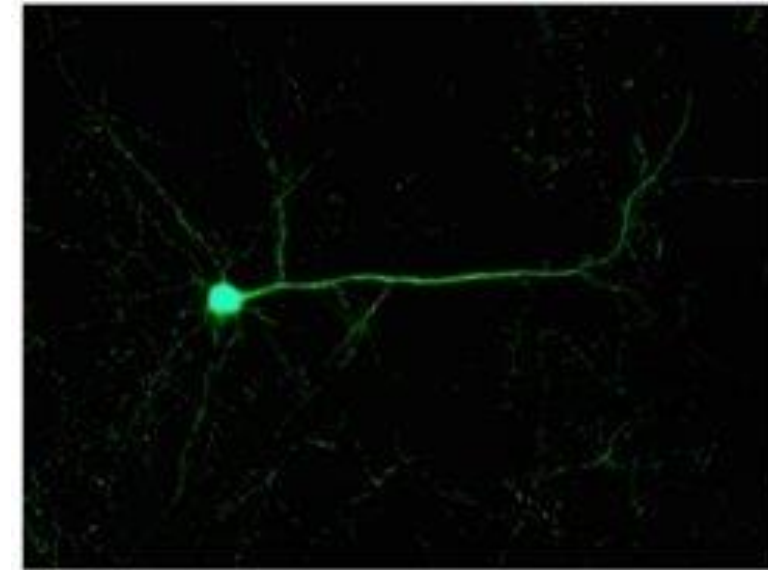


Your Brain: An Owner's Manual

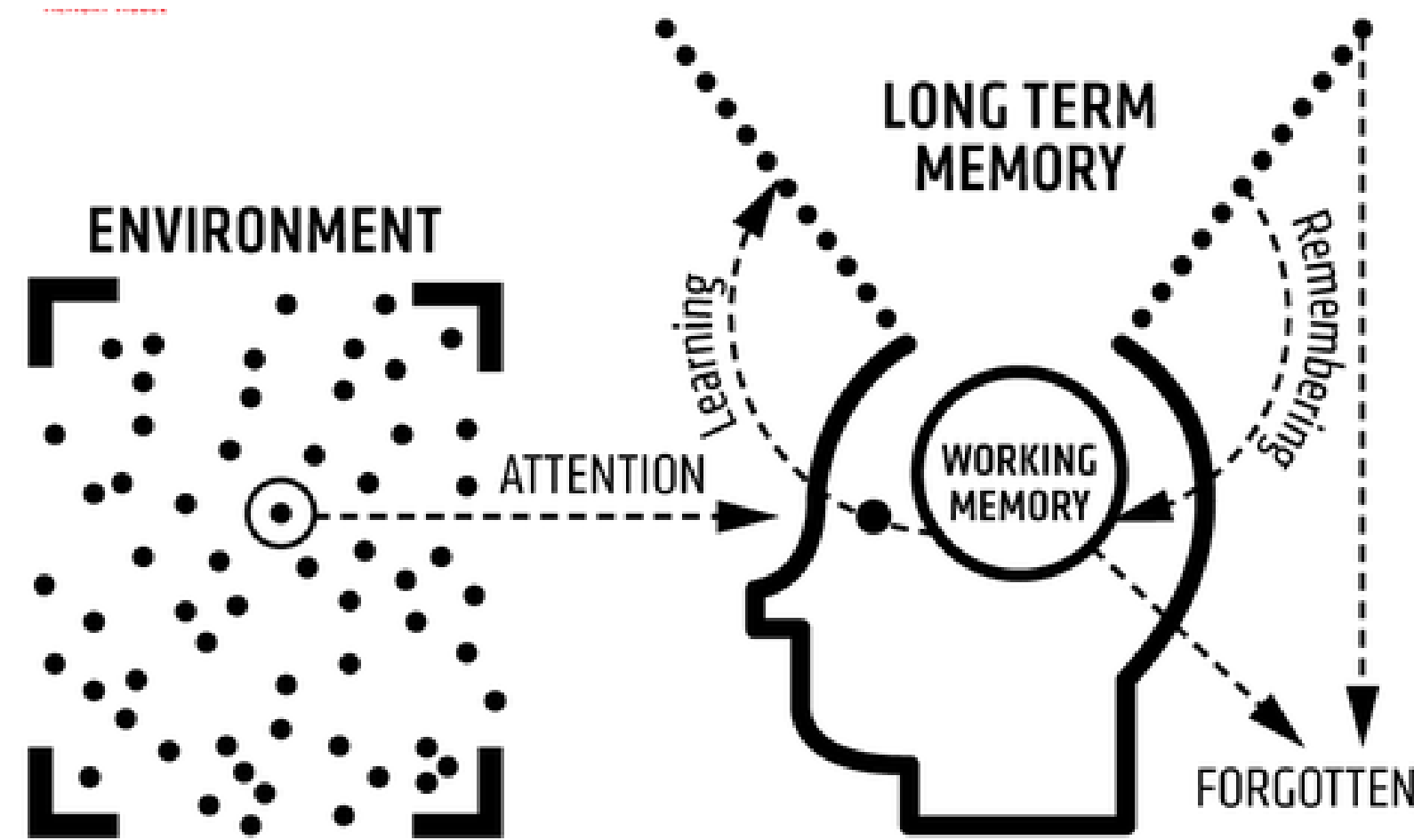
Your brain is very 'plastic' (able to change)
It is made up of billions of nerve cells, called neurons.
The neurons can "talk" to each other, mostly using chemical messengers.
We have to force the neurons to talk to each other (create neural pathways)
The more often we force them to talk to each other, the stronger these neural pathways get.



