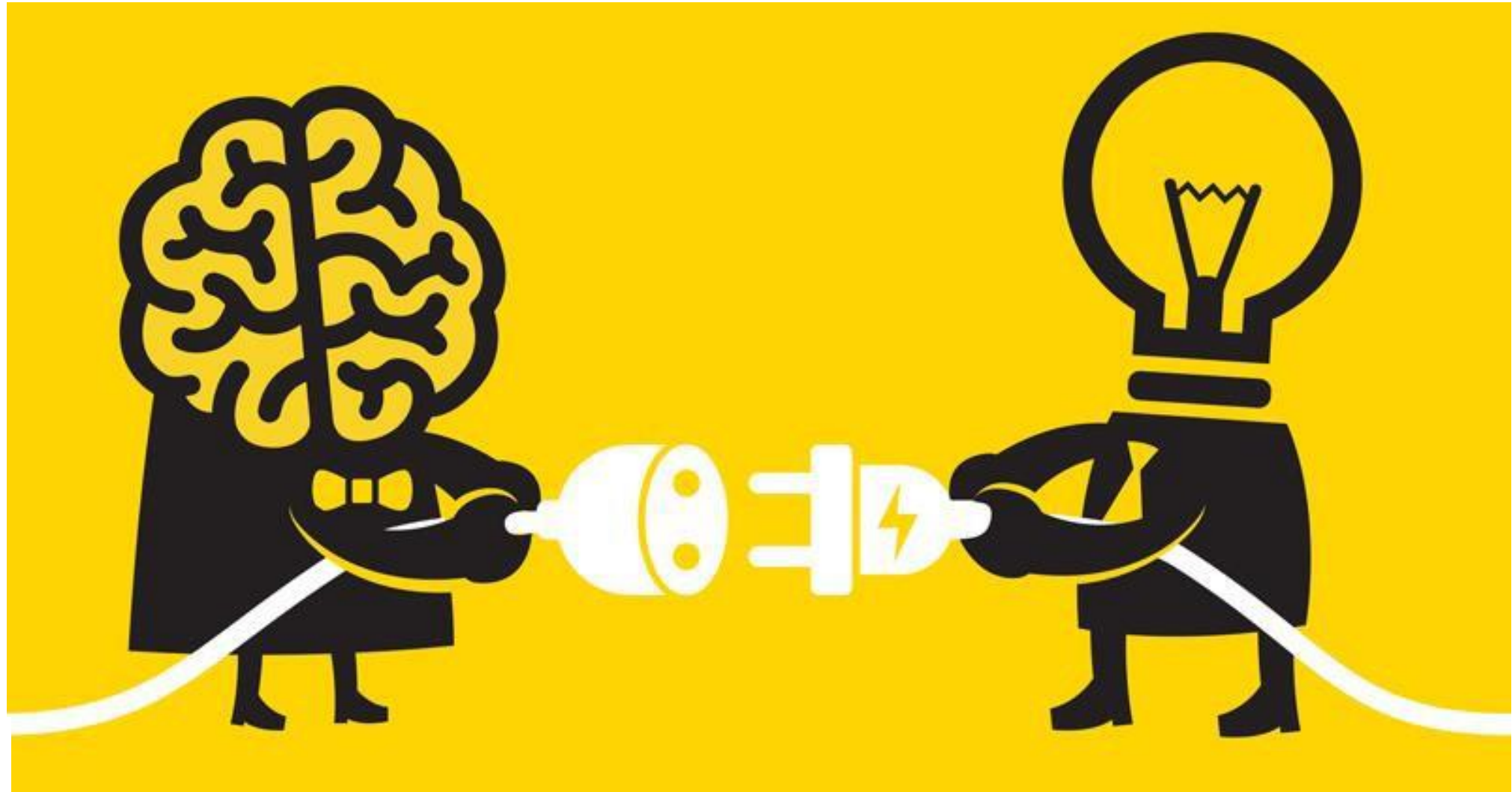


# How to: Use a knowledge organiser



**KNOWLEDGE = POWER**

# What is a knowledge organiser?

A knowledge organiser is a document, usually no more than two sides of A4, that contains key facts and information that you need to have a basic knowledge and understanding of a topic.

