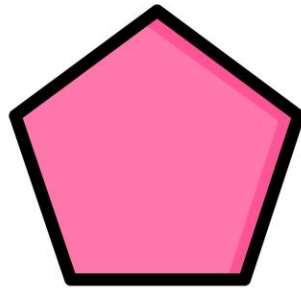




Pentagon



Welcome to: How to Revise

Why are we here today?

- As teachers we have an important role in guiding pupils with revision.
- Finding what works best for pupils is the key to doing well in exams.
- For this to happen pupils need support from us the teachers and you the parents.
- Today's talk is about how to support your child for the right revision.



Plan of the evening

- Myth-busting bad exam techniques
- Explaining the biological science of the brain in connection to revision
- Give you practical examples of how to revise which have been scientifically proven to work
- 20-minute break with refreshments
- Q & A session
- We plan to finish this event @ 4 pm 😊



Commonly Held Myths

- There is a shortcut to revise
- Just memorising key points is enough
- Re-reading and re-writing notes is revision
- Highlighting text makes it stand out
- You only need to revise just before exams



Myth Busting

- Parents don't always know the best way to revise. **Rote learning is no good** for today's exams you need to understand the concepts, not just recite them.
- A recent survey revealed that 1 in 2 parents admitted they didn't understand the questions the children were asking them about homework.
- Learning and exams have changed and keep on changing.



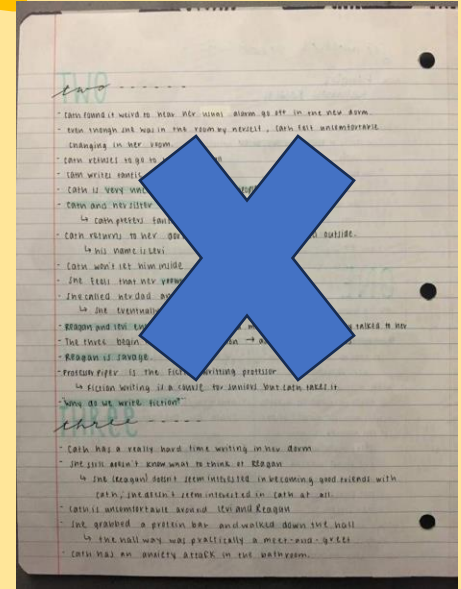


Myth Busting

- There is no quick and easy way to revise – revision is a repetitive process

Myth Busting

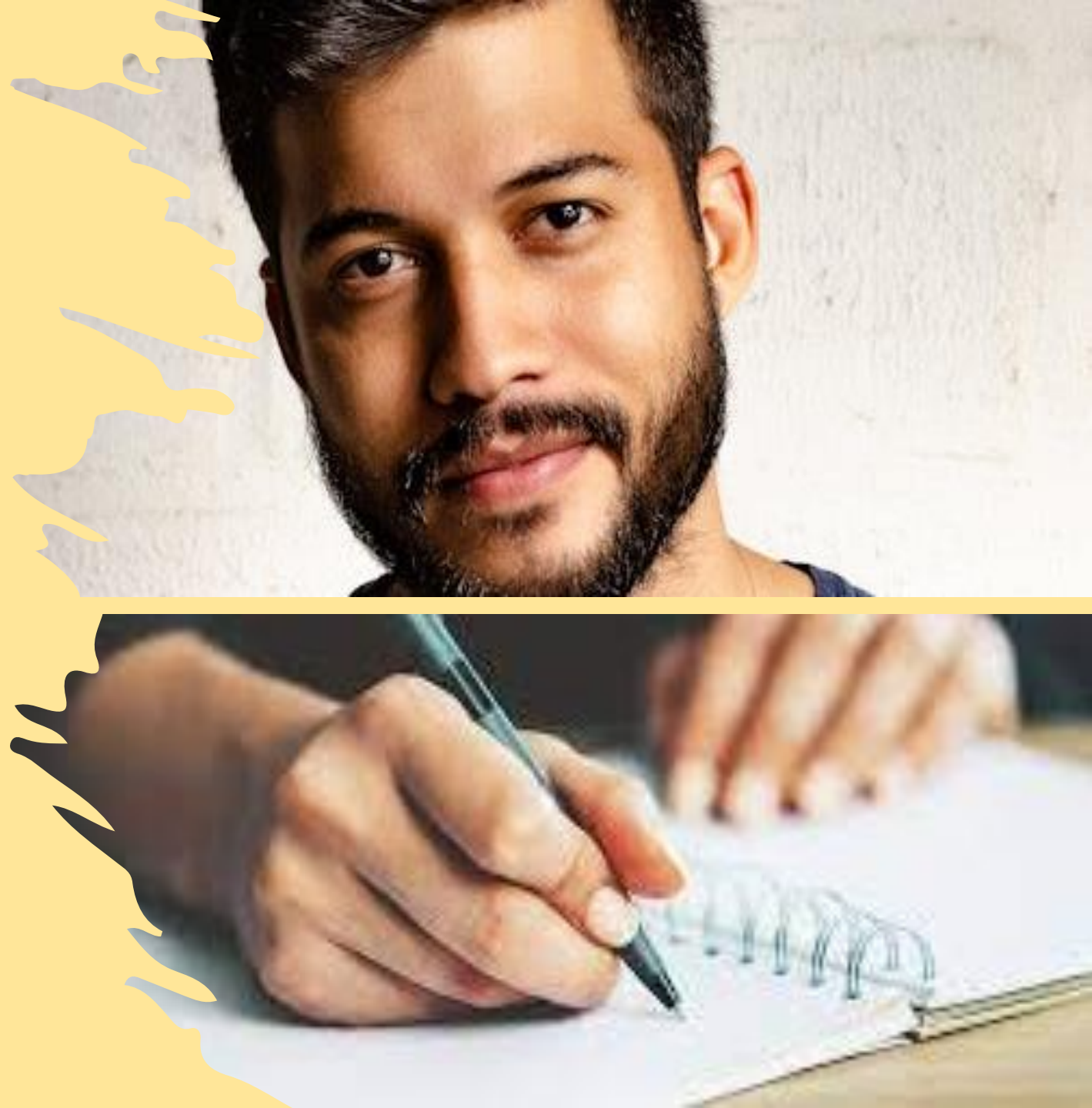
- Re-reading notes or re-writing your notes.
- Children like doing this because it make them feel like they know more than you do
- According to research this activity is ineffective it will give you cognitive bias – you will think you know it because it's familiar.



Cognitive Bias

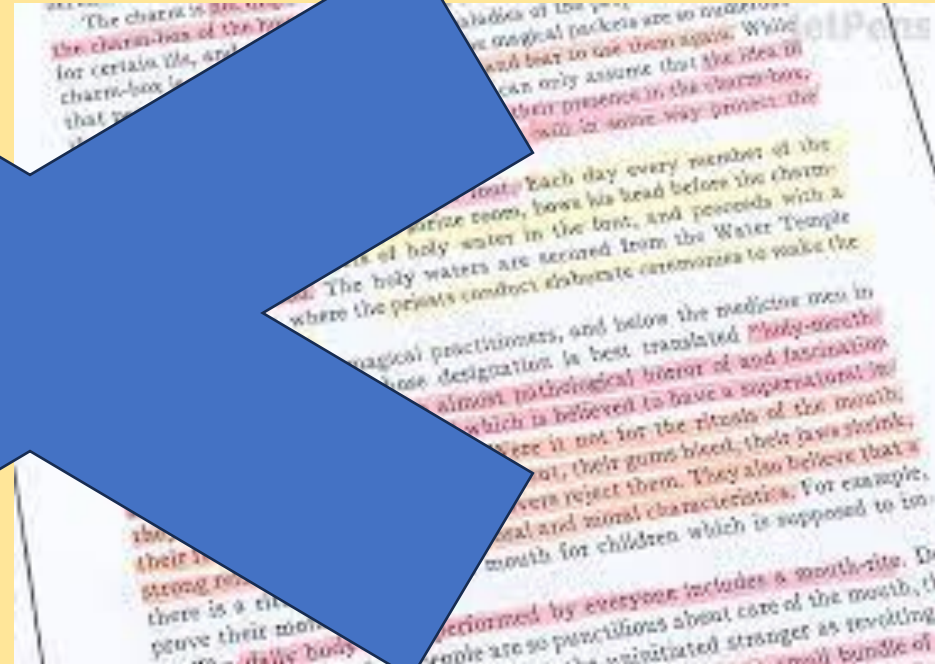
- Your brain is good at adding false information; you need to complete written tests, so you can see if your brain is falsifying information.
- Cognitive bias – your brain will also ‘think’ you know stuff, because it’s familiar to you. Again, write it down to check you know it. Do not listen to your brain!

Haselton, M. G., Nettle, D., & Andrews, P. W. (2015). The evolution of cognitive bias. *The handbook of evolutionary psychology*, 724-746.

