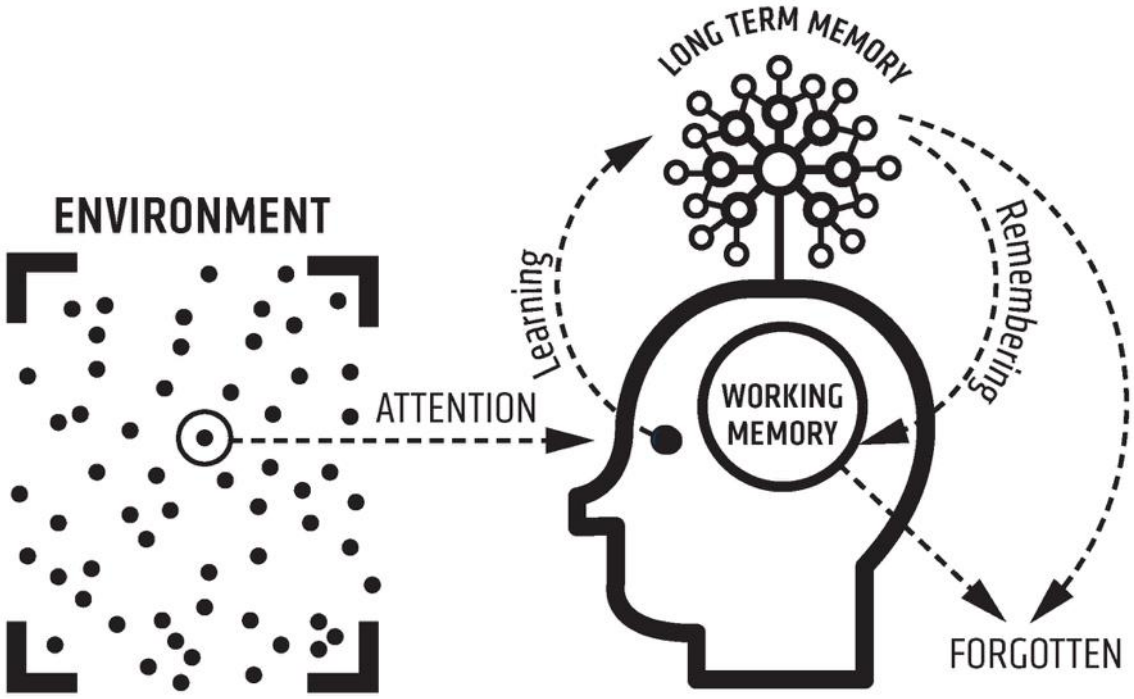
Wirral Grammar School for Girls

Revisi strategies handbook

Understand the science of learning to help you to retain and recall information!

