadratic graphs are always symmetrical with the turning point in the middle

Interpret other graphs

Cubic Graphs

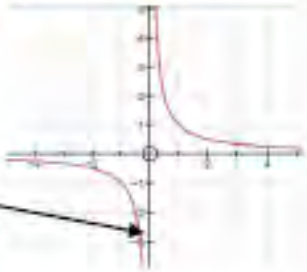
$y = x^3 + 2x^2 - 2x + 1$

If x^3 is the highest power in your equation then you have a cubic graph



Reciprocal Graphs

$y = \frac{1}{x}$



Reciprocal graphs never touch the y axis
This is because x cannot be 0
This is an asymptote

Exponential Graphs

$y = 2^x$

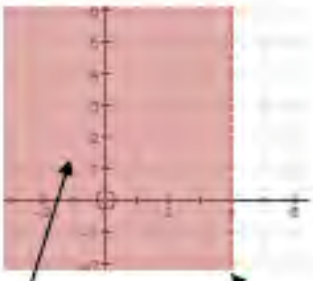
Exponential graphs have a power of x

Represent Inequalities

Multiple methods of representing inequalities

$x < 4$

All values are less than 4

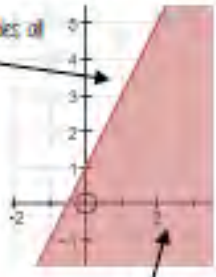


The shaded area indicates all possible values of x

The dotted line shows that the inequality does not include these points

The solid line shows that the inequality includes all the points on this line

$y \geq 2x + 1$



The shaded area indicates all possible solutions to this inequality

Science

Y9 Key Concept – Cells 1

	Definitions	
1	eukaryotic cell	Plant and animal cells. With cell membrane, cytoplasm and DNA enclosed in a nucleus.
2	prokaryotic cell	Bacterial cells. With cytoplasm, cell membrane and a cell wall. Chromosomal DNA in a single loop, not enclosed in a nucleus. There may be small rings of DNA called plasmids.
3	organelle	Specialised structure in a cell
4	nucleus	Contains the DNA which controls the cell, found in eukaryotic cells
5	cell membrane	Controls the movement of substances in and out of cell
6	mitochondria	Where aerobic respiration takes place
7	aerobic respiration	Respiration with oxygen (normal use) glucose + oxygen → carbon dioxide + water
8	ribosome	Where proteins are produced
9	chloroplast	Found in plant cells, where photosynthesis takes place
10	vacuole	A storage area for water and other molecules
11	cell wall	used to support plant and bacterial cells
12	magnification	How much an image is enlarged
12	resolution	How fine the detail is visible in an image.
14	light microscope	A piece of equipment used to study cells, using light and lenses
15	electron microscope	A piece of equipment used to study cells, using electrons beams and lenses
16	cell	The building block of living things
17	tissue	A group of similar cells that work together to carry out a function
18	organ	A group of different tissues that work together to carry out a function
19	organ system	A group of different tissues that work together to carry out a function
20	organism	A living thing, eg plant, animal, fungus, bacterium

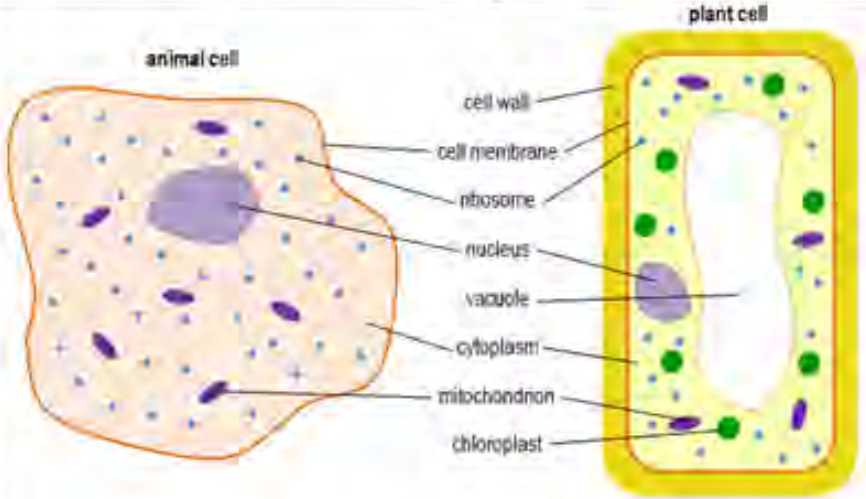
Maths Skills: understand scale and size of cells and be able to make order of magnitude Calculations using standard form

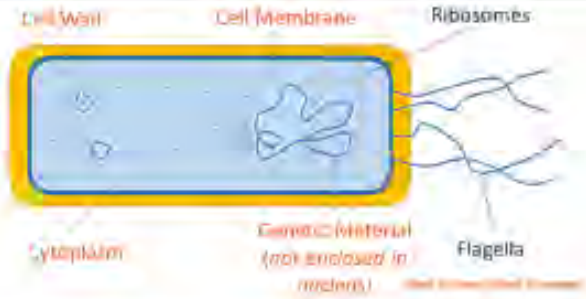
1. $$\text{magnification} = \frac{\text{size of image}}{\text{size of real object}}$$

2. unit prefixes

centi = $1/100^{th} = 0.01 = 10^{-2}$
milli = $1/1000^{th} = 0.001 = 10^{-3}$
micro = $1/1\,000\,000^{th} = 0.000\,001 = 10^{-6}$
nano = $1/1\,000\,000\,000^{th} = 0.000\,000\,001 = 10^{-9}$

Diagrams





Y9 Key Concept – Cells 2

Definitions		
1	eukaryotic cell	Plant and animal cells. With cell membrane, cytoplasm and DNA enclosed in a nucleus.
2	prokaryotic cell	Bacterial cells. With cytoplasm, cell membrane and a cell wall. Chromosomal DNA in a single loop, not enclosed in a nucleus. There may be small rings of DNA called plasmids.
3	organelle	Specialised structure in a cell
4	nucleus	Contains the DNA which controls the cell, found in eukaryotic cells
5	cell membrane	Controls the movement of substances in and out of cell
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10	vacuole	A storage area for water and other molecules
11	cell wall	used to support plant and bacterial cells
12	magnification	How much an image is enlarged
12	resolution	How fine the detail is visible in an image.
14	light microscope	A piece of equipment used to study cells, using light and lenses
15	electron microscope	A piece of equipment used to study cells, using electrons beams and lenses
16	cell	The building block of living things
17	Cell division	the division of a cell into two daughter cells with the same genetic material
18	Stem cell	undifferentiated cell of a multicellular organism which is capable of giving rise to more cells of the same type
19	Stem cell bank	a place where a person's stem cells are stored for future use
20	Cancer	A disease resulting from uncontrolled growth and division of abnormal cells

Maths Skills: understand scale and size of cells and be able to make order of magnitude Calculations using standard form

1. $$\text{magnification} = \frac{\text{size of image}}{\text{size of real object}}$$

2. unit prefixes
   - centi = $1/100^{th} = 0.01 = 10^{-2}$
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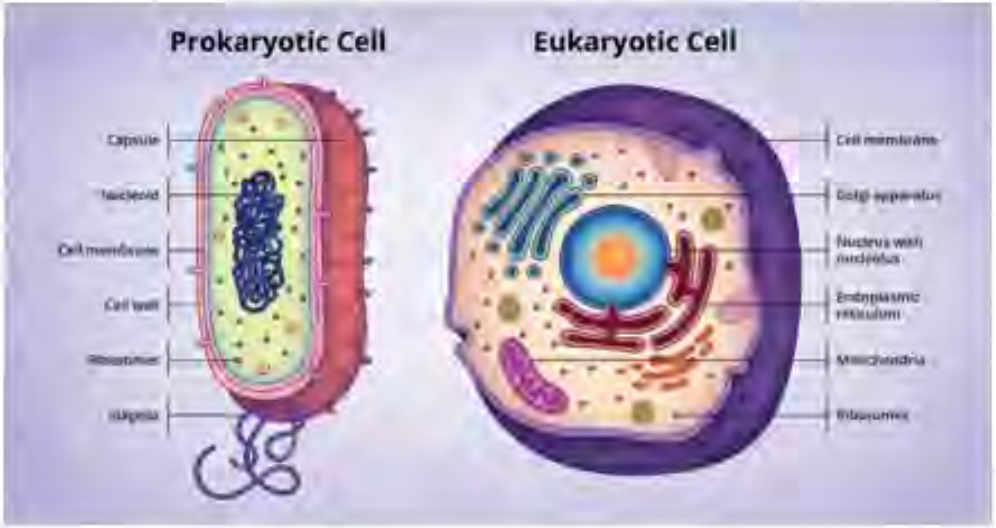
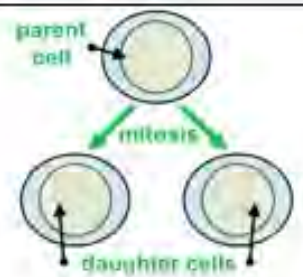
Diagrams



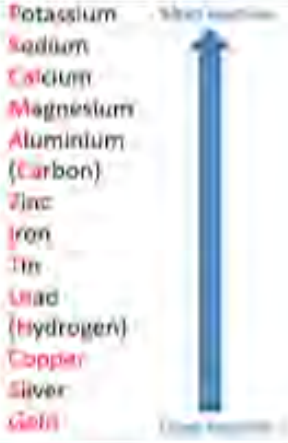


KS3.5 – The reactions of metals

Definitions

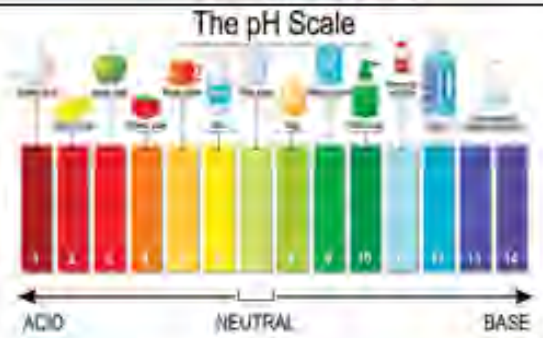
1	**Physical Change**	Reversible change in the physical properties of a substance, as size or shape: e.g. Freezing a liquid is a physical change.
2	**Chemical Change**	A chemical change happens when one chemical substance is transformed into one or more different substances, such as when iron becomes rust.
3	**Reduction**	The loss of oxygen from a substance. For example, copper oxide can be reduced to form copper if it is reacted with hydrogen
4	**Oxidation**	The gain of oxygen by a substance. For example, magnesium is oxidised when it reacts with oxygen to form magnesium oxide
4	**Reactivity Series**	The reactivity series allows us to predict how metals will react. A more reactive metal will displace a less reactive metal from a compound.

5. Reactivity Series



pH Scale

6.



7.	**pH Scale**	The pH scale, from 0 to 14, is a measure of the acidity or alkalinity of a solution, and can be measured using universal indicator or a pH probe.
8.	**Acid**	A proton (H^+) donor
9.	**Alkali**	A hydroxide (OH^-) donor
10.	**Neutralization**	Neutralisation is a chemical reaction in which an acid reacts with a base or an alkali to form a salt and water

Equations

Metal + Acid -> Hydrogen and salt

Acid + Alkali -> Salt and Water

Acid + Carbonate -> Carbon dioxide + Salt + Water

KS3.5 Digestion

	Definitions	
1	Oesophagus	A muscular tube that squeezes food from the mouth to the stomach. (Also known as the gullet.)
2	Stomach	A muscular organ that churns up the food. Enzymes and stomach acid are added here.
3	Small intestines	Absorption of nutrients into the blood stream happens here.
4	Peristalsis	The muscular contraction that squeezes food down the oesophagus.
5	Protein	Needed for growth and repair.
6	Carbonydrates	Needed for energy.
7	Fats	Needed for insulation of nerve cells and body insulation.
8	Fibre	Needed to provide the "bulk" for faeces (poo). Keeps the intestines working properly.
9	Vitamins and minerals	Help maintain general health and fitness.
10	Enzymes	Biological catalysts that speed up the rate of a reaction. Enzymes help speed up digestion.
11	Denatured	Enzymes can be altered in shape if exposed to high temperatures or pH.
12	Deficiency	Diseases can be caused by a lack of nutrients. E.g scurvy, anaemia.
13	Obesity	Being excessively overweight. Can result in type 2 diabetes, CHD, high blood pressure
14	Villi	Finger like structures that line the small intestines. These give a larger surface area for absorption.
15	Digestion	The break- down of large insoluble molecules into smaller soluble molecules

	Test for food groups	
16	Starch test	Iodine is orange. It will turn black in a positive test
17	Sugar	Benedict's solution is blue. When heated with sugar it will turn "brick red".
18	Protein	Biuret solution is blue. When heated with protein it will turn purple.
	Products of digestion	
19	Amino acids	Proteins are broken down into amino acids using protease enzymes.
20	Fatty acids	Fats are broken down into fatty acids and glycerol using lipase enzymes.
21	Simple sugars	Carbohydrates are broken down into simple sugars using carbohydrase enzymes e.g Amylase in saliva.

