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Chapter 7: Brain Neuropsychology

Complete Revision Guide & Practice Questions

AQA GCSE PSYCHOLOGY

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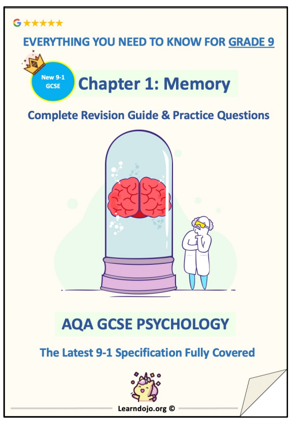

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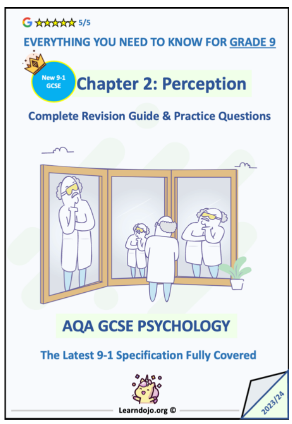

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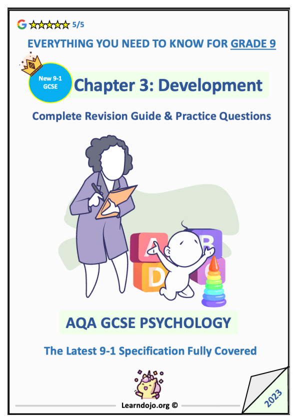

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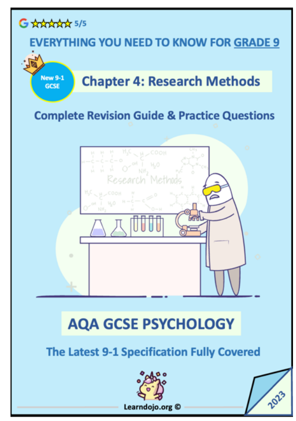

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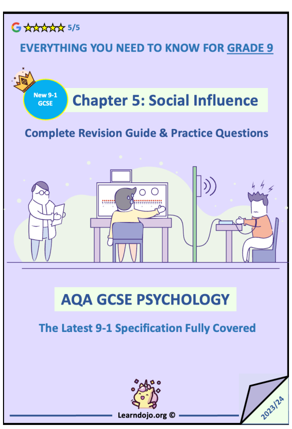

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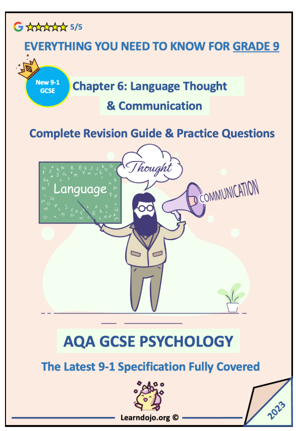

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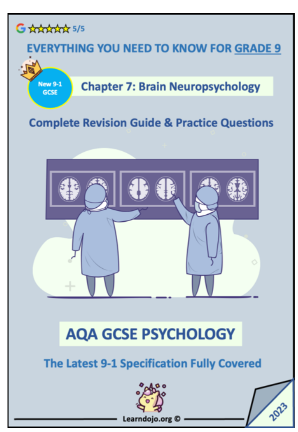

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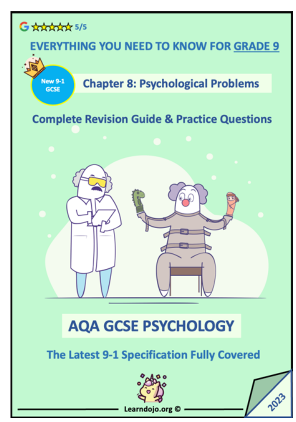

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This resource covers AQA GCSE Psychology and the brain neuropsychology topic. Everything in this pack follows the specification exactly so it should provide you with everything you need to know to master this topic.

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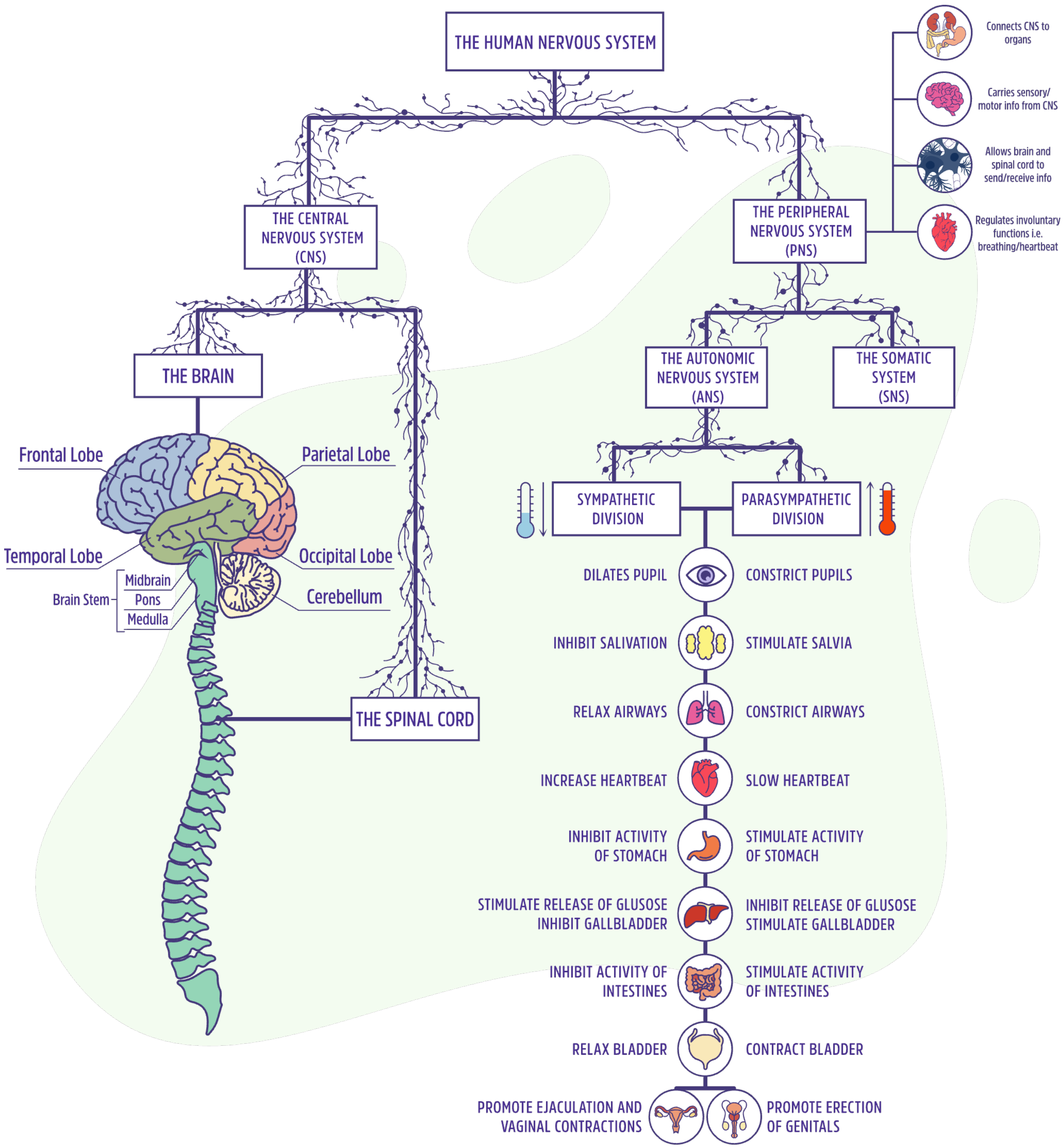
What the specification says you need to know for Brain Neuropsychology

Content	Additional Info
Structure and function of the nervous system	The divisions of the human nervous system: central and peripheral (somatic and autonomic), basic functions of these divisions. The autonomic nervous system and the fight or flight response. The James-Lange theory of emotion.
Neuron structure and function	Sensory, relay and motor neurons. Synaptic transmission: release and reuptake of neurotransmitters. Excitation and inhibition. An understanding of how these processes interact. Hebb's theory of learning and neuronal growth.
Structure and function of the brain	Brain structure: frontal lobe, temporal lobe, parietal lobe, occipital lobe and cerebellum. Basic function of these structures. Localisation of function in the brain: motor, somatosensory, visual, auditory and language areas. Penfield's study of the interpretive cortex.
An introduction to neuropsychology	Cognitive neuroscience: how the structure and function of the brain relate to behaviour and cognition. The use of scanning techniques to identify brain functioning: CT, PET and fMRI scans. Tulving's 'gold' memory study. A basic understanding of how neurological damage, e.g. stroke or injury can affect motor abilities and behaviour.