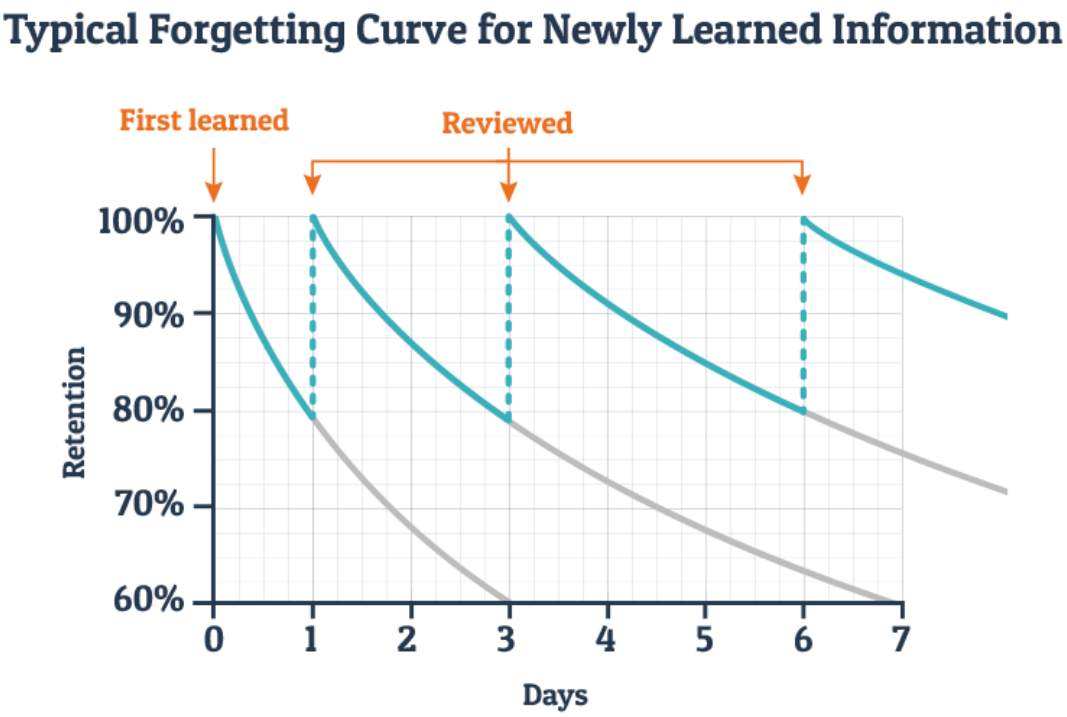
MEMORY – THE SCIENCE OF LEARNING

In recent years, there has been lots of research around the science of learning and how we learn and retain information.



1. We have a certain amount of attention to pay and this can be limited and can dramatically vary depending on the individual or the environment. In the diagram above, '**attention**' means we acknowledge new information and this is then transferred into our working memory.
2. Our **working memory** is where you do your thinking and where you take in new information. It is finite and we can only absorb a limited amount of information at a given time otherwise it gets crowded (research suggests we can hold 5 things in our working memory at one time). This may be up to 30 seconds. *As an example, if you write down a 'long number' and try and remember it every 30 seconds, you will be surprised how difficult this is to do!*
3. Information is processed into our **long-term memory** through '**learning**'. This long-term memory is effectively unlimited, and we can retrieve information from here back into our working memory as needed in a given moment. When we remember something, it comes from here. *As an example, this might be your phone number or address. We don't walk around thinking about those two things every second of the day but it is in our long-term memory ready to be used and retrieved when needed.* However, if we don't use the information it fades (is forgotten). **Learning is therefore a change in your long-term memory.** Whatever you think about, that's what you remember. Therefore, revision activities must require you to think hard.
4. Information in our **long-term memory** is interconnected and linked with prior knowledge. Anything that is not connected or not successfully stored well enough in our long-term memory is forgotten and this is completely natural.
5. If students undertake enough **retrieval practice**, generating the information in our long-term memory, it increases a level of fluency within the subject. Practice makes perfect!

Forgetting is completely natural. Research has shown that over time you forget a majority of what you've learnt and it happens immediately. The following diagram outlines this process and is called the Ebbinghaus Forgetting Curve (1885).



Ebbinghaus proposed that humans start losing 'memory of knowledge' over time unless the knowledge is consciously reviewed time and time again. He conducted a series of tests on himself which included the memorization of a meaningless set of words. He tested himself consistently across a period of time to see if he could retain the information. He found that:

- Memory retention is 100% at the time of learning any particular piece of information (in the moment). However, this drops to 60% after three days.
- A range of factors affect the rate of forgetting including motivation, the meaningful nature of the information, the strategies for revision and also psychological factors (sleep for example).
- If each day, repetition of learning occurs and students take time to repeat information then the effects of forgetting are decreased. According to research, information should be repeated within the first 24 hours of learning to reduce the rate of memory loss.

Practice and retrieval help to break this 'forgetting curve' as it strengthens the long-term memory and stops information from fading.

In summary, what do we know about **memory**?

- Consistent practice and revisiting previous material strengthen memory and boosts learning.
- Our working memory is finite and limited and so overloading this or cramming for revision doesn't work.
- Information, if not revisited, is 'lost' from our memory.