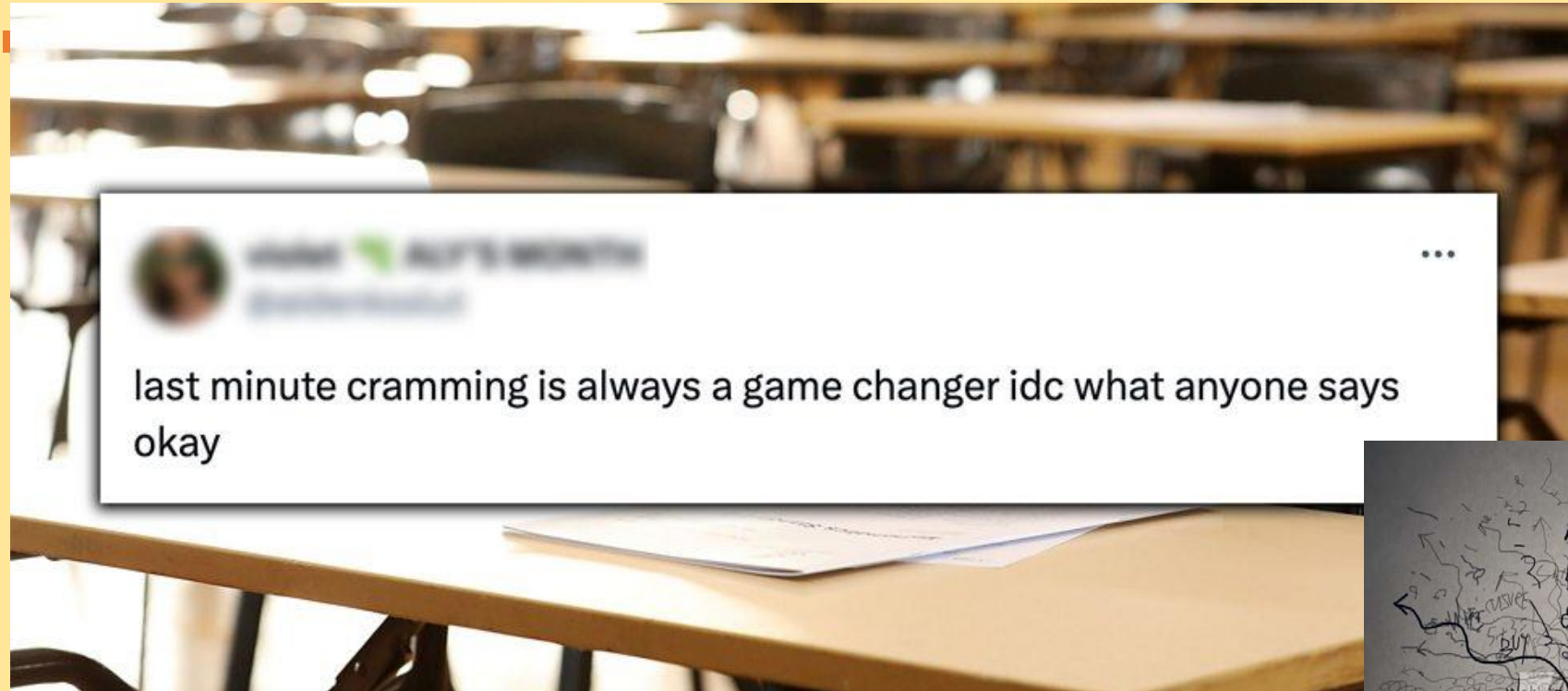


Myth Busting

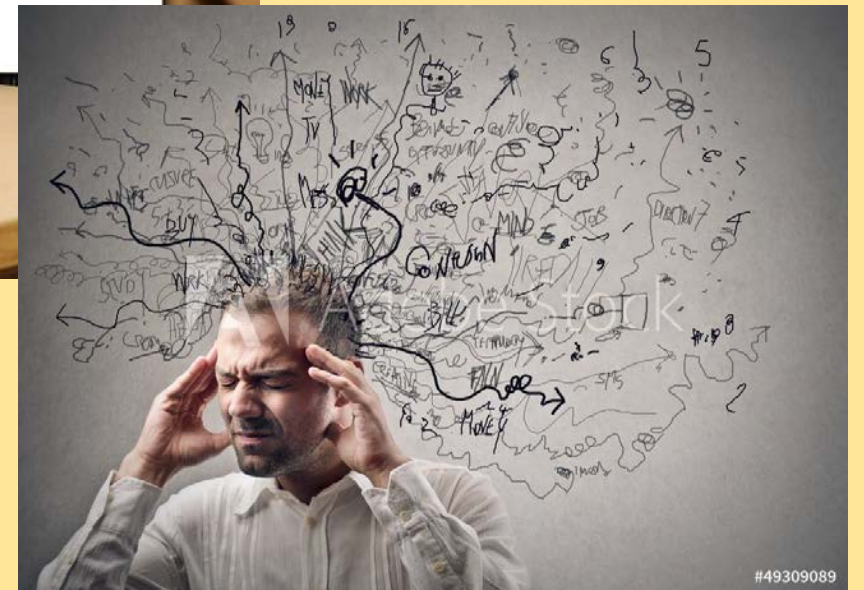
- Highlighting text – no scientific evidence that it improves your memory

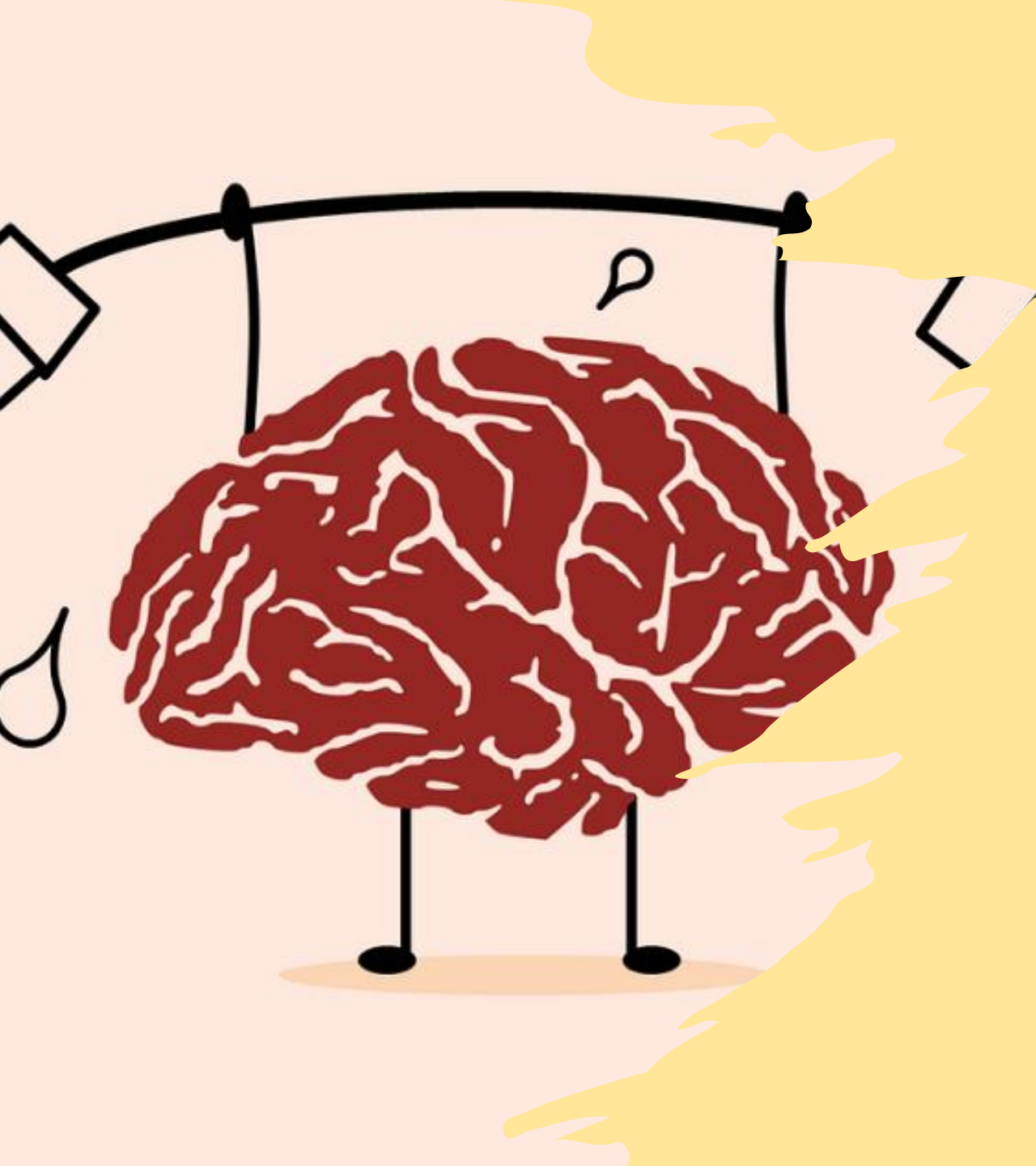


Myth Busting



Cramming will give you cognitive overload/fatigue, and stress





Cognitive overload

- This is when there is too much information for the brain to process.
- When you reach a point of paralysis of information, you can not process what is being heard.

