KNOWLEDGE ORGANISER

Seahaven Academy
The best in everyone™
Part of United Learning

YEAR 7:

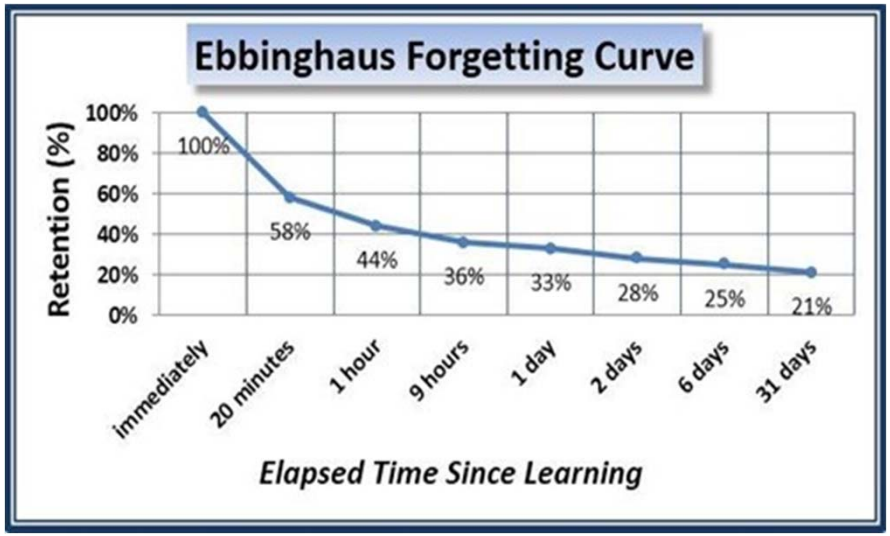
Terms 3 and 4

2023 - 2024

Core Subjects

Name: _____ Tutor Group: _____

Knowledge Organisers and The Forgetting Curve



Why are knowledge organisers important?

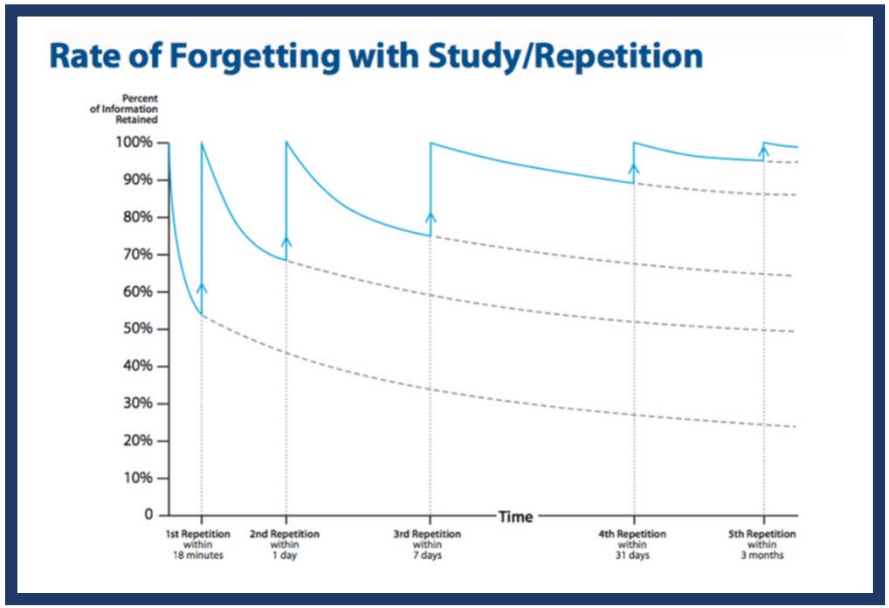
- Almost as soon as we have learnt something we begin to forget it
- In fact, it is surprising how quickly we begin to forget and within a few hours we usually only remember a fraction of what we have learnt ,the graph (left) is an example of how this happens

What can knowledge organisers be used for?

- The speed and amount of forgetting can be reduced by using knowledge organisers to practice recalling what you know
- By retrieving something back into our working memory we slow the rate of forgetting (see the second graph, below)

How will we be using our knowledge organisers?

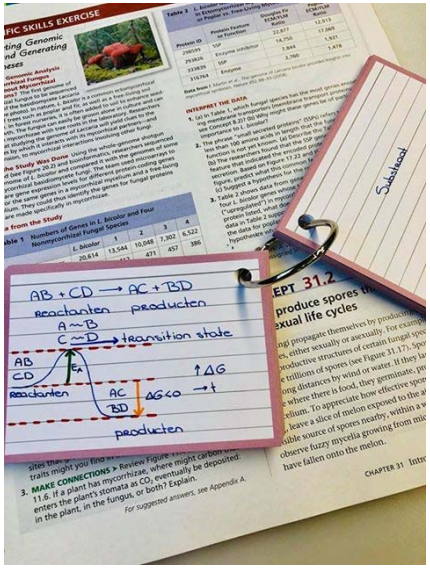
- You need to bring these to school each day in your bag, they may be used in lessons
- You will be set homework activities that use them
- You should use them to practice recall – there are tips on ways to do this in the next few pages
- You will use them to prepare for end of unit tests, including the 'Haven Hundred', set in drop-down tutor time during the penultimate week of each term



How To Use Your Knowledge Organiser

Make Flashcards

- A flashcard is a piece of card that has a cue or hint on the front side, and the answer on the back side.
- The cue can be a question, an image, or just one word that prompts or triggers a response
- Flashcards are one of the best ways to remember new information because they involve you in active learning, repetition, and reflection of your answers
- Use them to play memory test, pairing games, self quizzing or others quizzing you.
- They are very effective when used with the Leitner technique (see below)



Leitner Technique

When you've written the flashcards, they're sorted into three different boxes: 1, 2 and 3.

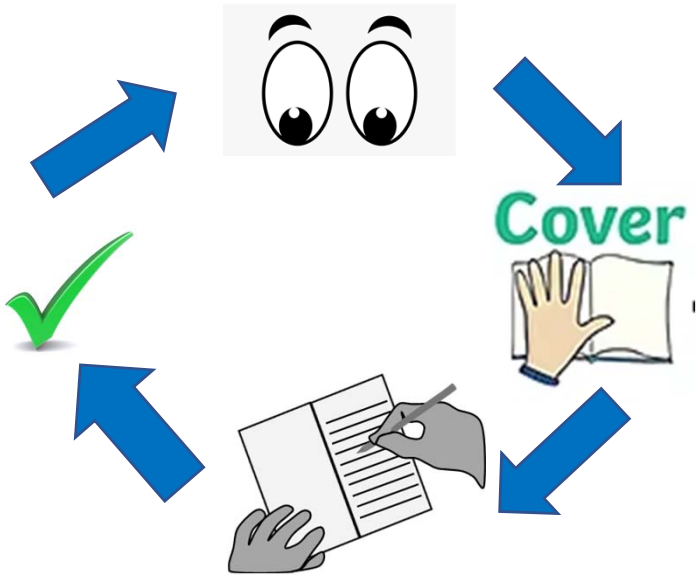
You start with all the cards in Box 1.
You learn these every day

You know a card from Box 1? Then it goes to Box 2.
You learn these every three days

You know are card from Box 2? Then it goes to Box 3
You learn these 3 every five days

If you get a card wrong, it goes back to Box 1

How To Use Your Knowledge Organiser



Read – Cover – Write – Check – Repeat

Read – a small section of your knowledge organiser
Cover – Cover the information so you are unable to read it
Write – out what you have remembered
Check – the knowledge organiser to see if you are right and add in any missing points in a different colour pen
Repeat this process the next day then a few days later