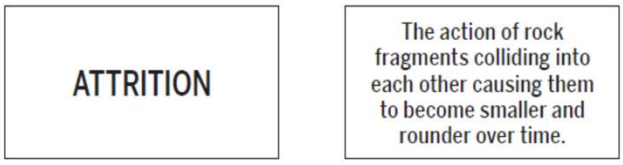
THE KEY PRINCIPLES OF EFFECTIVE REVISION

RETRIEVAL PRACTICE - FLASHCARDS

Simply put, recalling information from memory is simple and powerful. Retrieval practice is a learning strategy which makes you think hard and brings information to mind. It is the action of actively retrieving knowledge that boosts learning and strengthens memory. It means trying to remember previously learned information as opposed to simply re-reading it. It builds confidence over time and allows you to identify gaps in your knowledge. Examples include:

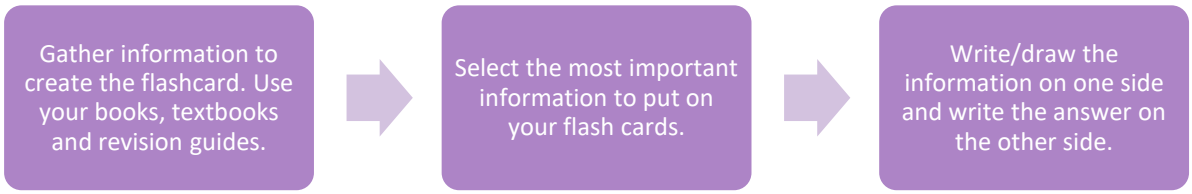
- Knowledge quizzing, low stakes testing and multiple-choice tests.
- Completing past paper questions or practice answers.
- Answering verbal questions asked by teacher/peers/parents.
- Summarising, creating flashcards or revision materials where you can 'test' yourself.

One particularly effective strategy is the creation and use of **flashcards**. Flashcards are generally a card containing a small amount of information on either side as an aid to learning. The use of flashcards is for low stakes testing to improve recall and to strengthen memory.



An effective flashcard may include the following (*in each subject they will be used in a different way*):

- A key term/key word with definition on the back.
- A key date with the event on the back.
- A key equation with its use in practice on the back.
- A past paper question/plan and a model answer on the back.

