



Great Marlow School

Excellence • Compassion • Integrity

How to **Revise**

Tips, hints and marginal gains
for exam students





I don't know
how to
revise !!!

A photograph of a desk setup. In the foreground, a silver laptop is open on a dark wooden desk. To the left of the laptop are two small potted succulents in white ceramic pots. In the background, there is a large green plant, a desk lamp with a silver base, and a white cabinet. The scene is brightly lit, likely from a window on the left.

Environment – replicate the exam space

- Ideally you will have a quiet area to work in
- Remove distractions, especially mobile phones. Turn off phones and put them somewhere that you can't access unless you are on a break
- Have a clear desk/table. The only things on the desk should be the focus of your revision
- Hydrate and feed before you start studying
- Reward yourself **AFTER** you have studied. This should be something to look forward to rather than something to procrastinate your studies

Music and Revision



Students who revised in a **QUIET** environment performed over 60% better in an exam than their peers who listened to music that had lyrics



Students who listened to music with no lyrics did better than those who revised listening to music with lyrics



It made no difference whether students listened to music with or without lyrics-both led to a reduction in subsequent test performance



Getting a **Good Night's** Sleep



A good night's sleep prior to learning allows students to better 'encode information'

A lack of sleep hinders the ability to 'consolidate information'

If you are sleep deprived, you will tend to cling to negative memories and forget positive ones

Excessive sleep loss increases the likelihood of negative emotions, the feelings of stress and a lack of ability to manage emotions

The amount of sleep has been found to correlate with the grades that students get

Look after **yourself**



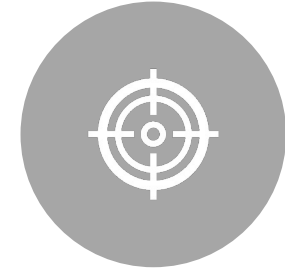
IF YOU PLAN YOUR REVISION, IT SHOULD REDUCE YOUR STRESS AND ANXIETY. IT IS OK TO FEEL ANXIOUS ABOUT EXAMS AND CAN, IT CAN ACTUALLY HELP YOU PERFORM WELL!



MAKE SURE THAT YOU STAY HEALTHY AND FIT-EVEN A BRISK WALK FOR 20PER DAY MINUTES CAN HELP



FIND A WAY TO REWARD YOURSELF POSITIVELY FOR YOUR EFFORTS. REWARDS SHOULD COME AFTER EFFORT, NOT BEFORE OR DURING.



BALANCE: EXAMS ARE GOING TO NEED MORE FOCUS AT THIS POINT IN YOUR LIFE BUT SHOULD NOT TAKE OVER IT! SEE FAMILY, FRIENDS AND HAVE SOME FUN TOO

Create a **plan** that suits **you**



**When are your exams?
What date and time do they
fall on?**

Be aware to help your revision



**Are you an early bird or a night
owl?**

**Work at the times which best suit
you. Closer to the exam, study at
the times that your exam will start
and finish at to replicate the exam
mindset**



**Create a revision timetable.
Commit to following a clear
and organised plan.**

Stick to your plan



**Work backwards: which exams
are first and require more
immediate attention?**



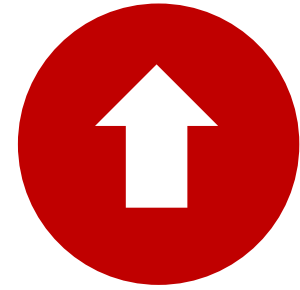
Today, a person is subjected to more information in a day than a person in the Middle Ages in their entire LIFE.

“Re-reading and highlighting your notes is proven To be INEFFECTIVE as a method of revision”

‘Students do not have to work very hard to reread notes or retrieve something from memory when they have just completed this same activity, and furthermore, they may be misled by the ease of this second task and think they know the material better than they really do.’

(Dunlosky et al., 2013).