Most knowledge organisers will include:

- essential facts about the topic, laid out in easily digestible chunks
- key vocabulary or technical terms and their meanings
- images such as maps or diagrams
- famous quotations, if relevant.
- Homework
- Read, Watch, Listen lists

What a knowledge organiser includes will depend on the subject.



YEAR 10 — DEVELOPING ALGEBRA...  
Representing solutions of equations and inequalities

@whsto\_maths

**What do I need to be able to do?**  
By the end of this unit you should be able to:

- Form and solve equations and inequalities
- Represent and interpret solutions on a number line as inequalities
- Draw straight line graphs and find solutions to equations
- Form and solve equations and inequalities with unknowns on both sides

**Keywords**

**Solution:** a value we can put in place of a variable that makes the equation true  
**Variable:** a symbol for a number we don't know yet  
**Equation:** an equation says that two things are equal — it will have an equals sign =  
**Expression:** numbers, symbols and operators grouped together to show the value of something  
**Identify:** An equation where both sides have variables that cause the same answer includes ≡  
**Linear:** an equation or function that is the equation of a straight line  
**Intersection:** the point that two lines meet  
**Inequality:** an inequality compares two values showing if one is greater than, less than or equal to another

**Solve equations** **R**

$3(2x + 4) = 30$

Expand the brackets

$6x + 12 = 30$

$6x = 18$

$x = 3$

Substitute to check your answer  
The code is negative or a fraction or decimal

**Form and solve inequalities** **R**

Two more than twice my number is greater than 11

**Form**

$x \rightarrow x + 3 \rightarrow -2 \rightarrow \parallel$

$3x + 2 > 11$

**Solve**

$x \leftarrow -3 \leftarrow -2 \leftarrow \parallel$

$x > 5$

**Solutions on a number line**

$x < 1$     $x \leq 1$     $x > 1$     $x \geq 1$

Both represent values less than 1

Includes the value 1

Both represent values more than 1

Includes the value 1

Includes the value 4 etc above

Does NOT include the value 4 etc above

Values less than or equal to 3 but also more than -1

$-1 < x \leq 3$

This includes the integer values 0, 1, 2, 3

**Plotting straight line graphs** **R**

$y = 3x - 1$

3 is the x coordinate then -1

Draw a table to display this information

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

You only need two points to form a straight line.

Plotting more points helps you check if your calculations are correct. If they do make a straight line.

Remember to join the points to make a line.

**Find solutions graphically**

For linear equations there is only one point the graphs meet, the x value.

These two lines all cross at (2, 4) because they are all in one place they are parallel to axes and meet in one place.

$x = 2$   
 $y = 4$

Remember equation of a line format is  $y = mx + c$

The solution is the point the two lines meet.

**Equations unknown on both sides** **R**

$8x + 5 = 4x + 13$

$8x + 5 = 4x + 13$

$-4x = -8$

$4x + 5 = 13$

$-5 = -8$

$4x = 8$

$x = 2$

**Inequalities unknown on both sides**

$8x + 5 \leq 4x + 13$

$x \leq 2$

Any value 2 or less will satisfy the inequality

# How are knowledge organisers used?

- At St Cuthbert's, every subject has designed a knowledge organiser (or equivalent) for each term or unit of work.
- They are used in lessons for retrieval quizzes / self testing.
- They are used in your homework and retrieval practice for assessments.
- They are used at home for remote learning tasks

**PIXL**  
Progress in Learning

**Crude oil hydrocarbons and alkanes**

Crude oil	A finite resource	Consisting mainly of plankton that was buried in the mud, crude oil is the remains of ancient biomass.
Hydrocarbons	These make up the majority of the compounds in crude oil	These compounds are made up of hydrogen and carbon only.
General formula for alkanes	$C_nH_{2n+2}$	For example: $C_1H_4$ $C_6H_{14}$

Display formula for first four alkanes

Methane ( $CH_4$ )

Ethane ( $C_2H_6$ )

Propane ( $C_3H_8$ )

Butane ( $C_4H_{10}$ )

**Carbon compounds as fuels and feedstock**

**Fractions**

The hydrocarbons in crude oil can be split into fractions

**Using fractions**

Fractions can be processed to produce fuels and feedstock for petrochemical industry

We depend on many of these fuels; petrol, diesel and kerosene.