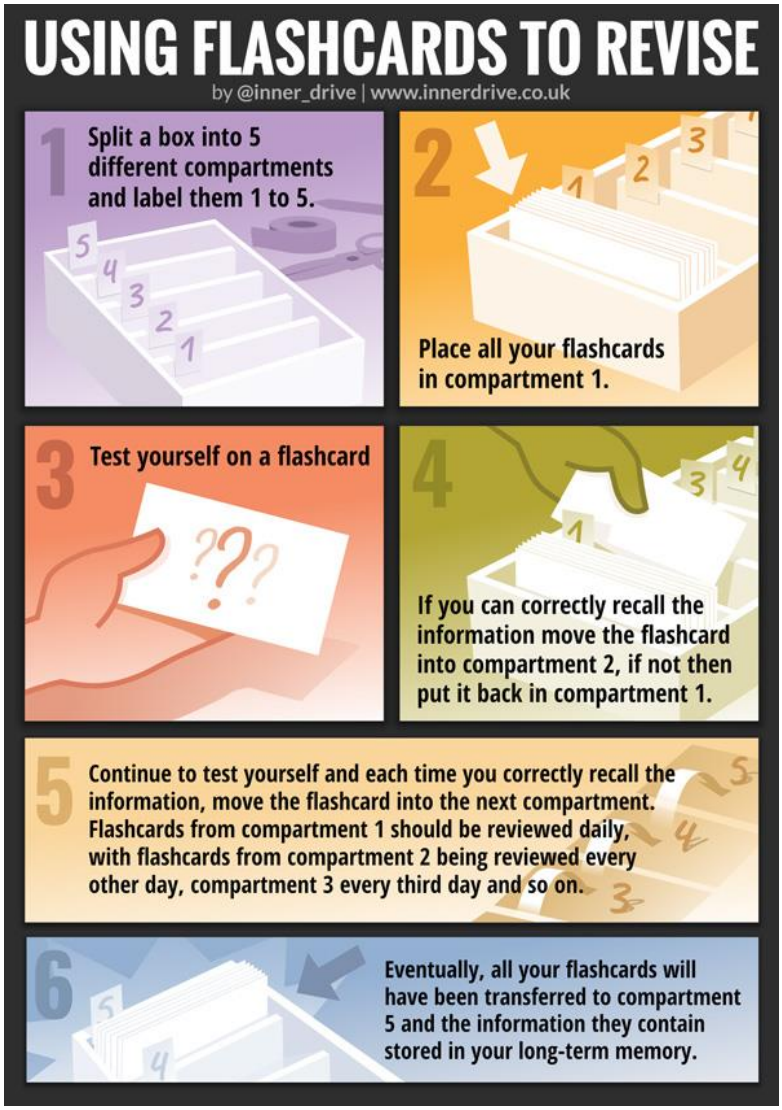


In order to use flashcards most effectively, the **Leitner System** is a desired strategy for spaced testing. Once you have created a set of flashcards, create three boxes/areas marked as the following.

BOX 1:	BOX 2:	BOX 3:
Every day	Twice a week	Once a week

- Test yourself on the flashcards in the Box 1 pile. If you get the answer correct on the flashcard, move it to the Box 2 pile. If you get it incorrect, it stays in Box 1.
- Twice a week, test yourself on the flashcards in Box 2. If you get the answer correct on the flashcard, move it to the Box 3 pile. If you get it incorrect, it stays in Box 2. The aim is to get all of the flashcards to Box 3.

Retrieval and Flashcards 'Do':	*Retrieval* and Flashcards 'Don't':
• Put a single piece of information on each flashcard. • Sort your flashcards according to your confidence with them (see above). • Create 'decks' for each topic. This may be a different colour card for each subject/unit. • Mix up topics so you aren't always testing yourself on the same topic. • *Practice the information you struggle and need to improve on.* • *Use PLCs, checklists or revision guides as a way to monitor your retrieval practice.* • *Move beyond recalling simple facts to detail and analysis.*	• Spend more time making the flashcards than using them. • Put lots of information onto each flashcard. • Revise the flashcards in the same order every time that you use them. • Only read the flashcards – test your memory! • *Assume everything you've written is correct.* • *Throw away your quizzes or brain dumps.* • *Avoid testing yourself on tough topics or ones you dislike. You want it to be difficult.*