The Structure and Function of the Nervous System

For this section on Structure and Function of the nervous system, you need to know the following for GCSE Psychology:

- The divisions of the human nervous system: central and peripheral (somatic and autonomic), basic functions of these divisions.
- The autonomic nervous system and the fight or flight response. The James-Lange theory of emotion.



The nervous system is an extremely complex network of nerve fibres and nerve cells that pass information around the body (see model below outlining this). As the nervous system is very complicated with many different functions, it is practical to divide it into sections to better understand how it works.

The first division is between the **central nervous system** (CNS) and the **peripheral nervous system** (PNS).
The central nervous system coordinates incoming information and makes decisions about movement or other activities. It consists of the brain and the spinal cord.

The peripheral nervous system (PNS) collects information from, and sends information to, different parts of the human body. The peripheral nervous system consists of two sections which are the somatic nervous system (SNS) and the autonomic nervous system (ANS).

The somatic nervous system is a network of nerve fibres running throughout the body, and sense receptors such as those in our skin, muscles and internal organs. The nerve fibres pass information to and from the CNS using sensory and motor neurons that are myelinated (covered with a myelin sheath which is a fatty wrapping), which helps the messages travel faster.

The autonomic nervous system (ANS) is a network of special nerves that also take information to and from the CNS but does so more slowly as the nerve fibres are not myelinated. The ANS uses information from our internal organs to coordinate our general physiological functioning while also responding directly to information such as stressful or emotional events.

The Functions of the Nervous System

The different divisions of the nervous system all have different functions. The central nervous system coordinates incoming sensory information and responds to it by sending appropriate instructions to other parts of the nervous system. Thinking, memory, decision-making and language are all part of the central nervous system as it also contains our store of knowledge, habits and other forms of learning allowing us to combine past experience with current situations to make relevant decisions.

The two sections of the peripheral nervous system are the the somatic system (SNS) and the autonomic nervous system (ANS). The somatic nervous system collects information from both the outside world and our internal organs and passes this on to the central nervous system. It also receives instructions from the central nervous system for big movements or small reactions to stimuli. In short, this is what allows us to feel and move.

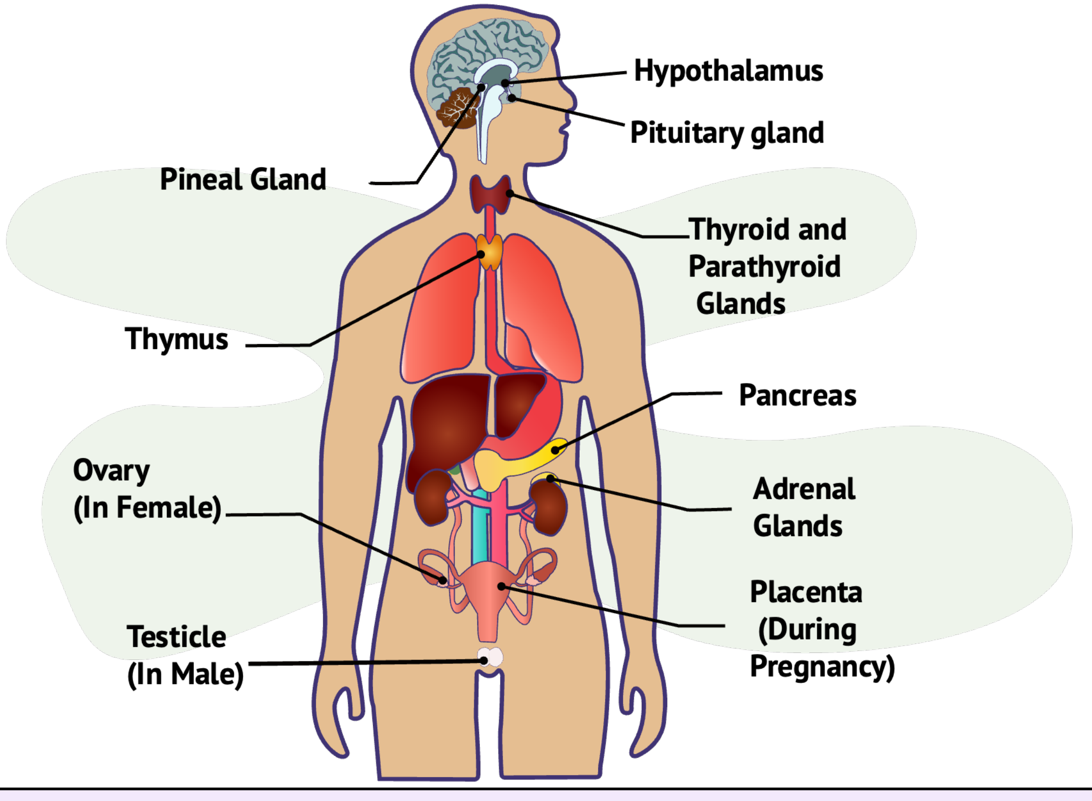
The autonomic nervous system reacts more slowly because it is concerned with moods and feelings. It deals with many different emotions we feel, responds to threats and is also involved in major changes to the body such as during puberty or pregnancy.

The Autonomic Nervous System

The autonomic nervous system (ANS) is split into two divisions: the sympathetic and the parasympathetic divisions.

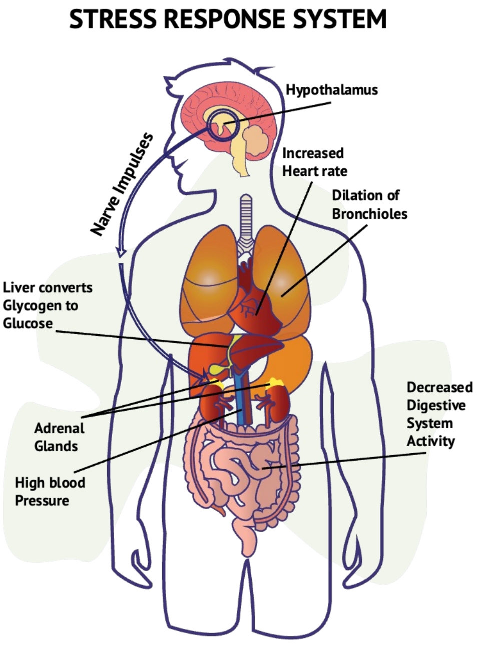
- **The sympathetic division** sets off arousal, which can be mild like a feeling of anxiety, or extreme such as the fight or flight response. This is activated when an individual feels "under threat".
- **The parasympathetic division** allows the body to store up energy when we are not "under threat".

Therefore the autonomic nervous system (ANS) is the part of the nervous system which helps us react quickly and strongly to emergency situations. It's other functions include breathing, digestion and it is the main link between the brain and the endocrine system which is a set of glands that release hormones into the blood stream.