1. Mouth
2. Oesophagus
3. Stomach
4. Small intestines
5. Pancreas
6. Large intestines
7. Rectum
8. Liver
9. Gall Bladder

Diagram 1: Parts of the digestive system

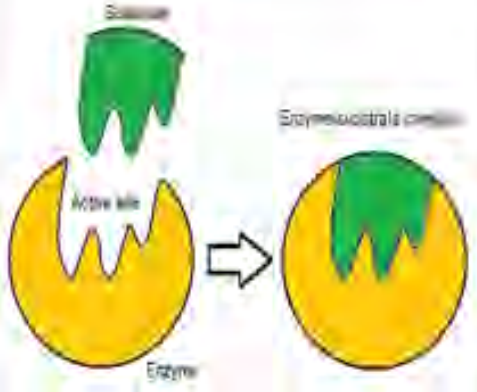


Diagram 2: Lock and Key theory.

Y9 Key Concept - Ecosystems

Definitions

1	Food chain	A sequence showing feeding relationships.
2	Producer	The organism that starts the food chain. They make their own food by photosynthesis.
3	Consumer	An organism that eats another organism to survive.
4	Herbivore	An organism that only eats plants.
5	Carnivore	An organism that only eats other animals.
6	Omnivore	An organism that eats both plants and animals.
7	Biomass	Living material that makes up organisms.
8	Trophic	A feeding level in a food chain.
9	Predator	A consumer that hunts and eats other animals.
10	Prey	The animals which are eaten by predators.
11	Ecosystem	An ecosystem is the interaction of a community of living organisms (biotic) with the non-living (abiotic) parts of their environment.
12	Biome	A large naturally occurring community of flora and fauna occupying a major habitat, e.g. forest or tundra.
13	Habitat	The place where an organism lives.
14	Community	A group of organisms of different species living in the same place or having a particular characteristic in common.
15	Population	A group of the same organisms living in an area.
16	Individual	A single living organism.
17	Biodiversity	The variety of plant and animal life in a particular habitat.
18	Abiotic factors	Those that are non-living and form the physical environment in which organisms live.
19	Biotic factors	Those that are living (biological), such as predators and plants.
20	Interdependence	The number of one species will depend on one or more other species. Numbers will rise and fall in relation to each other in a cyclic pattern.
21	Zonation	Areas (or zones) within an ecosystem that contains different species of plants and animals.
22	Competition	Organisms compete with each other for food, mates, territory, water, light.
23	Adaptation	Features that enable organisms to survive (either structural, behavioural or functional).

Scientific Skills

1	Variable	Something in an experiment that can change.
2	Independent Variable	The variable that you change (on purpose) in an experiment.
3	Dependant Variable	The variable that you measure in an experiment.
4	Control Variable	Variables that you keep the same to make the experiment fair.
5	Anomaly	A result that doesn't fit the pattern of the others (should be ignored when calculating averages or drawing lines of best fit).

Abiotic Factors

- Temperature
- Light
- CO_2 levels
- Toxic chemical
- Soil pH
- Moisture levels
- O_2 levels

Biotic Factors

- Predators
- Pathogens
- Disease
- Availability of food
- Competition

Abiotic and Biotic Factors

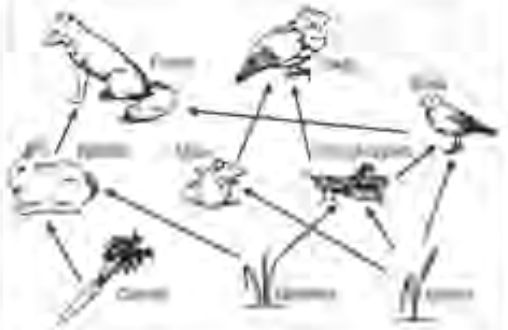


Diagram 1: Food web example

- Lines of best fit can be straight OR curved depending on the points
- Line of best fit should have roughly same number of points above line as below
- Do NOT force the line through the origin
- Do NOT join the points "dot-to-dot"

Diagram 2: How to plot line graphs and draw curves of best fit.

Y9 Key Concept – Energy

Definitions

1	Conservation of Energy	Energy cannot be lost or created; it can only be transferred from one store to another.
2	Transfer	Changing one form of energy into another.
3	Thermal	Another word for heat energy.
4	Kinetic energy	The energy of moving objects.
5	Nuclear	Energy stored inside an atom by the forces that hold together the nucleus of the atom
6	Chemical	A stored energy; e.g. food has a store of chemical energy that can be transferred into other types of energy.
7	Gravitational Potential Energy	Gravitational potential energy (GPE) is the energy an object has due to gravity.
8	Elastic Potential Energy	Energy stored in stretched or compressed objects, e.g. a spring.
9	Dissipated	Energy that is transferred to the surroundings.
10	Efficiency	A measure of how much input energy is transferred into useful energy.
11	Input	The energy that goes into a system (an object or group of objects).
12	Output	The energy that comes out of a system (an object or group of objects).
13	Power	The rate at which energy is transferred.
14	Gravitational Field Strength	The force experienced due to gravity. The gravitational field strength of the Earth is 10 N/kg. This means an object with a mass of 1 kg would be attracted towards the centre of the Earth by a force of 10 N.

Equations

work done = force x distance	$W = F s$
kinetic energy = 0.5 x mass x (speed)^2	$E_k = \frac{1}{2} m v^2$
GPE = mass x gravitational field strength x height	$E_p = m g h$
power = $\frac{\text{energy transferred}}{\text{time}}$	$P = \frac{E}{t}$
power = $\frac{\text{work done}}{\text{time}}$	$P = \frac{W}{t}$
efficiency = $\frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$	
efficiency = $\frac{\text{useful power output}}{\text{total power input}}$	
elastic potential energy = 0.5 x spring constant x (extension)^2	$E_e = \frac{1}{2} k e^2$
change in thermal energy = mass x specific heat capacity x temperature change	$\Delta E = m c \Delta\theta$

Units

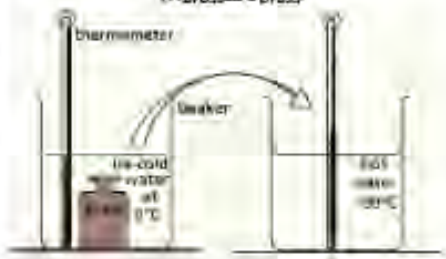
Energy or Work	Joules (J)
Mass	Kilograms (kg)
Force	Newtons (N)
Power	Watts (W)
Gravitational Field Strength	Newtons per kilogram (N /kg)
Specific Heat Capacity	Joules per kilogram per degree Celsius (J / kg°C)

Finding the Specific Heat Capacity of Brass

- The brass starts at 0°C
- When moved into the hot water the brass warms up and the water cools down until both are same temperature
- Energy gained by brass = energy lost by water

$m_{water} c_{water} \Delta\theta_{water} = m_{brass} c_{brass} \Delta\theta_{brass}$

$c_{brass} = \frac{m_{water} c_{water} \Delta\theta_{water}}{m_{brass} \Delta\theta_{brass}}$



Chemistry Topic 9 (Paper 2): Chemistry of the Atmosphere

Contents of Modern Atmosphere

1	Nitrogen:- about 4/5 or 80%
2	Oxygen:- about 1/5 or 20%
3	Carbon dioxide, water vapour and noble gases:- trace amounts

Evolution of Earth's Atmosphere

1	First billion years – intense volcanic activity released carbon dioxide and nitrogen to form early atmosphere and water vapour.
2	Nitrogen formed small amounts of ammonia.
3	Water vapour condensed to form the oceans.
4	Carbon dioxide dissolved into oceans forming carbonate sediment.
5	2.7 billion years ago, algae and plants started to evolve. Photosynthesis removed carbon dioxide and added oxygen to the atmosphere.
6	Carbon dioxide was also removed by the formation of sedimentary rocks and fossil fuels.

Greenhouse Effect

1. Sunlight passes through our atmosphere and heats up the Earth's surface.
2. This heat is then emitted as infrared radiation.
3. Some infrared passes through the atmosphere into space.
4. Some is absorbed by greenhouse gases and increases the Earth's temperature

Photosynthesis Equations

Word Equation carbon dioxide + water → glucose + oxygen

Balanced Symbol Equation

$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

Pollutants and Their Causes

1	Carbon monoxide (CO)	Caused by incomplete combustion – fuels burning without enough oxygen present.
2	Soot	Unburnt carbon particles, caused by incomplete combustion.
3	Sulphur dioxide (SO_2)	Caused by burning fuels contaminated with sulphur.
4	Oxides of nitrogen (NO & NO_2)	Reactions between oxygen and nitrogen in the air at high temperatures (e.g. in car engines or in power stations)

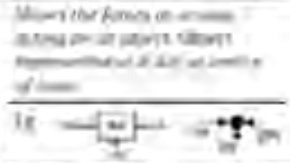
Pollutants and Their Effects

1	Carbon monoxide (CO)	Replaces oxygen in the blood, resulting in suffocation.
2	Soot	Clogs up lungs and causes respiratory diseases.
3	Sulphur dioxide (SO_2)	Causes acid rain which harms the environment.
4	Oxides of nitrogen (NO & NO_2)	Causes acid rain which harms the environment.

Carbon Sinks and How They Form

1	Carbon Sink	Something that removes carbon dioxide from the atmosphere
2	Limestone ($CaCO_3$)	Small sea creatures use calcium carbonate to make their shells, then when they die their shells go on to form the sedimentary rock limestone
3	Coal	Ancient trees and plants removed carbon dioxide from the atmosphere. When some of them died, they were prevented from decomposing and were fossilised to become coal. This kept their carbon trapped underground rather than returning it to the atmosphere.
4	Oil and gas	Ancient sea creatures had carbon stored in their bodies. When they died their bodies were covered by sediment preventing decomposition. Over time their bodies became oil and gas and were trapped underground.

Y9 BEST Knowledge Organiser – Forces

Definitions		
1	Distance	How far something has travelled
2	Displacement	Distance away from start point in a straight line
3	Magnitude	Size of a quantity
4	Force, F [N]	Push, pull or twist acting on an object
5	Contact force	Forces that act through touch eg friction, air resistance
6	Noncontact force	Forces that act without need for touch eg magnetic force, gravity, electrostatic force
7	Friction	A force that tries to stop an object moving.
8	Resultant force	The force you have if you replaced all the forces on an object with one single force.
9	*Free body force diagram*	
10	Weight, W [N]	Force acting on a mass due to gravity (Weight = mass x gravity)
11	Mass, m [kg]	The amount of matter in an object
12	Normal force	Push between solids. Acts at right angle to the surface at the point of contact
13	Distance-time (d-t) graph	A graph showing how distance changes with time
14	Speed, v [m/s]	Distance travelled in one second
15	Average speed [m/s]	Considers the total distance travelled and the total time taken
16	Velocity, v [m/s]	Vector. Speed in a given direction. Uses the same formula as speed
17	Acceleration, a [m/s2]	Change in velocity per second. eg 10m/s^2 means velocity changes by 10m/s every second Acceleration = change in velocity/ time taken for change
18	Deceleration a [m/s^2]	When acceleration is negative. Object slows down
19	Typical speeds	Walking ~1.5m/s Cycling ~6m/s Sound ~330m/s

Scientific Skills		
1	Variable	Something in an experiment that can change.
2	Independent Variable	The variable that you change in an experiment.
3	Dependant Variable	The variable that you measure in an experiment.
4	Control Variable	Variables that you keep the same to make the experiment fair.
5	Anomaly	A result that doesn't fit the pattern of the others (should be ignored when calculating averages or drawing lines of best fit).

Anything that changes direction, speed or shape does so because of unbalanced forces. They are the reason we go to bed up to 2cm shorter than we are when we wake up.

Weird? That's forces.

We all know about acceleration and speed, but how are they really related. The ideas on this page are essential in the use of vehicle design and tectonic movement. They can be used to describe any journey by any object.

Physics Topic 3.5: Particle Model of Matter

Definitions

1	Specific Heat Capacity	The energy required to increase the temperature of 1 kg of a substance by 1°C
2	Specific Latent Heat	The energy required to make a 1kg of a substance change state
3	melting	State change from solid to liquid
4	freezing	State change from liquid to solid
5	evaporating	State change from liquid to gas without reaching boiling point
6	sublimating	State change directly from solid to gas
7	boiling	State change from liquid to gas at boiling point
8	condensing	State change from gas to liquid
9	Kinetic Energy	Movement energy in the particles in a substance (gases have the most because particles move fastest)
10	Potential Energy	Stored energy in the particles in a substance (gases have the most because particles are furthest away)
11	Internal energy	Total kinetic and potential energy in a substance

Units

1	density	Kilograms per metre cubed (kg/m^3)
2	mass	Kilograms (kg)
3	volume	Metres cubed (m^3)
4	Thermal energy	Joules (J)
5	Temperature	Degrees Celsius (°C)

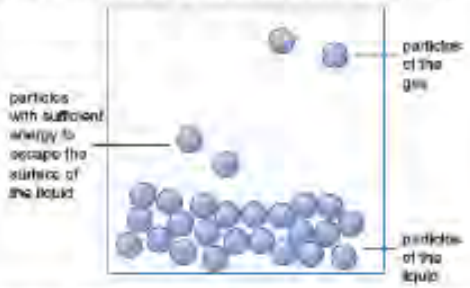
Equations to memorise

1. density = $\frac{\text{mass}}{\text{volume}}$ — $\rho = \frac{m}{V}$

Diagrams

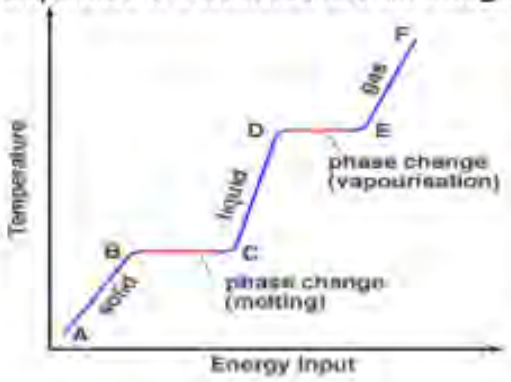
Cooling by evaporation

Particles with enough kinetic energy can escape a liquid and become a gas. This reduced the average kinetic energy of the liq