The Biological Science of Revision

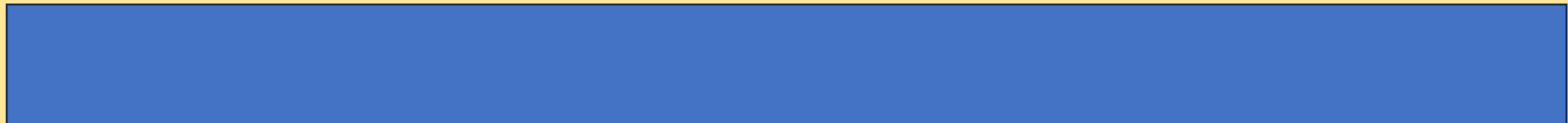
The memory

- Short-term memory and Long-term memory
- Working memory
- Cognitive overload

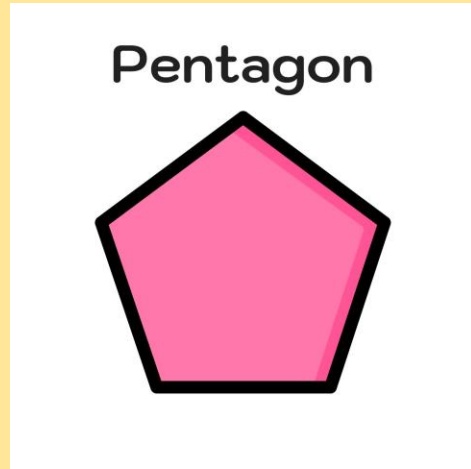
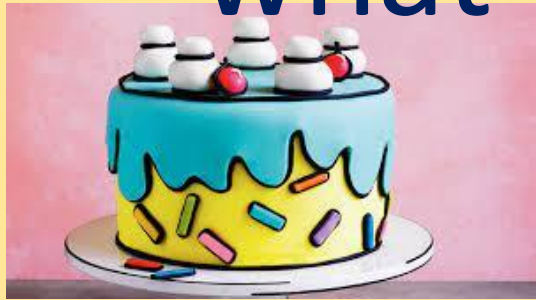


Our memory is a very complex but simple organism

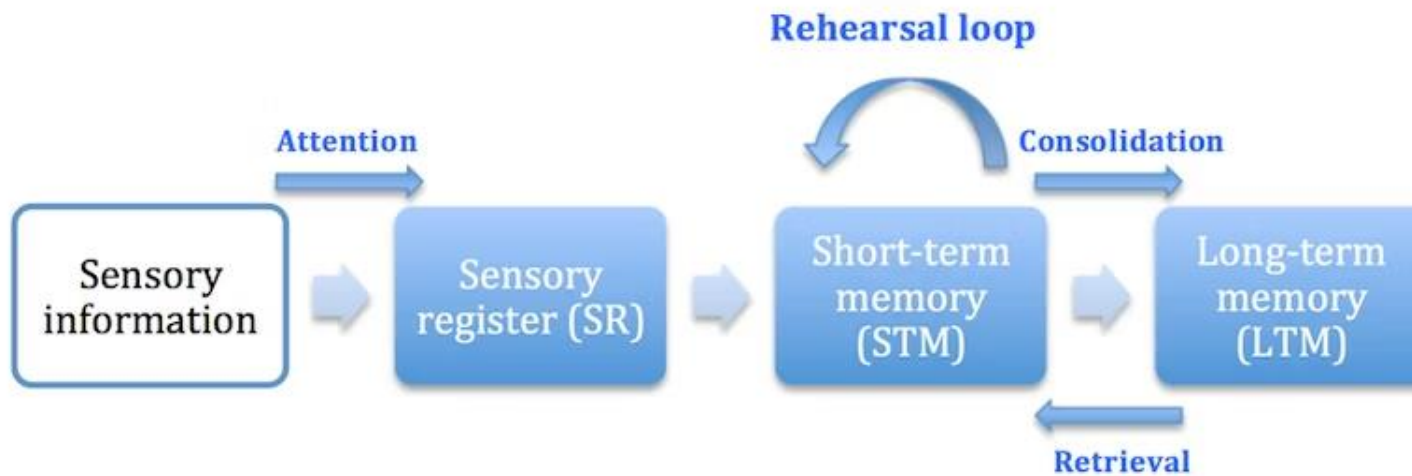
- Complex because it's an amazing piece of machinery
- Simple because it can't do very much



Can anyone remember the 1st slide – what were the items?



Memory stores and coding

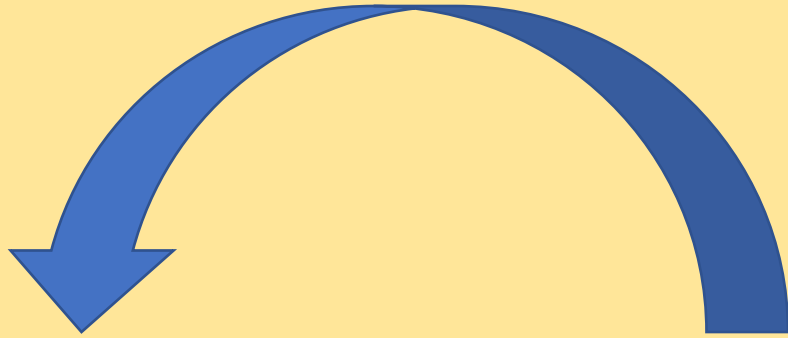


- LTM and coding
- Auditorial
- Visual
- Semantic (meaning)
- Forgetting

Neurological
pathways –
the more
you revisit,
the more
profound the
connection



Working memory is limited



Phonological loop – sound



Episodic buffer



Visual sketchpad - sight



Working memory

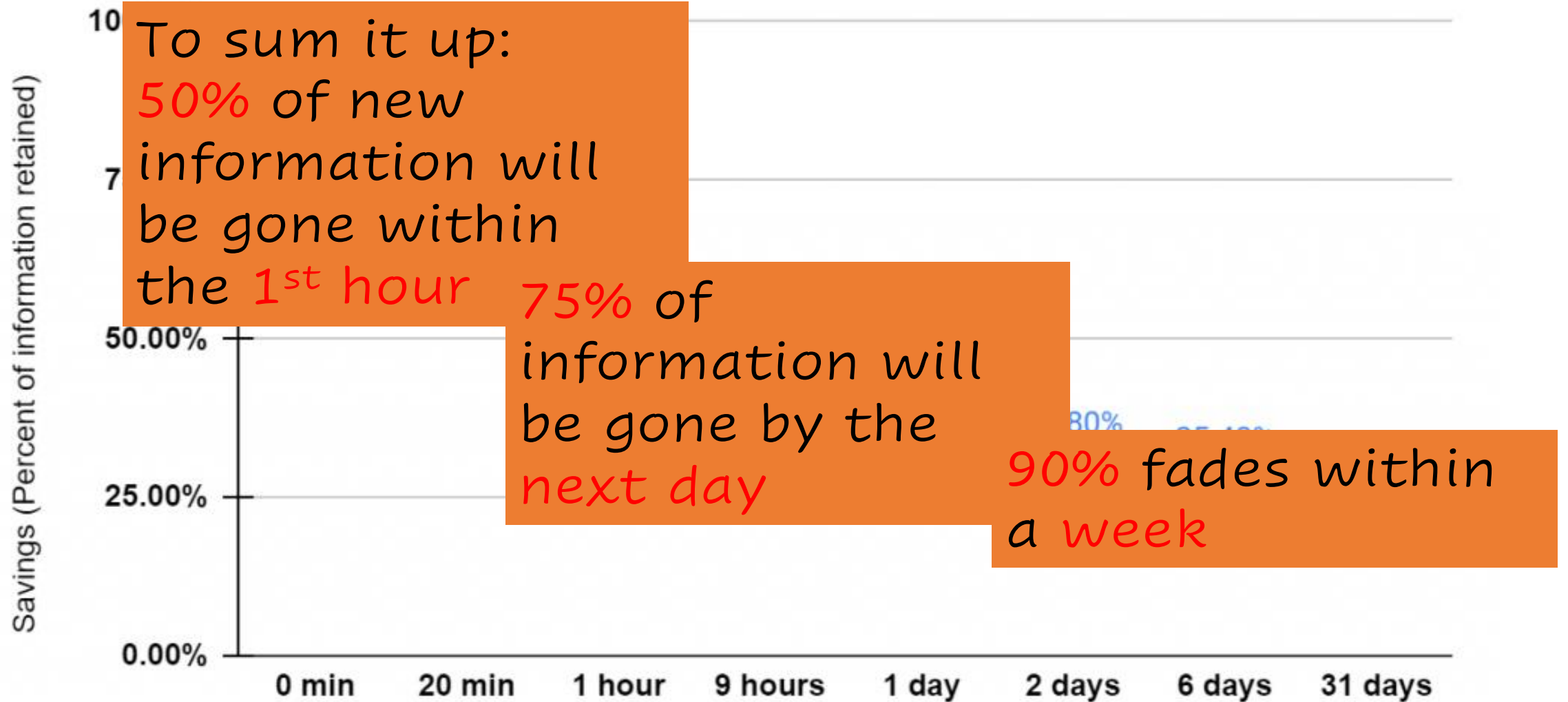
Cocktail party experiment
volunteers please



What next?