Hormones change the state of the body and when adrenaline is released, it activates the heart, making it beat faster ready for action. The release of adrenaline is part of the fight or flight response.

What is the fight or flight response?



The fight or flight response has evolved to help us **survive threatening situations**.

Imagine you are in a forest and you come across a fierce animal that is ready to attack you. Your body activates the fight or flight response so you can either fight the animal or run away (flight). The fight or flight response allows you to call on energy and strength to deal with the situation regardless of whether you choose to run away or stay and fight. It does this as there is no need for energy reserves if the encounter may potentially leave you dead. The autonomic nervous system (ANS) therefore steps in when a threat is detected and sends messages to your body, making it ready for action which is what we know as the fight or flight response.

The autonomic nervous system switches from parasympathetic activity to sympathetic activity during the fight or flight response. The result is we breath more deeply, our heart rate increases and the blood carries more oxygen. Our eyes also dilate and we also begin to sweat more to cool our muscles. The digestive system also changes so we metabolise sugar quickly, enabling instant energy. The blood also thickens in preparation for possible injury so it clots more easily. The brain also produces natural painkillers known as endorphins.

This states is maintained by the endocrine system, which continues to release adrenaline to keep the body in the aroused state.

To summarise: The parasympathetic division is in control of the body under normal conditions, storing energy. However, if a threat is detected, the sympathetic division activates and the body begins to prepare for action with the fight or flight response. Once the threat as gone, the ANS switches back to having the parasympathetic division in control.

The James-Lange Theory of Emotion

William James was one of the first to investigate the fight or flight reaction and how the body reacted to stressful events by increased heart rate, deep breathing and sweating.

The example of falling down the stairs was given as an example. He described how you save yourself from falling by grabbing the banister and how this reaction happened very quickly. Following this, your heart speeds up, you breath deeply and you begin to sweat.

In short, he believed the body changes are interpreted as an emotion. James believed that emotions were simply us perceiving physical changes in the body which the brain interprets and concludes which emotions are being felt.

James described this in his own words as: "We do not weep because we feel sorry: we feel sorry because we weep".

- **Evaluating The James-Lange Theory of Emotion**
- Not all researchers have not been convinced that the theory is an accurate explanation of how we experience emotional arousal. This is especially the case because for the theory to be correct, there would need to be separate and distinctive patterns of physiological arousal and a different pattern for every different emotion we experience. Researchers have found this is not the case which undermines the James-Lange theory of emotion.
- Schachter and Singer suggested it is not only physiological changes that occur when we perceive a threatening situation, but there was also a cognitive component. The argument is that when we experience stimulation in the ANS, we also interpret the situation we are in. It is these two things that lead to the emotion we then experience. This idea is supported by research evidence which shows physiological change and cognitive interpretations both lead to emotional experiences.
- The James-Lange theory did promote a great deal of research and recognised the importance of the ANS in emotional experiences.

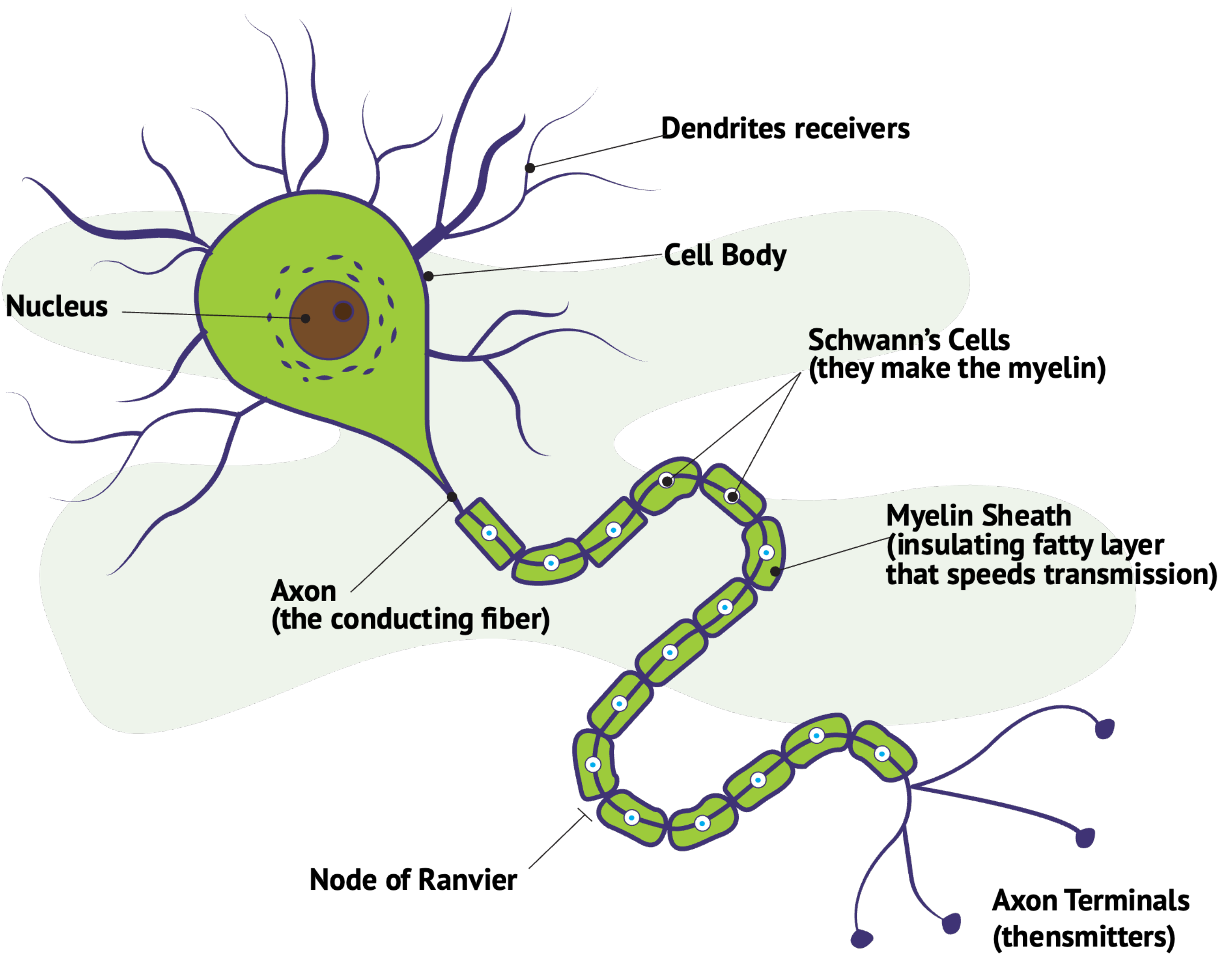
Neuron Structure and Function

For Neuron Structure and Function, you will need to know the following for GCSE Psychology:

- Sensory, relay and motor neurons. Synaptic transmission: release and reuptake of neurotransmitters. Excitation and inhibition. An understanding of how these processes interact.
- Hebb's theory of learning and neuronal growth.

Before we look into neuron structures and their functions, we need to establish what neurons are.