Help From Others
Parents/Carers /Siblings/ Friends

Where possible involve others in your review and recall practice. They can:

- Use your Knowledge Organiser to ask you questions or set you a quiz
- Play memory games with your flashcards – pairs or snap (with diagrams and specialist terms, specialist terms and definitions)
- Check your notes with you after read – cover – write
- Watch the videos and read the attached articles with you

Useful Links

Flashcards and Leitner Method

Read
https://study-stuff.com/how-to-study-flashcards-with-the-leitner-method/
https://e-student.org/leitner-system/

Watch
https://www.youtube.com/watch?v=d9u3KxGCio8
https://www.youtube.com/watch?v=C20EvKtdJwQ

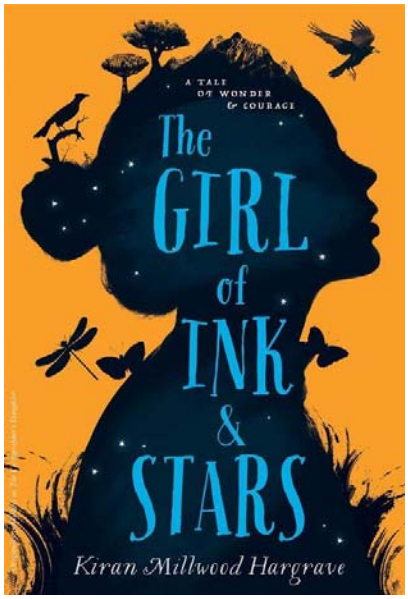
Different Methods of Revision – Created by Staff at Seahaven
https://www.seahavenacademy.org.uk/parents/key-stage-information-evening/key-stage-4-information

Homework Sites We Use That Assist with Recall
https://senecalearning.com/en-GB/
https://hegartymaths.com/
https://www.languagenut.com/en-gb/

Y7 English Knowledge Organiser:
The Girl Of Ink And Stars by Kiran Millwood Hargrave Terms 3&4

The context of a text is not the things that appear on the page but the circumstances in which it was written. The context helps to build up a background of how and why the piece of writing may have been written - events happening in the world at the time, how men or women were regarded in society, or even people's opinions of religion or social rules can be reflected in a piece of writing.

Context	What has influenced the text and how it is written?
Genre (type of story)	The text conforms to that of magic realism, a genre of writing that creates a real world, but adds magical elements to it.
Biographical context **(the writer's life)**	The writer has family all around the world and in her acknowledgements she explains how they have provided her with inspiration for her stories.
Historical context **(the historical background of the text)**	It seems that Hargrave has been influenced by Greek mythology, which often told of powerful beings and deadly monsters. One famous story is 'Theseus and the Minotaur', which is alluded to in the turning point of the story when Isabella and Lupe are trapped in the Labyrinth.
Social context **(the social background to the text)**	The text demonstrates recognisable social structures, present in societies around the world: rich and poor, the Governor as a tyrant (leader who rules through fear) and the rest of the island who serve him. There is a clear class divide.



Big Ideas:

- Relationships change over time.
- Friendship and loyalty are important.
- Supernatural forces can change the path of our lives.
- Sometimes we have to make difficult choices for the greater good.
- Power can be used for good and evil.
- Appearances can be deceiving.

Vocab

foreshadowing	A method when the writer gives clues or hints about what might happen next.
protagonist	Main character
antagonist	Main opponent or enemy of the protagonist
First person narrative	A story told from the narrator's perspective or point of view using 'I', 'we', 'our'.
Third person narrative	A story told using 'he', 'she', 'they' instead of 'I', 'we', 'our'.
Cartographer	A person who draws or collects maps
banishment	A punishment when a person must leave a place and they are not allowed to return.
labyrinth	A series of confusing paths that are difficult to navigate or find your way to the other side.
indignantly	In a manner that shows annoyance or the feeling that something is unfair.
foreboding	A sense or feeling that something bad will happen.
callous	Not caring about other people's feelings, pain or problems.
colonialism	When one country acquires full or partial control over another country, occupying it with settlers, and exploiting it and the local people for wealth and resources.
Subjugated	Being controlled or dominated.
genocide	The deliberate killing of people who belong to a particular racial, political, or cultural group.
enslaved	Made to work as a slave.
Atrocity	Extremely cruel or terrible acts.
subject	The person or thing that does the 'action' (verb) in a sentence.
verb	A word that conveys an action, an occurrence, or a state of being
fragment	Incomplete sentence – doesn't make sense on its own.
Setting	The time and place in which a story takes place.
Claustrophobic	Extreme fear of small spaces.
ambush	A surprise attack.
tethered	Something which is tied to restrict or stop movement.
redemption	Being saved or saving someone from evil, sin or suffering.
Fate	**T**he development of events outside a person's control, regarded as predetermined by a supernatural power.
Quest narrative	A story follows a difficult journey towards a specific goal.
Cliff-hanger	A chapter or part of a story ends without a resolution leaving the reader desperate to know what happens next.

4-Step Paragraph

1. **Introduce evidence/quotation**

The writer presents….The writer describes…as '…….'

2. Zoom in on words/phrases (challenge = methods)

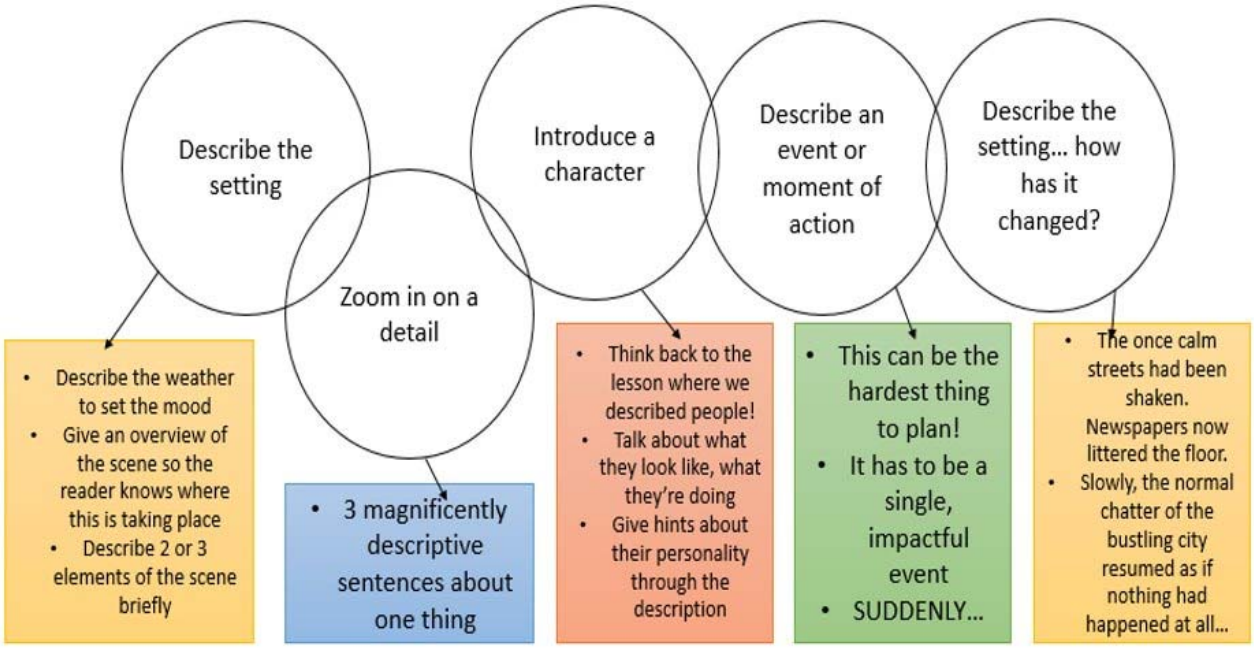
The word(s) '…..' suggests….is important/interesting because…

3. *As readers, we feel/think/imagine…*

4. Big Ideas

Perhaps the writer is communicating the idea that…

Creative writing circles plan



Three ways to start a sentence:

•HOW

With trembling hands,…

Terrified,…

As if walking through a dream,…

•WHERE

In the dusty dark of the church,…

From out of the shadows,…

Behind me,…

•WHEN

Seconds later,…

At the very moment when,…

Earlier, he had…

Simple sentence:

Mrs Hennig eats an apple.