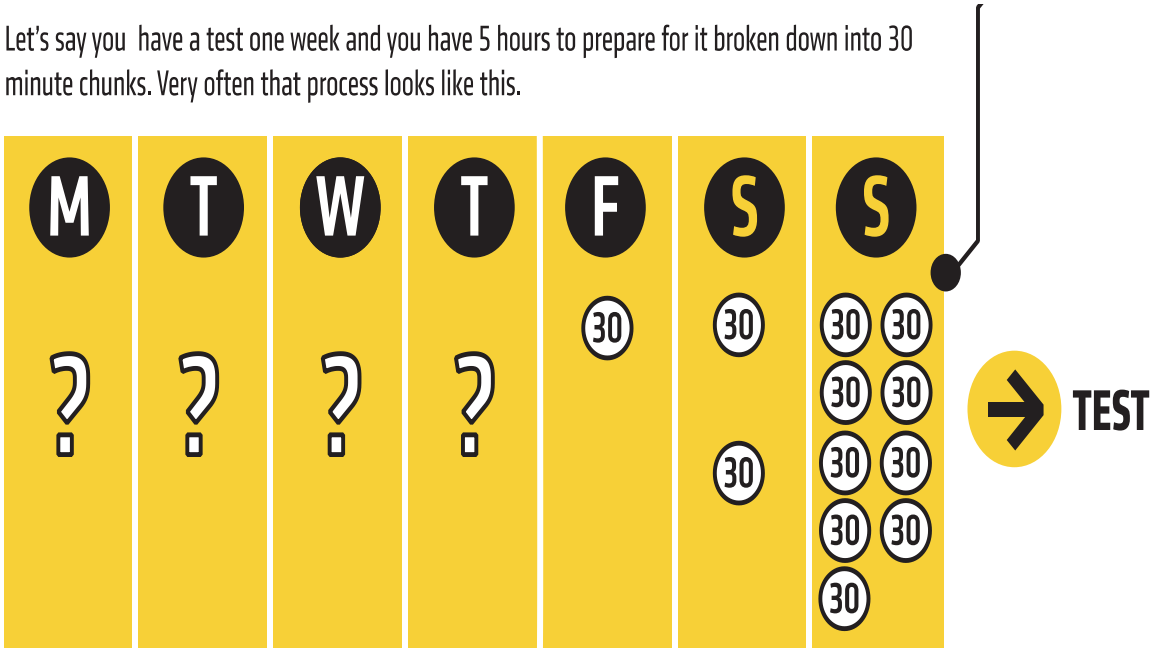


This video will help support you in using the Leitner system:
https://www.youtube.com/watch?v=C20EvKtdJwQ

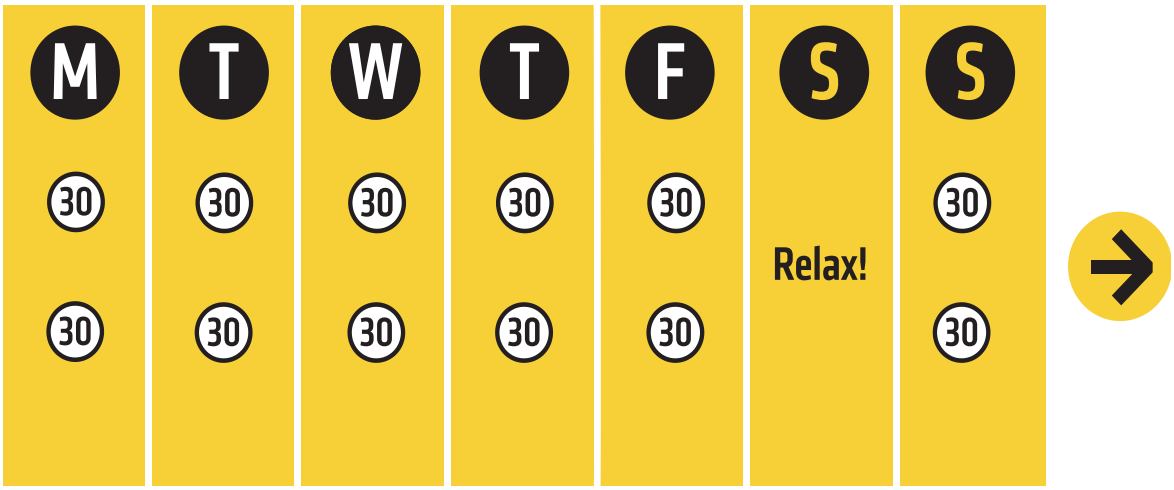
SPACING AND INTERLEAVING – PLANNING YOUR REVISION

Spacing out your revision into smaller chunks over a period of time helps you to remember the material better and ensures you are less stressed with your revision. This ensures you are not **cramming** as it will overload your memory and make you overconfident. By leaving time between revising and testing, the harder your brain works, the more chance of remembering.

Let's say you have a test one week and you have 5 hours to prepare for it broken down into 30 minute chunks. Very often that process looks like this.



Instead of mass practice, a much more effective way of revising is to space out your revision like this:



By breaking up your revision into 30 minute chunks and spacing out the time between revision, you will consolidate what you have learned and retain the material much more effectively.