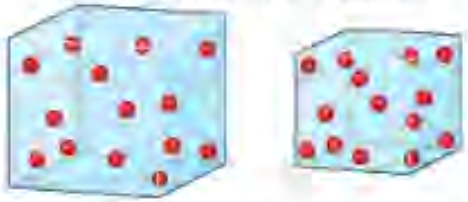


Gas Pressure is caused by the force exerted when particles collide with their container

Temperature of a substance as state changes



Changing volume and pressure



Halving the volume of a container will double the pressure of the gas because the particles will hit the sides more often (if the temperature is constant).
Pressure x Volume = constant

Y9 Key Concept – Photosynthesis

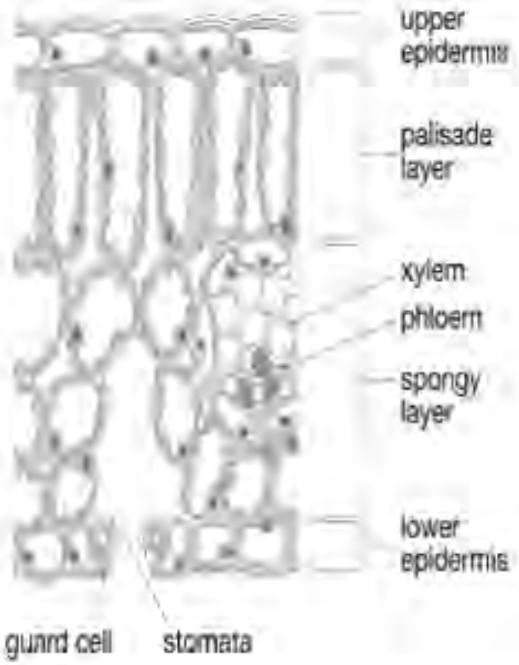
		Definitions
1	Photosynthesis	An endothermic reaction that makes glucose and oxygen from carbon dioxide and water.
2	Endothermic	A chemical reaction in which energy is transferred from the environment (in this case, by light).
3	Chloroplasts	The organelle in a plant where photosynthesis occurs; contains chlorophyll.
4	Chlorophyll	The chemical inside the chloroplasts that absorbs light energy to allow photosynthesis to take place.
5	Palisade cell	A specialised cell in a plant where lots of photosynthesis occurs.
6	Stomata	Tiny pores in a leaf where gas exchange happens.
7	Guard cell	A cell that surround the stomata and changes in response to light intensity.
8	Xylem	Tissue that transports water and mineral ions from the roots to the stems and leaves.
9	Phloem	Tissue that transports dissolved sugar from leaves to the rest of the plant.
10	Veins	The combined system of xylem and phloem that transports substances around a plant; also provides support to the plant.
11	Limiting Factor	A factor that limits the rate of a chemical reaction.
12	Biomass	The total number of living organisms in a habitat.
13	Variegated	Leaves that are marked with patches or spots of different colours, usually green and white.
14	Glucose	A simple sugar formed by plants via the process of photosynthesis.
15	Starch	A complex carbohydrate stored in leaves; made from glucose monomers.
16	Iodine	Used to test leaves for the presence of starch; turns blue-black if starch is present.

Equations

Word equation	carbon dioxide + water → glucose + oxygen
Balanced symbol equation	$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

Chemical Formulae

Carbon dioxide: CO_2	Oxygen: O_2
Water: H_2O	Glucose: $C_6H_{12}O_6$



The Structure of a Leaf

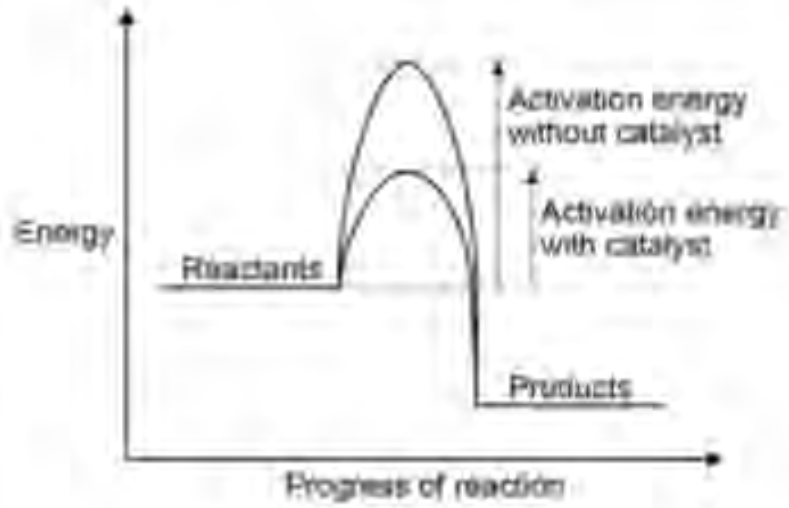
KS3.5 C6: Rate of reaction

Definitions		
1	Rate of reaction	How quickly a reaction happens
2	Limiting reactant	The substance that is totally used that causes a reaction to end
3	Excess	More than needed
4	Activation energy (E_a)	The minimum amount of energy that particles must have to react
5	Concentration	The amount of particles in a liquid per unit volume
6	Pressure	The amount of particles in a gas per unit volume

Factors which affect the rate of reaction	
7	**Concentration:** Increasing the concentration of reactants in solution, increases the frequency of collisions and so increases the rate of reaction.
8	**Pressure:** Increasing the pressure of reactants in gases, increases the frequency of collisions and so increases the rate of reaction.
9	**Temperature:** Increasing the temperature increases the frequency of collisions and makes the collisions more energetic, and so increases the rate of reaction. (***higher***: more particle have energy ≥ the activation energy so more successful collisions)
10	**Surface area:** Increasing the surface area of solid reactants increases the frequency of collisions and so increases the rate of reaction.

Equations	
11	Mean rate of reaction = $\frac{\text{quantity of reactant used}}{\text{time taken}}$
12	Mean rate of reaction = $\frac{\text{quantity of products formed}}{\text{time taken}}$

Catalyst



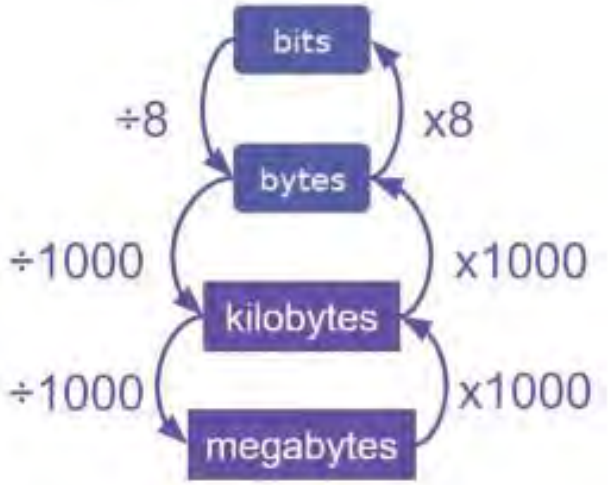
serif fonts like this are more difficult to read than ***or it will be quite difficult to read it.***

Computing


```
# This program adds two numbers

num1 = 1.5
num2 = 6.3

# Add two numbers
sum = num1 + num2

# Display the sum
print('The sum of {0} and {1} is {2}'.format(num1, num2, sum))
```

```
# This program prints Hello, world!

print('Hello, world!')
```

Computing



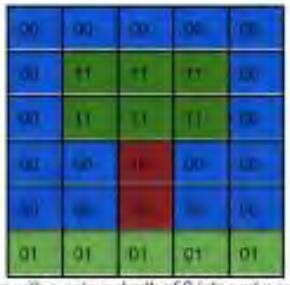
How to convert between units of data

In binary, 8 bits (individual 1s and 0s) make up a byte. The prefixes kilo-, mega-, giga-, tera-, ... are used to express increasingly large quantities of bytes.

1 kilobyte = 1000 bytes
1 megabytes = 1000 kilobytes
1 gigabyte = 1000 megabytes
1 terabyte = 1000 gigabytes

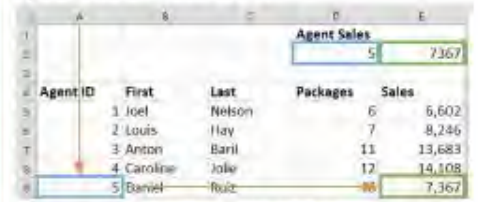
Bitmap images

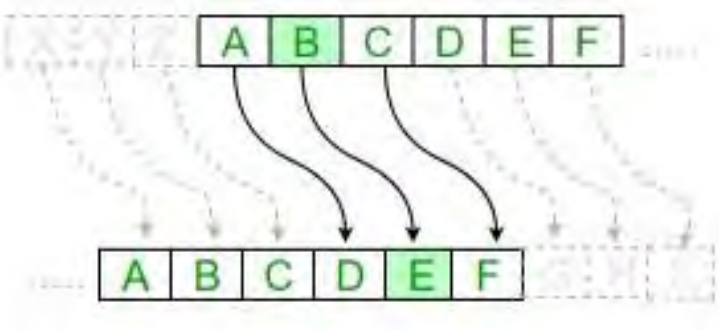
Bitmap images use a grid of pixels, each with an assigned colour, to represent an image.



A bitmap image with a colour depth of 2 bits and a resolution of 5x6

Computing

	VLOOKUP: Looks for and retrieves data from a specific column in a table.  =VLOOKUP(D2,A4:E10,5) **value** to look for in the first column of the table **table** from which to retrieve a value **col_index** the column number in the table from which to retrieve a value
	IF: Performs a logical test to return one value for a true result, and another for a false result. =IF(B2>69,"True","False") **logical_test** that can be evaluated as true or false **value_if_true** value to return when the test is true **value_if_false** value to return when the test is false


A B C D E F
A B C D E F

Year 9 History: World War One Knowledge Organiser

	What was World War One?				
1	A Global conflict involving the main **European powers** and their **empires** from August 1914 to November 1918.		10	**Franz Ferdinand**	Heir to the throne of **Austro-Hungarian Empire.** Assassinated by Gavrilo Princip.
	Key terms:		11	**The BEF**	The British Expeditionary Force.
2	**A long term cause**	Factors or causes which happen a **long** time before an event takes place.	12	**The Schlieffen Plan**	Based on the idea that Germany wanted to avoid a war on two fronts. It would quickly defeat France. It assumed the Russian's would be slow to mobilise. The **plan did not work**
3	**A short term cause**	Factors or causes which happen **just before** an event takes place. Usually a catalyst.	13	**Recruitment**	Millions of men volunteered in 1914 after a campaign by Lord Kitchener.
4	**Militarism**	An emphasis on military ideas and strength. Wanting our country to have a strong army and navy.		**World War One**	
5	**Alliances**	A group of countries that **promise to protect** and support each other.	14	**Conscription**	Men had to **join up** to fight even if they did not want to.
6	**Imperialism**	A desire to conquer colonies. This brought conflict with other countries keen to **expand their empires**.	15	**Trench Conditions**	Conditions were **terrible**- trench foot, lice and rats were just some of the problems faced.
7	**Nationalism**	The belief that your country is stronger and better than others.	16	**Going over the top**	**Leaving the trench** to go into no man's land to fight the enemy.
8	**The Triple Alliance**	The **Triple Alliance** was the treaty by which **Germany**, **Austria-Hungary** and **Italy** agreed to support each other militarily in the event of an attack against any of them.	17	**Trenches**	A long tunnel in the ground dug to protect from **attack.**
9	**The Triple Entente**	**The Triple Entente** was a diplomatic and military agreement between **France, Great Britain,** and **Russia,** formed in part as a response to the formation of **the Triple** Alliance.	18	**Stalemate**	Where neither side is able to push forward or make **progress.**
	The Home Front			**The end of the War**	
19	**The Home Front**	People at **home** tried to **support** the troops. They would work in factories making military supplies.	20	**The Treaty of Versailles**	It brought World War I to **an end**. The **Treaty** ended the state of war between Germany and the Allied Powers.

Humanities: History

Knowledge Organiser: Rights and Freedoms- Votes for Women

1	Franchise	The right to vote in public elections.	16	Cat and Mouse Act	Government act in 1913 that would release suffragettes who were on hunger strike but re arrest them as soon as they were healthy.
2	Suffrage	Another term for the right to vote in public elections	17	1913	The height of suffragette activity was in 1913
3	NUWSS	National Union of Women's Suffrage Societies- a large group of moderate campaigners for women's right to vote.	18	1914	Outbreak of World War 1
4	Suffragists	The nickname given to members of the NUWSS	19	1918	End of World War 1
5	Millicent Fawcett	The leader of the NUWSS	20	White feather	A symbol given to men who had gone to war by the suffragettes as a symbol of cowardice.
6	WSPU	Women's Social and Political Union- A smaller group of more militant campaigners for women's right to vote.	21	Munitions work	Work done by women making bullets, shells and ammunition during the war.
7	Suffragettes	The nickname given to members of the WSPU	22	Canaries	Nickname given to munitions workers as the TNT would often dye their skin yellow.
8	Emmeline Pankhurst	Leader of the WSPU	23	Herbert Asquith	British Liberal Prime Minister before the outbreak of WW1
9	Trade Union	An organisation where workers collectively bargain for better rights and wages but also campaign nationally for better standards of living.	24	David Lloyd George	British Conservative Prime Minister following WW1
10	Militant	Choosing more confrontational and aggressive means of getting what you want.	25	Representation of the People Act	Bill passed by Parliament in 1918. This married women over the age of 30 the right to vote in national elections.
11	Emily Davison	A committed suffragette who died at the Epsom Derby.	26	Constance Markiewicz	First woman elected in England. As a member of Sinn Fein she refused to take her seat.
12	Epsom Derby	One of the biggest horse races of the year in England. Often attended by royalty.	27	Sinn Fein	Irish republican party who wanted all of Ireland to be independent from Britain
13	Amner	The kings race horse.	28	Nancy Astor	First woman elected as an MP to take her seat in Westminster.
14	Hunger Strike	A method of protesting whilst in prison. Prisoners would refuse to eat.			
15	Force Feeding	When prisoners refused to eat, the government had to force feed them. This involved pushing a hosepipe up the nose and down into the throat.			