This neuron from a mouse brain shows the bulbous cell body with a single axon projecting from it. As the brain learns, neurons relay information faster and more efficiently. The mouse was genetically modified to make a fluorescent protein that glows green.

COURTESY OF HADLEY BERGSTROM/NIAAA

It has an amazing long-term memory but rubbish short term (working) memory!



The environment essentially has unlimited external information.

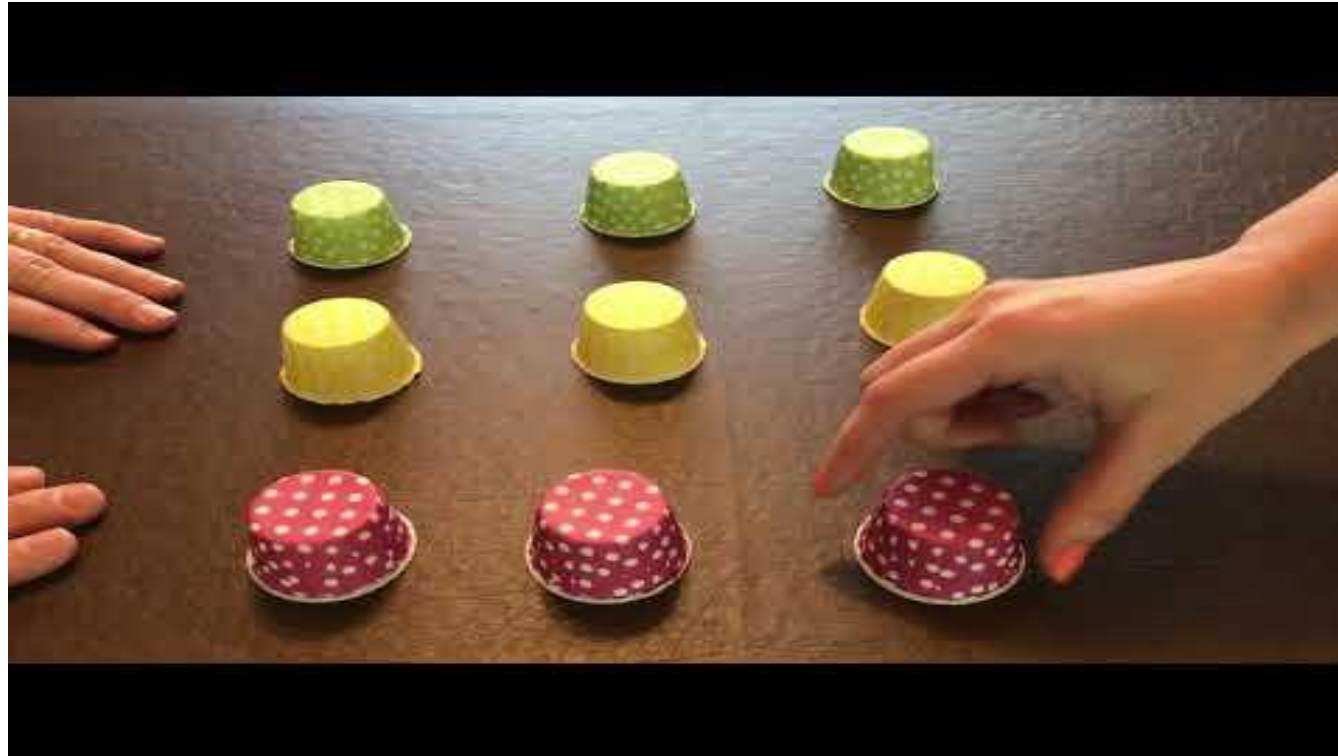
Working memory only lasts 15-30 seconds and can only store 5-9 items of information. Your working memory and your attention are comparatively limited. Working memory – “the bottleneck of thought”