Compound sentence:

Mrs Hennig eats an apple but the apple is bruised.

Complex sentence:

Even though the apple was bruised, Mrs Hennig still ate it

Key character	Key information	Key quote and theme
Isabella	The protagonist. Da's daughter.	'I shut my eyes, ready to fall.'- Mystery and tension
Da	Isabella's father. Map maker. Imprisoned in the Dédalo.	'Each of us carries the map of our lives on our skin, in the way we walk, even in the way we grow'. –Fantasy, family and friendship
Lupe	Isabella's best friend. She goes missing and her father organises a hunt for her.	'I threw my aching arms around her, pressing my face into her musty curls' - friendship
Governor	Isabella's father. The cruel dictator of Joya.	'They say the day the Governor arrived, the ravens did too.' - Mystery (foreshadowing)
Pablo	Family friend of Isabella and Da. Son of Masha. Very protective.	'His shoulders were hunched, and I wondered if he felt the same weight in his chest, the same tightness in his throat' - tension and 'friendship'
Masha	Mother of Pablo. She is very protective of Isabella.	'Masha wiped away my tears with her cuff, and steered me to a chair.' – Friendship and family.

Method	What is it?	Example
Simile	When two things are compared using **like** or **as**.	Her eyes glimmered like an inky pool.
Metaphor (harder to spot!)	When two things are compared subtly saying one thing **is** the other thing.	Her eyes were an inky pool.
Personification	Giving a non-human thing human characteristics (physical description, emotions or behaviour).	The inky pool gazed up at her invitingly.
Repetition	Repeating a word or phrase to add emphasis or make it more memorable.	Her eyes were an inky pool, a deep, inky pool that seemed to go on forever.
Contrast	Deliberately including images, ideas or characters that are very different in order to highlight their differences.	Her eyes were an inky pool gazing up at the brilliant stars.
Alliteration	Repeated consonant sound to start two or more words that are close together.	Her eyes were an inky pool, pleading to be let in.

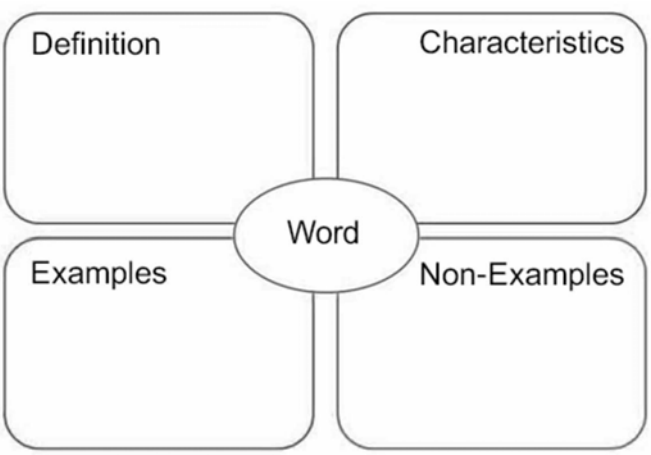
How do I revise key terminology / vocabulary?

1. Look / say / cover / write / check

Look → Say → Cover → Write → Check

Look/Say	Write / Check	Write / Check	Write / Check	Write / Check

2. Frayer model



3. Use the words in practice sentences

As readers, we admire the protagonist as he faces his fears.

KPI 7.01 Numerical Skills

1) Place Value	The value of a digit relating to its position in a number. In 1482 the digits represent 1 thousand, 4 hundreds, 8 tens and 2 ones.	**2) Integer**	Whole numbers including zero. -2, -1, 0, 1, 2, 3 …
3) Decimal	A number with a decimal point in it. It can be positive or negative. 0.3, 1.26, -3.4 etc.	**4) Positive Number**	Any number above zero. 1, 2, 3, 4 …
5) Negative Number	Any number below zero. Always written with a negative sign in front of it: -1, -2, -3 …	**6) Zero Place Holder**	A zero that is used as a place holder to denote the absence of a power of 10 E.g. 506 has no tens so there is a 0 in the tens column.
7) Even Number	Any integer that can be divided by 2 without leaving a remainder. 2, 4, 6, 8, 10 …	**8) Odd Number**	Any integer that cannot be divided by 2 without leaving a remainder. 1, 3, 5, 7, 9 …
9) Square Number	The result of multiplying a number by itself. It will always be positive. 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144 ...	**10) Square Root**	The opposite of squaring a number to find the original factor. E.g. $\sqrt{9} = 3$ or -3
11) Inequality	When one number, or quantity, is not equal to another. $a < b$ a is less than b $a > b$ a is greater than b $a = b$ a is equal to b $a \neq b$ a is not equal to b	**12) Ascending**	Smallest to largest.
		13) Descending	Largest to smallest.
14) Decimal Place Value	The value of each digit after the decimal point. Tenth, hundredth, thousandth etc.	**17) Rounding**	
15) Decimal Places	The number of digits after the decimal point. E.g.14.278 has 3 decimal places.		
16) Estimate	Find a rough or approximate answer by rounding. e.g. 2.3 x 18.4 ≈ 2 x 20 = 40 ≈ 'approximately equal to'		

Round to	Circle, Underline, Decide	Answer
Nearest 1000	5 7 8 3 . 1 9 9	≈ 6000
Nearest 100	5 7 8 3 . 1 9 9	≈ 5800
Nearest 10	5 7 8 3 . 1 9 9	≈ 5780
Nearest integer	5 7 8 3 . 1 9 9	≈ 5783
1 d.p.	5 7 8 3 . 1 9 9	≈ 5783.2
2 d.p.	5 7 8 3 . 1 9 9	≈ 5783.20

KPI 7.02 Order of Operations

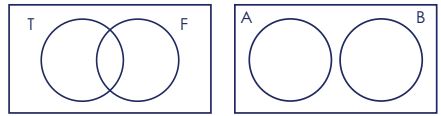
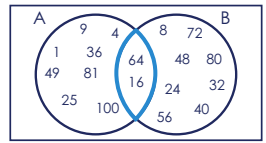
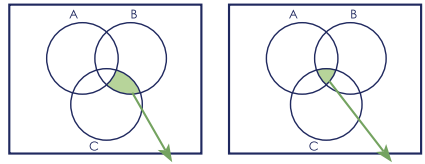
1) Operation	A rule for combining numbers + - × ÷	**2) Evaluate**	To work out the value of.
3) Index Notation	The **index** tells us how many times the **base** is being multiplied by itself. The plural of index is indices.		Power → 2^3 ← Index Base → 2^3
4) Order of Operations	**B** = **B**rackets **I** = **I**ndices and Roots	**DM** = **D**ivision and **M**ultiplication **AS** = **A**ddition and **S**ubtraction	
	If we have a calculation with addition or subtraction only then we calculate from left to right. 18 - 10 + 2 **8** + 2 **10**		If we have a calculation with multiplication or division only then go from left to right. 8 × 5 ÷4 × 10 **8** × **5** ÷ 4 × 10 **40** ÷ 4 × 10 **10** × 10 = 100