Re-visit



UPLOAD

Chunk it

- Split the topic into **manageable chunks**
- Choose a chunk at a time to **memorise**
- Start with the **most important** or the most difficult

Re-learn it

- **Re-read your notes** on the chosen topic
- Do some **wider research** on the internet **until you understand it**

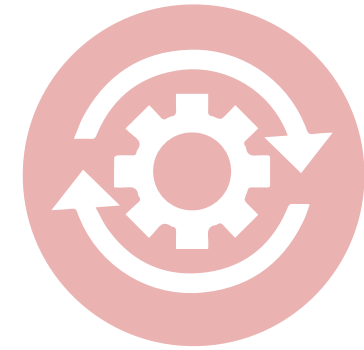
Write it

- Re-write a **detailed description** or an explanation about everything you know of this topic. **Try to do this without your notes**
- Topic on a page. Write key facts you need to memorise over and over until you have memorised them

Speak it

- Give a **verbal explanation** about the topic as if you were teaching it
- **Repeat facts** you need to remember 20 times
- **Record** key facts about this topic on your phone
- Say what you've learnt from memory, using **images** to prompt you

Re-visit



PROCESS

Transform it

- Transform key facts into a **series of images**
- Transform what you have learnt into a **diagram**
- Transform your learning **into a poem or story**

Reduce it

- Reduce what you have learnt about this topic into **5 bullet point prompts**
- Reduce the 3 most important facts in this topic into **9 words**

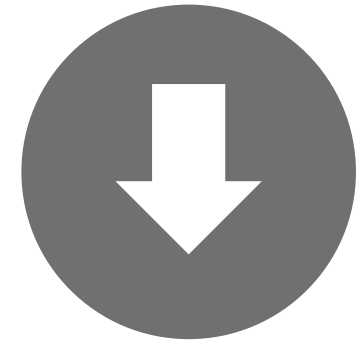
Sort it

- **Rank** the most important facts from this topic
- What is the most difficult point to remember? Why?
- **Categorise the key facts from this topic into 3 groups.**
You choose the headings

Link it

- Find 3 Links between this topic and other topics you have studied
- Link the points together
- Link the ideas
- Find some random links. Link the factors

Re-visit



DOWNLOAD

Restore it

- Go back to your 'Reduce it' bullet points. **Restore them to their original state.**
- Go back to your 'Transform it' images and **restore them back into written form**

Step it

- Create a 5 step process explaining the most difficult learning points here
- Recall the process or order of events you have studied

Test it

- Use the images to test your knowledge
- Write yourself 3-5 exam questions on this topic or skill

Refine it

- Improve it
- Rank it
- Reorder it
- Change it
- Condense it
- Add to it
- What you missed out from your topic on a page

Memory Test

Learn these facts

1. The capital of France is Paris.
2. '***Mare and Foal by a river***' was painted by George Stubbs.
3. A cartographer produces maps.
4. Ethology is the study of animal behaviour.
5. The chemical formula for water is H₂O.
6. Buzz Aldrin was the second person to walk on the moon.



Memory Test

Answer the
questions

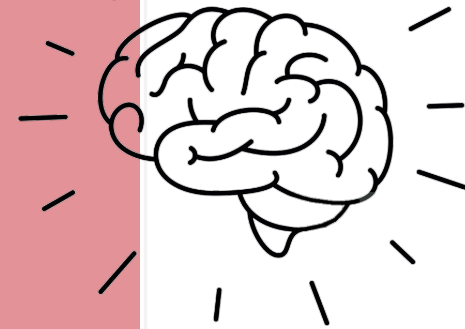
1. What is the capital of France?
2. Who painted '*Mare and Foal by a river*'?
3. What does a cartographer do?
4. Ethology is the study of what?
5. What is the chemical formula for water?
6. Who was the second person to walk on the moon?