“Memory is the residue of thought” (Willingham)
If there is no change in long term memory then no learning has taken place.
Knowledge does not stay in your long term memory unless you think about it regularly;
Long-term memory has unlimited storage capacity, and information stored within LTM can be stored there indefinitely.

At the age of 11 your working memory cannot increase much in capacity. You can however, get better at using it efficiently.

It can't cope with distractions

youtube.com/watch?v=_bnnmWYI0IM



No phones

No music (unless it is music without any lyrics and on a rolling playlist that they don't keep choosing from!)

It likes being very well-organised

New York

Joanna

Elsa

Football

Apple

Hong Kong

Pear

Orange

Cricket

Karate

Montevideo

Group A

Group B

<u>Cities</u>	<u>Names</u>	<u>Fruits</u>	<u>Sports</u>
London	Lucy	Banana	Rugby
Shanghai	Zoe	Satsuma	Hockey
Paris	Sophie	Grape	Surfing

sein -- to be			
singular		plural	
<i>ich</i>	bin	<i>wir</i>	sind
<i>du</i>	bist	<i>ihr</i>	seid
<i>er</i>			
<i>sie</i>	ist	<i>sie</i>	sind
<i>es</i>			
formal (s. & pl.)			
<i>Sie</i>		sind	

H	
Li	Lithium
Na	Sodium
K	Potassium
Rb	Rubidium
Cs	Cesium
Fr	Francium

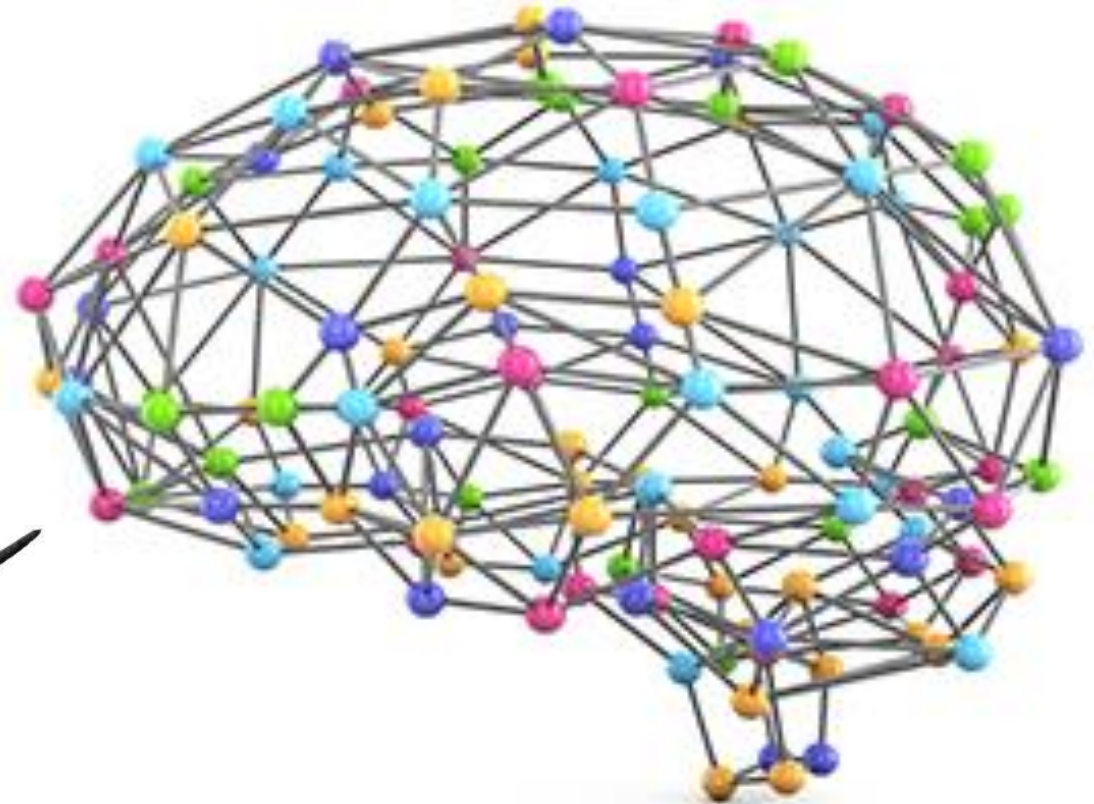
Classifying or grouping items is important for the structure of our memory. With these groups or 'schemas', we can easily learn new information. Shuell (1969): Memory is based on our ability to organise words.

It benefits from links