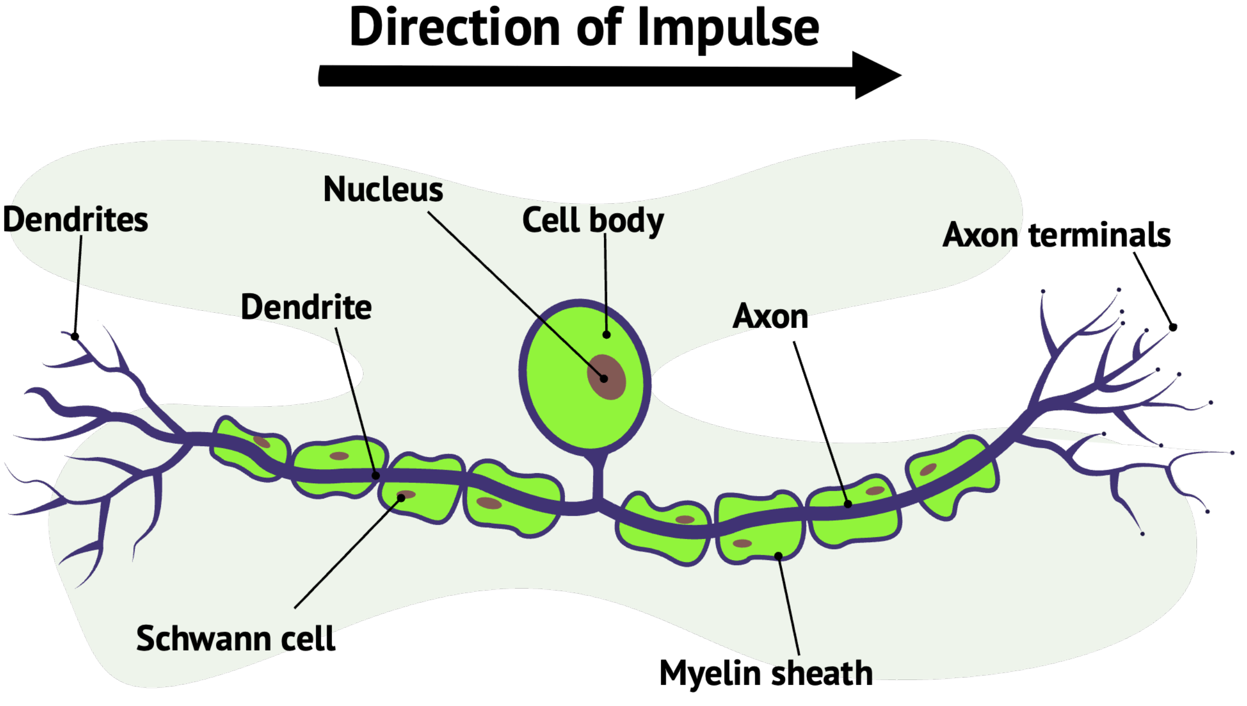
The brain works by electricity, believe it or not. The nervous system is made up of special cells which exchange chemicals to generate small electrical impulses and this is how information is passed around. These special cells are called neurons and there are three types in the nervous system, each with a different function:



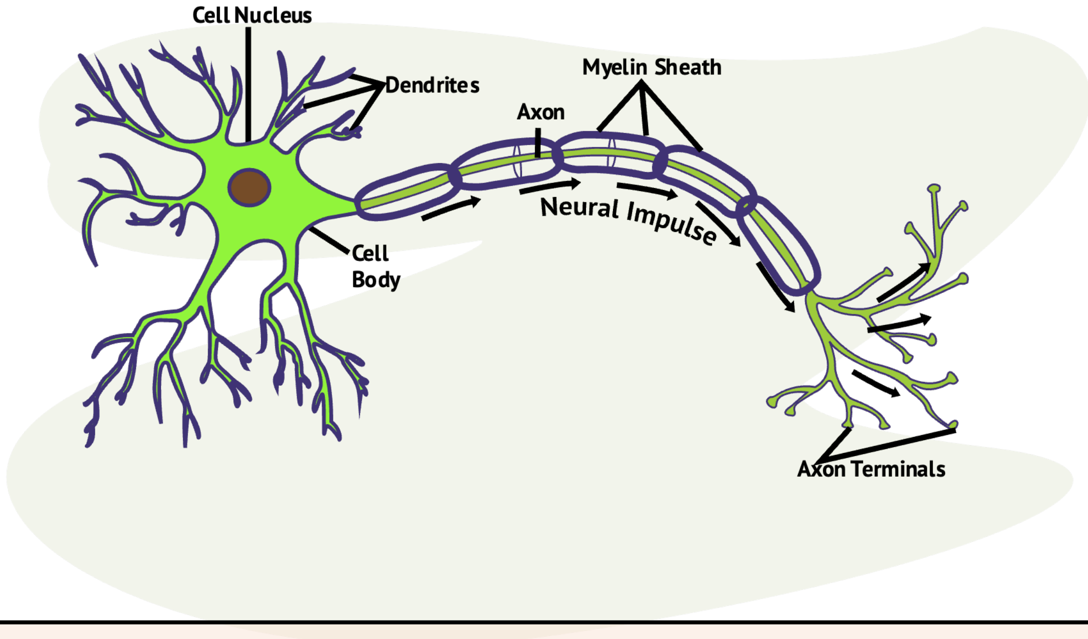
Sensory Neurons

Sensory neurons carry information from the sense organs to the central nervous system (CNS).

They have a cell body, with two stems on either side. One end receives information from the sense organs, and the other passes this on. Each stem ends in small branches called dendrites, which spread out and connect with other cells.



Motor Neurons



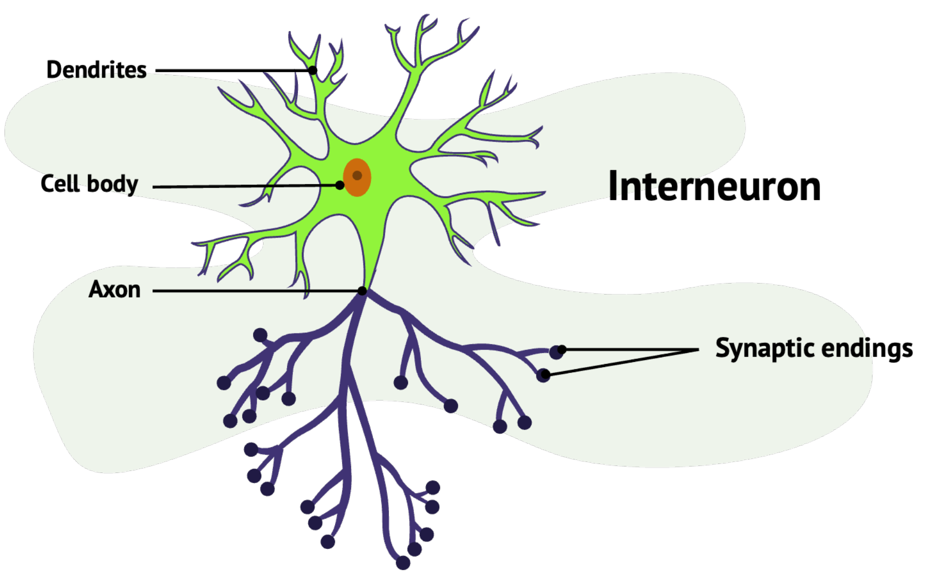
Motor neurons **stimulate muscles for movement.**

Motor neurons send signals from the brain to the muscles. They begin at the spinal cord, a long axon (or stem), leads to the muscle, where it divides into a spread-out set of dendrites called the motor end plate, which connects with the muscles.