Interleaving involves switching between ideas and topics during a study session and not revising in blocks of topics. This ensures that you are not studying one idea or topic for too long. Mixing up your revision and chunking it supports learning and strengthens your memory as we know you need to review information over time to reinforce learning. *If a subject involves a narrative (story), revise this in one piece.*

For example, instead of organising your revision week like this:

M	T	W	T	F
MACBETH	AN INSPECTOR CALLS	CREATIVE WRITING	UNSEEN POETRY	JEKYLL AND HYDE
MACBETH	AN INSPECTOR CALLS	CREATIVE WRITING	UNSEEN POETRY	JEKYLL AND HYDE
MACBETH	AN INSPECTOR CALLS	CREATIVE WRITING	UNSEEN POETRY	JEKYLL AND HYDE

A much more effective way of organising your revision would be like this:

M	T	W	T	F
MACBETH	UNSEEN POETRY	AN INSPECTOR CALLS	JEKYLL AND HYDE	CREATIVE WRITING
AN INSPECTOR CALLS	JEKYLL AND HYDE	CREATIVE WRITING	MACBETH	UNSEEN POETRY
CREATIVE WRITING	MACBETH	UNSEEN POETRY	AN INSPECTOR CALLS	JEKYLL AND HYDE

As you are doing this, another highly effective strategy is to try to think of connections between topics you are studying considering similarities and differences.

Studying one topic for a long time can give them impression you have mastered it but often this can be misleading.

DELIBERATE PRACTICE

Practice is essential. You can revise all you like but without practice, it is wasted. Start by spending time reviewing a topic/unit before quizzing/testing yourself **with no notes and from your memory (this is vital for revision)**. Once you have finished, check your answers. **This will support you in showing where your 'knowledge gaps' are and where focus needs to be in your future revision**. Revision shouldn't keep you in your comfort zone, you need to be thinking hard and identifying your own areas for development. Avoid simply revising topics you enjoy. A technique to support deliberate practice is the **Pomodoro Technique**.

Practice should be applying the knowledge and skills you need to succeed so may involve exam questions or planning answers.

Deliberate Practice 'Do':	Deliberate Practice 'Don't':
• Spend time practising what you will be tested on. • Practice the areas you struggle and need to improve on. • Make sure you review your practice – get a teacher to check it or review your notes and answers against mark schemes.	• Use notes, the point is you are doing it from memory! • Only practice areas you find easy or do well at. • Spend too long on a question – stick to timing and practicing what it will look like in exam conditions.

SUMMARISING AND CHUNKING INFORMATION

Chunking information into manageable chunks to revise is a powerful strategy as it aids motivation and ensures your working memory is not overwhelmed.

1. **Breaking up the information into paragraph or section chunks** – this ensures you can work through, revise and learn, one part of the text at a time. Give each section a heading to support your understanding.
2. **Only highlight the core information and do not highlight everything** - what is actually needed?
3. **Take out the information you have highlighted and bullet point it onto a revision card** – use this knowledge to explain the 'story' and narrative and to test yourself.

Muhammad Ali, arguably the greatest boxer in the history of the sport. He was born in 1942, in Louisville, Kentucky in the United States. He was named after his father, Cassius Clay, Sr., who was named for the 19th century abolitionist and politician Cassius Clay. He changed it to Muhammad Ali in 1964. He became a boxer at the age of 12. As an amateur boxer he won many titles, culminating in the Light Heavyweight gold medal in the 1960 Olympics in Rome, Italy. When Ali returned home to the states, he was so proud that he wore the medal around his neck wherever he went. After a week, he went to a café and ordered a drink. The waiter said "I'm sorry, we don't serve coloured people". Ali was so incensed by this! He had represented his country, won the gold medal, and come back to this kind of treatment. Muhammad Ali ripped from his neck and threw it into a river. Ali turned professional at the age of 18. Ali's record was 100 wins, 5 losses when he ended his amateur career. Ali became the World Champ at the age of 22. Clay was famed for his unorthodox fighting style. Rather than match his opponents with brute force, Clay brought tactics and strategy into the ring. With his fast-moving style, he was equally adept at dodging a punch as at delivering one. His fancy footwork soon became known as the 'Ali shuffle'. Ali also fought a great psychological game, often beating fighters before they stepped foot in the ring. It was in the pre-fight build up to his first world title fight with Sonny Liston that Ali famously said "I will float like a butterfly and sting like a bee". In 1967, when Ali refused on religious grounds to be drafted into the US army to fight in Vietnam, he was stripped of his title and banned from boxing, two decisions he successfully overturned in court. This he achieved by defending himself brilliantly without a lawyer. In 1971, Ali lost the title to Joe Frazier. Ali went on to win it back and then fought in two of the most famous fights in the history of boxing; The Rumble in the Jungle, versus George Forman and The Thrilla in Manilla, again versus Joe Frazier. Ali is the only boxer to have held the World title on 3 separate occasions. Ali retired from professional boxing in 1981, at the age of 39, with a career record of 56 wins and 5 losses, and as a three-time World Heavyweight Boxing Champion. Throughout his boxing career Ali was won over 50 million $. Muhammad Ali became a Muslim around the age of 22, and a member of a group known as the Nation of Islam (or the Black Muslims) and was inspired by the teachings of Malcolm X. Muhammad Ali has been married 4 times, and has had nine children. There have been many films made of his life, most recently with Will Smith in the title role. Ali was awarded the coveted title of 'Sportsman of the Century' by the BBC in 1999. Although suffering from Parkinson's disease, Ali still makes many public appearances. He refuses to allow his disability to beat him. He travels around the world doing great work for charity.