Memory Test

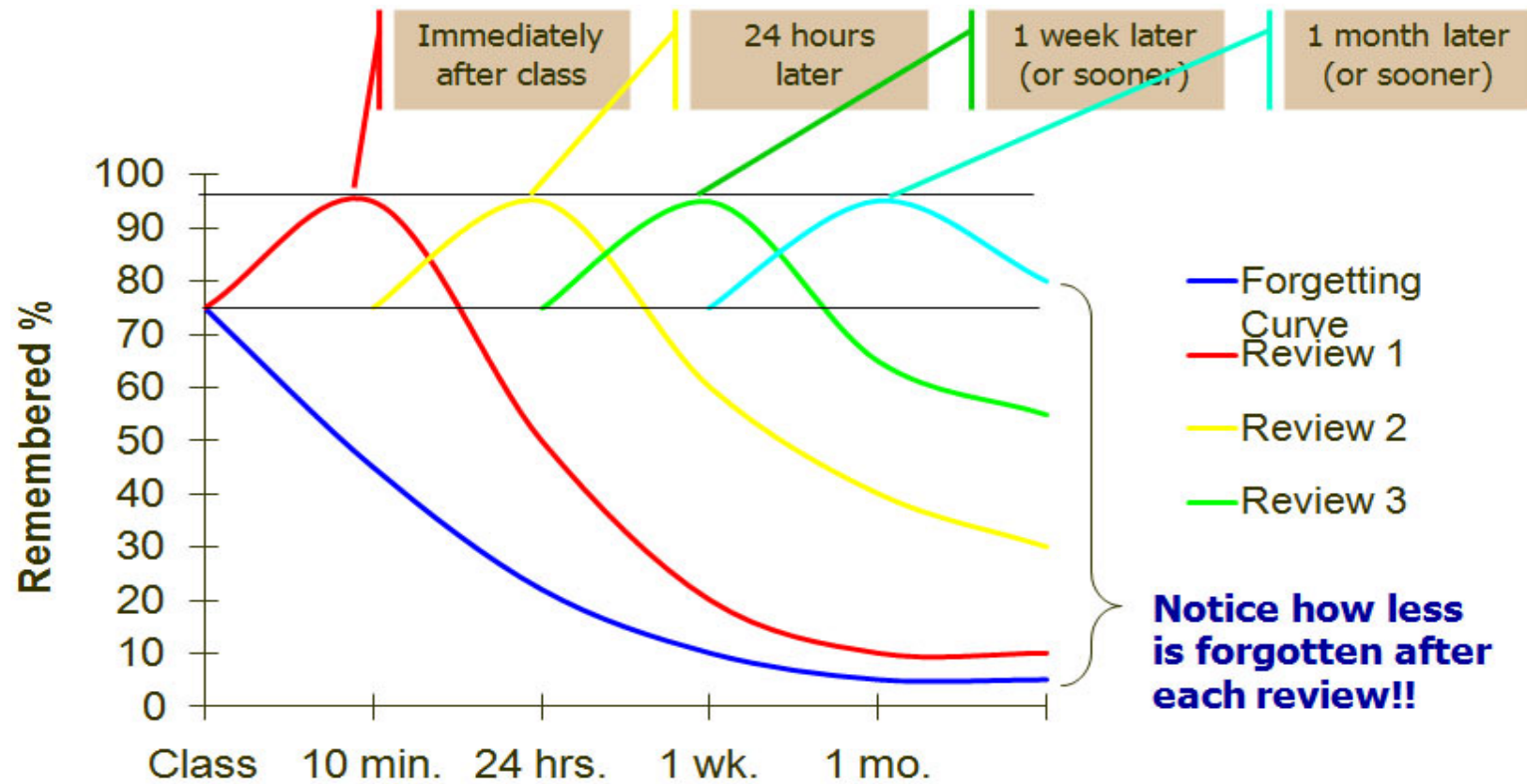
1. **The capital of France is Paris.**
2. *'Mare and Foal by a river'* was painted by George Stubbs.
3. **A cartographer produces maps.**
4. Ethology is the study of animal behaviour.
5. **The chemical formula for water is H₂O.**
6. Buzz Aldrin was the second person to walk on the moon.

You do not need to revise everything as some will already be in your long-term memory.