Many useful materials are made by the petrochemical industry; solvents, lubricants and polymers.

**EDEXCEL TOPIC 8: Fuels and Earth Science**

**Fuels**

**Cracking**

The breaking down of long chain hydrocarbons into smaller, more useful chains

The smaller chains are more useful. Cracking can be done by various methods including catalytic cracking and steam cracking.

**Sulfur dioxide**

Released from burning hydrocarbons with sulfur impurities in

Sulfur dioxide dissolves in rain water to form acid rain. This damages plant life and can make water habitats acidic. Acid rain can also erode limestone and sandstone structures.

**Oxides of nitrogen**

Oxygen and nitrogen react under high temperatures to form these

As pollutants, oxides of nitrogen can damage the ozone layer and are also classified as greenhouse gases. Can cause respiratory problems.

**Hydrogen fuel**

Hydrogen reacts with oxygen in the engine to power the vehicle

**Advantages:**

- Water is the product
- No greenhouse gases released
- Renewable

**Disadvantages:**

- Expensive to buy
- Difficult to re-fuel

**Fossil fuels**

Crude oil, natural gas and coal

Petrol, kerosene and diesel oil are non-renewable. Methane is found in natural gas and is also non-renewable.

**Incomplete combustion issues**

Carbon monoxide is an odourless, toxic gas that can kill

Soot (carbon) is also produced that builds up in the atmosphere and can cause global dimming. This reduces the amount of sunlight that reaches the Earth and can alter rainfall patterns.

**Fractional distillation and petrochemicals**

Hydrocarbon chains in crude oil come in lots of different lengths.

The boiling point of the chain depends on its length. During fractional distillation, they boil and separate at different temperatures due to this.

**Complete combustion of methane:**  
 $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$

**Boiling point (temperature at which liquid boils)**

As the hydrocarbon chain length increases, boiling point increases.

**Viscosity (how easily it flows)**

As the hydrocarbon chain length increases, viscosity increases.

**Flammability**

As the hydrocarbon chain length increases, flammability decreases.

**Crude Oil**

20°C: Butane & Propane  
 30°C: Petrol  
 150°C: Kerosene  
 200°C: Diesel  
 300°C: Fuel Oil  
 370°C: Lubricating oil, Paraffin Wax, Asphalt  
 600°C: The oil is treated in a furnace

**Combustion**

During the complete combustion of hydrocarbons, the carbon and hydrogen in the fuels are oxidised, releasing carbon dioxide, water and energy.

**Incomplete combustion**

During the incomplete combustion of hydrocarbons, there is not enough oxygen available for complete combustion. The products of the reaction is carbon monoxide, carbon and water.