The curvilinear structure of a mind map (NOT a spider diagram) mimics the sinuosity of neurological pathways in the brain
Brain is a network, you need to activate it by prompting it.

We can use prompts to recall information

How many types of dog can you name?
How about now?



It gets stronger with practice

1) 5×5

2) 12×10

3) 7×8

4) 9×999

5) 1200×120

1) 25

2) 120

3) 56

4) 8991

5) 144000

We have to concentrate hard when we first learn to do something.

The more we practice a task, the easier we find it, and the more mental bandwidth we have for other stuff!

Automation is where recall of information from your long term memory is done effortlessly and without conscious intent.

Automation again frees up cognitive space for deep thinking.

Automation is achieved by repeated practice. Many people make the mistake that learning is JUST about studying something in front of them/being taught it brilliantly first time round. For learning to be effective, you also need to practice recalling (retrieving) it, via quizzes and tests. These force yourself to TRY to pull information out of your memory (Retrieval Practice)



It needs to be made to work hard

WHAT DOES **NOT** WORK:

Highlighting
Underlining
Rereading

One study of undergraduates found that highlighting and underlining reduced their ability to draw inferences from a history textbook. These two techniques seem to draw a student's attention toward individual items rather than to connections across items.

What Students Should Do Instead: Any other strategy; **rereading is a waste of time.**

NOT SURE:

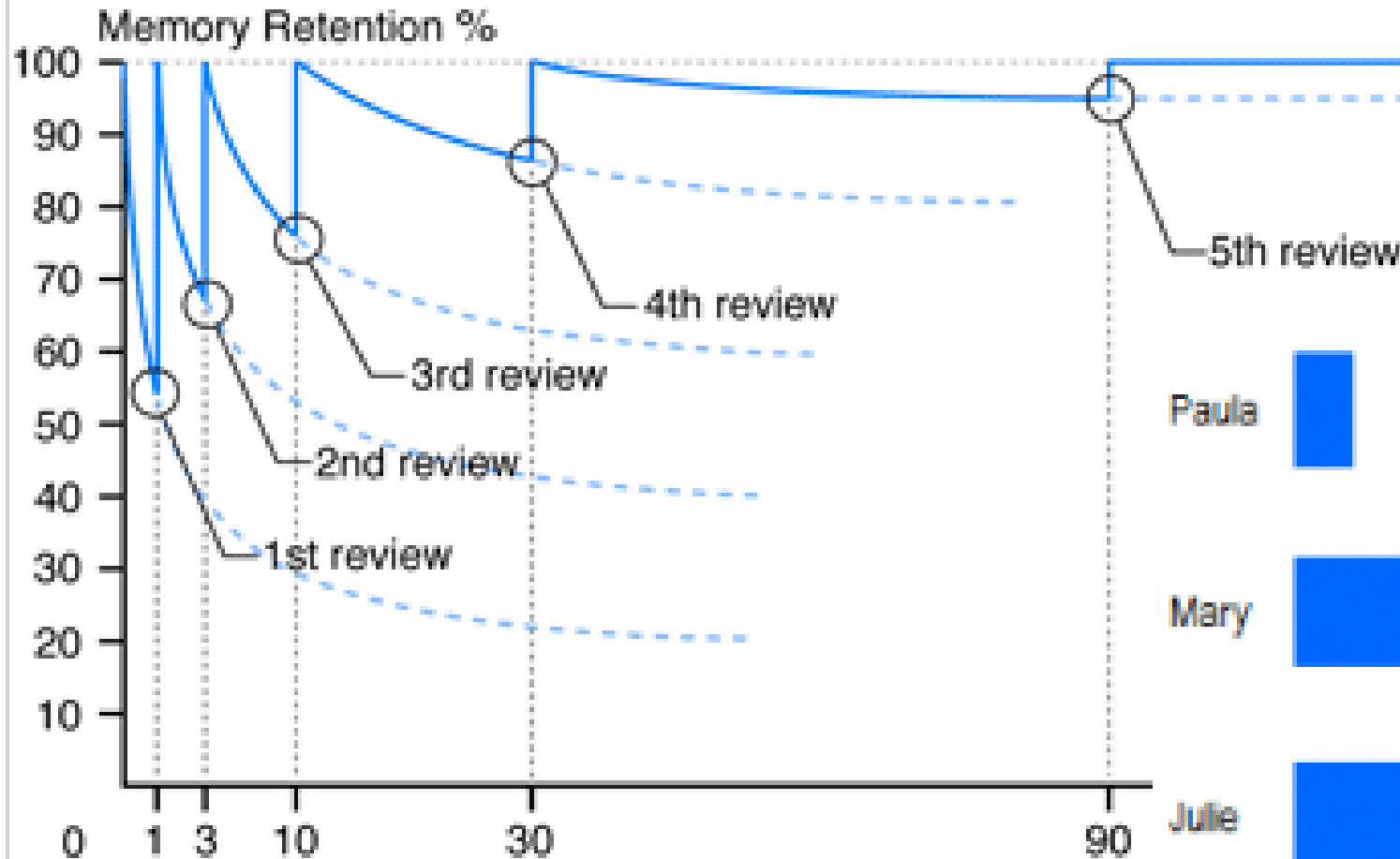
Summarising – you need expert training

Mnemonics – only for language vocabulary and definitions

It benefits from a break

1. Learn
2. Recall perfectly twice in a row
3. Wait – longer each time
4. Relearn
5. Recall perfectly twice in a row: it won't take you as long this time!

The Forgetting Curve



Paula



A grade

Half hour sessions

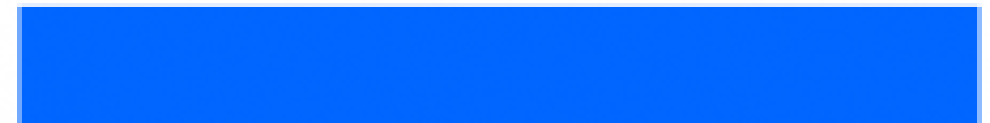
Mary



B grade

1 hour sessions

Julie



C grade

4 hour session

Making good quality FLASHCARDS

These can be used for more than just language vocab or key terms/definitions, they can deepen understanding too!

