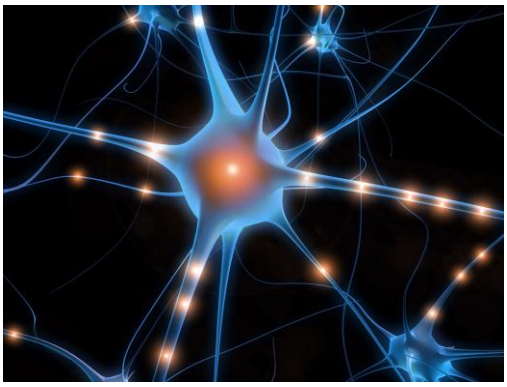
The Biology Behind Learning

Clench your 2 fists and hold them next to each other – this is about the size of your brain.



Scientists believe it contains more than one hundred billion nerve cells.
You learn by making connections between these cells.
If these connections aren't kept active they disappear – this is why it is important to keep re-enforcing them i.e. re-learning information

It is therefore important to look after your brain:

- Get plenty of exercise
- Eat a healthy diet
- Avoid additives
- Drink plenty of water
- Think positively
- Find time to relax
- Get enough sleep

Creating a productive work space

Here is a tick list, please fill in with a ✓ if you feel that you have already completed the task.
Set yourself weekly targets to complete these tasks in stages; you could use your planner to list tasks to do over the next few weeks. Keep going until the table is completed.

TASK	COMPLETE
Clear your desk so that you have a good work space	
Ensure that your desk is well lit	
Make sure you have a comfortable seat that gives you good support	
Buy a desk tidy	
Stock up with pens, pencils and coloured pencils	
Buy a pack of highlighter pens	
Buy a long ruler, protractor, compass, eraser, pencil sharpener, hole-punch	
Buy some post it notes	
Buy some white cards for summarising	
Buy some A3 paper for mind maps	
Stock up with A4 graph, plain and lined paper	
Buy some coloured stickers: it can be useful to colour code books by subject (timetables can also be colour coded by subject)	

The Night Before A Test

The table below contains a list of activities.

It includes things that you should, and things that you should not, do the night before a test.

In the 1st column, tick the things that are currently happening the night before a test.

In the last column, tick the things that you think would lead to a good performance in the test the next day.

(See next page for the answers)

What I currently do		What I should do
	Cram until the early hours of the morning	
	Try to learn a new topic	
	Have a bath	
	Listen to some relaxing music	
	Stay up late to watch a film on the TV	
	Do deep breathing exercises	
	Stop work an hour before bedtime	
	Eat dinner late to give plenty of time to revise before dinner	
	Pack bag before going to bed	

Can you make a list below of things that you should do on the **morning** of the test:

The Night Before A Test –some answers

		What I should do
	Cram until the early hours of the morning	No – you need to sleep!
	Try to learn a new topic	No – you'll panic and little info will be retained
	Have a bath	Yes – this will be relaxing and ensure a good night's sleep.
	Listen to some relaxing music	Yes – again, this will relax you. Without words would be best.
	Stay up late to watch a film on the TV	No
	Do deep breathing exercises	Yes – more oxygen to the brain and relaxing.
	Stop work an hour before bedtime	Yes – gives you time to do the above!
	Eat dinner late to give plenty of time to revise before dinner	No – a full stomach may hinder sleep.
	Pack bag before going to bed	Yes – you won't get stressed in the morning and you can have an extra 5 mins in bed.

Things that you should do on the **morning** of the test (I am sure that you know these, but some ideas anyway):

Allow plenty of time to get dressed and have breakfast.
Have a shower to wake you up.
Eat a good breakfast including a piece of fruit (brain food) and plenty of water.
Walk to school if possible.
If you can't walk to school, at least get some fresh air.
Glance through summary notes but don't try to do too much.

Beating the memory dip

During a revision session you will all have experienced a memory dip or drifting point – a time when you find your mind wandering and thinking of more enjoyable activities than revision!

You remember best at the beginning and at the end of a learning session.

Therefore, if you create more beginnings and ends i.e. by having shorter revision sessions (20-30mins) with regular 5min breaks, you should remember more information.

Below is a list of activities you could do in your breaks.

Highlight the activities that you think would be good for a 5min break. Explain your answer next to the activity.

(*The answers are on the next page)*

Listening to your favourite music

Reading a book

Playing on the computer

Eating a piece of fruit

Having a drink of water

Taking a short walk

Watching TV

Juggling

Phoning a friend for a chat

Skipping

Beating the memory dip answers:

Listening to your favourite music – **good** as puts in positive mood

Reading a book – **bad** as new information entering brain in same way clashes with what you're trying to learn

Playing on the computer – **bad** as above and also how often do you stay on computer for just 5 mins?