Paragraph 1: 'Born':

Muhammad Ali, arguably the greatest boxer in the history of the sport. He was born in **1942**, in **Louisville, Kentucky** in the United States. He was named after his father, **Cassius Clay, Sr**., who was named for the 19th century abolitionist and politician Cassius Clay. He changed it to Muhammad Ali in 1964. **He became a boxer at the age of 12**.

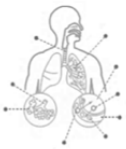
Born: • 1942 • Kentucky • Cassius Clay • 1964 • 12	Boxing: • 1960 Rome Olympics • Professional at 18 • 100 wins, 5 losses at amateur
World Champion: • 22 • 'Float like a butterfly, sting like a bee' • Vietnam 1967 • 3 times World Champion • $50 million	Life: • National of Islam • Married 4 times • 9 children • BBC Sportsman of the Century 1999

DUAL CODING

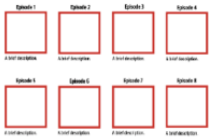
When reviewing something you have learnt, combining words and pictures can be powerful. Research suggests that combining words and images increase your learning by visually representing information in two different ways. Examples of this include creating a:

Timelines
These can show the events that happen in a sequence, and the links between these events.

Mind Maps
These allow you to group information in branches from a central theme



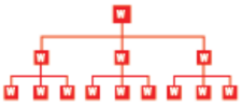
Diagrams
Diagrams to annotate key information e.g. biological features about the body.



Story Boards
These can help you remember the key parts in a story or event

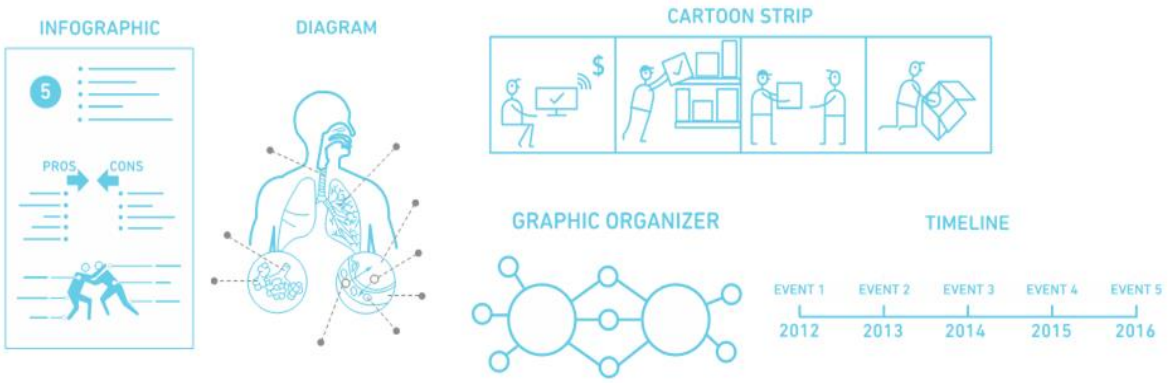
Flow Diagrams
Use flow diagrams to highlight cause and effect, input/output and processes

Venn Diagrams
Useful to compare change/continuity in history or characters in English



Graphic Organiser
These can chunk any aspect of a topic; hierarchy, process, cause/effect etc.