Knowledge Organiser: Rights and Freedoms- Russian Revolution

1	Russia in 1914	Geographically the largest state in the world but hugely divided. There were few cities (mostly in the west) and millions of peasants.	15	Karl Marx	German philosopher who wrote the Communist Manifesto in Manchester in 1858. This was the theory behind communism.
2	Serfs/ peasants	Even by 1914 over 10 million Russians lived as peasants- poor agricultural workers with few rights.	16	Communism	Political and economic theory that emphasises equality and wealth distribution amongst the population.
3	Trans Siberian railway.	The only real way to cross Russia- this was a single rail line that travelled East to west.	17	Bolsheviks	Russian Communist party (translated as 'majority')
4	Russian Orthodox church	The state religion of Russia. As the Tsar was the head of the church, his opponents accused the church of spying for him.	18	Lenin	Vladimir Illyich Lenin was a former lawyer and leader of the Bolshevik Party.
5	Tsar Nicholas II	The king and absolute ruler of Russia in 1914	19	Red Army	Name given to the communist fighters during the Russian Revolution and Civil War
6	St Petersburg	The Capital of Russia in the West of the country.	20	October Revolution	In 1917the Bolsheviks successfully stormed the Winter Palace, overthrowing the government.
7	Winter Palace	The main residence of the Russian Royal family, located in St Petersburg.	21	Russian Civil War	Following the Revolution there was a period of civil war between the Reds- the Communists and the 'Whites'- the anti communists.
8	Julian Calendar	Prior to the Revolution, Russia was still using an old medieval calendar that had 13 less days than the rest of the world.	22	Leon Trotsky	Lenin's right hand man. He successfully organised and won the Russian Civil War.
9	World War 1	Russias involvement in the First World War was a disaster- its armies were ill equipped and poorly trained. Their casualties were higher than all other states combined.	23	Josef Stalin	Influential member of the Bolsheviks. Successfully defeated Trotsky to become leader after the death of Lenin.
10	Oligarchs	A ruling elite class (1% of the population). These aristocrats were related to the royal family.	24	Soviet Union/ USSR	Union of Soviet Socialist Republics- the new name for Russia under Stalin.
11	Intelligensia	A growing group in Wester Russia- this group of 'intellectuals' included lawyers, scientists, academics, journalists etc. They were all highly educated.	25	NKVD	Stalin's notorious secret police force led by Yeschov- responsible for the 'great purges'.
12	Rasputin	Russian 'mystic'/ monk who was brought to the Royal palace.	26	5 year plans	Stalin's series of goals for modernising Russia.
13	Alexei Romanov	The Tsars only son. He suffered from acute Haemophilia.	27	Great Purge	A period also known as the 'Great Terror'. Stalin unleashed the NKVD on the people, leading to 20 million deaths
14	Haemophilia	Rare blood disorder which means the blood does not clot.	28	Gulag	Notorious force labour camps across Russia

Year 9 History – Nazi Germany Knowledge Organiser

When was Nazi Germany?		How did the Nazis control Germany?	
1. The period in German history from 1933 to 1945, when Germany was governed by a dictatorship under the control of Adolf Hitler and the Nazi Party		**17. The SS**	'Protection squad' – Hitler's personal bodyguard
2. Adolf Hitler	A German politician who was the leader of the Nazi Party and Chancellor of Germany from 1933 to 1945.	**18. The SA**	Also known as the Brownshirts (led by Ernst Rohm). The Nazi party's paramilitary wing that helped Hitler to power in 1933.
3. Heinrich Himmler	The leader of the SS who oversaw the Holocaust.	**19.The Gestapo**	The Nazi secret police
4. Joseph Goebbels	In charge of propaganda in Nazi Germany.	**20. The police and courts**	The Nazis controlled the police and Nazis were appointed as judges so a fair trial was impossible.
5. Authoritarian	Enforcing strict obedience to authority at the expense of personal freedom.	**21. Block warden**	These were local Nazis who would visit people's homes to check everyone was supporting the Nazi party.
6. Dictatorship	A ruler with total power over a country.	**22. Concentration camps**	Places that held Jews, Communists, Socialists and anyone who criticised the Nazis.
7. Swastika	Emblem of the Nazi party.	**23.Propaganda**	Information advertised to persuade or influence people.
8. Fuhrer	German word for 'leader' that was given to the dictator Adolf Hitler.	**24. Hitler Youth**	Nazi youth group set up in 1927.
9. National Socialism	The Nazis believed in Germany's greatness, national loyalty, racial purity and government control. They also believed all German speaking peoples should be united.	**25Honour Cross of the German Mother**	Award given to mothers who had four or more children.
10. Volksgemeinschaft	The 'people's community'. This excluded minority groups such as the Jews.	**26. Opposition parties banned**	This happened on the 14th July 1933 and left the Nazis as the only political party in Germany.
11. Fuhrerprinzip	Idea that Germany should have one leader obeyed by all.	**Who opposed the Nazis?**	
12. Paramilitary	Organised in a way that is similar to an army.	**27. White Rose Group**	A group of students led by Hans and Sophie Scholl who spread anti-Nazi messages around their university.
13. Communism	Ideology violently opposed by the Nazis. The Nazis promised to destroy it if they came to power.	**28. Dietrich Bonhoffer**	A pastor (member of the church) who opposed Nazism and said it was un-Christian.
14. Reichstag	The German parliament.	**29. Operation Valkrie**	Failed plot by a group of German army officers to assassinate Hitler. A bomb was placed in Hitler's HQ.
15. Aryan	The German 'master race'.	**30. Edelweiss pirates**	Groups of working-class young people who would avoid Hitler Youth meetings. Instead they would make fun of the Nazi, drink and have sex.
16. NSDAP	The official title of the Nazi Party (National Socialist German Workers Party).		

Humanities: History

Y9 History- World War 2

World War2		Key terms/words	
Or 'The Second World War' – a global conflict fought between 1939 and 1945. Germany invaded Europe in 1939. In 1941 both Russia and The U.S. entered the war.		**13. Allied forces**	Britain, America, Russia (Soviet Union or USSR) and 'free soldiers' from occupied territories.
1. Blitzkrieg	Meaning 'Lightning war'. The German tactic of using aircraft	**14. Axis powers**	Germany and Italy. After 1941 this also included Japan.
2. Panzer	German word/ title given to tanks	**15. Nazi Soviet Pact**	Agreement between Russia and Germany that they wouldn't attack each other. This was cancelled in 1941 when Hitler attacked Russia.
3. Paratrooper	Infantry that were dropped behind the enemy front lines by aircraft. This was a new development in warfare in 1939.	**16. League of Nations**	An organisation made up of many countries (like an early version of the UN) which was supposed to stop was happening again.
4. Luftwaffe	The German Air force.	**17. Appeasement**	A deal made between Britain and Germany in the late 1930s. Germany promised not to take any further land in Eastern Europe. The terms of this were broken in 1939 when Hitler invaded Poland.
5. Operation Barbarossa	The codename given to the German invasion of Russia in 1941.	**18. Operation Pied Piper**	The official code name given to the plan to evacuate the vulnerable from British cities.
6. Pearl Harbour	U.S. Naval base in Hawaii- Japan attacked the American fleet here in December 1941which led the US to join the war on the side of the Allies	**19. Evacuation**	'Operation pied piper'- the government plan to evacuate children, the handicapped and pregnant women from British cities to the countryside to avoid the Blitz.
7. Dunkirk	The British evacuation of Europe in 1940. A battle was fought on the beaches of Dunkirk as the British evacuated.	**20. Evacuees**	Children and the vulnerable who were evacuated from the cities to the country side.
8. Resistance	A broad term/ name given to people in occupied countries who secretly sabotaged and attacked the occupying Nazi forces.	**21. Hosts**	Families in the countryside who would take in evacuated children from the cities
9. Battle of Britain	Germany's major attempt to prepare to invade Britain. In the summer of 1940 the Luftwaffe began bombing British towns and cities in preparation for invasion. They were however stopped by the British Royal Airforce.	**22. Hiroshima**	Japanese city where the US dropped the first Atomic Bomb
10. D-Day	June 1944 Allied forces (US, Canada and Britain) launched a huge amphibious assault on the beaches of Normandy. This was the beginning of the final stages of the war.	**23. Enola Gay**	The name of the US bomber that dropped the first Atomic bomb.
11. Amphibious landing	Attacking a coastline/ country from the sea. This was a relatively new technique in 1944 and required a whole range of specialised vehicles and weapons.	**24.Fat man**	Codename given to the very first Atomic bomb- the name was derived from the shape and size of the weapon.
12. The Blitz	The term given to the prolonged period of bombing of British cities by the Luftwaffe	**25. Little Boy**	The 2nd Atomic bomb developed by the US and dropped on Nagasaki. It was significantly smaller than Fat Man.

Y9 History- The Holocaust

1. **Holocaust**	(Meaning destruction) The name given to the mass murder of Jews and minorities by the Nazis.	**13. 1936 Olympic Games**	A Nazi propaganda piece- Hitler wanted to prove to the world that the Aryans were physically superior (it did not work). German Jewish athletes were banned from competing.
2. **Shoah**	Alternate name for the Holocaust meaning 'catastrophe', favoured by some as it acknowledges there were survivors (as opposed to destruction which suggests no survivors)	**14. Kristallnacht**	(night of broken glass) In 1938, the Nazis organised a night of violence against German Jewish citizens. Over 1000 people were killed, hundreds of Jewish businesses and homes were attacked and a number of synagogues were burned.
3. **Anti-Semitism**	Proper term for the hatred of Jewish People.	**15. Der Sturmer**	(The storm trooper) A Nazi newspaper used particularly to encourage people to persecute Jews and minorities.
4. **Genocide**	The deliberate killing of a large number of people.	**16. Ghetto**	A small, walled in area of towns in Poland such as Warsaw and Krakow where Jews from all over Europe were sent to. Often very crowded and run down.
5. **11 Million**	Total number of people murdered during the Holocaust.	**17. Labour camp**	Large purpose build camps where Jews were sent to work as enforced/ slave labour.
6. **6 million**	Total number (out of the 11 million) of Jewish people murdered during the holocaust.	**18. Concentration camp**	Originally developed by the British in the Boer war, these camps (sometimes referred to as internment camps in the modern day) were intended to isolate a group of people in one area e.g. Jews and minorities.
7. **1.5 Million**	Total number of people murdered during the Holocaust who were under the age of 5	**19. Einsatzgruppen**	Specially selected group in the S.S. Their job was to follow behind the front line troops in Russia and round up and murder Jews from the occupied villages. They killed over 1 million people.
8. **Persecution**	The deliberate targeting and miss-treatment of a group of people. Often legally removing rights, public targeting etc.	**20. Wannsee Conference**	Held in 1942. This was a meeting of the top S.S. and Nazi officials where they decided on the 'final solution'- the extermination of Jews and minorities.
9. **Propaganda**	Extremely biased media (e.g. posters) intended to convince people of a point of view (in this case, to hate the Jewish People).	**21. Final Solution**	The Nazi plan to exterminate all Jews and minorities in Europe. It was put in place between 1942 and 1945.
10. **Boycott**	To refuse to engage with something (e.g. buying things from certain shops).	**22. Death Camp**	A camp specially built (or converted) for the mass murder of Jews and minorities. They were often built in isolated areas near rail lines.
11. **Nuremburg Laws**	A series of laws passed by the Nazis banning marriage to Jewish people by Germans, removing Jewish rights etc.	**23. Auschwitz-Birkenau**	Largest and most notorious death camp built by the Nazis in Poland. Over a million people were murdered here.
12. **Aryan**	The term used by the Nazis to identify 'pure Germans' i.e. not minorities/ Jews	**24. Zyklon B**	The poison gas used to murder people at Auschwitz-Birkenau.