Eating a piece of fruit – **good** as gives brain energy

Having a drink of water – **good** as prevents dehydration and stops you from feeling tired

Taking a short walk – **good**, exercise sends more O_2 to brain

Watching TV – **bad**, as unlikely to be for 5mins

Juggling – **good**, this is supposed to get both hemispheres of the brain working well together

Phoning a friend for a chat – **bad**, unless you can keep to just 5mins

Skipping – **good**, as exercise sends more O_2 to brain

Some key exam words

ANALYSE	Break down the information into smaller pieces, examine in great detail in order to understand it better or discover more about it.
COMPARE	Examine similarities and differences
CONTRAST	Explain the key points of difference.
DESCRIBE	Provide a detailed account, including significant characteristics that tell a story about the issue in question. If describing a table or graph: state trends and quote figures.
DISCUSS	Present opposing arguments, analyse advantages and disadvantages, present pros and cons.
EXPLAIN	State reasons for something, or how and why something occurred.
SUMMARISE	Present the main points in a concise manner.
STATE	Recall and write a fact.
IDENTIFY	Give the name.
SUGGEST	Work out the answer based on knowledge and understanding of the material you have been taught.

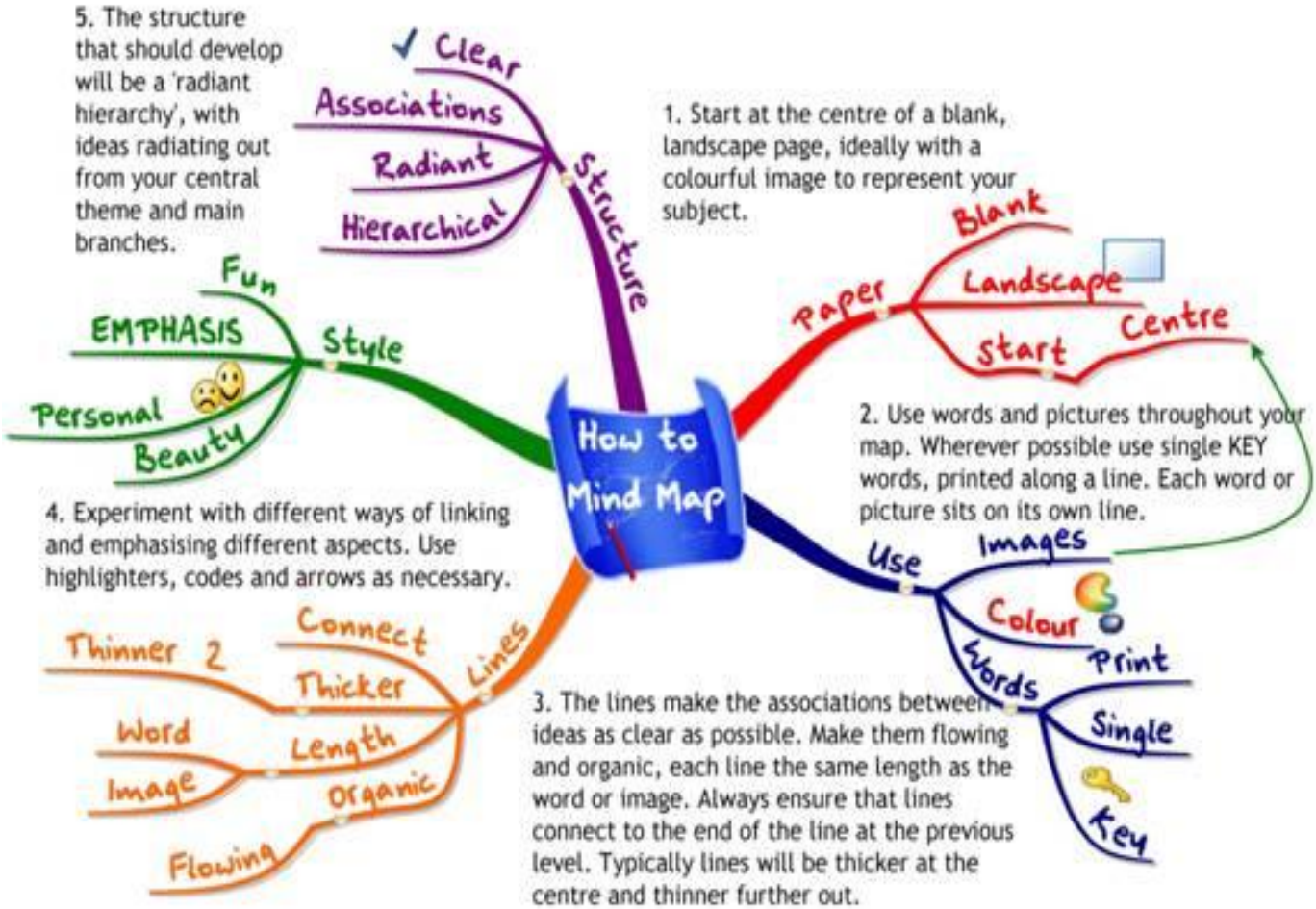
Mind mapping

Mind mapping involves writing down a central idea and thinking up related ideas which radiate out from the centre. The idea of mind mapping is to think creatively and in a non-linear manner.

By focussing on key ideas written down in your own words, and then looking for branches out and connections between the ideas, you are mapping knowledge in a manner which will **help you understand and remember new information**.

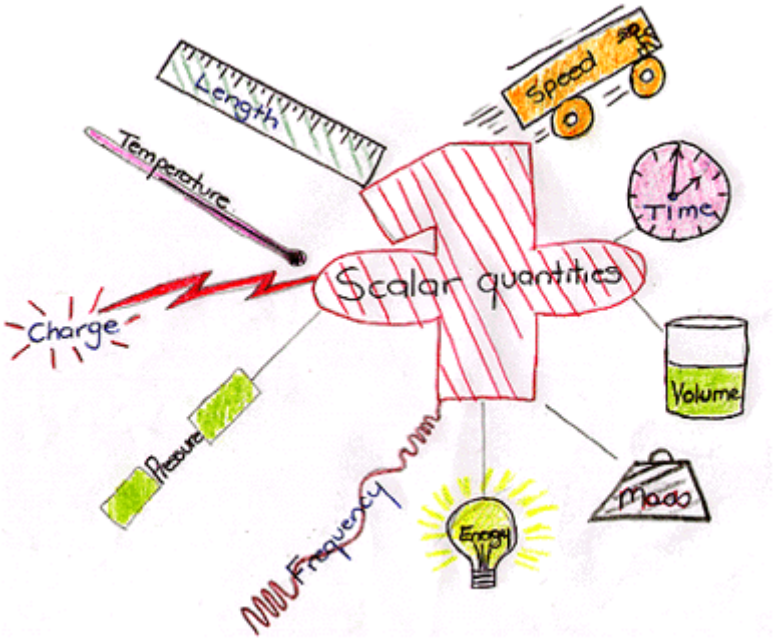
By **personalising the map with your own symbols and designs** you will be constructing visual and meaningful relationships between ideas which will **assist in your recall and understanding.**

Have a look at the figure below and read through 1 to 5.



(Source: Get Ahead by Vanda North with Tony Buzan)

Sample Mind Map – showing the key sections of the topic Scalar Quantities



Source: http://www.jcu.edu.au/tldinfo/learningskills/mindmap/samplelecture.html