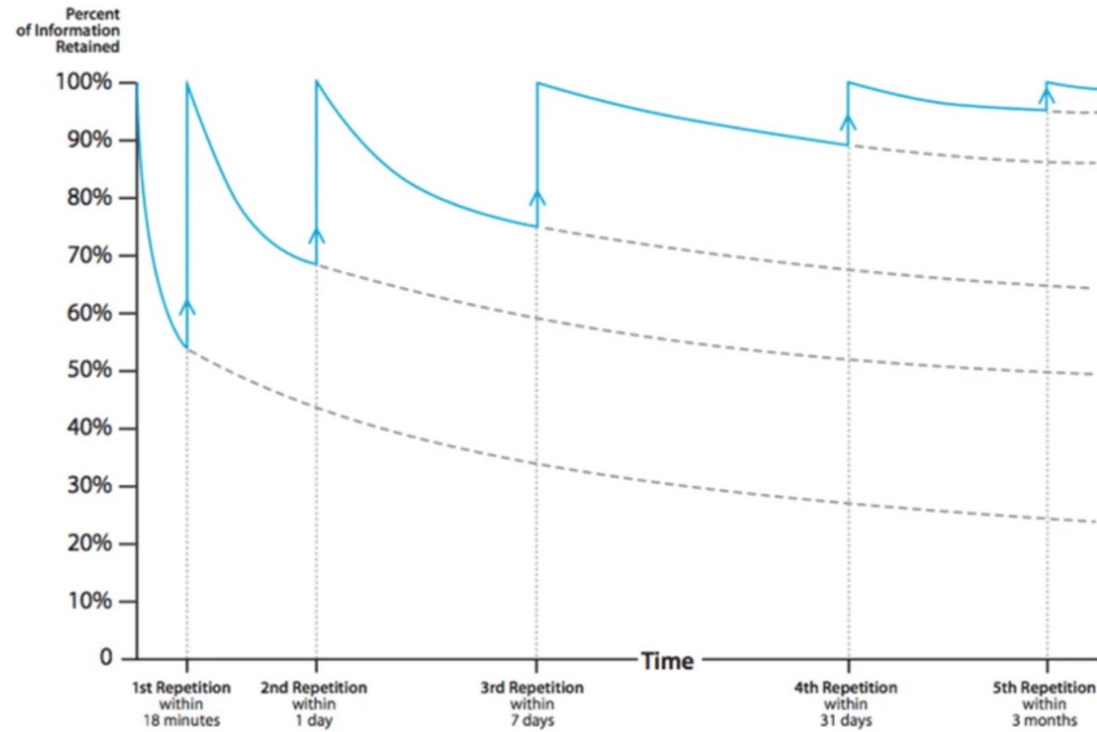
The image features a large, solid red oval in the center. Inside this oval, the text "The Forgetting Curve" is written in a white, sans-serif font. The word "Forgetting" is bolded, while "The" and "Curve" are in a regular weight. To the left of the red oval, a thick, black, curved arrow points towards the left side of the frame. The background is white and decorated with several thin, light gray lines that form concentric, overlapping circles and arcs, some of which are dashed.

The Forgetting Curve



Overcoming the curve

Ebbinghaus' forgetting curve



- Visual representation of the forgetting process
- Loss of memory over time is exponential
- **Spaced practice** is more effective than massed practice (cramming)

1880s

(successfully replicated by other researchers e.g. Murre and Dros, 2015)



Flash Cards
as Practice Testing

What goes on the Cards?