KPI 7.03 Introduction to Algebra

1) $2a$	$2 \times a$	**2)** ab	$a \times b$
3) a^2	$a \times a$	**4)** $3a^2$	$3 \times a \times a$
5) a **subtracted from** b	$b - a$	**6)** a **less than** b	$b - a$
7) a **subtract** b	$a - b$	**8)** a **reduced by** b	$a - b$
9) a **divided by** b	$\frac{a}{b}$	**10)** b **divided by** a	$\frac{b}{a}$
11) 4 times smaller than a	$\frac{a}{4}$	**12) 4 times larger than** a	$4 \times a \rightarrow 4a$
13) 5th power of a	a^5	**14) Variable**	A letter used to represent any number.
15) Coefficient	The number to the left of the variable. This is the value that we multiply the variable by. $4x \rightarrow$ The coefficient of x is 4. $\quad x \rightarrow$ The coefficient of x is 1.	**16) Term**	A single number, variable or numbers and variables multiplied together.
17) Expression	A mathematical statement which contains one or more terms combined with addition and/or subtraction signs. E.g. $4x + 3y$.	**18) Collecting like terms**	Combining the like terms in an expression. $7x + 3y - 2x$ is simplified to $5x + 3y$.
19) Substitute	Replace a variable with a given value. E.g. if b = 10, 2b = 2 × 10 = 20 $\quad$ b - 2 = 10 - 2 = 8	**20) Rearrange**	Alter the position of variables using the 4 operations. $5 = \frac{a}{t} \quad t = \frac{a}{5} \quad a = 5 \times t$

KPI 7.04 Primes, Factors and Multiples

1) Factor	Any whole number that divides exactly into another number leaving no remainder is a factor. Factors of 20 are: 1, 2, 4, 5, 10, 20	**2) Multiple**	The result of multiplying a number with a whole number (all times tables!). The multiples of 7: 7, 14, 21, 28, 35, 42, 49, 56, 63, 70 ...
3) Highest Common Factor (HCF)	The HCF of 2 or more numbers is the largest number that is a factor of each of those numbers. E.g. HCF of 18 and 45 = 9 18: 1, 2, 3, 6, (9) 18 45: 1, 3, 5, (9) 15, 45	**4) Lowest Common Multiple (LCM)**	The LCM of 2 or more numbers is the smallest number that is a multiple of each of those numbers. E.g. LCM of 6 and 8 = 24 6: 6, 12, 18, (24), 30, 36, 42, 48, 54, 60 8: 8, 16, (24), 32, 40, 48, 56, 64, 72, 80
5) Prime Numbers	A prime number only has two distinct factors: 1 and itself. 2 is the only even prime number. 1 is not a prime number. Prime numbers between 1 and 100 are: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97		

6) Venn Diagrams	These were created by an English Mathematician, John Venn (1834 – 1923). They are used to sort groups of data and consist of two or more circles, often overlapping, contained inside a rectangle.	
7) One Intersection	In a Venn diagram with 2 circles, an overlap represents a section where **elements** (E.g. numbers) lie in **both sets** (E.g. A and B). The overlap between the sets, is called the intersection. E.g. A = First ten square numbers B = First ten multiples of 8	**16 and 64** are in the intersection as they are in both sets. 
8) Multiple Intersections	If a Venn diagram is representing three sets, it will have three circles. Each circle will often overlap with another data set twice, with all three circles overlapping at the centre.	

KPI 7.05 Expanding and Factorising 1

1) Expand	Multiply out the bracket(s) in the expression. E.g. $3(5x + 7) = 15x + 21$	**2) Factorise**	Identify the HCF and rewrite the expression with brackets. E.g. $6x^2 + 9x = 3x(2x + 3)$

KPI 7.06 Addition and Subtraction

1) Addition Plus, add, sum, more than.	To find the total of two or more numbers. The inverse operation is subtraction. 1.38 4.90 + 6.28 1	**2) Subtraction** Subtract, minus, take away, less than.	To find the difference between two numbers. The inverse operation is addition. 8 1 4.90 1.38 - 3.52
3) Commutative	Addition is commutative – the order of addition does not change the result. Subtraction is not commutative.	**4) Associative**	When you add you can do so regardless of how the numbers are grouped. Subtraction is not associative.
5) Two-way Table	A visual representation of the possible relationships between two sets of categorical data. You can add and subtract values horizontally and vertically to find totals or missing values.		

	Child	Adult	Total
Male	7	9	16
Female	8	6	14
Total	15	15	30

The values in a row have a total at the right-hand side of the row.

The values in a column have a total at the bottom of the column.

KPI 7.07 Perimeter

1) Perimeter	The total distance around the outside of a closed shape. 8 cm 5 cm Perimeter = 5 + 8 + 5 + 8 = 26 cm	**2) Polygon**	A 2D shape which has 3 or more straight sides.
		3) Regular Polygon	A polygon where all sides are equal length, and all angles are of equal size.
		4) Irregular Polygon	A polygon where all sides are not equal and/or all angles are not equal.
		5) Units of Length	1 cm = 10mm; 1 m = 100 cm; 1 km = 1000 m

KPI 7.08 Mean

1) Average	A number expressing the central or typical value in a set of data.	**2) Mean**	The sum of the numbers divided by how many numbers are being averaged. E.g. Calculate the mean of 14, 6, 18, 2, 3. 1) Add the values: 14 + 6 + 18 + 2 + 3 = 43 2) Divide by 5 3) Mean is $\frac{43}{5}$ = 8.6
3) Reversing the Mean	If we have the mean but one of the data points is missing, we can find the missing value by: 1) Multiplying the 'mean' by the number of data points to get the total of the values. 2) Subtracting the sum of the known values from the total of all values.	E.g. The mean of three numbers is 5. Two of the numbers are 3 and 10. Find the third value. Total of the values: 5 x 3 = 15 15 – (3 + 10) = 2 The third value is 2	

KPI 7.09 Multiplication and Division

1) Multiplication
lots of, times, product, of

Multiplication is the operation of scaling one number by another.
Multiplication is the inverse operation of division.
Multiplication is commutative – the order of multiplication does not change the result. E.g. 2 x 3 = 3 x 2.
Multiplication is associative – when you multiply you can do so regardless of how the numbers are grouped. E.g. 1 x (2 x 3) = (1 x 2) x 3

2) Multiplying Integers

29 x 3

$$\begin{array}{r} 29 \\ \times\ 3 \\ \hline 87 \\ \hline \cancel{2} \end{array}$$

3) Multiplying Decimals

Remove the decimal points
Multiply
Insert the same number of decimal points in the answer as in the question
0.5 x 0.3
5 x 3 = 15
0.5 x 0.3 = 0.15

4) Division

Division can be thought of as sharing.
The number being divided is shared equally into the stated number of parts.
Division is the inverse operation of multiplication.

$D \div \blacksquare = \blacksquare \overline{)D} = \frac{D}{\blacksquare}$

E.g. $8 \div 9 = 9\overline{)8} = \frac{8}{9}$

4524 ÷ 3 = 1508 (3 | 4524; 1 2)

3 ÷ 8 = 0.375 (8 | 3.000; 3 6 4)

5) Dividend

The number being divided.
15 ÷ 3 → 15 is the dividend.