Some of the most useful mind maps are those which are added to over a period of time.

After the initial drawing of the mind map you may wish to highlight things, add information from other sources, or add questions for the duration of a subject right up until exam time.

For this reason it is a good idea to use A3 paper and don't try to occupy all the space on your first attempt.

Suggested activities:

1. Try to construct a mind map for your favourite TV programme/ play etc.
2. Below is some information about specialised cells. Using an A3 sheet create your own personalised mind map.

Cells are designed to do a particular job in an organism. For example, a sperm cell is designed to fertilise an egg. It is very small and has a tail which provides movement so it can swim and find an egg to fertilise. Its head contains enzymes which allow it to digest its way through an egg membrane so that fertilisation can take place. It carries genetic information from the father. A palisade cell is a leaf cell, designed specifically for photosynthesis. It is rectangular with a large surface area to capture all the light. It's found on the top side of a leaf, ideal for the maximum absorption of light; light being needed for photosynthesis. It is packed with chloroplasts, which contain the green pigment chlorophyll, which is needed to capture the light energy. A ciliated cell can be found in the air passages in your lungs. It has tiny hairs, which filter the air as it blows through. The hairs sweep mucus (snot) with trapped dust and bacteria up to the back of the throat where it is swallowed. The root hair cell, found in the roots of a plant is designed for absorbing water and minerals. The root hair cell has an extended membrane to increase its surface area; this increases the absorption of water and minerals. It also has a really thin cell wall, which makes it easier for minerals to pass across into the root itself.

Mnemonic devices: Story lines

A compelling story line, however off the wall, can help you to remember the facts you're trying to learn.
Whether you wish to learn a set of directions, a recipe, the events during an historical event or the members of the cabinet, imposing a story line over what you wish to learn is a wonderfully simple way of binding the ideas together in a way that allows easy and enjoyable recollection.