Humanities: Geography

Year 9 Geography – Population

Key concepts			Key concepts		
1	The number of babies born per 1000 people	**Birth rate**	14	The proportion of working (economically active) people to non-working (non-economically active) people in a country.	**Dependency ratio**
2	The number of people who die per 1000 people	**Death rate**	15	Population ageing happens when the median age of a country or region rises due to rising life expectancy and/or declining fertility rates.	**Ageing (greying) populations**
3	A doubling of population growth	**Exponential growth**	16	Excessive population of an area that can lead to overcrowding.	**Overpopulation**
4	The difference between the birth rate and death rate (how quickly the population grows or declines)	**Natural change**	17	Where there is a greater number of males of females for a variety of reasons within society.	**Gender imbalance**
5	A graph that shows the growth and decline of both birth and death rates for each development stage of a country.	**Demographic Transition Model**	18	Recently relaxed to allow parents to have two children, this policy was introduced by the Chinese government in 1979 and restricted parents to only having one child to reduce population growth.	**One Child Policy**
6	Average number of years that individuals are expected to live depending on where and when they are born and how they spend their lives.	**Life expectancy**	19	Children with no brothers or sisters have excessive attention from their parents and grandparents causing them to be highly demanding.	**Little emperor syndrome**
7	A graph that shows the population structure of a country (separating males and females into different ages groups).	**Population pyramid**	20	Factors such as water supply, food supply and energy supply that influence how many people can live in an area.	**Siting factors**
8	Low income country – those where the average salary (income) is less than $1000 per year	**LIC**	21	The number of people who lives within a square miles.	**Population density**
9	High income country - those where the average salary is more than $12,000 per year	**HIC**	22	A small number of people who live within the same area (measured in square miles).	**Sparsely populated**
10	The number of deaths of infants (children) below the age of one per 1000 live births in that year.	**Infant mortality**	23	A large number of people who live within the same area (measured in square miles).	**Densely populated**
11	Between the ages of 16 to 65, considered to be of working age, earning a wage and paying taxes.	**Economically active**	24	Someone who leaves their own country for fear of safety.	**Asylum seeker**
12	Age groups 1-15 and over 65 who are either too old or young to work. These age groups are dependent on the state for their education or welfare.	**Economically dependent**	25	The country from which migrants originally come from.	**Source Country**
13	The bottom of a population pyramid is called the **base** and the top is known as the **apex**.	**Apex and base**	26	The country which the migrant has settled.	**Host country**

Humanities: Geography

A) Development indicators

Gross Domestic Product (GDP) per capita - the total value of all goods and services produced in a country, which is then divided by the total population.
Life expectancy - the average number of years a person is expected to live.
the number of children *Infant mortality rate* - per 1,000 live births who die before the age of one.
Human Development Index - this looks at a combined set of indicators - life expectancy, mean years of schooling and gross national income (GNI).

B) Population

Population density is a measurement of population per unit area e.g. per sq km.
Population distribution is how people are spread across the globe. World population is distributed unevenly.
Sparsely populated means an area with very few people living in it (low density) e.g. Africa, Australasia.
Densely populated means an area with a large quantity of people living in it (crowded/high density) e.g. SE Asia, Europe.

C) Humanitarian

Sanitation - Conditions relating to people's access to safe water and adequate sewage disposal.
Cholera - A water-borne disease.
Malnourished - A lack of key nutrients for the human body to function.
NGO (Non-Governmental Organisation)- A charitable organisation working to support those most in need. E.g. UNICEF and The Red Cross

D) Trade

Trade - involves the exchange of goods and services between countries.
Exports - When goods are sold to other
Imports - When goods are brought into a country

E) Middle East – UK connections

The UK is connected with the Middle East via historical, trade and tourism connections

F) Black gold

The United Arab Emirates has relied on the money generated from oil for the last 30 years.
Oil has accounted for 30% of the country's GDP.
The government aims to reduce this to 21% by 2021.

Economic diversification - is a way of reducing economic risk. One way to achieve this is by placing your money in lots of different areas.

Social sustainability is about identifying and managing business impacts, both positive and negative, on people. The quality of a company's relationships and engagement with its stakeholders is critical.

Economic sustainability refers to practices that support long-term economic growth without negatively impacting social, environmental, and cultural aspects of the community.

Environmental sustainability is the responsibility to conserve natural resources and protect global ecosystems to support health and wellbeing, now and in the future.

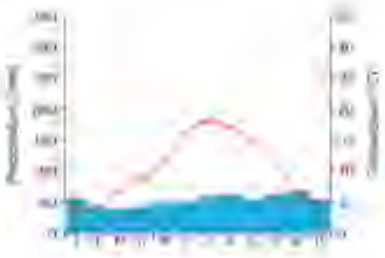
Year 9 Geography – Weather

Key concepts - weather			Key concepts		
1	A cold front is the leading (front) edge of a cooler mass of air, replacing at ground level a warmer mass of air by forcing it upwards out of the way. This results in an area of low pressure.	**Cold front**	14	The atmosphere of Earth is the layer of gases, commonly known as air, that surrounds the planet.	**Atmosphere**
2	The leading (front) edge of an advancing mass of warm air, it often marks the warm sector of a low-pressure system.	**Warm front**	15	The point at which water has been sufficiently heated to be turned into gas form.	**Evaporation**
3	A weather system made up of two fronts, a warm front chased by a cold one. It is a low pressure system as air rises.	**Depression**	16	Rain caused by the sun heating the ground; the ground then heats the air which rises to form clouds.	**Convectional rainfall**
4	A weather system with high pressure (isobars far apart), associated with calm, fine weather. Winds circle slowly clockwise around the centre.	**Anti-cyclone**	17	Rain caused when a warm front meets a cold one.	**Frontal rainfall**
5	The jet stream is a core of strong winds 5 to 7 miles above the Earth's surface, blowing from west to east. They drag depressions across the Atlantic towards us.	**Jetstream**	18	Rain caused when air is forced to rise over a hill or mountain. As the air cools, it condenses and precipitation occurs.	**Relief rainfall**
6	Water falling to the ground. This can be in the form of snow, sleet, hail, and rain.	**Precipitation**	19	Air mass that is cold and moist as it travels over an ocean from a polar region.	**Polar maritime**
7	It is the force exerted on a surface by the air above it as gravity pulls it to Earth.	**Air pressure**	20	Air mass that is cold and dry as it travels over a cold land mass (such as Northern Europe).	**Polar continental (arctic)**
8	A line on a map connecting points having the same atmospheric pressure.	**Isobar**	21	Air mass that is warm and moist as it travels over a warm ocean close to the equator.	**Tropical maritime**
9	A mass/volume of air defined by its temperature and water vapour content.	**Air mass**	22	Air mass that is warm and dry as it travels over a warm land mass (such as central and southern Europe).	**Tropical continental**
10	An instrument for measuring the speed of the wind, or of any current of gas.	**Anemometer**	23	The boundary between the troposphere and stratosphere (usually found 10km high).	**Tropopause**
11	Scientific instrument used in meteorology to measure atmospheric pressure	**Barometer**	24	The lowest section of Earth's atmosphere, the boundaries of which go as high as 6-10km.	**Troposphere**
12	A dense, towering vertical cloud, forming from water vapour carried by powerful upward air currents.	**Cumulonimbus cloud**	25	The highest part of Earth's atmosphere, roughly starting at 50km and ending at 110km.	**Stratosphere**
13	Look like flat sheets of thin clouds across the sky.	**Stratus clouds**			

Humanities: Geography

Climate graphs

Climates vary by distance from the equator (latitude) and how high up they are (altitude). Climate graphs give us a summary of the precipitation (bars) and temperature (line) of each environment.



Fragile environments

There is a wide range of fragile environments across the globe, generally being affected by human activity.

- Seychelles, Indian Ocean – sea level rise
- Antarctica, Southern Ocean – ice melt
- Amazon, South America – deforestation
- Great Barrier Reef, Australia – sea level rise
- Aral Sea, West Asia – water removal
- Western Desert, North America - desertification

Coral Reefs

Coral reefs are referred to as the 'rainforests of the ocean' They need warm, shallow water to survive, climate change is a significant threat to them.
This can lead to bleaching and destruction of habitats.
Educating tourists about the importance of coral reef is one example of how we can protect them.

Farming (Agriculture)

Farming is necessary to provide food for the growing global population and can be done on different scales:

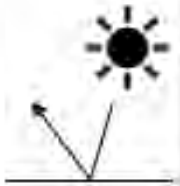
- Factory farming (agribusiness) is large scale
- Organic farming is small scale

There are a variety of different impacts

- Increased flooding and chemical leaching on a local scale
- Climate change from methane and deforestation on a global scale.

Ice Caps

Ice cools the climate due to the albedo effect: White surfaces reflect heat
Ice is melting due to increased climate change from greenhouse gasses.
This can speed up climate change as less ice is available to reflect the suns energy



Invasive Species

An invasive species is a living thing that is *not native* to a particular area.
Invasive species can cause great damage.
Invasive species can be introduced on purpose or accidentally – attaching themselves to boats, seeds being transported or exotic pets escaping.
Grey squirrels in the UK have made red squirrels an endangered species.

Rewilding

Rewilding is when nature is brought back to an environment. This can be done by humans or allowed to happen naturally.
In Scotland the Lynx is being planned to rewild the area. This could bring tourists and control the deer population, however, may cost farmers much money as their animals are at risk from them.

Flexitarianism

Flexitarians are people who reduce the amount of meat that they eat.
Meat can cause damage as farming has many negatives environmentally and can be damaging to humans in an unbalanced diet.
However meat in balance is good and can provide us with nutrients and more choice of food.

Very Useful Vocab Mat

I want your opinion!

je préfère
j'adore
j'aime beaucoup
j'aime vraiment
j'aime assez
j'aime bien
je suis fan de
c'est génial

je n'aime pas trop
je n'aime pas vraiment
je n'aime pas
je n'aime vraiment pas
je n'aime pas du tout
c'est nul
je déteste

in my opinion
à mon avis
I think that
je pense que
I find that
je trouve que

Questions

qui – who
que/qu'est-ce que/quoi – what
quel/quelle/quels/quelles – which
où – where
quand – when
comment – how, what (is it) like
combien – how much/many
pourquoi – why
est-ce que – just indicates it's a question

Mois

janvier
février
mars avril
mai
juin
juillet
août
septembre
octobre
décembre

Saisons

au printemps
en été
en automne
en hiver

Numbers

1 un	11 onze	21 vingt et un	40 quarante
2 deux	12 douze	22 vingt-deux	50 cinquante
3 trois	13 treize	23 vingt-trois	60 soixante
4 quatre	14 quatorze	24 vingt-quatre	70 soixante-dix
5 cinq	15 quinze	25 vingt-cinq	80 quatre-vingt
6 six	16 seize	26 vingt-six	90 quatre-vingt-dix
7 sept	17 dix-sept	27 vingt-sept	100 cent
8 huit	18 dix-huit	28 vingt-huit	1000 mille
9 neuf	19 dix-neuf	29 vingt-neuf	1 000 000 un million
10 dix	20 vingt	30 trente	

Days

lundi mardi
mercredi jeudi
vendredi
samedi
dimanche

Couleurs

noir, noire, noirs, noires
rouge, rouges,
bleu, bleue, bleus, bleues
vert, verte, verts, vertes
blanc, blanche, blancs, blanches
jaune, jaunes
rose, roses
marron
orange

masculin	féminin	pluriel
un frère	une sœur	des grands-parents
mon père	ma mère	mes parents
le stylo	la trousse	les cahiers
du poulet	de la glace	des légumes

Watch out for common mistakes!

je **m'**appelle, tu **t'**appelles, il/elle **s'**appelle
j'ai quatorze ans - je **suis** de taille moyenne
j'ai les cheveux blonds **– j'ai** les yeux bleus
c'est/ça va être **+ masculine adjective**
ennuyeux intéressant
mon copain, ma copine, mes copains/copines
de temps **en** temps
au collège – **à** Reading – **dans** ma maison

Avoid repetitions!

boring: ennuyeux, barbant
exciting: intéressant, passionnant
fun: amusant, drôle, marrant
great: génial, super, chouette, fantastique
rubbish: nul, pénible, affreux

French

Tenses

Past tense

Auxiliary "avoir" in present + past participle.

j'ai tu as il/elle/on a nous avons vous avez ils/elles ont	ER – mangé
	IR – fini
	RE – vendu

Most common irregular endings :

j'ai dit (dire)	j'ai eu (avoir)
j'ai lu (lire)	j'ai été (être)
j'ai écrit (écrire)	j'ai fait (faire)
j'ai pu (pouvoir)	j'ai bu (boire)
j'ai vu (voir)	j'ai pris (prendre)

Auxiliary « être » (+ E in feminine, S in plural):

je suis **m**onté
je suis **r**esté
je suis **s**orti
je suis **v**enu
je suis **a**llé
je suis **n**é
je suis **d**escendu
je suis **e**ntré
je suis **r**entré
je suis **t**ombé
je suis **r**etourné
je suis **a**rrivé
je suis **m**ort
je suis **p**arti

+ reflexive verbs: je **me** suis disputé

Negative : je **ne** suis **pas** allé, je **n'**ai **pas** vu

Present tense

Regular verbs

ER	IR	RE
je chant**e**	je fini**s**	je vend**s**
tu chant**es**	tu fini**s**	tu vend**s**
il chant**e**	il fini**t**	il vend
nous chant**ons**	nous fini**ssons**	nous vend**ons**
vous chant**ez**	vous fini**ssez**	vous vend**ez**
ils chant**ent**	ils fini**ssent**	ils vend**ent**

Some irregular verbs

ETRE (to be)	AVOIR (to have)
je suis tu es il est nous sommes vous êtes ils sont	j'ai tu as il a elle a nous avons vous avez ils ont
ALLER (to go)	**FAIRE (to do)**
je vais tu vas il va nous allons vous allez ils vont	je fais tu fais il fait nous faisons vous faites ils font
VOULOIR (to want)	**POUVOIR (can)**
je veux tu veux il veut nous voulons vous voulez ils veulent	je peux tu peux il peut nous pouvons vous pouvez ils peuvent

Reflexives: je **me** lave, tu **te** laves, on **se** lave, nous **nous** lavons, vous **vous** lavez, ils **se** lavent

Future tense

Verb "aller" in present + infinitive.

je vais tu vas il va nous allons vous allez ils vont	aller
	manger
	finir
	vendre
	aller
	faire
	avoir
	être

Negative: Je **ne** vais **pas** manger

Past	Present	Future
hier	aujourd'hui tous les jours	demain
le week-end dernier	souvent rarement	le week-end prochain
la semaine dernière	quelquefois normalement	la semaine prochaine
l'année dernière	de temps en temps	l'année prochaine
avant-hier	ne ... jamais toujours	ce week-end
il y a dix ans	en général maintenant	dans dix ans
l'hiver dernier	en ce moment en été	l'été prochain
l'été dernier	en hiver au printemps	cet hiver

German

Im Klassenzimmer

Wie sagt man "....." auf Englisch?	What does "_____" mean in English?
Wie sagt man "_____" auf Deutsch?	How do you say "_____" in German?
Wie schreibt man das?	How do you spell it?
Ich verstehe nicht.	I don't understand.
Langsamer, bitte.	Speak more slowly please.
Ich habe mein Heft / Kuli vergessen.	I have forgotten my exercise book/ my pen.
Ich habe meine Hausaufgaben vergessen.	I have forgotten my homework.
Entschuldigung!	Sorry.
Ich weiß / ich weiß (es) nicht.	I know it/ I don't know.
Möchtest du mit mir arbeiten?	Do you want to work with me?
Wo ist....?/ Wo sind....?	Where is...?/ Where are...?
Er ist nicht hier/ sie ist nicht hier.	He is absent/ she is absent.
Ja, Herr Munn/Frau White.	Here (during registration).
Darf ich ..... leihen?	Can I borrow....?
Darf ich ein /e/einen ..... haben?	Can I have....?
Hast du ...?/ Haben Sie....?	Do you have.....?
Wie bitte, bitte?	Repeat please.
Ich brauche Klebstift.	I need some glue.