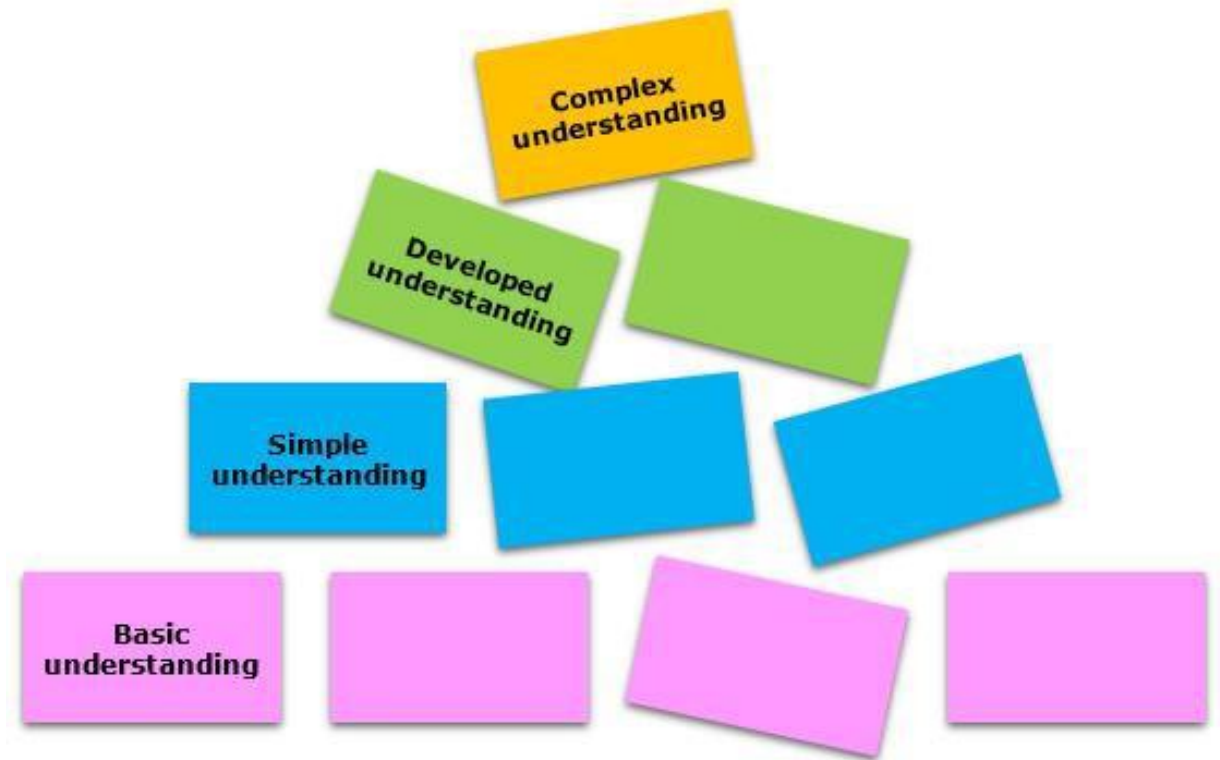
better scope - brighter future

To get the most out of the Knowledge Organiser, sections should be learnt and then self-tested. The sections should not just simply be copied out!



# Why are knowledge organisers important?

- In order to flourish, you need to build your knowledge carefully and systematically.
- Think of learning like building a wall: every new thing you learn build on something you already know.
- If the knowledge isn't secure before you move on, it is really hard to build that stable knowledge and understanding that ultimately leads to success.



**Knowledge organisers help to ensure that the bottom row – the knowledge that we need to have a good, basic understanding of each subject – is solid.**

# Why are knowledge organisers important?

- To quiz yourself in lessons and at home
- To practise spelling key vocabulary
- To further research people, events and processes most relevant to the unit
- As a way to trigger memories from lessons about key information

**Physical Landscapes in the UK - River Landscapes**

**Water Cycle Key Terms**

Precipitation	Moisture falling from clouds as rain, snow or hail.
Interception	Vegetation prevents water reaching the ground.
Surface Runoff	Water flowing over the surface of the land into rivers.
Infiltration	Water absorbed into the soil from the ground.
Transpiration	Water lost through leaves of plants.

**Physical and Human Causes of Flooding.**

<b>Physical. Prolong &amp; heavy rainfall</b> Long periods of rain causes soil to become saturated leading runoff.	<b>Physical. Geology</b> Impermeable rocks causes surface runoff to increase river discharge.
<b>Physical. Relief</b> Steep-sided valleys channels water to flow quickly into rivers causing greater discharge.	<b>Human. Land Use</b> Tarmac and concrete are impermeable. This prevents infiltration & causes surface runoff. Building on a floodplain

**Case Study: The River Tees**

**Location and Background**  
Located in the North of England and flows 137km from the Pennines to the North Sea.

**Geomorph Processes**  
**Upper** – Features include V-Shaped valley, rapids and waterfalls. Highforce Waterfall located close to Forest-in-Teesdale drops 21m and is made from harder Whinstone and softer limestone rocks.  
**Middle** – Features include meanders and oxbow lakes. The meander near Yarm encloses the town.  
**Lower** – Greater lateral erosion creates features such as floodplains & levees near Darlington. Mudflats at the river's estuary.