6) Divisor

The number by which another is divided.
15 ÷ 3 → 3 is the divisor.

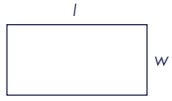
KPI 7.10 Area

1) Area

A measure of the space inside a 2D shape. Area is measured in square units. E.g. square centimetres (cm²), square metres (m²).

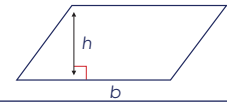
2) Area of a Rectangle

Area = length x width



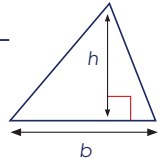
3) Area of Parallelogram

Area = base x height



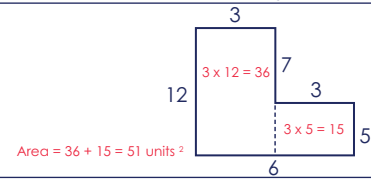
4) Area of Triangle

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



5) Compound Area

Split into regular shapes
Find the area of each
Sum the areas



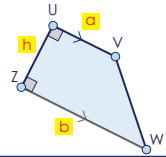
6) Units of Area

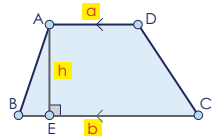
1 cm² = 100 mm²; 1 m² = 10,000 cm²

7) Area of Trapezium

Sum of the parallel sides.
Divide by 2.
Multiply by the vertical height.

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





KPI 7.11-7.14 Fractions

1) Fraction

Part of a whole.

The result of dividing one integer by a second (non-zero) integer.

$\frac{3}{4}$ ← **Numerator** *How many equal parts do you have?*

Denominator *How many equal parts is the whole divided into?*

2) Proper Fraction

The numerator is smaller than the denominator e.g. $\frac{5}{6}$

3) Improper fraction

The numerator is greater than or equal to the denominator e.g. $\frac{11}{8}$

4) Mixed number

A whole number combined with a fraction. e.g. $2\frac{1}{3}$

5) Simplify a fraction

Divide both the numerator and the denominator of the fraction by their HCF.

$\frac{6}{14} \overset{\div 2}{=} \frac{3}{7}$

6) Writing one number as a fraction of another

Write £15 as a fraction of £25. $\frac{15}{25} = \frac{3}{5}$

7) Equivalent Fractions

Fractions which have the same value.
The numerator and the denominator can be multiplied or divided by the same number.

E.g. Fractions equivalent to $\frac{3}{5}$: $\frac{3}{5} \times \frac{2}{2} = \frac{\mathbf{6}}{\mathbf{10}}$ | $\frac{3}{5} \times \frac{3}{3} = \frac{\mathbf{9}}{\mathbf{15}}$ | $\frac{3}{5} \times \frac{4}{4} = \frac{\mathbf{12}}{\mathbf{20}}$ | $\frac{3}{5} \times \frac{10}{10} = \frac{\mathbf{30}}{\mathbf{50}}$

8) Convert an integer to a fraction

Whole numbers are an integer with a denominator of 1.

$3 = \frac{3}{1} \overset{\times 5}{=} \frac{15}{5}$

9) Converting an improper fraction to a mixed number

Divide the numerator by the denominator.
Write down the whole number of the answer and the remainder as the numerator of the fraction. The denominator of the mixed number is the same as the denominator of the improper fraction.

$\frac{15}{7} = 2\frac{1}{7}$

10) Converting a mixed number to an improper fraction

Change the whole number into a fraction (same denominator) and add on the fraction part.

$2\frac{3}{4} = \frac{8}{4} + \frac{3}{4} = \frac{11}{4}$

11) Add/Subtract Fractions

Make the denominators the same (find the LCM).
Use equivalent fractions to change each fraction to the common denominator. Add/subtract the numerators only.

$\frac{2}{7} + \frac{2}{5} = \frac{10}{35} + \frac{14}{35} = \frac{24}{35}$

12) Order Fractions

Find the lowest common denominator.
Write equivalent fractions with the LCD.
Order from the smallest to largest numerator.
Rewrite original fractions in the new order.

$\frac{2}{3}, \frac{5}{6}, \frac{4}{5}$

$\frac{20}{30}$ ① $\frac{25}{30}$ ③ $\frac{24}{30}$ ②

$\frac{2}{3}, \frac{4}{5}, \frac{5}{6}$

13) Convert fractions to decimals

Use short division.

E.g. to convert $\frac{3}{8}$ to a decimal:

$$8 \overline{)\,3.000}\ \ 0.375$$

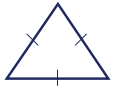
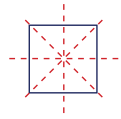
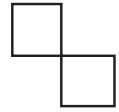
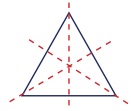
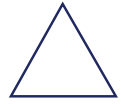
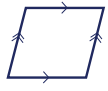
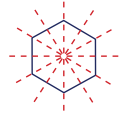
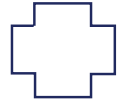
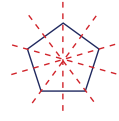
(3 6 4)

14) Fractions of an amount

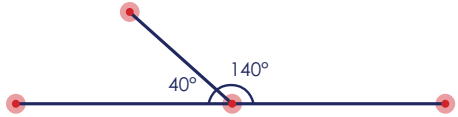
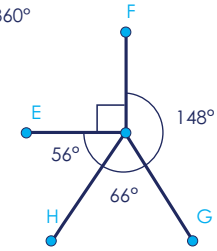
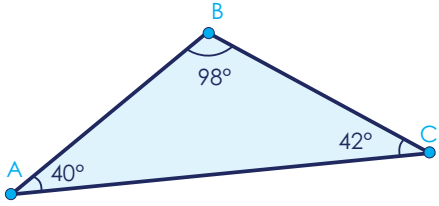
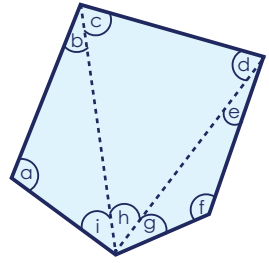
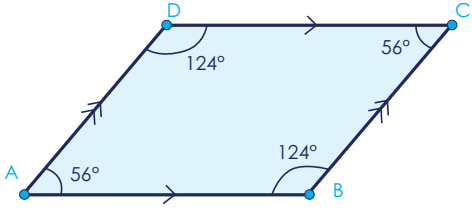
We divide the amount by the denominator and then multiply the result by the numerator.