Key word – **definition**

Name of a process –
**description or
explanation**

FRONT OF CARD

REVERSE OF CARD

Image (graph,
equipment, object,
picture, example) –
explanation

Question – **answer(s)**

Examples of cards

remain unchanged
to make genes a gene mutation
change tertiary structure of the enzyme stop function
of structural components in an organism e.g collagen
to substrate (can only catalyse reaction involving specific mol-
structure altered by: PH, Temp

EXTRACELLULAR

- Enzymes secreted from cells e.g hydrolytic enzymes, released from fungi, mucus, like myxase
- Alimentary canal digestive system release enzymes into gut lumen to digest: lipids, proteins, carbohydrates.
- Amylase is released from salivary glands to digest starch into maltose PH 7.3-8.5.
- Trypsin made in pancreas digests proteins in small intestine

consecutive reactions
by an enzyme
medicines act as substrates, these
are known as metabolites
pathways: big → small metabolic energy
small → synthesized by molecules
glucose produced from reactive O₂ by human aorta
down H₂O at PH 7 Temp 45°C, 30°C

FACTORS

enzymes only work with cofactors - small non-protein molecules attached. Permanently d ones by covalent bonds are called prosthetic groups. Non permanent are also cofactors. METAL IONS: e.g carbonic anhydrase it contains a permanent zinc ion bound to active site - found in RBCs and catalyses CO₂ + H₂O → carbonic acid broken to protons + bicarbonate ions. It's a reversible reaction. It enables CO₂ to be carried by blood to lungs. RS: enzyme + substrate temporarily bind form etc in a catalysed reaction. Some ionically bind to enzyme or substrate increasing rate of the catalysed reaction. Ions bind to substrate to form correct shape for active site. Ions change substrate's active site charge distribution on surface making bonds form. Enzyme only works with chloride ions present. Ions bind to active site at same time substrate binds. Chemically changed reaction to be recycled into original state. e.g. heme is a cofactor for vitamin B12, cobalamin coenzymes, pernicious anaemia, folic acid, tetrahydrofolic acid, Niacinamide, NAD + NADP, Pellagra

EFFECT OF ENZYME ACTION

shape complementary to substrate

enzyme product complex
bonds form between substrate and enzyme
when product leaves the enzyme can convert a large no of substrates
complementary by free amino (R groups)
substrate more accurately
had enzyme substrate

EFFECT OF TEMPERATURE ON ENZYME ACTIVITY

KINETIC ENERGY: extra energy, in the form of heat, causes molecules to move faster. The force of the collisions and rate of collisions: both molecules (enzyme and substrate) gain kinetic energy increasing the rate per second of collisions, formation of ESC increases.

VIBRATING MOLECULES: vibrating breaks weak tertiary structure bonds e.g H-bonds. Changes the enzyme active site shape. more heat: more irreversibly changed shape: no longer complementary. Enzyme is denatured - the reaction can no longer proceed at all.

OPTIMUM TEMPERATURE: Maximum rate of reaction.

Psychrophilic bacteria: cold conditions enzymes work at really low temp e.g red algae

Thermophilic bacteria: hot conditions enzymes work at really high temp e.g Taq polymerase

EFFECT OF PH ON ENZYME ACTIVITY

Acids dissociate into protons (H⁺) and negatively charged ions.
buffers = resist PH change e.g those in blood that donate accept H ions.
EFFECT OF IONS: excess H⁺ ions interfere with hydrogen ionic bonds changing the shape of the tertiary structure slowing rate. Also alters charges on active site as protons cluster around negatively charged groups like amino acid groups in the active site so binding of the substrate is disrupted. Small changes of PH either side of optimum can cause active site shape change so enzymes can only work in a small range of PH. Extreme PH cause denaturing.

DIFFERENT OPTIMUM PHs: Extracellular may not be PH 7. HCl in stomach gives low PH so stomach enzymes, pepsin, work best at low PH. Saliva in bile neutralise PH in small intestine where trypsin + enterokinase work at PH 7-8.

EFFECT OF SUBSTRATE CONCENTRATION

Substrate conc increases → rate increases
More ESCs can form: more product molecules form. Maximum rate is when all active sites are occupied with substrate, so more added can't successfully couple into active site.