Read the paragraph below, which recounts a brief and chaotic story. Your aim is to <u>simply understand</u> what happens:

"A man called Nigel is sat next to his enormous 300lb pet squid as they travel around in the back of his lime-green limo. They're arguing over what to watch on the limo's TV: Coronation Street or Sesame Street. It soon turns into a fight, which the squid wins by using its eight limbs to empty eight pepper grinders on to Nigel's head. Nigel leaps from the car in terror and runs away towards the sea, cleverly heading through a thick yellow field of rapeseed to stop the squid from following. On reaching the beach, he meets Prince Harry, who is celebrating his 25th birthday. Prince Harry persuades Nigel to help him confront two Gallic dancers who have eaten a beautiful "she-swan". After the attack, Nigel jumps into the sea and swims out towards the Lady of Shallot, who is bobbing up and down in a boat made from a giant orange pepper. She invites him on board and they fall in love."

It will have taken you about a minute to read through this. The next step is to see how much of the story you can recall.

1 Close your eyes and repeat the story as well as you can in your head

2 When you're done, open your eyes and tick off all the items you have successfully recalled in the table below

STORY ELEMENT	√	
300lb squid		
Lime-green limo		
Coronation Street		
Sesame Street		
Eight pepper grinders		
Rapeseed field		
Prince Harry, aged 25		
Two Gallic dancers		
She swan		
The sea		
Lady of Shalott		
Orange pepper boat		

Now, you'll perhaps be wondering what the point of remembering a random list of objects like this may be.

But I can reveal that the story you've learned is not at all random, but in fact encodes the ingredients for a Nigel Slater recipe.

The 300lb squid represents 300g of squid;
the lime-green limo is a lime;
Coronation Street stands for coriander;
Sesame Street for sesame oil;
eight pepper grinders for eight crushed peppercorns;
the rapeseed field for rapeseed oil;
Prince Harry celebrating his birthday for 25g of ginger;
two Gallic dancers for two cloves of garlic;
the "she-swan" for Szechuan pepper;
the sea for salt;
the Lady of Shalott for shallots;
the orange pepper boat for one large orange pepper.

Have another look over these connections; then re-read the original story.

Cover up the ingredients list above.
Your next task is to fill in the 'ingredient' column of the table below from memory with the ingredients that correspond to each element in the story.

STORY ELEMENT	√	INGREDIENT
300lb squid		
Lime-green limo		
Coronation Street		
Sesame Street		
Eight pepper grinders		
Rapeseed field		
Prince Harry, aged 25		
Two Gallic dancers		
She swan		
The sea		
Lady of Shalott		
Orange pepper boat		

Finally, find time tomorrow to see if you can write the ingredients list by just running through Nigel's adventure in your head.

Good Listening in Class

It is important for you to be a good listener in class. Some of what you will have to learn will be presented verbally by your teachers. Just hearing what your teachers say is not the same as listening to what they say.

Listening is a cognitive act that requires you to pay attention, think about what's being said and mentally process what you hear.

Here are some things you should do to be a good listener in class:

Be ready to Listen - Prepared
Make sure you complete all homework tasks on time. Review your notes from previous class sessions. Think about what you know about the topic that will be covered in class that day. Check that you've understood work covered in previous lessons.

Listen with a Purpose.
Identify what you expect and hope to learn from the class session – the learning outcomes. Listen for these things as your teacher talks.

Be an Active Listener.
Be **attentive** – focus on what your teacher says (maintain eye contact) and listen to the contributions of your fellow pupils. Try not to daydream.
Ask questions – to further your understanding and to show your enthusiasm.

Listen with an Open Mind.
Be curious! It is good to question what is said as long as you remain open to points of view other than your own.

Meet the Challenge. Don't give up and stop listening when you find the information being presented difficult to understand. Listen even more carefully at these times!

Triumph over the Environment. The classroom may be too noisy, too hot, too cold, too bright, or too dark. Don't give in to these inconveniences. Stay focused on the big picture - LEARNING.

If the 'should do' list does not match what you are currently doing – highlight areas to work on.

Now – see if you can make a short mnemonic to use as a checklist to make sure that you are ready to listen in all your classes!

Examples of mnemonics:

MRS GREN for remembering the characteristics of living things.
Richard Of York Gave Battle In Vain for remembering the colours of a rainbow.

One idea is at the bottom of the page - try not to look until you've had a go!

APPrOACh
A = attentive; P = purpose; Pr = prepared; O = Open-minded; A = Asks questions; Ch = Challenge