E.g. $\frac{2}{7}$ of 35 $\quad 35 \div 7 = 5$
$\quad 2 \times 5 = 10$

KPI 7.15 Polygons

1) 3 sides	Triangle	**2) 4 sides**	Quadrilateral	**23) Line symmetry**	**24) Rotational symmetry**
3) 5 sides	Pentagon	**4) 6 sides**	Hexagon	The mirror lines of a shape. If a polygon is regular, the number of sides is equal to the number of lines of symmetry.	The number of positions in which the rotated object appears unchanged. The number of positions is called the order of the symmetry. For example, **Order 3** tells us that a shape can be rotated into three positions where the shape appears unchanged.
5) 7 sides	Heptagon	**6) 8 sides**	Octagon		
7) 9 sides	Nonagon	**8) 10 sides**	Decagon		
9) 11 sides	Hendecagon	**10) 12 sides**	Dodecagon		
11) Equilateral Triangle	• 3 equal angles • 3 equal sides 	**12) Isosceles Triangle**	• 2 equal angles • 2 equal sides 	*Four lines of symmetry*  *Square*	 Order 2
13) Scalene Triangle	• All angles are different • All sides are different 	**14) Right-angled Triangle**	• One angle of 90° • Can be isosceles or scalene 	*Three lines of symmetry*  *Equilateral Triangle*	 No rotational symmetry
15) Square	• 4 right angles • 4 equal sides • 2 pairs of parallel sides 	**16) Rectangle**	• 4 right angles • 2 pairs of parallel sides • 2 pairs of equal sides 		 Order 3
17) Parallelogram	• 2 pairs of equal sized angles • 2 pairs of parallel sides • 2 pairs of equal sides 	**18) Rhombus**	• 4 equal sides • 2 pairs of equal sized angles • 2 pairs of parallel sides 	*Six lines of symmetry*  *Regular Hexagon*	 Order 4
19) Trapezium	• 1 pair of parallel sides 	**20) Right-angled Trapezium**	• 2 right angles • 1 pair of parallel sides 	*Five lines of symmetry*  *Regular Pentagon*	 Order 5
21) Isosceles Trapezium	• 1 pair of parallel sides • 2 pairs of equal sides • 2 pairs of equal sized angles 	**22) Kite**	• 1 pair of equal sized angles • 2 pairs of equal sides 		

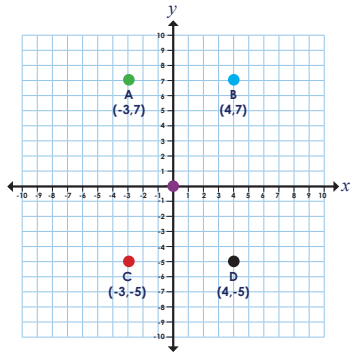
KPI 7.16 Angles

1) Angle	An angle is a measure of turn from one line segment to another. One whole turn is equal to 360 degrees.	**2) Degree**	The most common unit of measurement for angles.
3) Acute Angle	Less than 90°	**4) Right Angle**	Exactly 90°
5) Obtuse Angle	Greater than 90° but less than 180°	**6) Reflex Angle**	Greater than 180°
7) Angles on a straight line	Angles on a straight line sum to 180° 	**8) Angles around a point**	Angles around a point sum to 360° 
9) Angles in a triangle	Angles in a triangle sum to 180° 	**11) Angles in any polygon**	Any polygon can be split into several triangles to find the sum of the total interior angles. a + b + i = 180° c + d + h =180° e + f + g =180° So, total sum of interior angles = 540° This information allows us to find a missing angle. 
10) Angles in a quadrilateral	Angles in a quadrilateral sum to 360° 		

KPI 7.17 Co ordinates

1) Coordinates

Written in pairs and inside a bracket.
The first number is the x coordinate (horizontal position).
The second number is the y coordinate (vertical position).



Point A is in the SECOND quadrant

Point B is in the FIRST quadrant

Point C is in the THIRD quadrant

Point D is in the FOURTH quadrant

The coordinate (0,0) is also known as the ORIGIN

2) Origin

The coordinate (0,0) is where the x axis and y axis intersect.

3) Axis Plural-Axes

x axis is horizontal ($y = 0$). y axis is vertical ($x = 0$).

4) Vertical lines

Always in the form $x = a$.

5) Horizontal lines

Always in the form $y = a$.

6) Midpoint of two coordinates

6) Midpoint of two coordinates

1. Add the x coordinates, divide by 2.
2. Add the y coordinates, divide by 2.
3. Write as a coordinate (x, y).

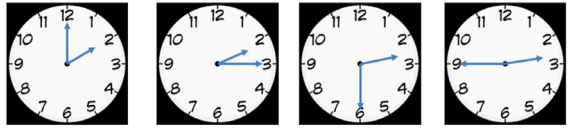
E.g. The midpoint of (2, 2) and (8, 4) = (5, 3)

midpoint of x coordinates: $\frac{2+8}{2} = \frac{10}{2} = 5$

midpoint of y coordinates: $\frac{2+4}{2} = \frac{6}{2} = 3$

KPI 7.18 Time

1) Analogue



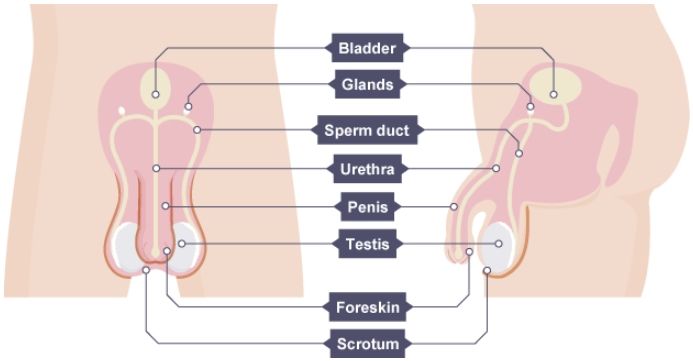
2 o'clock | Quarter past 2 | Half past 2 | Quarter to 3

2) Digital

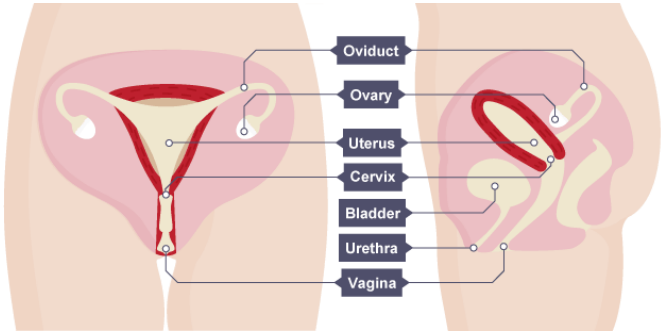
Times will appear differently on digital clocks depending on whether they are in 12-hour clock or 24-hour clock mode.

2:00 am → 02:00	2:15 am → 02:15	2:30 am → 02:30	2:45 am → 02:45
2:00 pm → 14:00	2:15 pm → 14:15	2:30 pm → 14:30	2:45 pm → 14:45

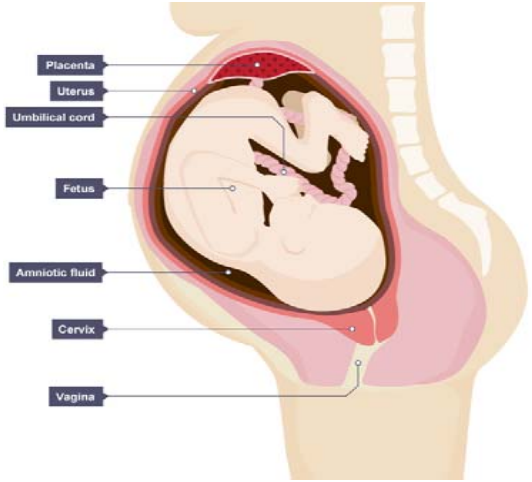
3) Days	There are 24 hours in one day.	**4) Hours**	1 hour = 60 minutes	**5) Minutes**	1 minute = 60 seconds



Testes - produces gametes (sex cells) called sperm; make male sex hormones.
Glands - produce a fluid which is mixed with sperm. The mixture of sperm and fluid is called **semen**.
Sperm ducts – takes the sperm from the testes to the penis
Urethra – semen passes through here during **ejaculation**;
Penis - passes urine out of the man's body; passes semen out of the man's body.