BONUS CARDS:

- Why is that the answer?
- How might the answer be different if.....
- Is that always the correct answer?
- How does that link to the previous flashcard?
- Do you have an example?
- Can you prove it?

Question on one side, answer on the other

- Make them about the most important info, not whatever comes to mind;
- Make them about the info that your teacher/self-testing has identified as missing/weak;
- Make the questions progressively harder.....
 - Name 3 elements from the Halogens in the Periodic Table
 - Describe the characteristics of a Halogen
 - Explain how Halogens react with Hydrogen and why
- Don't chuck flashcards away just because you got it right twice, 'overlearning' works!
- Pause before turning over - the act of trying to remember, even if unsuccessful, aids learning.

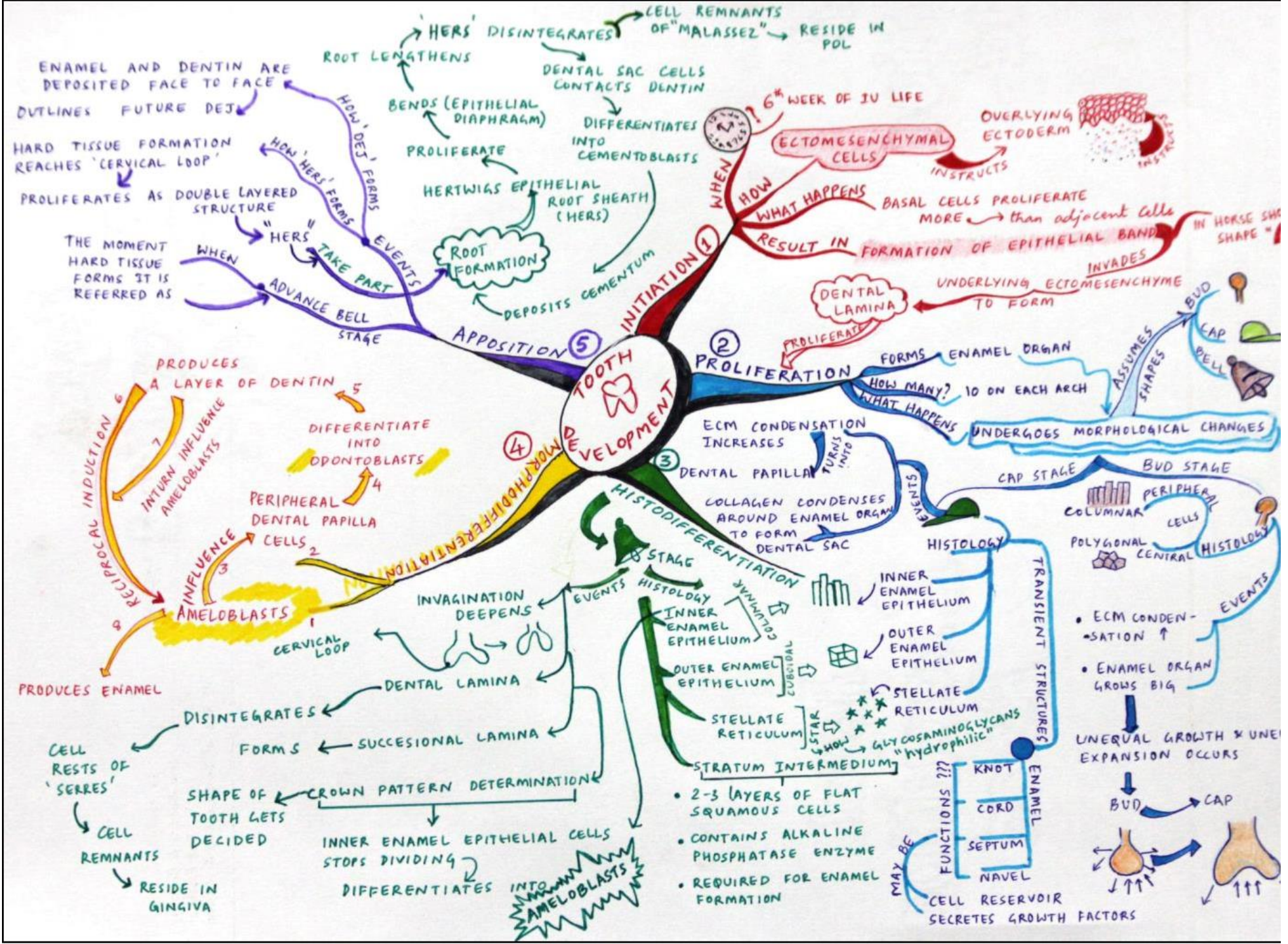
Good quality Mindmaps

- Structure your page according to the 'big questions' or sections of the specification – NOT just random bits of information;
- Start from blank, with no books/notes open – make your brain work hard to RETRIEVE information!
- Draw and justify links between bits of information, as this will likely prompt further retrieval
- Now open your notes/books and add in any missing information
- Later, try starting from a blank page again! What should happen to how much you remember?

Great example of a mindmap

Look at the:

- structure
- order
- links



Test n'Fold

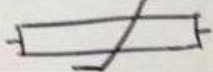
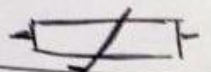


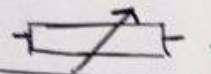
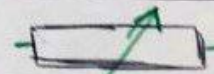
Write hard
questions for
yourself
Not all questions
are the same:

What = simple
When
Why
How
What if
Does
Could = harder

You should get
more right over
time

Test n' Fold – Mock Revision

Week 4 - Circuits, Charge and Current

Question	Test 3	Test 2	Test 1
What is the equation that links charge, current and time?	$\text{charge} = \text{current} \times \text{time}$ ✓	$\text{charge} = \text{current} \times \text{time}$ ✓	$\text{charge} = \text{current} \times \text{time}$ ✓
What is the symbol for a thermistor?	 ✓	 ✓	 ✓
What is the symbol for a variable resistor?	 ✓	 ✓	 ✓