Relay Neurons

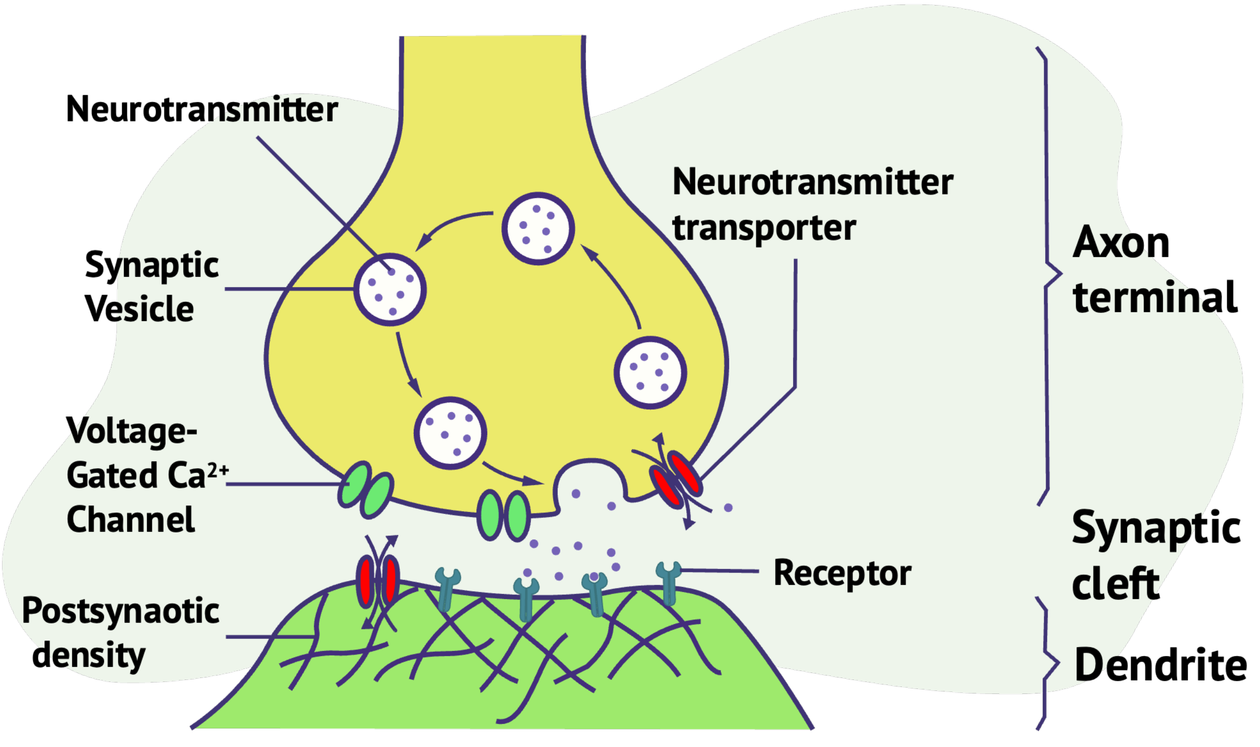
Relay neurons have a cell body surrounded entirely by dendrites.

Relay neurons pass messages to other neurons within the central nervous system (CNS) and make millions of connections between each other, sensory neurons and motor neurons.



Synaptic Transmission

Synaptic transmission is the process where neurons pass messages to other neurons or muscles by releasing special chemicals known as neurotransmitters into tiny gaps between dendrites. These tiny gaps are called synapses. The chemical is released from swellings at the end of each dendrite, called synaptic knobs. These contain vesicles of neurotransmitter and when an electric impulsive reaches them, the vesicles open and release the chemicals into the synapse. These chemicals are then picked up at receptor sites on the next neuron, which are sensitive to that particular neurotransmitter. This is the process of synaptic transmission.



See YouTube video on the Nervous System here: https://youtu.be/VitFvNvRIIY

When a neurotransmitter is picked up at a receptor site, it alters the neurons chemistry slightly. Some synapses will make the receiving neuron more likely to generate an electrical impulse, this is called excitation. Meanwhile other synapses will make the neuron less likely to fire, this is called inhibition. Once the neuron has fired (or not), the neurotransmitter in the receptor sites are released back into the synapse. The re-uptake process then happens so the neurotransmitter can be reused when the next impulse arrives.

Donald Hebb’s Theory of Learning and Neuronal Growth

Hebb suggested that if a neuron repeatedly excites another neuron, neuronal growth occurred and the synaptic knob becomes larger. This meant that when certain neurons act together frequently enough, they become established as a connection and form neural pathways. Hebb referred to these combinations of neurons as “cell assemblies”. He suggested each cell assembly formed a single processing unit.

Hebb suggested that whenever we learn, do or remember certain things, we are developing stronger cell assemblies, and the more we use them, the better we learn and hold on to the information in that neural pathway.

Although Donald Hebb’s theory was proposed in the 1950s, it has been the basis for research into how computers should be developed and modern neuropsychological research supports Hebb’s ideas of learning and neuronal growth.

The Structure and Function of the Brain

For Structure and Function of the Brain, you will need to know the following for GCSE Psychology:

- Brain structure: frontal lobe, temporal lobe, parietal lobe, occipital lobe and cerebellum.
- Basic function of these structures.
- Localisation of function in the brain: motor, somatosensory, visual, auditory and language areas.
- Penfield’s study of the interpretive cortex.

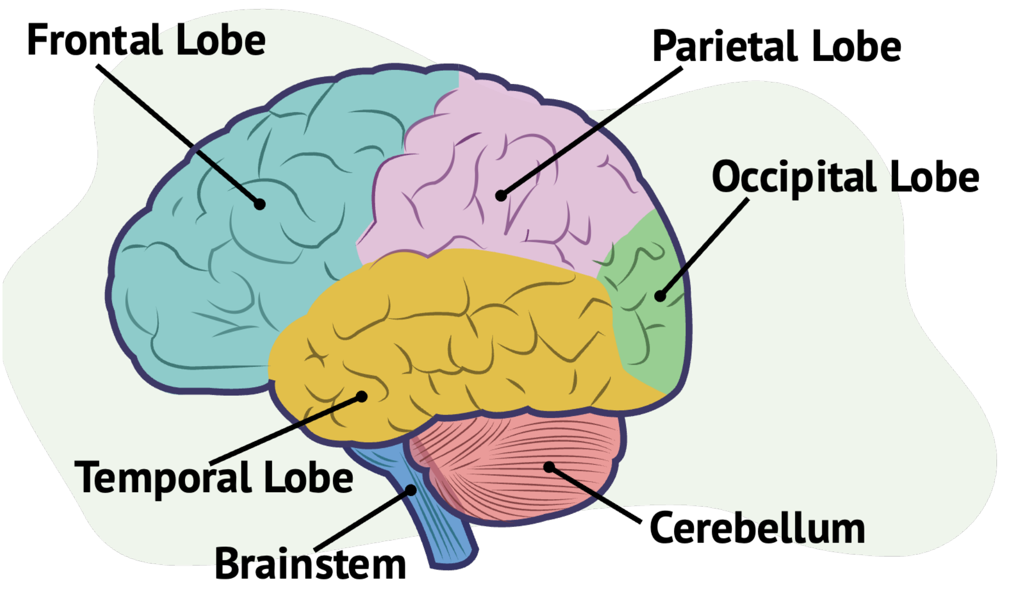
See YouTube video here to learn more: https://youtu.be/vHrmiy4W9C0

Relay neurons have a cell body surrounded entirely by dendrites.

Relay neurons pass messages to other neurons within the central nervous system (CNS) and make millions of connections between each other, sensory neurons and motor neurons.

The brain consists of millions of relay neurons that are tightly packed together.

The cerebrum is the top layer of the brain. The brain consists of two cerebral hemispheres, one on each side of the head and with each hemisphere divided into four areas known as lobes. The four lobes in the hemispheres are broken down in the image below:



The frontal lobe controls thought, memory, problem-solving, planning, cognitive and social behaviours and movements such as facial expressions. This area of the brain is most often affected by brain injuries from motor vehicle crashes.

The parietal lobe is responsible for integrating information from other areas to form the basis of complex behaviours which includes behaviours that involve the senses (such as vision, touch, body and spatial awareness). The parietal lobe is also responsible for language and helps us form words and thoughts.

The occipital lobe is where visual information such as colour, shape and distance is processed. Injury or damage to the primary visual cortex can cause impairments in vision such as blindness or blind spots in a persons visual field.

The cerebellum is found at the back of the brain and is involved in balance and coordination. These activities are carried out automatically by the brain and are not under conscious control. As we become more experienced and practiced in our physical movements, the cerebellum controls these actions so they become smoother and more automatic.