- Now we understand how memory works or doesn't work, let's look at what research says about how we should revise, and why...
- Forgetting curve
- Space repetition
- Pomodoro technique
- Active learning

Ebbinghaus's learning curve



Neurological
pathways –
the more
you revisit,
the more
profound the
connection



Overcoming the Forgetting Curve – using spaced repetition to stop the forgetting curve

“**Practice** strengthens the connections between neurons and so is **essential for effective remembering**. Moreover, **elaborative rehearsal**, where we process information at a deep level, is much more effective for remembering than simple rote repetition. In a nutshell, we have to **pay careful attention** to whatever it is we are trying to learn and **make connections between new information and what we already know**. Then we need to **practice** remembering this information **regularly**.”

Spielman *et al.*, (2021)

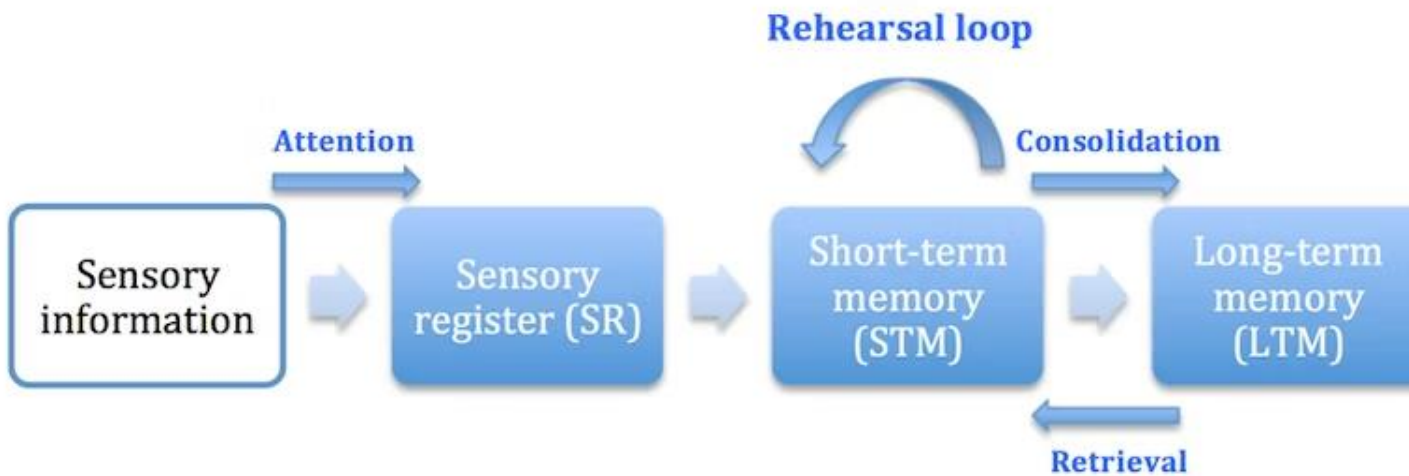
“**Regularly reviewing classroom work** is vital if students are to understand, retain and apply information.” “...how this may be negated is by scheduling **regular self-assessments**.” This further promotes student engagement with the course content, as students engage more with reflective practice and **active learning** and **less in surface learning and rote learning**.”

Swart & Venter (2018).

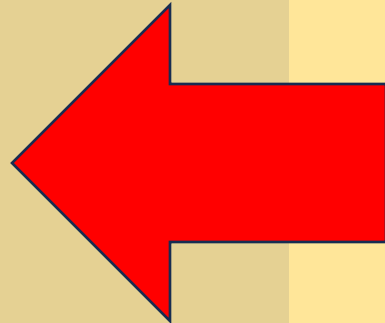
“If students **focus on understanding** what they are trying to learn, memory thereof will be far less of an issue, because we tend to **remember what we understand**”

SAIKALI, J. Improving Learning by Understanding the Psychology of Human Memory.

Memory stores and coding

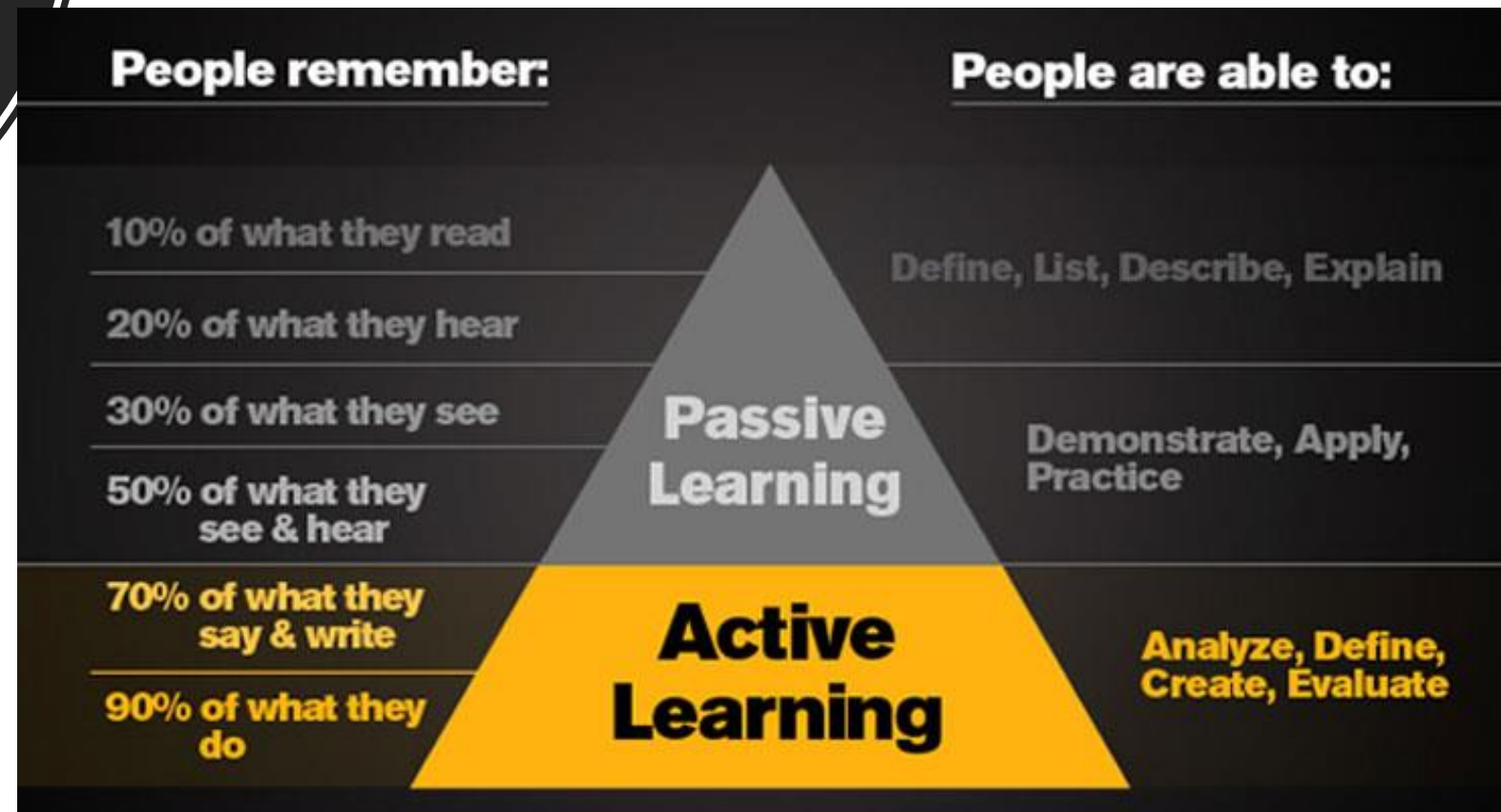


- LTM and coding
- Auditorial
- Visual
- Semantic (meaning)
- Forgetting



Active learning

This is what research has proved.