Useful grammar terminology

Verb	A doing word/ a being word *e.g. I play/ I am*
Infinitive	The form of the verb that you will find in the dictionary. In English it starts with 'to' and in German it ends in "en" *e.g. to play = spielen*
Conjugation	The process you follow when using the verb flowers to put the various endings onto the stem of the verb
Subject pronouns	I/you/he/she/it/we/you/they
Adjective	A describing word e.g. blue/ big/ bright/ bold...
Noun	A name of a person, a thing (concrete or abstract), a place, a quality... e.g. Sophie/ a house/ intelligence/ Köln / a beach/ kindness....
Connective	A word that joins up separate pieces of information to make a single more complex sentence e.g. The dog is black and he is called Jack
Tenses	Tenses represent the time frame you are talking about e.g. Present- I go to school Past- I went to school Future- I am going to go to school/ I will go to school

Auf Deutsch !

1	eins	31	einunddreißig
2	zwei	34	vierunddreißig
3	drei	40	vierzig
4	vier	50	fünfzig
5	fünf	60	sechzig
6	sechs	70	siebzig
7	sieben	71	einundsiebzig
8	acht	72	zweiundsiebzig
9	neun	73	dreiundsiebzig
10	zehn	74	vierundsiebzig
11	elf	75	fünfundsiebzig
12	zwölf	76	sechsundsiebzig
13	dreizehn	77	siebenundsiebzig
14	vierzehn	78	achtundsiebzig
15	fünfzehn	79	neunundsiebzig
16	sechzehn	80	achtzig
17	siebzehn	81	einundachtzig
18	achtzehn	87	siebenundachtzig
19	neunzehn	90	neunzig
20	zwanzig	91	einundneunzig
21	einundzwanzig	94	vierundneunzig
22	zweiundzwanzig	96	sechsundneunzig
23	dreiundzwanzig	98	achtundneunzig
24	vierundzwanzig	100	(ein) hundert
25	fünfundzwanzig	152	einhundertzweiundfünfzig
26	sechsundzwanzig	200	zweihundert
27	siebenundzwanzig	1000	(ein) tausend
28	achtundzwanzig	3684	dreitausendsechshundert
29	neunundzwanzig		vierundachtzig
30	dreißig		

Die Tage

Montag
Dienstag
Mittwoch
Donnerstag
Freitag
Samstag / Sonnabend
Sonntag

Die Monate

Januar
Februar
März
April
Mai
Juni
Juli
August
September
Oktober
November
Dezember

Meinungen

☺☺☺	ausgezeichnet
☺☺	prima , klasse , toll
☺	gut, sehr gut
😐	befriedigend
☹	mangelhaft
☹☹	ungenügend
☹☹☹	furchtbar

Ich denke	I think that
Ich finde	I think that
meiner Meinung nach	In my opiniön
es ist	It is
sie sind	They are
es war	It was
es wird ...sein	It will be
ich mag es...	I like it
es hat mir gut gefallen	I liked it

	m.sg.	f.sg.	neuter	plural
THE	der	die	das	die
A	ein	eine	ein	-
SOME	-	-	-	

Useful connectives

und	and
aber	but
auch	also
aber	however
weil *	because
wenn	if
ob wohl *	although
mit	with
wo	where
weil *	because

Time phrases

normalerweise	normally
immer	always
ab und zu	from time to time
manchmal	sometimes
nie	never
jetzt	now
Heute	today
im Winter	in Winter
im Sommer	in Summer
im Herbst	in Autumn
im Frühling	in Spring
jede Woche	every week
ein/zweimal pro Woche	once/twice a week
gestern	yesterday
letzte Woche	last week
letztes Jahr	last year
nächste Woche	next week
nächstes Jahr	next year
morgen	tomorrow
in der Zukunft	in the future

Adjectives go before the noun and so are like English, but they can change their spelling !

German

GRAMMAR NOTES
LEARNING MAP
KS3

Who does what?

ich = I
du = you (familiar)
er = he
sie = she
es = it
wir = we
ihr = you lot (familiar)
Sie = you polite
sie = they

Present Tense - Regular

ich – e
du – st
er – t
sie – t
es – t
wir – en
ihr – t
Sie – en
sie - en

spielen
TAKE OFF THE EN
→ spiel + endings

haben = to have

ich habe
du hast
er hat
sie hat
es hat
wir haben
ihr habt
Sie haben
sie haben

sein = to be

ich bin
du bist
er ist
sie ist
es ist
wir sind
ihr seid
Sie sind
sie sind

werden = to become

ich werde
du wirst
er wird
sie wird
es wird
wir werden
ihr werdet
Sie werden
sie werden

können – to be able to

ich kann
du kannst
er kann
sie kann
es kann
wir können
ihr könnt
Sie können
sie können

müssen – to have to

ich muss
du musst
er muss
sie muss
es muss
wir müssen
ihr müsst
Sie müssen
sie müssen

wollen – to want to

ich will
du willst
er will
sie will
es will
wir wollen
ihr wollt
Sie wollen
sie wollen

dürfen – to be allowed to

ich darf
du darfst
er darf
sie darf
es darf
wir dürfen
ihr dürft
Sie dürfen
sie dürfen

Modal Verbs are

always used with the infinitive of another verb – eg I **can play** football.

In German the infinitive goes at the end of the sentence.

Ich **kann** Fußball **spielen**

was / were

ich war – I was
es war – it was
wir waren – we were
sie waren – they were

EXTRAS

sollen – to should!
ich sollte – I should
er sollte – he should
wir sollten – we should

mögen – to like
ich mag = I like
er mag = he likes
wir mögen – we like
ich möchte – I would like
er möchte – he would like
wir möchten – we would like

Future Tense

Present tense of werden + infinitive at the end of the phrase.

ich **werde** Fußball **spielen**.
wir **werden** nach Deutschland **fahren.**

Alternatives
Ich möchte Fußball spielen – I would like to play football.
ich will Fußball spielen – I want to play football

Irregular Past Participles

to get	bekommen	bekommen
to visit	besuchen	besucht
to eat	essen	gegessen
to find	finden	gefunden
to win	gewinnen	gewonnen
to sleep	schlafen	geschlafen
to read	lesen	gelesen
to see	sehen	gesehen
to wear	tragen	getragen
to meet	treffen	getroffen
*to travel	fahren	gefahren

Joining things

und / aber / denn – **no change in words order**

weil / dass / obwohl - send the verb → end
,weil **es** gut **ist** // ich finde, **dass** Fußball gut **ist**.

Comparing things

besser als	nicht so gut wie
größer als	nicht so groß wie
kleiner als	nicht so klein wie

Perfect Tense

Regular verbs – add ge and take off the en and add a t
spielen → gespielt.
Add the correct part of 'haben' and 'sein' and the past participle (ge word) goes to the end of the phrase.
ich habe Fußball gespielt.
ich bin nach Leeds gefahren
You use haben for most verbs and sein for verbs of motion + to stay

Spanish

GIVING OPINIONS

Me gusta	I like
No me gusta	I don't like
Me gusta mucho	I really like
No me gusta nada	I don't like it at all
Me encanta/Me chifla	I love
Odio	I hate
No aguanto	I can't stand
Creo que/Pienso que	I think that
En mi opinión	In my opinion
Prefiero	I prefer
Personalmente	Personally

CONJUNCTIONS - CONNECTIVES

Y	And
Pero	But
Porque	Because
También	Also
Sin embargo	However
Aunque	Although
Además	Moreover
Así que	So
Por un lado	On one hand
Por otro lado	On the other hand

SEQUENCERS

Primero	First
Luego	Then/Next
Después	Afterwards
Más tarde	Later on
Finalmente	Finally

TIME MARKERS - PRESENT

Normalmente	Normally/Usually
Siempre	Always
Nunca	Never
A veces	Sometimes
Cada día	Every day
Ahora	Now

TIME MARKERS - PAST

Ayer	Yesterday
El lunes pasado	Last Monday
La semana pasada	Last week
El fin de semana pasado	Last weekend
El mes pasado	Last month
El año pasado	Last year
Anoche	Last night

TIME MARKERS - FUTURE

Mañana	Tomorrow
El próximo lunes	Next Monday
La próxima semana	Next week
El próximo fin de semana	Next weekend
El próximo mes	Next month
El próximo año	Next year

QUANTIFIERS - INTENSIFIERS

Muy	Very
Bastante	Quite
Un poco	A little/A bit
Cada	Every/Each
Demasiado	Too (much/many)
Mucho	much/many/lots of/a lot of

USEFUL VERBS

Es	He/She/It is
Son	They are
Soy/Estoy	I am
Tengo	I have
Hay	There is/are
Puedo	I can
Quiero	I want
Hago	I do/make
Voy	I go

QUESTIONS

¿Qué?	What?
¿Por qué?	Why?
¿Dónde?	Where?
¿A dónde?	Where (to)?
¿Cuándo?	When?
¿Cómo?	How?
¿Cuánto?	How much?
¿Quién?	Who?

THE WEATHER

Hace sol	It is sunny
Está nublado	It is cloudy
Está lloviendo	It is raining
Hace frío	It is cold
Hace calor	It is hot
Hace viento	It is windy
Está nevando	It is snowing
Hay niebla	It is foggy

ADJECTIVES - POSITIVE

Divertido	Funny/Amusing
Interesante	Interesting
Genial	Great
Guay	Cool
Entretenido	Entertaining
Emocionante	Exciting
Estimulante	Stimulating
Relajante	Relaxing
Increíble	Incredible
Útil	Useful
Sensacional	Sensational
Agradable	Nice
Fácil	Easy

ADJECTIVES - NEGATIVE

Aburrido	Boring
Molesto	Annoying
Horrible	Awful
Raro	Strange/Rare
Estresante	Stressful
Agotador	Tiring
Inútil	Useless
Asqueroso	Disgusting
Difícil	Difficult
Irritante	Irritating