Localisation of function in the brain

Research into the brain has helped us understand the brain better and although we do not fully understand every part of it, we do know that some brain functions are associated with particular areas on the folded outer layers of the cerebrum known as the cerebral cortex. These localised functions include movement, vision, hearing, language and touch.

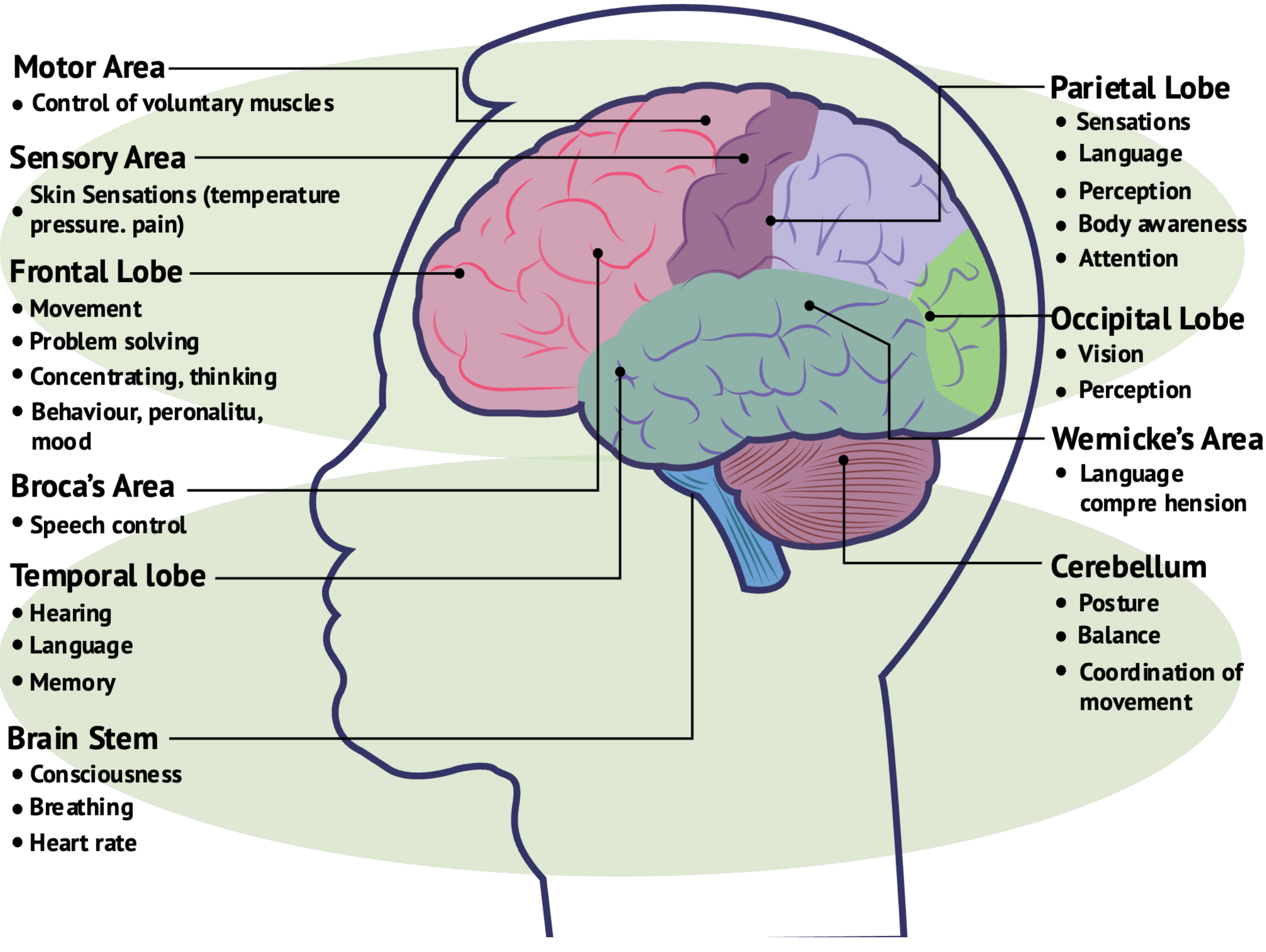
The area responsible for controlling movement is called the motor area. It controls deliberate movement, using motor neurons to send signals to our muscles. Our fingers and thumbs have a larger share of the motor cortex than less active parts like the torso. The area behind this is the somatosensory area, which is responsible for touch. The more sensitive a part of the body is, the larger the amount of the somatosensory cortex it will involve.

The two cerebral hemispheres of the brain control opposite sides of the body. For example, the right hemispheres sensory and motor strips deal with the left side of the body while those on the left hemisphere deal with the right side of the body.

The visual cortex is in the occipital lobe which is just above the cerebellum. This was linked to vision during the first world war when soldiers suffered shrapnel damage to the back of the head and became partially blind. The visual cortex receives information from both the eyes through the optic nerves while another area on the temporal lobe, the auditory cortex, serves the same job for hearing. The auditory cortex receives information from the ears so damage to this area of the brain can lead to hearing loss.

One of the key features that distinguish human beings from animals is how we use language. Humans have specialised areas on the left hemisphere of the brain, which are dedicated to language processing.

For example, Broca's area is at the base of the left frontal lobe and deals with speech production (see image below). If this area is damaged, people may still understand what is being said to them, but struggle with saying things themselves. This condition is known as motor aphasia.



Wernicke's area is in the temporal lobe, and is concerned with understanding speech. When this area is damaged for people, they can speak perfectly well however they have problems understanding what other people are saying to them. This condition is known as Wernicke's aphasia.

The angular gyrus is located at the back of the parietal lobe and receives information about written language from the visual cortex and interprets it as being similar to speech. When people experience injury to this area, they develop a condition known as acquired dyslexia where they experience difficulties in reading.

Penfield’s Study of the Interpretive Cortix

Aim: The study looked to investigate the workings of the conscious mind.

Study design: Clinical case studies investigated the brain functioning of a number of patients who were undergoing open brain surgery.

Method: Some of the brain surgery being conducted required patients to be conscious so the surgeon can be sure that any actions occurred in the right place. This is painless as the brain has no sense receptors. In this study, the surgeon probed different areas of the cortex using gentle electrical stimulation and asked the patients to report what they experienced.

Results: The study produced qualitative results. One patient had their temporal love stimulated and reported they could hear a piano playing and could even identify the son being played. When another part of the brain was stimulated, they reported on a clear memory. As a method of control over the study, the surgeon told the patient he would stimulate the area again but did not activate the electrode to check their response. The patient reported not to experience anything.

A female patient had her temporal lobe stimulated and reported to hearing an orchestra playing a particular tune. When the electrode was removed they reported that the music had stopped. They could hear it again once the electrode was stimulated again and this was confirmed once the experiment was repeated several times.

A young boy reported to be hearing his mother telling his brother that he had got his coat on backwards when the same area of the temporal lobe was stimulated. When this area was stimulated again he reported to be hearing the same conversation ever after some period of time.
Other research by Penfield found that stimulating the visual cortex resulted in subjects reporting to see images such as balloons floating into the sky. Stimulation of the motor and sensory areas produced movements or sensations of being touched for the patients. Penfield concluded that the temporal love was therefore active in the interpretation of meaning.

Conclusion: Penfield concluded that there was evidence for localisation of function; the idea that some psychological functions are controlled from particular parts of the brain within the cerebral cortex.

Evaluating Penfield's Interpretive Cortex Study 1959

- The study demonstrated how certain areas of the cerebral cortex were involved in particular functions of the brain through studying living brains rather than post-mortems.
- The study also demonstrated how complex memories, such as conversations, are stored in the brain.
- A limitation of Penfield's study is the patients were epileptic and therefore they may not be typical of the general population.
- The findings from this study were different for each individual so this makes it hard to generalise the findings.
- Participants may have found it difficult to articulate their experiences into words so this makes it difficult to know exactly what their experiences were.