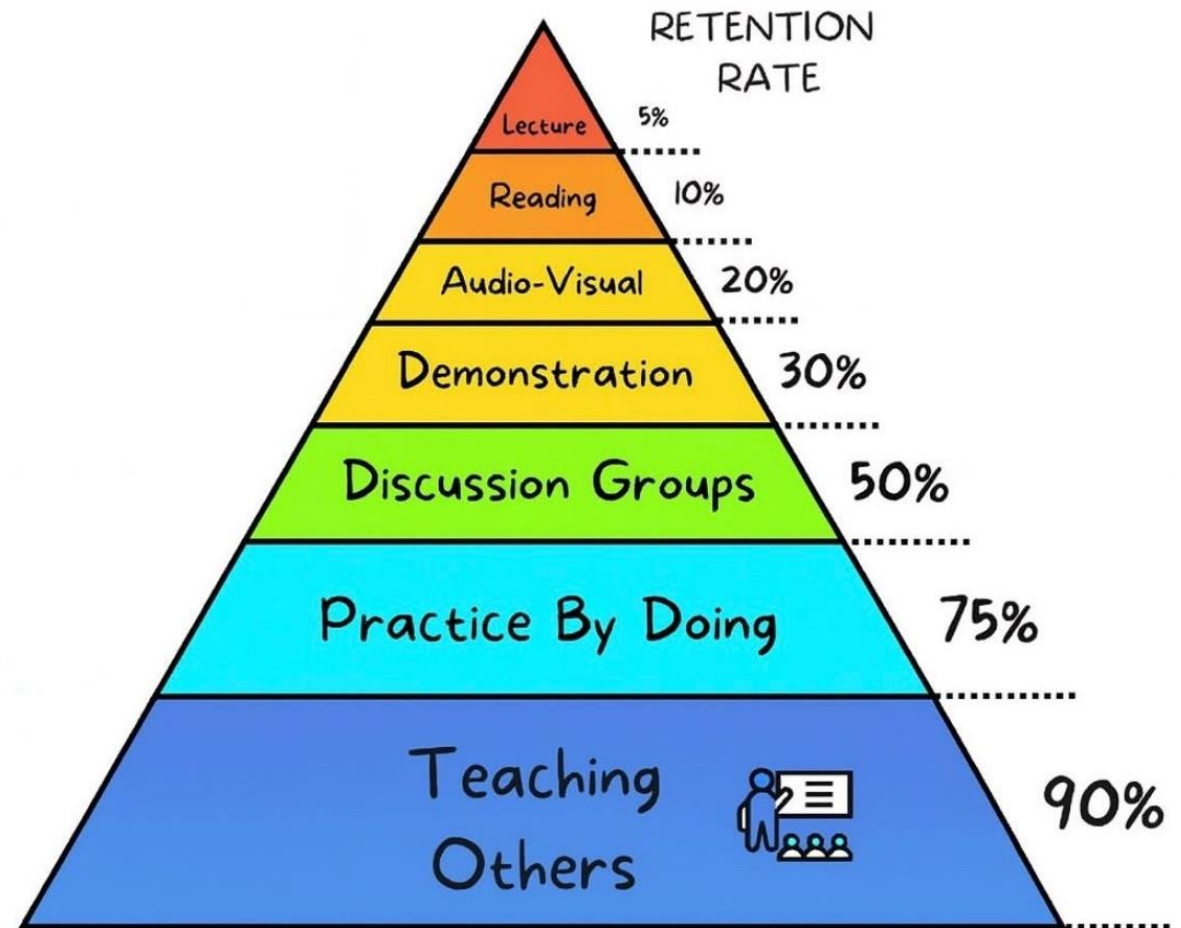


Neurological
pathways –
the more you
revisit, the
more
profound the
connection
and the easier
it is to recall



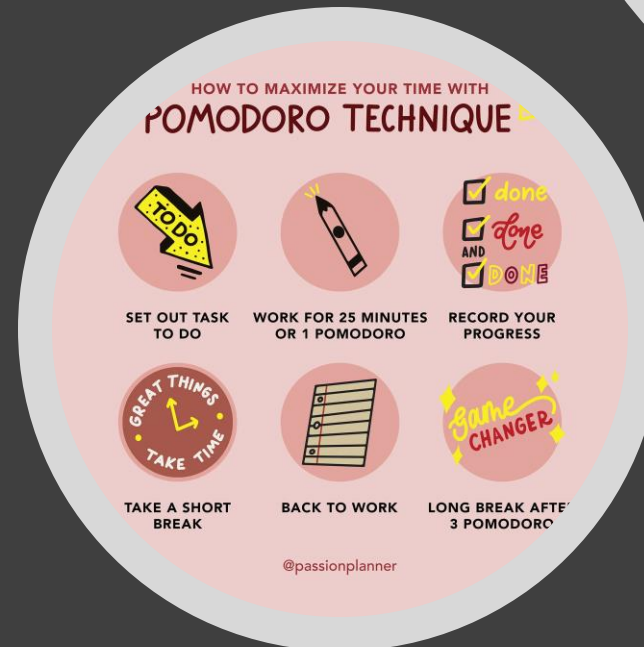
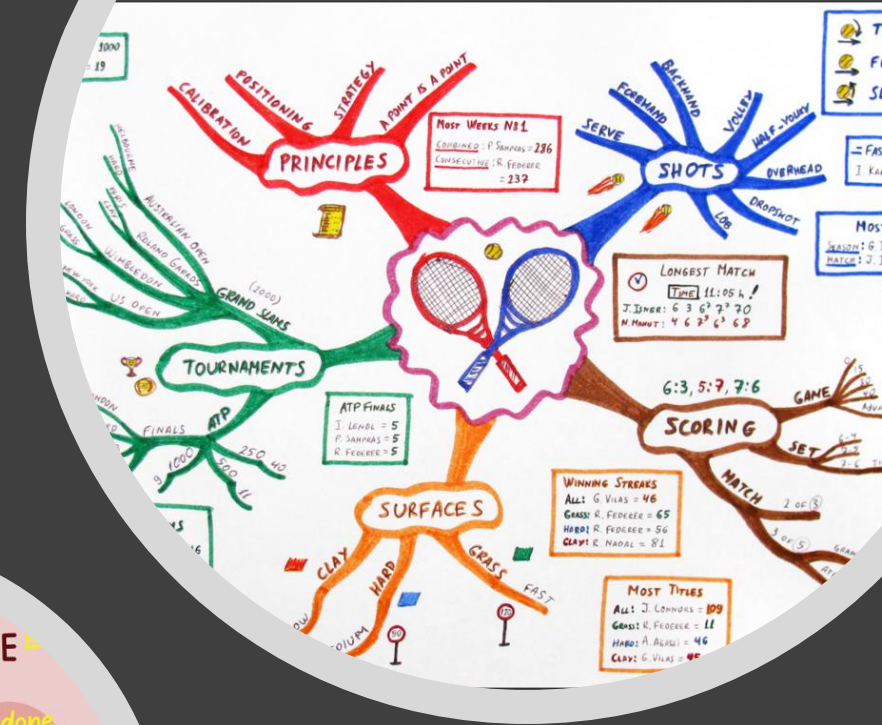
Connecting learning to how and why we need to use revision techniques to

Learning Theory Pyramid



Methods of how to revise using active learning

- Flash cards
- Knowledge dumps
- Mind maps
- Pomodoro technique
- Revision timetables
- GCSE Pod



	B	C	D	
	April 26, 2030	April 29, 2030	May 4, 2030	May 10,
	April 27, 2030	April 30, 2030	May 16, 2030	
ate geometry	April 27, 2030	May 4, 2030	May 16, 2030	May 25,
ar measure	April 28, 2030	May 7, 2030	May 14, 2030	
onometry	April 26, 2030	April 29, 2030	May 6, 2030	May 17,
es	April 29, 2030	May 6, 2030	May 13, 2030	May 21,
erentiation	April 26, 2030	April 29, 2030	May 7, 2030	May 15,
ration	April 29, 2030	May 6, 2030	May 11, 2030	May 22,

Flash cards

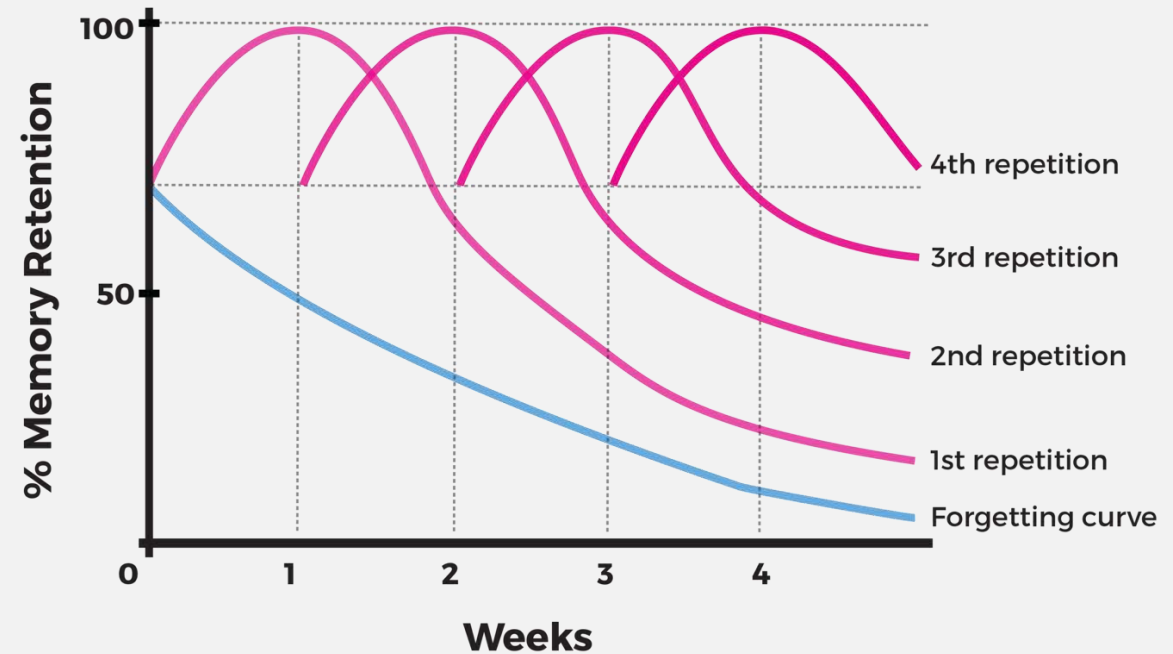
- The physicality of writing – a deeper learning process
- Typing is only surface-level learning. However, there are good apps these days that use space repetition
- Flash cards for keywords and small questions, use pictures to support learning
- Use the Leitner system (spaced repetition) for a deeper learning process.