MAKING COMPARISONS

Más... que	More... than
Menos... que	Less... than

ESPAÑOL

Social Science: RE

Year 9 RE Knowledge organiser

1. What is ethics?	2. Morality	3. Situation Ethics	4. Sexual ethics
Morals – personal principles or views about what is right and wrong. **Philosophy** – a love of wisdom or a search for truth. **Ethics** – a type of moral philosophy that investigates the natural of morality (what is right and wrong) and how moral decisions should be made. Our ethics stem from what we call 'our conscience', 'inner voice', or even 'our heart'. In the face of a moral dilemma, one tends to leave logic aside and turn towards the conscience for an appropriate answer. But then, there are times when our rather straightforward ethics may seem questionable. This is because, while our morals and ethics may be based on righteousness, they may not always be *right*.	Some people argue that our ethics and morality are innate – we are born with them, but others would point to the fact that Humans' moral views have varied greatly in different places and different points in history for this to be true. For example, there are some parts of the world where people believe that the **death penalty is right** and others, such as the UK, where it has been **abolished**. These big differences in opinion could suggest that morality is not innate. The 17th century English philosopher John Locke would argue this. He would say we are born with no knowledge of anything – a new-born baby's mind is like a blank slate (***tabula rasa***). Instead all of our knowledge comes from experiences that are written on the 'blank slate' of our mind.	**Situation ethics** is a theory where the situation is taken into account first, before deciding on the rules of right and wrong. There are no set of rules, because what might be considered immoral in one situation could be considered the most moral thing to do in another. In the what 'would you do scenario' it would not be loving to laugh at someone else but because it is your friend you might laugh along with them even if it makes you uncomfortable. **Joseph Fletcher** was a philosopher and ethicist who wrote the book '**Situation Ethics**' in 1966. Fletcher was a Christian who was concerned that in the 'swinging 60s' people were abandoning their morality in America. Thus, an act must be evaluated by the laws of unconditional love, rather than standard ethics. Fletcher cited the concept of **agape**, a Greek word used to describe 'love' in the Bible.	Religious people would argue that their relationship with God is very important; if not the most important thing to them. Consequently, this relationship might also have an impact on other relationships they form and how they conduct themselves in those relationships. Most religions teach that marriage is an important life event – **a rite of passage**. Most religious people would want to be married in a place of worship, with family and friends making important promises or vows. Most Christians believe that sex should only take place within marriage Marriage is also regarded as the best environment to raise a family. In Islam, sex is seen as a gift from Allah and sexual relationships should be restricted to marriage between a man and a woman. In the Qur'an, unmarried Muslims are advised against sex before marriage.
5. Abortion	**6. Euthanasia**	**7. What is justice?**	**8. Social justice**
The key questions within the abortion debate include; • When does life begin? This is impossible to say for sure. Is it at conception? First heart beat? When there are brain waves? When the baby is viable? Or at birth? • What are the rights of an unborn child? • What are the rights of a woman over her body? • What do we mean by 'quality of life'?	**Sanctity of life**: The belief that human life is sacred. This fits with both Christian and Islamic beliefs **Quality of life**: This is the idea that someone should be able to enjoy their lives. If someone is likely to live in daily pain, they might be said to have a bad quality of life. Most Christians believe that Euthanasia is wrong, but do not regard switching off life support machines when someone is technically 'brain-dead' as wrong. They believe this because: • Sanctity of life	Justice is a concept on ethics and law that means that people behave in a way that is fair, equal and balanced for everyone. Equality is when each person is seen as equal in the eyes of the law. A government that protects human rights and promotes social justice makes one set of laws for everyone, not different laws for different people. In the past, the law has discriminated against some groups based on their race, religion, gender, or sexuality. Social justice is when each person can exercise their rights within a society.	A government that promotes social justice ensures that everyone has physical security, education, healthcare, and employment. The term social justice means promoting a fair society by challenging injustice and valuing diversity. It also ensures that everyone has the same access to equal opportunities and rights. Unfortunately, there are many people in the world who do not have social justice and do not have their basic needs and rights met.

The Law ❑ The 1967 Abortion Act says an abortion can take place if TWO doctors agree: ❑ The mothers life is at risk ❑ There is risk of injury to mothers physical or mental health ❑ There is risk to another child ❑ There is a risk the baby may be born seriously handicapped Some Christians accept abortion in some circumstances due to situation ethics.	• Euthanasia as murder (thou shall not kill) • Switching off machine of brain-dead not murder (God has already taken) • Doctrine of double effect • Genesis – God gives life • We have a soul and are made in the image of God		Christian churches are supportive of the fight against social injustice. There are many Christian charities and groups that fight hard to make the world a fairer place for everyone.

8. Equality: BLM The Black Lives Matter movement was founded in 2013 in response to Trayvon Martin's murderer being acquitted (he was not sent to prison). Since 2013, BLM has been at the forefront of fighting injustices when it comes to the murders of black people and unfair prosecutions against black Americans. The goals have recently shifted to also include recognising black contributions to society and decolonising our curriculums.	**10. Do we have free will?** Christianity teaches that God gave humans free will. This is the ability for humans to make their own decisions. It means that although God made a world and it was good, it is up to humans whether they choose to do good or bad deeds. **What does Christianity say about the origin of evil?** Many Christians believe that evil is the result of **Adam and Eve**'s disobedience to God. In the **Garden of Eden**, Adam and Eve ate the forbidden fruit. God punished Adam and Eve for their actions, and the punishment was to endure suffering in life. This is known as **'the fall'**. Some Christians believe that all people inherited the tendency to sin from Adam and Eve. This belief is called **original sin**. According to this belief, all humans are born with a tendency towards evil and the ability to cause suffering.	**11. The free will defence?** The free will defence argues... Free will is an essential part of humanity, without which we would be mere robots. This explains why free will is sufficiently important to be worth the risk of evil Genuine free will requires the genuine possibility of evil, so that if God has removed this possibility, he would have to have taken away out free will The free will defence centres on the idea that for humans to need to be allowed to respond freely to God, they must be able to make their own decisions and choose to love God of their own free will. This means that, ultimately, humans must have the choice to do good or to commit evil. When moral evil occurs, it is because humans have misused their God-given freedom. The Freewill defence attempts to combat the problem of evil by rationalising that evil is a result of human action and therefore God is not to be held responsible.	**12. Does suffering have a purpose?** Some people believe that suffering exists to help us become better people. Soul-making is the theory that evil must exist so that humans can develop their souls by living and becoming good, moral people. It gives humans a chance to learn from suffering and develop moral virtues. This doctrine allows for God to exist as an omnibenevolent being. This is because God is not responsible for creating evil, as evil itself as an entity does not exist.

Social Science: Citizenship

Year 9 Citizenship Knowledge organiser

1. Age of criminal responsibility Why do we need laws? • to keep us safe and live together peacefully • to protect **all citizens** • to keep order and prevent chaos A crime is a deliberate act that causes physical or psychological harm, damage to or loss of property, and is against the law. The age of criminal responsibility in England and Wales is 10 Having the age as low as 10 is a useful **deterrent. BUT** children under 10 are too young to know what they are doing.	**2. How is the criminal justice system applied to young people?** A police officer upholds the law A solicitor gives legal advice Youth Offending Team supports people aged 11-18 who have been sent to court A judge hears more serious cases A Magistrate hears less serious cases Youth Offender panel is a group of people who help a young person make up for their crime Crown Prosecution Service decides which cases go to court There are several reasons for sentencing a person: deterrence, protection, reform, retribution, reparation	**3. Deliberative debate** An effective speech includes: 1. Confident and persuasive speaking tone. 2. Sound analysis of evidence using statistics. 3. Takes a steady pace through his speech. 4. Make eye contact. 5. Offers hope - making people want the alternative he is suggesting. Creating a strong argument **Reasons:** A short statement that is an important claim in your speech or argument. **Examples:** A statistic, case study or illustration that supports the reasons. **Analysis:** An explanation of the relevance of the Example, and of the Reason, adding context and clarification. **Link:** A connection back to the Reason	**4. Elections** For the purposes of a general election, the UK is split into 650 areas, each area is called a constituency. Each constituency is represented by one MP. A General Election takes place within 5 years in the UK and all 650 MPs are elected. Voters choose one candidate and put a X beside their name. After the election result is announced the leader of the largest party, will visit the Monarch to ask their permission to form a new government.
5. Government and parliament UK is a representative democracy: people elect their representatives to work on their behalf. Government: Those who have the authority to run the country. Parliament: Those elected and appointed to hold the government to account. The UK is a constitutional monarchy: the Monarch is Head of State, Parliament makes and passes laws. The House of Commons is made up of MPs who are elected during General Elections. The House of Lords is made up of Lords/Peers. Most Lords are appointed by the government.	**6. Political Parties** An organised group of people who share similar ideas and values and want to win an election to become the government. They represent the voters, help people to understand politics, run the Country The Conservative Party is a right-wing party that believes in lower taxes and more private businesses. The Labour Party is a centre-left party that believes individuals and companies who earn more money should pay higher taxes which fund better public services.	**7. Role of a Member of Parliament** A Member of Parliament (MP) is the person elected by all those who live in a particular constituency to represent them in the House of Commons. **They attend debates and specific events in the House of Commons e.g. Prime Minister's Questions.** They make media appearances. They meet with their constituents.	**8. Why do people migrate?** Migrant move from one county to another. There are factors that attract people to another country. These are called pull factors and include: education, employment, family, life change. Factors that force you out of your country are called push factors and include: War, natural disaster, political unrest, persecution.

Social Science: Citizenship

9. Should migration be controlled?

The UK has a Points-Based Immigration System for all immigrants. This means that all immigrants will be required to 'score' a set number of points before their application is granted. Points are awarded for specific skills, professions, or qualifications/attributes.

The UK controls immigration by only permitting those from outside the UK to remain in the UK for an extended period of time when they have applied for and been granted a Visa.

The UK does this because it wants to ensure that it knows who is in the country and limit the number of people remaining in the UK. On the other hand, it may also do this to target certain groups, to help the UK economy.

10. How does migration affect communities?

Migrants have 3 effects on communities:

1. **Economic:** fill gaps in employment and pay tax towards the cost of public services.
2. **Social:** introduce new cultural activities and encourage tolerance and respect.
3. **Political:** bring new ideas, encourage debate around migration.

11. How to bring about change in school?

Active citizenship involves people acting together or individually to achieve a change or benefit in society. It is about making a difference in society.

Active citizenship can be big or small.

Active citizenship is an important part of democratic society.

There are two ways you can take part in democratic decision making:

1. Involved directly through the student council
2. Setting up your own campaign and activity that you feel is important and taking the idea to a decision-maker in school.

To carry out a campaign you must:

1. Identified issue
2. Collect evidence
3. Cause and effect
4. Plan the action
5. Carry out the action

12. Young people and local democracy

Local democracy is about decisions made in your local area and how you can influence them. The power to make decisions at a local or regional level in our villages, towns, cities and counties usually rests with local councils or elected mayors. They make important decisions about local services like rubbish and recycling collections, roads and often facilities like swimming pools, museums and leisure centres.

1. Young people can do 4 things to take part:
2. Ring up the council and talk to the person responsible about an issue
3. Organise a local demonstration or march
4. Draw up a petition to send to the council expressing residents views
5. Play an active part in your local Youth Council

13. influencing people in power

Power - the ability to influence decisions, people or a course of actions. In politics we often talk about people in positions of power, like Councillors, MP's or the Prime Minister.

Influence - the ability to get your message across to people in positions of power and as such become powerful yourself.

To influence people:

- You can **influence** your school by being part of the student council or forum.
- You can create **change** through your actions in your community, for example, by joining a youth council, or local action group.
- You can have your **voice** heard, for example, through contacting the media, setting up an online petition, or joining a national group.
- You can **engage** in political action, for example, by persuading others to vote or joining a political party.

14. Making change happen

"Changemakers" are activists that make a difference at a local, national or international level

Greta Thunberg led young people around the world in protests, calling for more action to be taken on climate change.

June Eric Udorie started a campaign and wrote to her local MP to stop the government from removing feminism from the A–Level politics syllabus. Her actions resulted in a change of plan by the government.

Year 9 Construction: Nesting Boxes (12) Designing for Markets

Key Learning Aims

Identify and work with a range of materials taking into account their physical and working properties and qualities
Safety use a range of work shop tools, equipment, machines and processes within a work shop environment
Produce design proposals based on a design brief and effectively communicate the ideas using a range of different techniques and taking account of any research carried out
Understand the wider influences on design including reading technical drawings, producing technical drawings, impact on the environment and society, quality control and natures influence

Materials & Properties

Timber comes from trees. Trees have to grow to full maturity (between 25 and 100 years) before they can be cut down for wood.

Hardwoods come from **deciduous** trees, which have large flat leaves that fall in the autumn. Hardwoods take longer to grow, are not easily sourced and are expensive to buy. Examples include Oak Mahogany Ash and Beech.

Softwoods come from **coniferous** trees. These often have pines or needles, and they stay evergreen all year round - they do not lose leaves in the autumn. They are faster growing than hardwoods, making them cheaper to buy, and are considered a **sustainable** material. Examples include Larch, Pine and Spruce

Manufactured boards are usually made from timber waste and **adhesive**. To make them more aesthetically pleasing they are often **veneered**. They are cheap to buy. Examples include MDF, Plywood and Chipboard.

Metals are found naturally and are mined from the earth. Metals used in products are extracted from the natural ore using large heat furnaces.

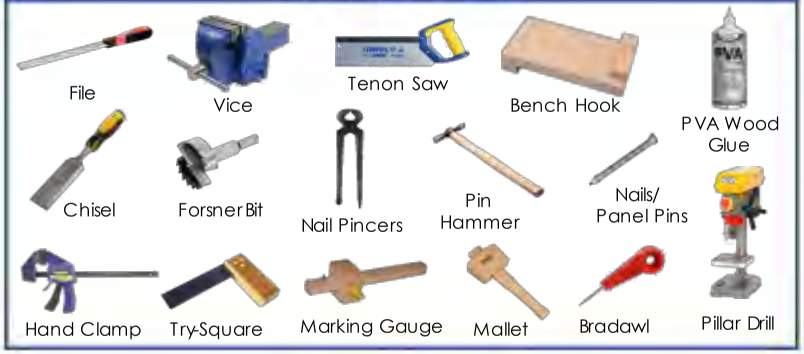
Ferrous metals contain iron and are magnetic. They are prone to rust. Examples include Mild Steel, Cast Iron and High Carbon Steel (Tools Steel)

Non-ferrous metals do not contain iron and are not magnetic. They do not rust. Examples include Aluminum, Copper, Tin and Zinc.

Alloys are mixtures of metal with an element to improve its properties or aesthetic. For example brass is a mixture of copper and zinc. Alloys can also be classified as ferrous or non ferrous. Examples include Brass, Stainless Steel and High -Speed Steel.

Rusting is the special name for the corrosion of iron and steel. It occurs when iron or steel reacts with oxygen in air and water. It is usually a slow reaction and can make the metal weaker over time. Rusting is also known as oxidizing

Equipment & Tools



Techniques

Measuring and Marking: Use the of pencils, rulers, try squares and marking gauges to identify the waste materials of drill holes

Cutting Processes: Removal or unwanted material using saws, files and drills

Joining Process Assembling parts together ing permanent or semi permanent methods like glues, nails and wood joints (Half Lap Joint, Comb Joint and Dove Tail Joints)

Finishing Processes: The application of a substance to change the aesthetics, function or to protection

Exploded Diagrams show how a product can be assembled and how the separate parts fit together, with dotted lines showing where the parts slide into place.