**Hydrographs and River Discharge**

**River discharge is the volume of water that flows in a river. Hydrographs who discharge at a certain point in a river changes over time in relation to rainfall**

1. **Peak discharge** is the discharge in a period of time.
2. **Lag time** is the delay between peak rainfall and peak discharge.
3. **Rising limb** is the increase in river discharge.
4. **Falling limb** is the decrease in river discharge to normal level.

**Factors affecting hydrographs**

- \*Basin size – small flashy
- \*Drainage density – high = flashy
- \*Rock type – impermeable = flashy
- \*Land Use – urbanisation = flashy
- \*Relief – steep = flashy
- \*Soil moisture – saturated = flashy
- \*Rainfall intensity – high = flashy.
- opposite characteristics & precipitation = SUBDUED

**Upper Course of a River**

Near the source, the river flows over steep gradient from the hill/mountains. This gives the river a lot of energy, so it will erode the riverbed vertically to form narrow valleys.

**Formation of a Waterfall**

- 1) River flows over alternative types of rocks.
- 2) River erodes soft rock faster creating a step, pool beneath.
- 3) Further hydraulic action and abrasion form a plunge pool.
- 4) Hard rock above is undercut leaving cap rock which collapses providing more material for erosion.
- 5) Waterfall retreats leaving steep sided gorge.

**Middle Course of a River**

Here the gradient get gentler, so the water has less energy and moves more slowly. The river will begin to erode laterally making the river wider.

**Formation of Ox-bow Lakes**

- Step 1**  
Erosion of outer bank forms river cliff. Deposition inner bank forms slip off slope.
- Step 2**  
Further hydraulic action and abrasion of outer banks, neck gets smaller.
- Step 3**  
Erosion breaks through neck, so river takes the fastest route, redirecting flow.
- Step 4**  
Evaporation and deposition cuts off main channel leaving an oxbow lake.

**Lower Course of a River**

Near the river's mouth, the river widens further and becomes flatter. Material transported is deposited.

**Formation of Floodplains and levees**

When a river floods, fine silt/alluvium is deposited on the valley floor. Closer to the river's banks, the heavier materials build up to form natural levees. Nutrient rich soil makes it ideal for farming. Flat land for building houses.

**Soft Engineering**

- Floodplain zoning-restrict land use to certain locations
- River restoration – return river to original course eg River Quaggy
- Demountable Flood Barriers put in place when warning raised. Eg Bewdley
- Managed Flooding – naturally let areas flood, protect settlements. Eg Banbury

**Case Study – Managing Floods at Boscastle**

**Why require**

1. Loss of trees.
2. Topography of the land – the landscape directing vast volumes of water into the village.
3. The valley sides are steep sided.
4. Narrow river channels in the village itself.
5. Impermeable rock

**Hard Engineering**

- Dams and reservoirs – regulate river flow eg Rutland
- Straightening Channel – increases velocity to remove flood water.
- Artificial Levees – heighten river so flood water is contained.
- Flood relief channel – man made channel to by-pass an urban area eg Jubilee River

**Management Strategy – 2012**

1. New flood wall
2. Removal of bridges/ making stronger
3. Raising the carpark deeper.
4. River channel being made wider and down stream
5. New drains channelling water further

**Social, Economic and Environmental Issues**

**Social** – Quality of life improved for the local people, reduction in anxiety through fear of flooding.

**Economic** – A £4.6m scheme to improve flood defences Donors – Environment Agency, North Cornwall District Council, The National Trust. Shops remained open as usual.

**Environmental** – Land use zoning. Clearing vegetation from the river banks – active maintenance every summer.



# How can I use my knowledge organiser?

1. Look, Cover, Write, Repeat

[https://www.youtube.com/watch?v=CHyUYx\\_2v84](https://www.youtube.com/watch?v=CHyUYx_2v84)

2. Word up

<https://www.youtube.com/watch?v=HqIS4irrD7k>

3. Flashcards

<https://www.youtube.com/watch?v=6VKnDZmj8js>

4. Mind Maps

<https://www.youtube.com/watch?v=gBuo6RFtPvc>



# What can you do?

- ✓ Make sure you have a knowledge organiser for every subject for each term.
- ✓ Keep them safe
- ✓ Use them regularly at home using the four methods suggested
- ✓ Ask your teachers to regularly test your knowledge.