Space repetition for revision

- Spacing is more effective than cramming
- The optimum gap to leave before you revisit the same material depends on how long you want to remember the material for
- The further away the test, the longer the gaps between study sessions should be

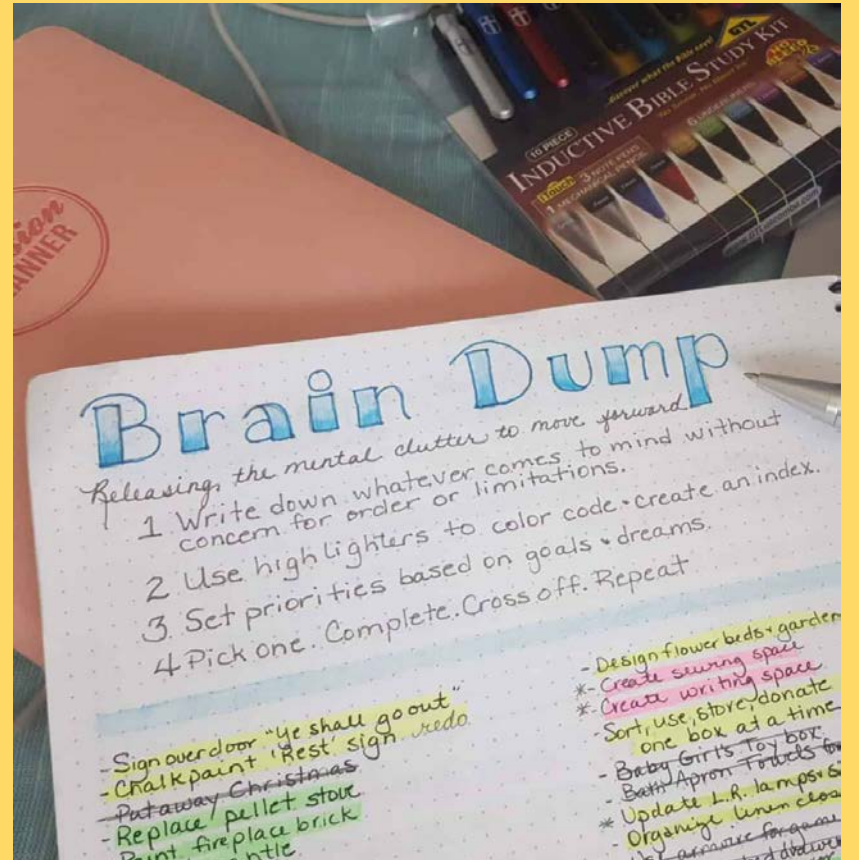
Curve of Forgetting

For newly learned information



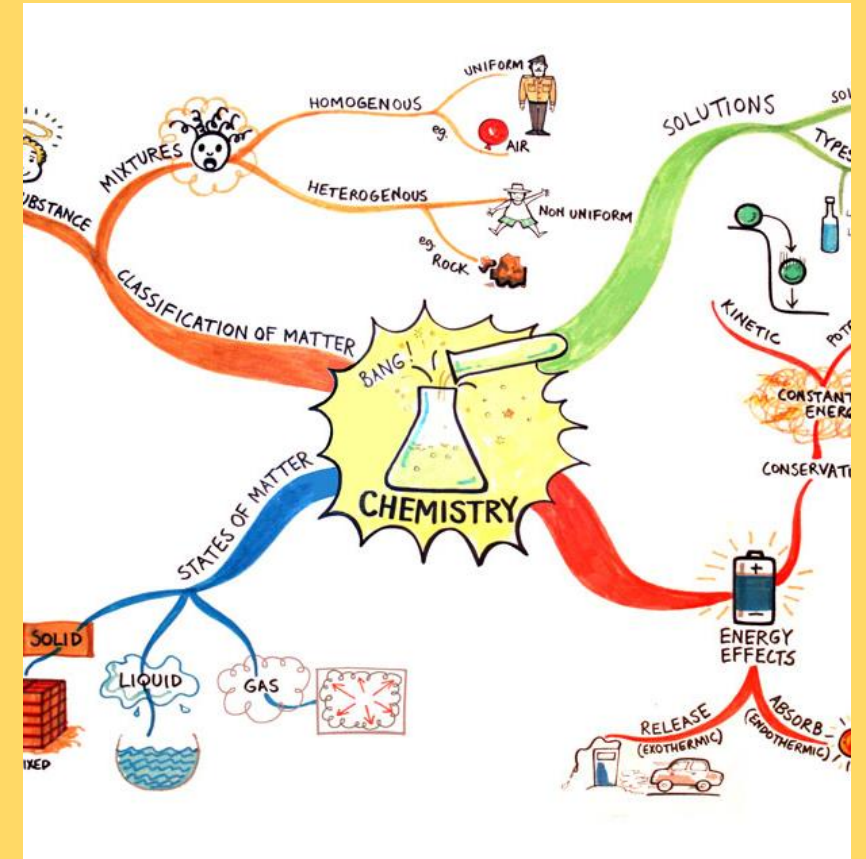
Knowledge Dump

1. Go over your notes or go to your textbook and read part of a chapter
2. Close/remove everything, and then write as much down as you can remember (this is the knowledge dump)
3. You can use pictures and highlight explanations
4. Now open your notes/book and check to see if what you have written is correct
5. Anything you have missed write down in a different colour pen on the same paper of the knowledge dump.
6. Put the paper to one side and leave for a week.
7. Repeat on a new piece of paper and then compare papers/notes and see if you have improved.



Mind maps

- Mind maps allow you to organise information into easy-to-remember chunks
- The organisation process helps you to understand and remember content
- Mind maps help reduce information overload
- We generally find it easier to remember images and diagrams in comparison to plain written text
- The mind map structure is similar to how our own brain stores and recalls information
- Mind maps are full of mental triggers which help our memory recall



Chromosomes = DNA + Histone

Organization of Eukaryotic Chromosomes

DNA double helix
DNA wrapped around histone
Nucleosomes coiled into a chromatin fiber
Further condensation of chromatin
Duplicated chromosome

Gene

- Base sequence (base triplet) on a DNA molecule.
- Codes for amino acid sequence.
- Therefore, if base sequence of DNA is known, then amino acid sequence can be chalked out.
- If amino acid sequence of a protein is provided, then base sequence of DNA can be analyzed.
- Present on locus of DNA.
- Complete set of genes in a cell is genome.
- Also codes for rRNA and tRNA during protein synthesis.

Prokaryotes
DNA is naked (no histones)
DNA is circular
Genes do not contain introns
DNA found in cytoplasm (nucleoid)

Eukaryotes
DNA associated with histones
DNA is linear
Genes may contain introns
DNA found in nucleus

Nitrogenous Base (A, C, G, T)

A = T (adenine and thymine join by 2 H-bonds)
C ≡ G (cytosine and guanine join by 3 H-bonds)

Triplet or genetic code:

- 3 bases of DNA form complementary 3 bases of mRNA.
- 3 bases of mRNA (base triplet) are called codon.
- 1 codon codes for 1 amino acid.

Genetic Code Table:

First letter	U	C	A	G
U	UUU Phe UUC Phe UUA Leu UUG Leu	UCU Phe UCC Phe UCA Leu UCG Leu	AUU Ile AUA Ile AUG Met	GUU Val GUC Val GUA Val GUG Val
C	CUU Leu CUC Leu CUA Leu CUG Leu	CCU Pro CCC Pro CCA Pro CCG Pro	CAU His CAC His CAA Stop CAG Stop	GUU Val GUC Val GUA Val GUG Val
A	AUU Ile AUA Ile AUG Met	AUU Ile AUA Ile AUG Met	AUU Ile AUA Ile AUG Met	AUU Ile AUA Ile AUG Met
G	GUU Val GUC Val GUA Val GUG Val	GUU Val GUC Val GUA Val GUG Val	GUU Val GUC Val GUA Val GUG Val	GUU Val GUC Val GUA Val GUG Val

Prokaryotic cells

- DNA is circular and lies freely in the cytoplasm
- Very few cell organelles
- No ER present
- DNA is naked
- Cell wall present- wall contains murein, a peptidoglycan

Cell Division

- Binary fission
- Replication of DNA & plasmids
- Division of cytoplasm
- 2 daughter cells

Many prokaryotic cells have:

- one or more plasmids
- a capsule surrounding the cell
- one or more flagella.