What is the equation that links current, potential difference and resistance?	current = p.d / resistance $\text{resistance} = \frac{\text{p.d}}{\text{current}}$ ✓	$\text{resistance} = \frac{\text{p.d}}{\text{current}}$ ✓	$\text{resistance} = \frac{\text{p.d}}{\text{current}}$ ✓
How do you set up a voltmeter in a circuit, series or parallel?	parallel ✓	parallel ✓	parallel
How do you find the total resistance of resistors connected in series?	add them up ✓	add them up ✓	add them together
What happens to the total resistance when resistors are added in parallel, increase or decrease?	decrease ✓	decrease ✓	decrease ✓
What happens to the total potential difference in a series circuit?	splits between components ✓	splits between components	splits between components
What is used to measure current?	ammeter ✓	ammeter ✓	Ammeter ✓
What are the units for charge?	coulombs ✓	coulombs ✓	coulombs Joules x
Score	10 / 10	9 / 10	5 / 10

Detective Interrogation

Step 1: Can you speak for one minute on a particular topic without stopping, hesitating or going off topic? Try it.

Step 2: Your partner can now stop you whenever you make a **generalisation** (“all Roman emperors were evil”), or **assumption** (“and obviously, lithium passes two electrons to sodium”), and ask you to explain yourself – WHY? HOW? WHAT IF?

This forces you to make connections between new and old material, and reveals where there might be gaps in your knowledge.



CRAMMING DOESN'T WORK! START NOW!

Ebbinghaus (1885): 'a suitable **distribution** of a considerable number of **repetitions over a space of time** is decidedly more advantageous than the massing of them at a single time'.

'Cramming' of information is unfavourable – indeed, it may lead to what McCloskey & Cohen (1989), refer to as 'catastrophic interference', whereby rapid change to neurological pathways damages the existing knowledge structure.

Carey (2014): With longer spaces, 'You find out which **cues**, which **associations...are** working and which aren't...if they're not working, you come up with new ones'.

Starting revision earlier means that study sessions can be less frequent, study time can be less concentrated hence studying can feel less strenuous and LESS STRESSFUL.