An Introduction to Neuropsychology

For an Introduction Into Neuropsychology, the GCSE Psychology specification states you need to know the following:

- Cognitive neuroscience: how the structure and function of the brain relate to behaviour and cognition.
- The use of scanning techniques to identify brain functioning: CT, PET and fMRI scans.
- Tulving's 'gold' memory study.
- A basic understanding of how neurological damage, eg stroke or injury can affect motor abilities and behaviour.

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Cognitive Neuroscience

Cognitive neuroscience is all about understanding the relationship between the brain, our cognitive processes and our behaviour.

Our behaviour is not simply about reacting and responding, we also think, make decisions, use our imagination, plan and engage. All these brain activities affect our behaviour and cognitive neuroscience investigates the relationships with our cognitive processes and subsequent behaviour.

Neuropsychologists look at which different areas of the brain are involved in cognitive activities and how they may potentially link up with one another. For example, certain areas of the cerebral cortex were are involved in language and sensory functions, while other brain functions may involve larger areas of the cortex or several other areas working together.

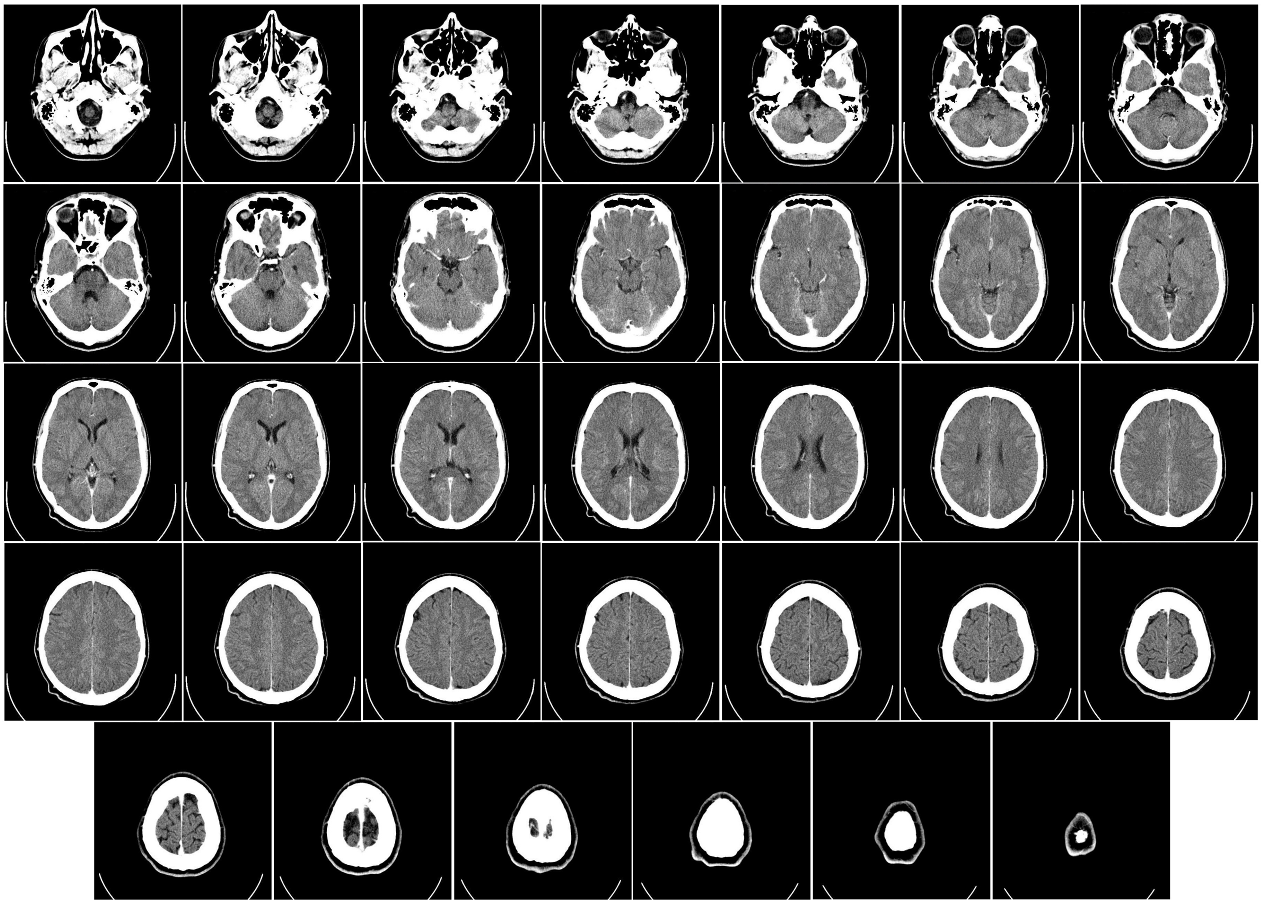
The parietal lobes of the brain for example, particularly on the right side have been found to be involved in attention. Research also seems to indicate there does not appear to be a single part of the brain for memory but neuropsychologists have found that memory for places links to the temporal lobes of the cortex and the sub-cortical structure known as the hippocampus in particular.

Brain scans (see below) have been used by neuropsychologists to find out more about how the brain works.

CT Scans

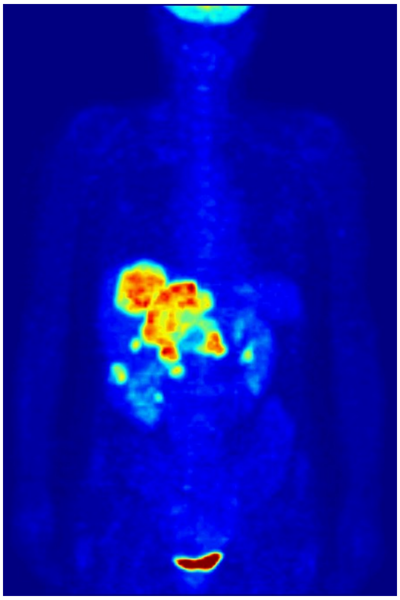
CT scans are able to map the brain by taking a number of X-ray "slices" of the brain and then combining them together to build a complete image. As some types of tissue are denser than others, CT scans enable them to show up in X-rays.

Bone is the densest however nerve cell bodies (grey matter), are less dense than myelinated nerve fibres (white matter), so they appear different too. CT scans are helpful for identifying tumours and blood clots are they show up different too within CT scans which provides a useful medical purpose.

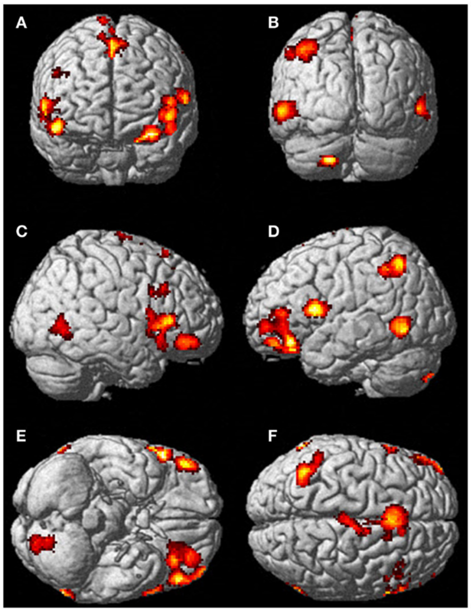


PET Scans

Pet scans (also known as positron emission tomography) work by monitoring a small amount of radioactive chemical which is put into the blood supply. Active brain cells use more blood than passive brain cells which enables the scanner to see which parts of the brain active and in use. PET scans are able to highlight the brain pathways in use, as well as specific areas of activity or if there are blockages in blood flow around the brain. Due to the slight risk from radioactivity, PET scans are not used as much but they do provide medical uses when required.