EVIDENCE FOR CHEMOSMOSIS

- No ATP made in mitochondria (without outer membrane)
- Lower pH in intermembrane compartment
- more negative potential in matrix
- no ATP made if stalked particles removed
- no ATP made if oligomycin present (blocks H⁺ channels)
- ATP can still be made if pH gradient across membrane provided.

Metabolic Pathways:

- GLYCOLYSIS (CYTOSOL):** Glyceraldehyde-3-phosphate → Pyruvate. Produces 4 ATP, 2 NADH.
- Link Reaction:** Pyruvate → Acetyl CoA. Produces 1 NADH.
- KREBS' CYCLE (MATRIX):** Acetyl CoA enters cycle. Produces 3 NADH, 2 FADH₂, 4 CO₂.
- OXIDATIVE PHOSPHORYLATION (INNER MEMBRANE):** Electrons from NADH and FADH₂ flow through ETC (EC1-EC3) to reduce O₂ to H₂O. Produces 34 ATP.

INNER MEMBRANE:

- Highly folded cristae → SA
- Impermeable to H⁺ → build up of electrochemical gradient
- Contains stalked particle (ATP synthase)
- Electron carrier for oxidative phosphorylation

Stem cells

- Embryonic stem cells are described as pluripotent.
- Adult stem cells are only able to produce a few types of cell and may be described as multipotent.
- Unipotent stem cells can differentiate into only one cell type.
- Bone marrow transplantation is the only form of this therapy that has progressed beyond the experimental stage into routine medical practice.
- Stem cells that can produce any type of cell are described as totipotent.
- The extent of the power of a stem cell to produce different cell types is variable and is referred to as its potency.
- Stem cell therapy is the introduction of new adult stem cells into damaged tissue to treat disease or injury.

Stem Cell Differentiation:

- Totipotent embryonic stem cell → Pluripotent embryonic stem cells (Endoderm line, Mesoderm line, Ectoderm line) → Multipotent stem cells (Lung, Pancreas, Heart muscle, Red blood cell, Skin, Neuron)
- Human embryonic stem cell → Induced pluripotent stem cells → Adult bone marrow, skin, cord blood, deciduous teeth

Carbohydrates (Sugars)

Disaccharides (dimers) [C₁₂H₂₂O₁₁]

- Sucrose = Glucose + Fructose
- Lactose = Glucose + Galactose
- Maltose = Glucose + Glucose

Monosaccharides (monomers) (C₆H₁₂O₆)

Three monosaccharides common: α-Glucose, β-Glucose, Fructose

Polysaccharides (polymers) (C_nH_{2n}O_n) where 'n' may be up to 3000

- Storage Polysaccharides:** Starch = amylose + amylopectin, Glycogen = repeating glucose sub-units
- Structural Polysaccharides:** Cellulose, Chitin, Hemicellulose, Pectin

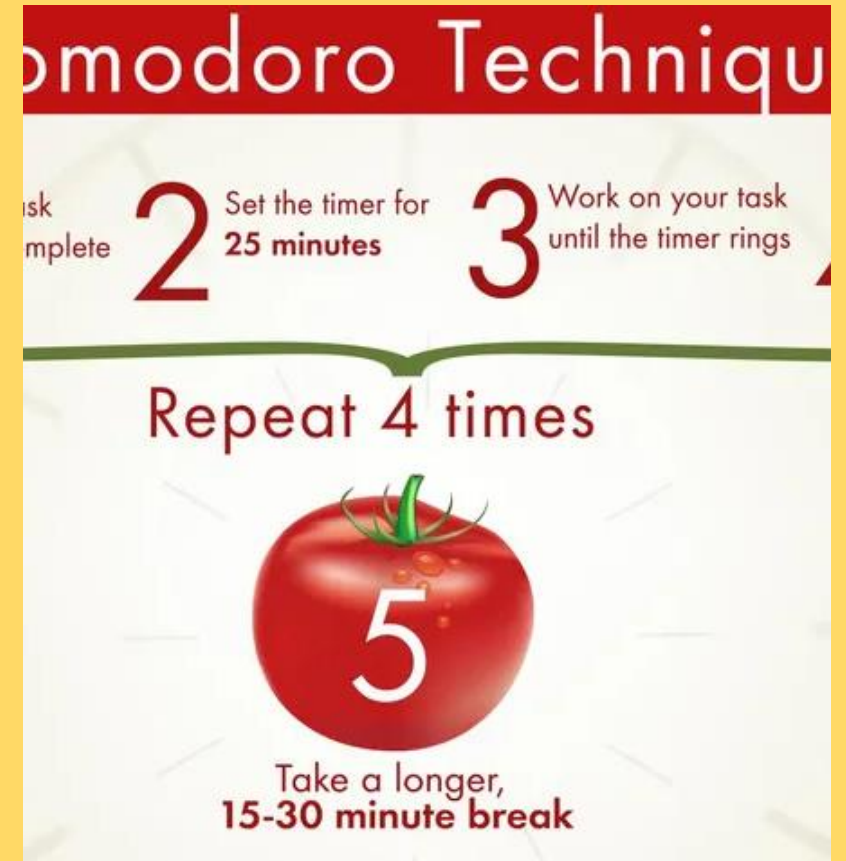
- Cellulose** – plant and algae cell wall, monomer β-glucose.
- Chitin** – fungi cell wall and exoskeleton of arthropods, glucose + glucosamine.
- Hemicellulose** – plant cell wall, polymer of xylose units.
- Peptidoglycan** – bacterial and cyanobacterial cell wall, glucose + short chains of amino acids.
- Pectin** – plant cell wall, galactose + galacturonic acid.

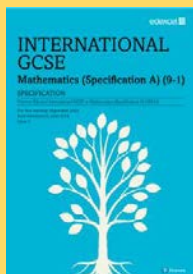
Two monosaccharides join together by glycosidic bond to form disaccharides.

Position of OH - group at C1

Pomodoro technique

- Identify a task or tasks that you need to complete.
- Set a timer for 25 minutes.
- Work on a task with no distractions.
- When the alarm sounds, take a 5-minute break.
- Repeat the process 3 more times.
- Take a longer 30-minute break and start again.
- This technique will stop cognitive overload





Retrospective Timetable



Maths

Algebra and functions	19/11/2020 ●	20/11/2020 ●	23/11/2020 ●	
Coordinate geometry	19/11/2020 ●	23/11/2020 ●	24/11/2020 ●	26/11/2020 ●
Sequences and series	20/11/2020 ●	23/11/2020 ●	25/11/2020 ●	27/11/2020 ●
Trigonometry	18/11/2020 ●	20/11/2020 ●	23/11/2020 ●	
Exponentials and logarithms	19/11/2020 ●	22/11/2020 ●	24/11/2020 ●	
Differentiation	20/11/2020 ●	22/11/2020 ●	25/11/2020 ●	27/11/2020 ●
Numerical methods	18/11/2020 ●			
Vectors	18/11/2020 ●	19/11/2020 ●		

1. You will make a page for all your subjects
2. You will need the subjects' specifications with all the topics
3. Write all the topics up in that subject
4. Each time you visit a topic and revise it, you put a date next to it and RAG it.
5. If it's green, you don't visit that topic as much as a red one.

Active learning

- Get together with other pupils from your class and test each other
- Get family members to test you
- Talk to yourself out loud
- This technique supports deeper learning, so retrieval practice is easier





Past Paper Questions

- It strengthens retrieval practice
- It develops exam technique and familiarity
- It helps identify where their/your strengths and weaknesses are
- Timing the completion of the papers makes it real

GCSE Pod

- This is an online learning and a revision platform that provides students with thousands of short, subject-specific, 3–5-minute video lessons called "Pods".
- Students can use the platform to create personalised playlists, track their progress, and test their knowledge with quizzes, making learning more engaging and manageable for their GCSEs



GET ORGANISED, DE-STRESS,
GET GREAT GRADES
GET GCSEPOD!