Ovaries - contain hundreds of undeveloped female gametes (sex cells) called **ova** (egg cells).
Oviducts – connect the ovary to the uterus; lined with **cilia**. Every month, an egg develops, becomes mature and is released from an ovary to the uterus;
Uterus - a muscular bag with a soft lining; where a baby develops until birth;
Cervix - a ring of muscle at the lower end of the uterus; keeps baby in place during pregnancy;
Vagina - muscular tube leading from cervix to the outside of a woman's body. The penis goes into the vagina during sexual intercourse.



Fertilisation → Zygote → Embryo → Foetus → Baby → Birth

A **foetus** develops in the **uterus**
The foetus relies on its mother for:

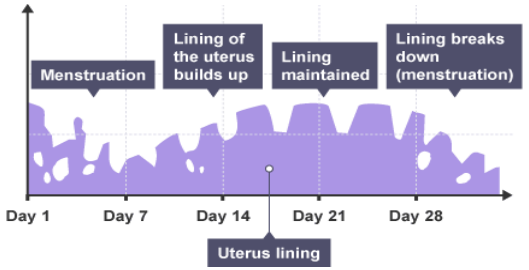
- protection against bumps, and temperature changes;
- oxygen for respiration;
- nutrients (food and water).

The foetus also needs its waste substances removing.

The foetus is protected by the **uterus** and the **amniotic fluid**, a liquid contained in a bag called the **amnion**.

The **placenta** provides oxygen and nutrients, and removes waste (eg carbon dioxide).
The **umbilical cord** joins the placenta to the foetus, and transfers substances between the two.

The menstrual cycle



The thickness of the uterus lining varies during the menstrual cycle.

The **menstrual cycle** lasts about **28 days**, it stops while a woman is pregnant:

- **Day 1,** is when bleeding from the vagina begins, caused by the loss of the uterus lining, with a little blood. This is called **menstruation** or having a **period**.
- **Day 5**, the loss of blood stops. The uterus lining begins to re-grow; an egg cell starts to mature in one of the ovaries.
- **Day 14**, the mature egg cell is released from the **ovary**. This is called **ovulation**. The egg cell travels through the **oviduct** towards the **uterus**.

If the egg cell does not meet with a sperm cell in the oviduct, the lining of the uterus begins to break down and the cycle repeats.

Y7 Science Reproduction

Fertilisation happens if the egg cell meets and joins with a sperm cell in the **oviduct**. The fertilised egg (**zygote**) attaches to the lining of the **uterus**.

The woman becomes pregnant, the lining of the uterus does not break down and menstruation does not happen

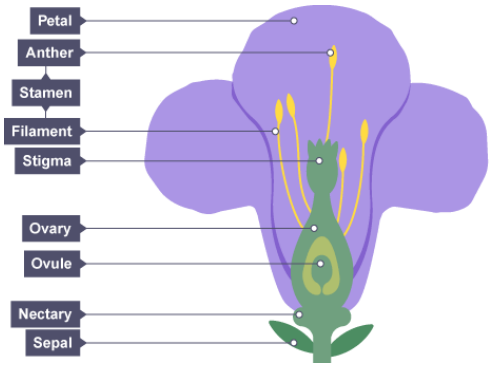
Y7 Science Reproduction

Plant reproduction
Pollen grains need to move from the **anther** of one flower to the **stigma** of another flower.

This is called **pollination**.
Plants can be **insect pollinated** or **wind pollinated**.

Structure	Function
Sepals	Protect the unopened flower
Petals	May be brightly coloured to attract insects
Stamens	The male parts of the flower (each consists of an anther held up on a filament)
Anthers	Produce male sex cells (pollen grains)
Stigma	The top of the female part of the flower which collects pollen grains
Ovary	Produces the female sex cells (contained in the ovules)
Nectary	Produce a sugary solution called **nectar**, which attracts insects

Plant fertilisation
- **Pollen grain** starts to grow when it lands on stigma;
- **Pollen tube** grows until it reaches an **ovule** inside the **ovary**;
- The **nucleus** of the pollen grain (the **male gamete**) moves along the tube and joins with nucleus of the ovule (the **female gamete**);
- the **ovules** become **seeds.**



Feature	Insect-pollinated	Wind-pollinated
Petals	Large and brightly-coloured – to attract insects	Small, often dull green or brown – no need to attract insects
Scent and nectar	Usually scented and with nectar – to attract insects	No scent or nectar – no need to attract insects
Number of pollen grains	Moderate - insects transfer pollen grains efficiently	Large amounts – most pollen grains are not transferred to another flower
Pollen grains	Sticky or spiky - sticks to insects well	Smooth and light – easily carried by the wind without clumping together
Anthers	Inside flower, stiff and firmly attached - to brush against insects	Outside flower, loose on long filaments – to release pollen grains easily
Stigma	Inside flower, sticky - pollen grains stick to it when an insect brushes past	Outside flower, feathery – form a network to catch drifting pollen grains

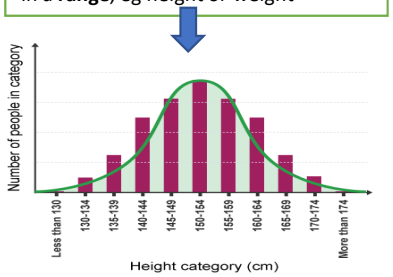
Seed dispersal
Plants compete with each other for:
- light
- water
- space
- minerals in the soil

Seeds must be **dispersed** from each other and from the parent. This reduces **competition.**

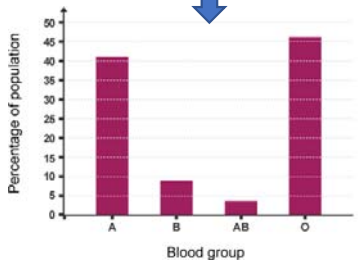
Method	Detail	Examples
Wind	Seeds have lightweight parts, wings or parachutes	Dandelion, sycamore
Animals (inside)	Brightly coloured and tasty fruits contain seeds with indigestible coats, so that the seeds pass through the animal's digestive system undamaged	Tomato, plum, raspberry, grape
Animals (outside)	Fruits have hooks that attach them to the fur of passing animals	Goose grass, burdock
Self-propelled	Have a pod that bursts open when ripe, throwing the seeds away from the plant	Pea pod

Differences between living things is called **variation**.

Continuous variation can be any **value** in a **range**, eg height or weight



Discontinuous variation has values that are one thing or another, but have no values in between.
eg blood group, gender (male or female), eye colour.



Y7 Science Chemical Reactions

The pH scale

Solutions can be **acidic**, **alkaline** or **neutral**:

- **Acidic solutions** form when **acids** dissolve in water;
- **Alkaline solutions** form when **alkalis** dissolve in water;
- Solutions that are neither acidic nor alkaline are **neutral**
- Pure water is neutral.

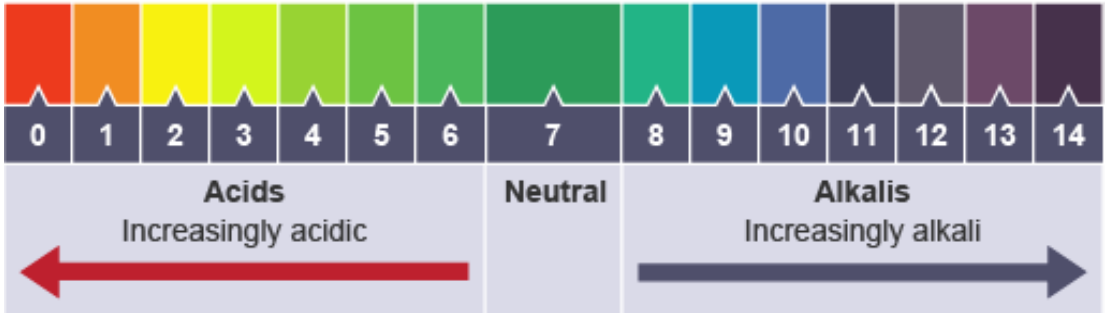
Universal indicator can tell us how strong acidic or alkaline a solution is. This is measured using the **pH scale**, which runs from pH 0 to pH 14:

- **The closer to pH 0** you go, the **more strongly acidic** it is;
- **The closer to pH 14** you go, the **more strongly alkaline** it is.