Orthographic Projection is a way of representing a 3D object by using several 2D views of the object

Health & Safety

Workshop Health and Safety Rules

1) Bags and Coats stored on the storage racks
2) Blazer removed, hair tied back, sleeves rolled up
3) Stools tucked under and standing up when using tools
4) Watch and follow health and safety demonstrations
5) Use PPE provided
6) Clear away tools, equipment, waste material at the end of a lesson

Risk Assessment – Identifying potential dangers and how likely they could occur

Hazard – A dangerous, substance or activity

Risk – The likelihood of something happening associated with risk assessments

Personal Protective Equipment (PPE)

Further Reading

Woodworking Manual. By Jackson Day
Choosing and using hand tools. By Andy Rae
Why Materials Matter – See tal Solanki
The Language of Things Deyan Sudjic
The Design of Everyday Things by Don Norman
Sustainable Materials – With Both Eyes Open by Julian Allwood and Jonathan Cullen

Watch	Visit
BBC Big Life Fix	Wollaton Hall Industrial Museum
BBC The Imagineers	Conkers
BBC Click	The Museum of Making - Derby

Key Words

Aluminium - A light metal. Non ferrous. Grey silver in colour. Corrosion resistant but not for marine use. Used in the manufacture of cans, alloy wheels and aircraft.

Chisel - Bevel edge and firmer chisels are used to remove waste wood when cutting joints. Generally used across the grain. Joints should be cut with saw before using a chisel

Chuck - Chucks are used to hold drill bits. Chucks can be found on portable drills and pillar drills Centre lathes are also fitted with a chuck to hold the work (usually a 3 Jaw chuck but 4 Jaw chucks are used to hold square or irregular shaped work).

Dovetail - The dovetail joint is a very strong joint used in the construction of boxes and drawers. The pins of the joint are splayed out like the tail of a dove.

Hammer - A tool used to accurately hit against another object such as a centre punch. Hammers are also used for riveting and when installing nails and pins.

Mallet - Used with a chisel when cutting joints. The mallet is used to hit the chisel.

Pillar drill - a power drill which is mounted on a strong steel pillar bringing it to chest height. The pillar drill can drill accurately and perfectly vertically. A depth stop can also be used to control the depth the hole is drilled to.

Planning - *A step by step set of instructions describing how to manufacture the product. A flowchart is an effective way of presenting the plan. Good planning will reduce wasted time and mistakes.*

Scale – the size of the model compared to the real thing

Specification - A list of features that a product should have

3D Design: Architecture (Designing for Markets)

Year 9

Key Learning Aims

Identify and work with a range of materials taking into account their physical and working properties and qualities
Safety use a range of workshop tools, equipment, machines and processes within a workshop environment
Produce design proposals based on a design brief and effectively communicate the ideas using a range of different techniques and taking account of any research carried out
Understand the wider influences on design including the history of Architecture, greenfield and brownfield sites, form over f unc tion and the work of Architects

Materials & Properties

Papers and boards are formed from wood pulp, which comes from trees. This squishy wood pulp is rolled out into thin sheets in paper mill factories to form the papers and boards that we use.

Papers are made from **wood pulp** .
Their **density** is measured by their weight, in grams per square metre (gsm) - the thinner the paper the lower the gsm. Examples include Cartridge paper, grid paper, layout paper and tracing paper.

Board thickness is measured in microns or grams per square metre (gsm) - the thinner the card the lower the microns or gsm. Examples include Corrugated card, duplex boards, foil lined boards, form boards and solid white boards

3D Printing Materials

ABS filament is the most commonly used 3D printing plastics. It is used in the bodywork of cars, appliances, and mobile phone cases. It is a thermoplastic which contains a base of elastomers making it more flexible, and resistant to shocks.

PLA: Known as polylactic acid, or PLA, this material has the benefit of being biodegradable, unlike ABS. PLA is manufactured using renewable raw materials such as corn starch. PLA is one of the easiest materials to print, though it does have a tendency to shrink slightly after 3D printing.

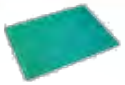
Polypropylene (PP) is known for its resistance to abrasion and its ability to absorb shocks, as well as relative rigidity and flexibility. However, drawbacks of the material include its low temperature resistance, and sensitivity to UV rays.

Equipment & Tools


Pencil


Rule/ Ruler


Safety Ruler


Cutting Mat


Hot Glue Gun


Masking Tape


Scissors


All Purpose


Craft Knife

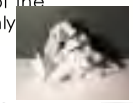

CAD - TinkerCAD


3D Printer

Techniques

Biomimicry is a practice that learns from and mimics the strategies found in nature to solve human design challenges

Deconstructivism is a movement of postmodern architecture which appeared in the 1980s. It gives the impression of the fragmentation of the constructed building, commonly characterised by an absence of obvious harmony, continuity, or symmetry.



Perspective usually refers to the representation of three dimensional objects or spaces in two dimensional

The word **prototype** comes from the Latin words proto, meaning original, and typus, meaning form or model

Health & Safety

Workshop Health and Safety Rules

1) Bags and Coats stored on the storage racks
2) Blazer removed, hair tied back, sleeves rolled up
3) Stools tucked under and standing up when using tools
4) Watch and follow health and safety demonstrations
5) Use PPE provided
6) Clear away tools, equipment, waste material at the end of a lesson

Risk Assessment – Identifying potential dangers and how likely they could occur

Hazard – A dangerous, substance or activity

Risk – The likelihood of something happening associated with risk assessments

Personal Protective Equipment (PPE)


Safety Ruler


Safety Glasses


Apron


Hair Bobble

Further Reading

Bauhaus – Magdalena Droste
Memphis. By Bigitte Fitoussi
Masterpieces of British Design by Charlotte and Peter Fiell
British Design from 1948: Innovation in the Modern Age
How to Fail at Almost Everything and Still Win Big by Scott Adams Invention: A Life Hardcover – by James Dyson
Design for the 21st Century. By Charlotte Fiell and Peter Fie
Sketching User Experiences: getting the design right & the right design. By Bill Buxton

Watch	Audio-Visual
George Clarke's Amazing Spaces	Dieter Rams: Principles of Good Design – BBC Four
BBC The Imagineers	Podcast - Creators Collective
BBC How to build...	Design Matters – Debbie Millman

Key Words

Artefact - The product. An object that has been designed and made.

Brief - A short and clear statement of what is to be designed and made. The design task.

CAD - Computer aided design. Prodesktop and 2D Design work is CAD.

CAM - Computer Aided Manufacture Computers control the machines manufacturing the product

Dimension - the size of the object. Adding dimensions to a drawing means to add the measurements.

Fabrication – making up something from materials

Oblique - A drawing system to produce a 3D look. The angle of 45 degrees is used to project the sides of objects.

Perspective - A drawing system invented in the fifteenth century which makes it possible to represent objects and scenes realistically on paper. Objects are drawn smaller if they are farther away. Use is made of an horizon line and vanishing points to construct the drawings.

Scissors - A tool used for cutting paper and fabrics. Scissors cut by using a shearing force. Well designed scissors should be ergonomically designed and safe to use.

ADT: Art

Art: The Ocean

Year 9

Key Learning Aims

To learn about themes, facts and environmental concerns linked to the ocean, To learn how to compose a visual design, To learn mixed media and mark making effects, To learn how to create a graphic poster.

Materials & Properties

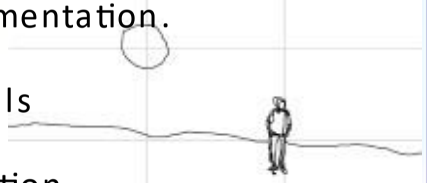
How to use oil pastels:
https://www.youtube.com/watch?v=Y8ekri4
How to use text font for posters:
https://www.youtube.com/watch?v=SIBkz6TJH6A
How to create aPolyboard print:
https://www.youtube.com/watch?v=USoDCzLmCVk

Equipment & Tools

Shells
Various pens
Oil pastels
Watercolours
Acetone
Spoons
Polyboards

Techniques

Mark making effect with graphic pens.
Pattern effects and blending in oil pastel.
Mixed media experimentation.
Printmaking skills
Design planning skills
Compositional skills
Watercolour application



Health & Safety

Careful safe use of Acetone to print.
Learn how to tidy your work station safely and effectively.

Key Words

Composition
Mark making
Pattern
Blending
Colour
Shape
Font
Scale
Layering
Tone
Outline
Print

Further Reading

The Blue Planet:
https://www.bbcearth.com/shows/blue-planet
Marine Conservation Society
https://www.mcsuk.org/

National Geographic
https://www.nationalgeographic.com/environment/topic/oceans

ADT: Art

Art: Mexico

Year 9

Key Learning Aims

To learn about Mexican Art and explore artistic culture from around the worldTo learn how to sculpt a 3D form. To learn how to compose pattern and decorative features To learn how to present colour and line boldly and effectively.

Materials & Properties

How to make real Mexican sugar skulls
https://www.tablespoon.com/recipes/how-to-make-sugar-skulls-calavera-de-azucar/c12860df-02bc-4901-a2e4-46efbf570322
DIY Papel Picado tutorial
https://www.youtube.com/watch?v=5Y6pujg

Equipment & Tools

Shells
Various pens
Oil pastels
Watercolours
Acetone
Spoons
Polyboards

Techniques

Papel picado paper cutting
3D Clay Construction
Line and decorative pattern

Exploration of colour through coll
Tonal rendering to show 3D form

Health & Safety

Careful safe use of clay sculpting and cutting materials.

Key Words

Colour
Pattern
Shape
3D Form
Decorative
Line
Construction
Picado
Presentation
Sculpture
Composition

Further Reading

Research on Day of the dead festival
https://www.nationalgeographic.com/travel/article/top-ten-day-of-dead-mexico

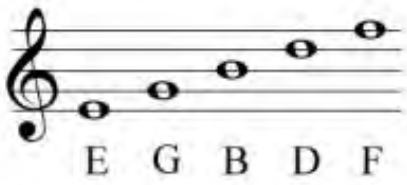
History of Sugar Skulls
https://en.wikipedia.org/wiki/Calavera

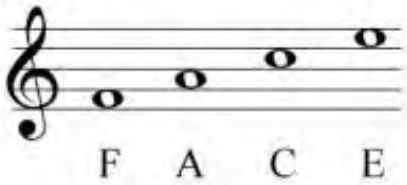
Cheat Sheet!

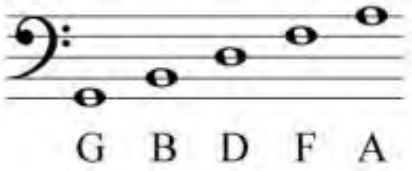
Note Names

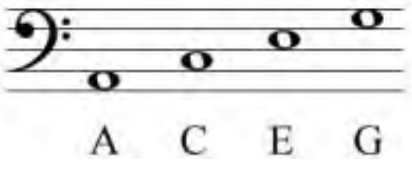
Symbol	Rest	Name	Beats
𝅝	𝄻	Semibreve	4
𝅗𝅥	𝄼	Minim	2
♩	𝄽	Crotchet	1
♪	𝄾	Quaver	½
𝅘𝅥𝅯	𝄿	Semiquaver	¼

Lines and Spaces









DR T SMITH

D ynamics
R hythm, Tempo and Metre

T exture

S tructure
M elody
I instrumentation/Sonority
T onality
H armony

The Piano

Time Signatures

The top number tells you how many beats there are in a bar

The bottom number tells you what sort of beats they are

You need to know and understand what the DR T SMITH Elements of Music are. Use your keywords lists to help you.

Keyword	Definition
Pitch	How high or low the music is
Tempo	How fast or slow the music is
Rhythm	How long or short the notes are, in relation to the pulse
Melody	The tune
Dynamics	How loud or quiet the music is
Instrumentation	The instruments used in a piece
Timbre	The sound or tone quality of an instrument or voice
Structure	The form/layout of a piece of music
Tonality	The types of harmonies created in a piece, determined by a hierarchy

Then you need to be able to use them in a sentence to describe pieces of music. Some examples are below:

1. The **tempo** of the piece starts **slowly** and gets **faster**
2. In the piece, the **dynamics** start **loudly** and get **quieter** in the middle
3. The **instrumentation** in the piece includes **guitars**, **flutes** and a **piano**
4. The **rhythm** uses **short note values** and **syncopation**

The **texture** in the piece starts very **thin**, and **builds** as the piece progresses

Drama

Year 9 Drama – Knowledge Organiser

Climax	A climax is when the tension within a scene builds to its highest point. It's the most exciting moment.
Flashback	Playing events from the past
Tone	Adapting your voice from harsh to soft, which reflects the attitude or mood of a character.
Pace	The speed that you deliver your lines / movement.
Pitch	How high or low you make your voice.
Volume	How loud or quiet you say something on stage.
Facial Expressions	Adapting your face to show a specific emotion. The focus is usually on your eyes, eyebrows and mouth.
Body Language	The position of your body to show a clear emotion.
Movement	Where the actors move on the stage, what this communicates to the audience and the effect this has upon the drama.
Gestures	Everyday 'small actions'.
Eye Contact	Establishing eye contact with another actor or the audience.
Proxemics	The proxemics is the distance or level between character/actors shows their relationships and feelings, and give clues of the situation or the people within the situation at that moment.