Over 3,500 audio-visual podcasts

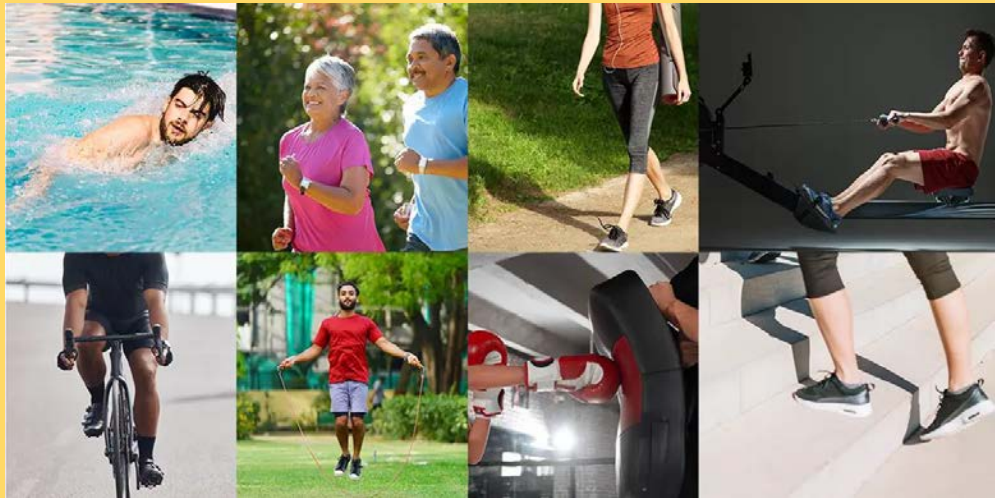
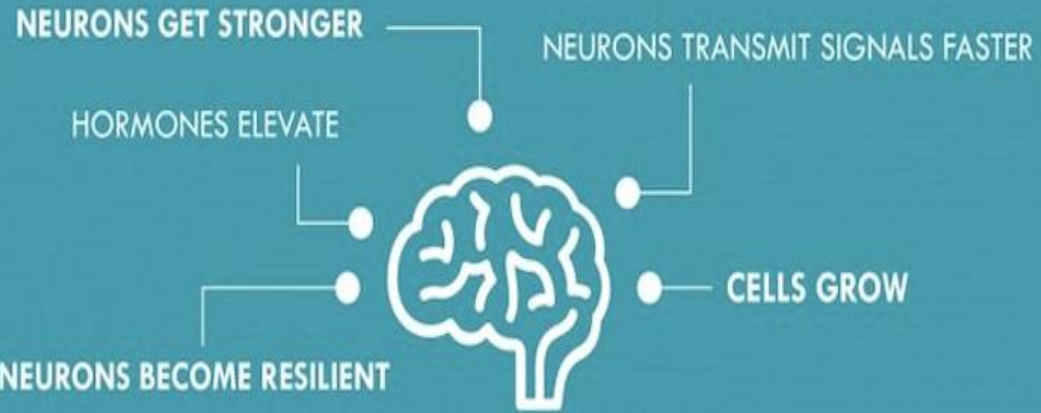
Watch on mobile devices, tablets and PCs

Designed to squeeze exactly the right
knowledge you need for exam success into
short 3-5 minutes chunks

Helps you with learning, homework and
revision



WHAT HAPPENS TO YOUR BRAIN WHEN YOU EXERCISE?



THE SCIENCE BEHIND EXERCISE & YOUR BRAIN

AS A RESULT, EXERCISE CAN...



INCREASE
ACTIVITY IN THE
TEMPORAL LOBE



INCREASE
YOUR ABILITY TO
STORE MEMORIES



INCREASE
ENDORPHINS IN
THE PITUITARY GLAND



REDUCE
STRESS, ANXIETY,
& DEPRESSION



INCREASE
THE PRODUCTION
OF BDNF



MAINTAIN
HEALTHY
NEURONS

Aerobic activity has been linked to improving self-regulation, planning and attention. While anaerobic activity improves concentration and memory.

Stroth et al., 2009 & Rashidi et al., 2016

THE BRAIN BENEFITS OF EXERCISE



EXERCISE FACILITATES INFORMATION PROCESSING AND MEMORY FUNCTIONS



EXERCISE RELEASES ENDORPHINS WHICH TRIGGERS POSITIVE FEELINGS IN THE BODY



REDUCES ANXIETY AND DEPRESSION

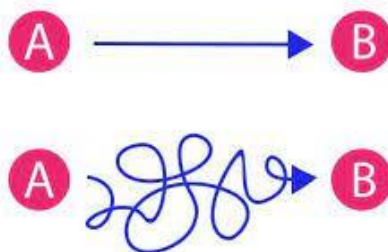


IMPROVES COGNITIVE FUNCTIONING



IMPROVES ATTENTION

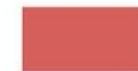
Even short bouts of activity can lead to improved concentration and attention, which will directly affect how you learn.



IMPROVES BLOOD FLOW TO THE BRAIN



INCREASED RETENTION OF NEW INFORMATION



IMPROVED PROBLEM SOLVING SKILLS



IMPROVES MOOD AND SLEEP



EXERCISE REDUCES THE EFFECTS OF STRESS



IMPROVED LEARNING



STIMULATES GROWTH OF BRAIN CELLS



BOOSTS BRAIN REGENERATION



IMPROVES YOUR FOCUS

Signs to watch for in your children

- losing touch with friends and the activities you enjoy.
- feeling moody, low or overwhelmed.
- having trouble making decisions.
- losing appetite or overeating.
- sleeping poorly and struggling to get out of bed.
- difficulty getting motivated to start studying.
- tense muscles or headaches

Understanding exam stress



Physical Symptoms

Things like headaches, fatigue, muscle tension, digestive issues, rapid heartbeat, and difficulty sleeping are all physical manifestations of exam stress.



Emotional Signs

Feelings of anxiety, irritability, mood swings, tearfulness, lack of motivation, and self-doubt are prevalent emotional responses to exam pressure.



Cognitive Signs

Difficulty concentrating, memory lapses, negative thoughts, negative talk, and a sense of being overwhelmed are often associated with exam stress.

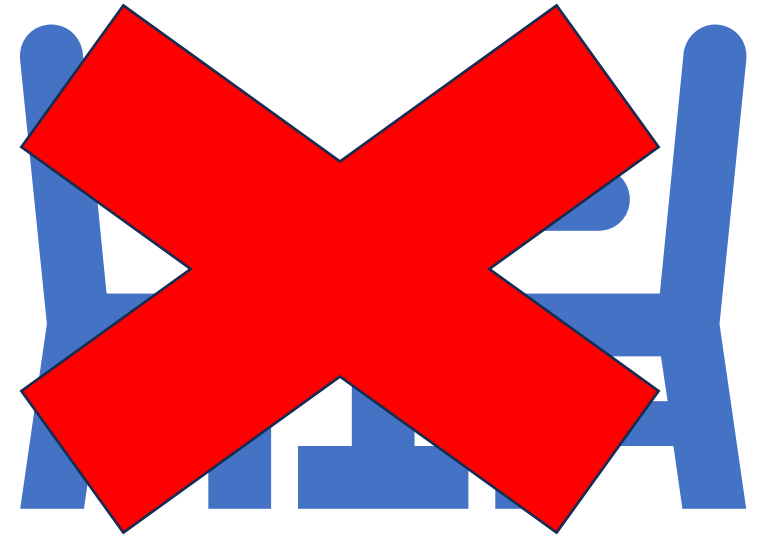
What you can do

- Ensure they have a balanced diet
- Help get enough sleep - 8 – 10 hours
- Encourage them to study
- Ask revision questions
- Talk about exam nerves – normal to feel anxious
- Encourage exercise
- Motivate and encourage them to think about their goals
- Be flexible – don't worry about the state of their room
- Celebrate with an end-of-exam treat or celebration
- **Stay calm – exams don't last forever**



Recap on what not to do for revision

- Sit and do nothing – ask a teacher/parent or a revision buddy for help
- Highlight or rewrite your notes
- Complete your revision by just reading (this is passive learning)
- Do not cram – last-minute revision is worthless due to stress and cognitive overload
- Panic/stress – you will lose the use of your frontal lobes, which help aid higher-level thinking
- Rote learn things (not knowing the meaning behind what you are learning)
- Listen to “other words” while revising



Please enjoy your refreshments

- While we have a 20-minute break, if you have any questions, please write the question on a sticky notes which are at the back of the room



What do you take away

- A better understanding of the expectations of revision
- Knowledge of how to revise
- Together is better
- How exercise can help memory
- How to support your child's wellbeing



Contact information

- Miss Sarah Rigby – Psychology teacher
SarahRigby@bisak.org
- Miss Sarah Gilbertson – English teacher and Head of Year 10
SarahGilbertson@bisak.org
- Miss Naheed Yousif – Science teacher and Head of Year 11
NaheedYousaf@bisak.org
- Mr Jamie Coll – Deputy Head of Senior School
JamesColl@bisak.org

The links below have been put onto the school website

- Short Term Memory - <https://www.youtube.com/watch?v=WfIbP8a4x8A>
- Long Term Memory - <https://www.youtube.com/watch?v=E4evnus2olo>
- Working memory - <https://www.youtube.com/watch?v=PWHq95-hkkA>
- Ponodoro technique - <https://www.youtube.com/watch?v=mNBmG24djoY&t=192s>
- Mind maps - <https://www.youtube.com/watch?v=MC6TyoGxy-A>
- Flash cards - <https://www.youtube.com/watch?v=eVajQPuRmk8&t=187s>
- Retrospective timetable - <https://www.youtube.com/watch?v=z88tsBnAsPw&t=2s>
- Knowledge dump - <https://www.youtube.com/watch?v=wNavd5SzNWM>
- Active revision - <https://www.youtube.com/watch?v=lyvlgRf7u3Y>
- GCSE Pod - <https://members.gcsepod.com/login>

References

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