Concept Maps
Use to highlights links between themes, concepts and ideas.



INEFFECTIVE REVISION STRATEGIES – WHAT DOESN'T WORK

With the above in mind, it is vitally important to think about strategies that students may employ that have a limited or no real benefit on learning or memory. These include:

- Simply writing out notes or copying from a textbook/exercise book.
- Cramming revision to the 'final minute' overloads your working memory so you can't learn at all. It can also cause stress/anxiety before exams.
- Re-reading and doing nothing with the information. Trying to focus on 'too much information' on a single page and cramming revision.
- Highlighting information for the sake of it.
- Not enough silent work or attention to a given task. Attempting to revise while multitasking and doing other things.
- Comfort zone revision of easy material that pupils have already mastered because it makes you 'feel good'.

DEVELOPING REVISION ROUTINES AND HABITS

Within your revision, it is vitally important to establish a strong routine. Having goals are good for setting a direction. What do you want to achieve in *this* revision session? Habits are incredibly powerful in helping you to succeed. If you have the mindset of wanting to be a better student and build the habits to become the person you want, the results will come. Getting one percent better every day counts for a lot in the long-run.

In order to support the forming of good revision habits, there are a number of areas to consider:

- Make it obvious – revise in one area, leave your materials out ready to support organisation and ensure routines are stuck to. Ensure your environment is clear, uncluttered and comfortable.
- Start small and build up – reduce distractions where and when you revise and get your family to encourage the creation of a revision timetable and placing it somewhere visual in your house. Ensure someone else is knowledgeable of this timetable to enable accountability and aid support. Start revising for a short amount of time and build up over time.
- Make it attractive – collaborative focused revision (with friends) is beneficial (alongside attending interventions or revision sessions) but you could also ensure there is a 'reward' at the end of a revision session. *If I complete this, I can do this.* Write a revision contract.
- Make it satisfying and rewarding – challenge yourself, track your own revision progress and ensure you stick to your revision timetable. Small steps build success and motivation. Use PLCs or checklists to support. Focus on 'I'm a hard worker' than 'I want a Grade 8'.

CREATING AN EFFECTIVE REVISION ENVIRONMENT

Goals are good for setting a direction but systems are best for making progress. We know that working memory can only hold a small amount of information at once. Therefore, in order to revise and learn effectively, you should use techniques which free up your working memory and stop it from being overwhelmed. One way is working in an environment which is free from distractions.

Whilst phones are a brilliant intervention, research has found that they have a negative impact on revision and learning. It can reduce concentration, impacting working memory, impact your sleep due to the bright lights and distractions, reduce your motivation to reduce and through listening to music, you are more likely to remember the lyrics to the song than the material you are revising

CREATING A REVISION TIMETABLE

1. Collate all your topics and determine where you need to focus your time. Which subjects and topics do you need to target?
2. Create a table for a week with 30-minute revision slots and breaks built in.
3. Write the subjects in the table, leaving yourself at least two days between each.
4. Type it up so you re-use it and edit it. Ensure it is easy to check and find.
5. Put it somewhere visible and tick off completed sessions = see the success! Ensure someone at home also has ownership of it. It will support motivation.

For an example revision timetable, see below. *This involves only English, Maths, Science and R.S to show how a timetable may look but please ensure all subjects are included depending on the focus at a given moment.*

Subjects				English	Maths	Science	R.S.
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
30 mins	Reactions	Biblical experiences	Buddhism	Features of theatre texts	Atoms, electrons and protons	Experiences of an author	Properties
30 mins	The late romance plays	Expansion	Features of compounds	Partial fractions	Buddhism	Partial fractions	Features of theatre texts
Break							
30 mins	Equations	Act One character and plot	Algorithms	Properties	Features of compounds	Theme of Power and Control	Experiences of an author
30 mins	Properties	Buddhism	Theme of Power and Control	Act One character and plot	Algorithms	Equations	Expansion