EXPERIMENT: EFFECT OF SUBSTRATE CONC ON UREASE CATALYSING BREAKING AMIDES (UREA) INTO AMMONIA

- 1) 5cm³ urea solution 1cm³ phenol red indicator (shows when ammonia is released)
- 2) 10 mins in 30-40°C water bath
- 3) 1cm³ urease solution, shake every 5 mins for 20 mins
- 4) use cuvette to read absorption of each tube (remember to do this with a blue/green colorimeter filter absorption 0 for calibration)
- 5) record data in a table then graph
- 6) repeat with different conc urea (with dilution)

Range of 10cm³ 0.1M urea solution 0cm³ water to 0cm³ 0.1M urea solution 10cm³ water (conc 0.10 - 0.00)

ENZYME INHIBITION - POISONS + MEDICAL DRUGS

POISONS - block inactive enzymes.
Potassium cyanide: Inhibits aerobic respiration's catalase. It's hydrolysed to toxic hydrogen cyanide which dissociates into ions which bind to the final enzyme of aerobic respiration stopping earlier stages from running.
Venom: contains acetylcholinesterase (AChE) inhibitor chemical. AChE is important to break down ACh (acetylcholine (a neurotransmitter)) so it's inhibited. ACh keeps muscle contracted as it's attached to receptors on muscle membrane. Causes paralysis.

MEDICAL DRUGS:

Aspirin: Salicylic acid binds to enzymes in the formation of prostaglandins so the acid binds to it instead stopping prostaglandins forming which cause painful nerve sensation.
ATPase inhibition: cardiac glycoside inhibit sodium potassium pump in membranes of heart muscle cells allow calcium ions in which increase contraction strengthening heart beat.
ACE inhibitors: inhibit ACE (an enzyme) which increases blood pressure. Lower BP, treat heart failure.
Protease inhibition: e.g amprex (Avis) prevent virus particles replicating by stopping protease.
Nucleic acid reverse transcriptase inhibitor: treat HIV by inhibiting DNA making enzymes.

EFFECT OF ENZYME CONCENTRATION

INCREASING ENZYME CONCENTRATION: more active sites available - more successful collisions - more ESCs per unit time - rate increases.
When enzyme conc surpasses substrate conc, no rate increase as active sites are empty and substrate conc becomes the limiting factor.

EXPERIMENT:

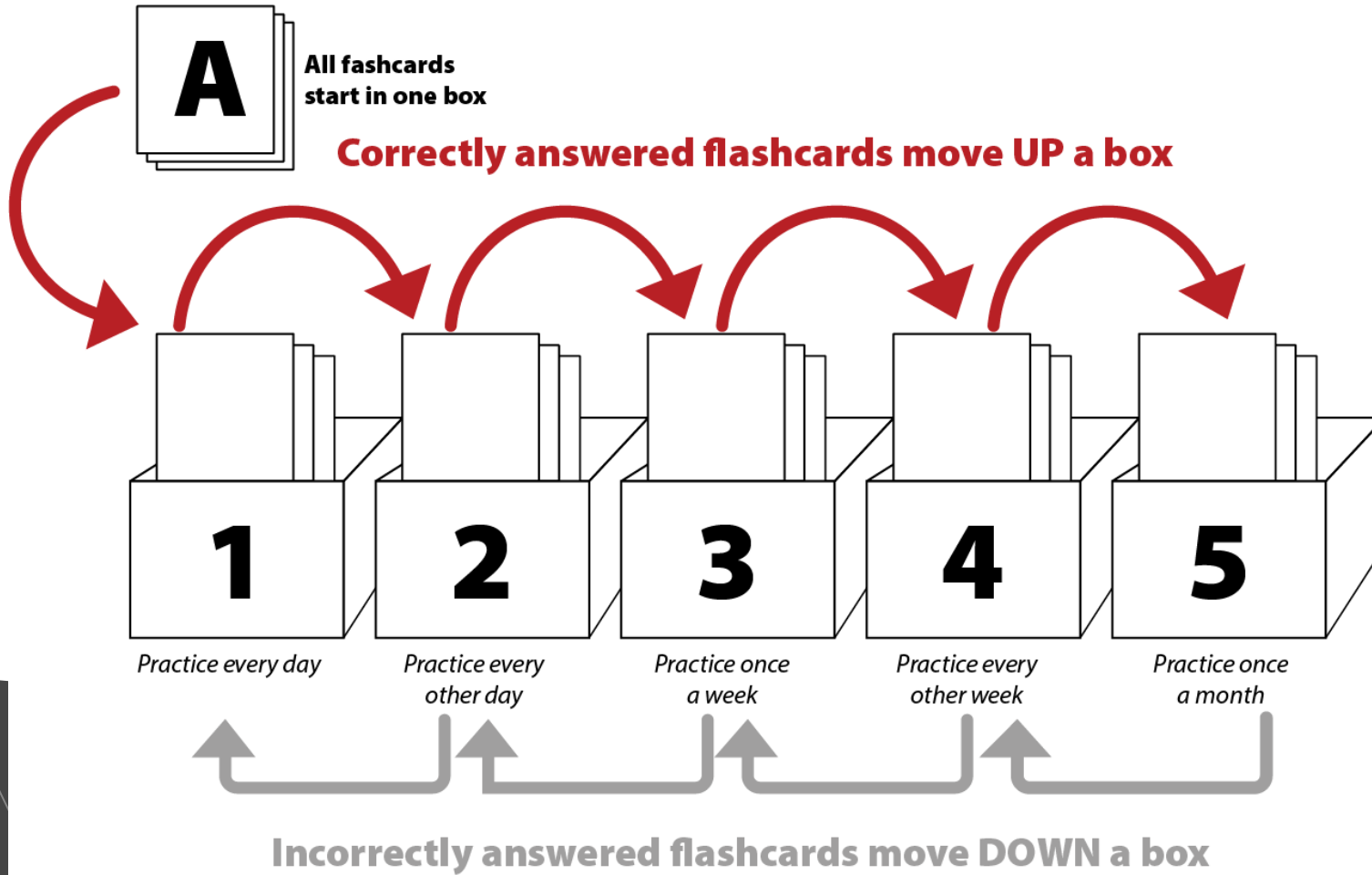
- 1) Use a set conc of urea + make up different conc of urease
- 2) Add the 2 together and use phenol red
- 3) Repeat record data in a table

CONTROL OF METABOLIC SEQUENCES

When cells do not need to accumulate too much of a product, the last enzyme in the reaction may attach to a allosteric site to stop the running of the pathway. Used to not break down too much needed. This is reversible non-competitive inhibition.

Non-competitive inhibition: Inhibitor binds to an allosteric site, preventing a substrate from binding to the active site.

The **Leitner** System



What is it?

The Leitner system forces your brain to retrieve flashcard information at different intervals based on your past successes.

How? By popping your flashcards into separate boxes based on how well you're recalling what's on them.

The Leitner system can help you study more efficiently and effectively by helping you focus on what you need to study more and what you already know well.



Chunking

Chunking



Chunking involves dividing the information up into smaller units or chunks.