Hazard signs to be aware of when dealing with acid and alkalis:

Corrosive 

Irritant 



Naming salts

The name of a salt has two parts:

- ❖The first name comes from the **metal** in the alkali used.
- ❖The second name comes from the **acid** that was used.

From an alkali containing potassium, eg potassium hydroxide

Potassium nitrate

From the acid "NITRIC ACID"

Acid used	Second name of salt
hydrochloric acid	chloride
sulfuric acid	sulfate
nitric acid	nitrate

Y7 Science Chemical Reactions

Conservation of mass

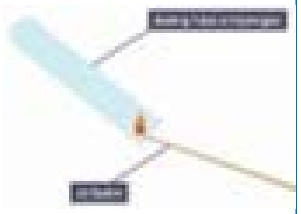
Total mass of reactants = **Total mass of products**

We say that **mass is conserved** in a chemical reaction.

Reacting metals with acids

metal + acid → metal salt + hydrogen

E.g. zinc + hydrochloric acid → zinc chloride + hydrogen



To test if **hydrogen is produced**, hold a **lit splint** to the gas and listen for it to **burn with a squeaky pop**.

Oxidation reactions

An example of an oxidation reaction is where metals react with oxygen to make metal oxides.

metal + oxygen → metal oxide

E.g. magnesium + oxygen → magnesium oxide

Another example is a combustion reaction, where we burn fuels in oxygen:

Fuel + oxygen → carbon dioxide + water

We can represent theses reactions using **WORD EQUATIONS**

The substances that react together are called the **reactants**

The substances that are formed in the reaction are called the **products**

The → shows that we are making something new

Neutralisation

When an acid reacts with an alkali (or **base**), a **neutral** salt solution is formed. This is called **neutralisation**.

acid + alkali → salt + water

eg sodium hydroxide + hydrochloric acid → sodium chloride + water

Y7 Science Energy

Different energy stores:

- **Chemical**;
- **Kinetic**;
- **Gravitational potential**;
- **Elastic potential**;
- **Magnetic**;
- **Electrostatic**;
- **Internal (or thermal)**;
- **Nuclear**

The energy laws:

1) Energy can not be destroyed or created, only transferred - this is called **conservation of energy**;
2) Energy tends to spread out and become less useful (eg hot objects always eventually cool down).

Pathways

There are 4 main **pathways** by which energy can be transferred:

- by **mechanical** work (a **force** causing an object to move);
- by **electrical** work (when charges move due to a potential difference);
- By **heating** (due to a difference in temperature);
- By **radiation** (due to electromagnetic waves, eg light or to mechanical waves, eg sound).

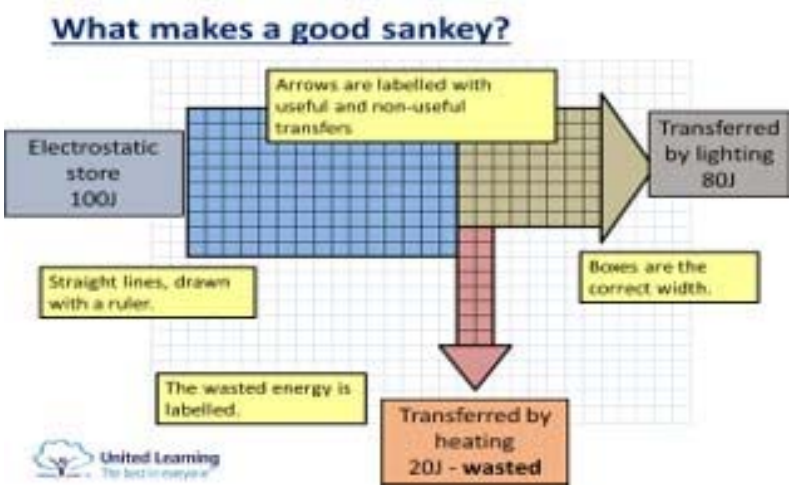
We can measure the amount of energy in a store

Units of energy:
joules (J);
kilojoules (kJ);
kilowatt-hours (kWh).

Heat transfer – there are three ways to transfer heat:
1) Conduction – heat transfer in a solid;
The solid particles are always **vibrating.**
Heat makes the particles **vibrate more**.
Because they are **touching**, the particles **collide** with the particles next to them with more energy, and this transfers the heat along.
2) Convection – heat transfer in fluids (liquids and gases);
***Particles** in a fluid gain **energy** and **move further apart**. This makes the fluid **less dense**, causing it to **rise**.*
3) Radiation – heat transfer via **infra-red (thermal) radiation** – can travel through a vacuum.

Y7 Science Energy

Total energy before transfer = total energy after transfer



Energy supplied = useful energy + wasted energy

$$\text{Efficiency (\%)} = \frac{\text{Useful Energy Transferred (Joules)}}{\text{Total Energy Supplied (Joules)}} \times 100 \text{ (\%)}$$

Power is a measure of how fast energy is being transferred.

Units of power:
watts (W);
kilowatts (kW).

Energy costs money.
To work out how much it costs you need to know:

- the amount of **units** of energy used (in **kWh** not **joules**);
- the **cost per unit** (1 unit is 1 kWh) – you will be told this

total cost (p) = number of kilowatt-hours (kWh) × cost per kilowatt-hour (p)

Power
Power is calculated by dividing energy transferred by time taken

P = E/t

P= :Power (W); E = energy (J); t = time (s)

You can work out how many units something uses if you know its power (in kW) and how long you have used it for (in hours):

number of units of energy used (kWh) = power (kW) x time (s)

Y7 Science Energy

Renewable and non-renewable resources:

1) Non-renewable energy resources cannot be replaced once they are all used up;

- ***Fossil fuels (coal, oil, gas)***
  - *releases carbon dioxide (a greenhouse gas and increases global warming). - releases sulphur dioxide and nitrogen oxides, which cause acid rain*
- ***Nuclear***
  - + nuclear fuels do not produce carbon dioxide or sulphur dioxide;
  - non-renewable energy resources. They will run out one day;
  - risk of radioactive material being released into the environment

2) Renewable energy resources can be replaced, and will not run out;

- ***Wind***
  - *+ no release of* carbon dioxide or sulphur dioxide
  - *if there is no wind, there is no electricity.*
- ***Water*** *(**wave**, **tidal** or **hydroelectric**)*
  - *+ noif there is no wind, there is no electricity.*
  - *release of* carbon dioxide or sulphur dioxide
  - *difficult for wave machines to produce large amounts of electricity.*
  - *tidal barrages destroy the habitats;*
  - *hydroelectric floods farmland and push people from their homes.*
- ***Geothermal***
  - *+ no release of* carbon dioxide or sulphur dioxide
  - *most parts of the world do not have suitable areas for geothermal*
- ***Solar***
  - *+ no release of* carbon dioxide or sulphur dioxide
  - *if there is no sunlight, there is no electricity.*