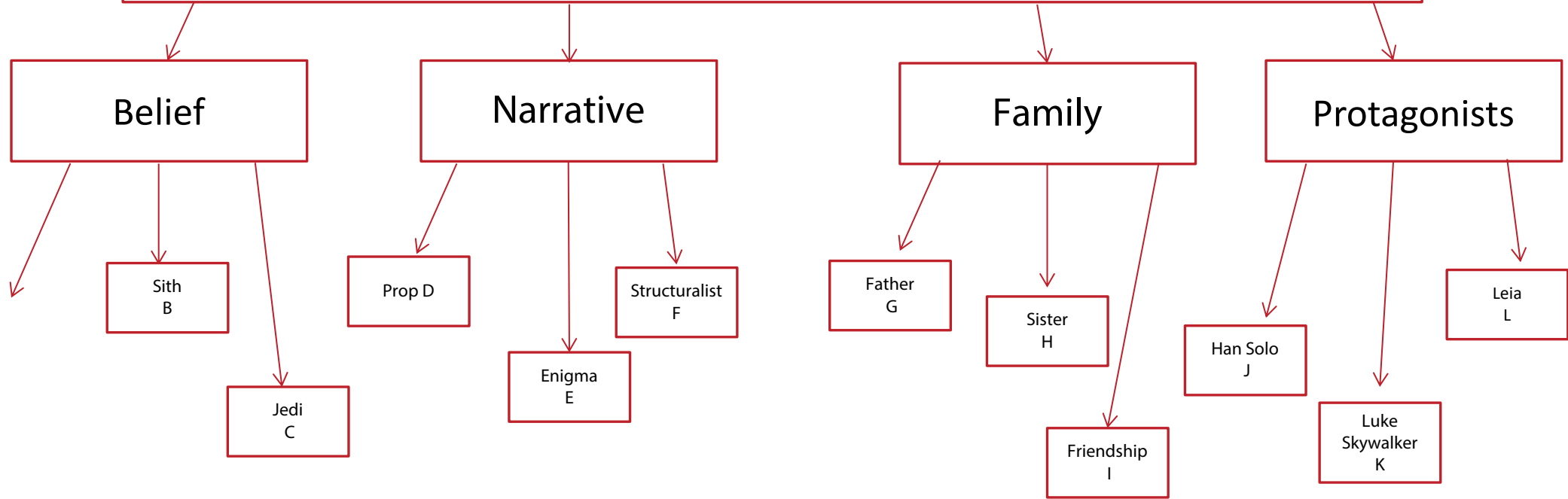
These chunks are small pieces of information, closely linked to each other, that have been grouped together and stored in the memory. This grouping aids the retrieval of information and reduces the load on working memory, decreasing the cognitive load.



Deliberate practice is important when chunking. If practice is not deliberate 'a vast number of irrelevant chunks may be acquired, which not only will not improve performance, but may even hinder it'

(Gobet, 2005, p.193).

Star Wars – a new hope



Deconstruct: Make a large amount of learning manageable

Past Papers

- Check out command words carefully to understand what the question is asking of you!
- Use past papers to make sure that you are managing your time well. Set yourself a time frame to complete each question
- Go through past paper answers with a different colour pen to highlight any marks you lose or mistakes you make
- Test yourself. Find out if your revision has been effective by using past papers or ask someone to test you
- If your notes are all bullet points, past papers might be the first chance you have to write in clear and linked sentences!
- Examiner reports can give you an idea of where students went wrong in previous exams
- Repeat your testing – it is important you test yourself more than once. Try it ten minutes after revising a topic, one day after, then a week later.

“To maintain a high level of mental effort invested in their learning tasks, students need to regularly replete working memory resources. Taking breaks helps to recover depleted working memory, for example, through active rest in between learning tasks (Chen et al., 2018) or through a relaxation pause (Lee et al., 2021). However, this self-regulation of breaks comes with a cost and might require additional effort (Seufert, 2018). For example, the decision if and when to take a break requires additional metacognitive resources, and switching between the task and break can cause additional load (Lee et al., 2021; Seufert, 2018).”

(Biver et al., 2023)

Chunking time – the **Pomodoro** technique

Decide on the task.

Set the timer for 25 minutes.

Work on the task. It is important that the task is not interrupted and that this time is spent on the task itself, not setting up the task.

When the timer rings take a short break, normally 5 minutes.

Go back to step 2 for four Pomodoro's.

Take a longer break, normally 20 to 30 minutes. Then return to step 2.





**'You do not rise to the level of your
goals,
you fail to the level of your systems'**

James Clear 'Atomic Habits'

Summary

1. Environment
2. Turn off the music
3. You need to sleep
4. Look after your mind and body
5. Create a plan-start early
6. Know your exam timetable
7. Write-don't just read
8. Upload-Process-Download
9. Focus on what you don't know
10. Reward yourself AFTER
11. Fight the forgetting curve-regular review
12. Use flashcards/chunking/the Leitner system/Pomodoro technique
13. Past papers
14. Listen to the experts