PET Scan



fMRI Scan

fMRI Scans

Functional Magnetic Resonance Imaging (fMRI) is a modern and accurate tool used by researchers. fMRI scanners work as the water molecules in the brain cells have tiny magnetic fields which can be influenced by the strong magnetic field of the scanner and are slightly different when the cell is active rather than quiet. A complete fMRI scan of the brain takes only 2 seconds enabling researchers to explore brain and cognition activity. For example, if a person reads out a word or is asked to think of a specific event, the fMRI scan will show which parts of the brain are active as they do this. fMRI scanners are a popular method for researchers due to their accuracy but also the fact there there is less health risks involved, unlike the use of X-rays or radioactive substances.

Tulving's "Gold" Memory Study 1989

Aim: To explore the connection between different types of memory and brain activity.

Study design: Case studies were used.

Method: Six volunteers were injected with a gold radioactive isotope which spread within the bloodstream and up to the brain. The gold isotope had a half-life of only 30 seconds and therefore presented little risk to participants. The distribution of the isotope was measured using a PET scanning technique called regional cerebral blood flow, which measures blood flowing in different areas of the brain.

Tulving's study compared episodic memory, in this case, the memory of something participants had experienced personally like a trip or holiday, with semantic memory, such as knowledge they had learned through reading a book. Researchers also compared whether the memory was recent or established some time ago. The volunteers all chose their own topics.

Each volunteer lay on a couch and closed their eyes and began thinking about their chosen topic. After 60 seconds, the gold isotope was injected and 7-8 seconds, a rCBF reading was taken. The reading lasted 2.4 seconds and consisted of 12 rapid scans of 0.2 seconds each.

Each participant experienced eight trials in total, with a two minute rest inbetween.

Results: Three volunteers were dropped from the analysis because their results were inconsistent. The remaining three however showed a clear difference in blood flow patterns depending on whether what they were remembering was episodic or semantic information. This difference was the same regardless of whether what they were remembering was a recent memory or a memory from some time ago. Episodic recollection generally produced more activation of the frontal and temporal lobes, while semantic recollection produced more activity in the parietal and occipital lobes of the cerebral cortex.

Conclusion: Tulving concluded that semantic and episodic memories produce activity in different parts of the brain.

Evaluating Tulving's Gold Memory Study 1989

- A strength of the study is, it was one of the first to show how we can investigate cognitive processes in a living brain.
- The study demonstrated how different areas of the brain activity are related to cognitive processes.
- Tulving's study used ethical procedures with the participants fully informed before they gave their consent.
- Only three participants showed the effects and as the sample is incredibly small, the results may not generalise to everyone.
- There is no way to know for certain what people are actually thinking about at the exact moment of the scan. Therefore the study may lack internal validity as researchers may not actually be measuring what they want to measure.
- As the volunteers were fully informed members of the study, they may have tried very hard to get the procedure to work or present demand characteristics. For example, they may have said they were thinking about the memories to please researchers even if they were not at the time of the scans.

Past Paper Questions 2021

1) Complete the following sentence. Circle **one** answer only.

Sensory neurons carry information…

A. both to **and** from the central nervous system.

B. both to **and** from the peripheral nervous system.

C. to the central nervous system.

D. To the peripheral nervous system.

E. within the central nervous system.

[1 mark]

2) Complete the following sentence. Circle **one** answer only.

Relay neurons carry information…

A. both to **and** from the central nervous system.

B. both to **and** from the peripheral nervous system.

C. to the central nervous system.

D. to the peripheral nervous system.

E. within the central nervous system.

[1 mark]

3) Outline **two** differences between the autonomic nervous system and the somatic nervous system.

[4 marks]

4) Imagine that one afternoon as you are walking along looking at your phone, you go to cross the road without looking and the driver of a car narrowly avoids you. As you step back onto the safety of the pavement, you realise that your mouth is very dry, you are sweating and your breathing and heart beat are both very fast.

Using your knowledge of the nervous system, explain why you are likely to be experiencing the described physical effects.

[4 marks]

5) Explain how excitation **and** inhibition are involved in synaptic transmission.

[4 marks]

A psychologist researched treatment for stroke patients with damage to the language areas of their brains. She compared the effectiveness of two kinds of speech and language therapy. One therapy was carried out in person by a trained therapist. The other therapy was carried out by a specially programmed computer known as a virtual therapist.

The psychologist timed each participant reading the same paragraph of text before and after six weeks of speech and language therapy. She then worked out how much faster the participants could read the text at the end of the six weeks. The results are shown in **Table 1 below**.

Table 1: The decrease in time taken to read a paragraph of text after six weeks of speech and language therapy.

	Trained therapist		Virtual therapist
Participant	**Decrease in time taken (seconds)**	**Participant**	**Decrease in time taken (seconds)**
1	50	11	25
2	15	12	10
3	45	13	05
4	10	14	10
5	30	15	15
6	25	16	45
7	20	17	25
8	15	18	05
9	60	19	20
10	15	20	10

6) Name **one** of the lobes of the brain where a language area is located.

[1 mark]

7) What is the **mode** for the decrease in time taken when the speech and language therapy was provided by the trained therapist?

[1 mark]

8) Calculate the range for the decrease in time taken when the speech and language therapy was provided by the virtual therapist. **[1 mark]**

9) What percentage of the twenty participants were able to read the text more than 40 seconds faster after six weeks of therapy? Show your workings.

[2 marks]

Workings:

Answer:

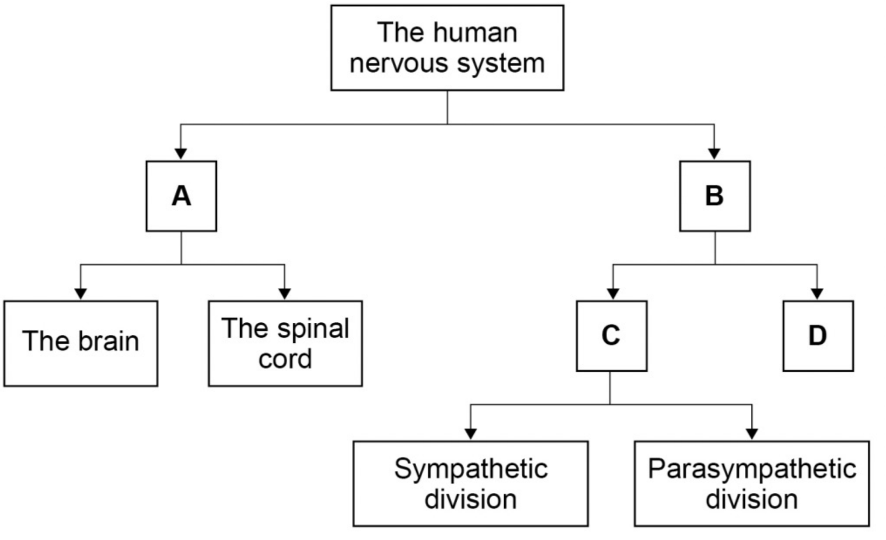
10) Describe **and** evaluate Tulving's 'gold' memory study.

[6 marks]

Past Paper Questions 2020

Look at the diagram of the divisions of the human nervous system in **Figure 2** and answer the questions that follows:

Figure 2



In **Figure 2**, four divisions of the human nervous system are labelled with the letters **A, B, C** and **D.**

11) Identify each of the divisions by placing the correct letter in the appropriate box in **Table 2.**

[3 marks]

Table 2

Name of the division of the human nervous system	**Letter given in Figure 2**
The autonomic nervous system	
The central nervous system	
The peripheral nervous system	
The somatic nervous system	

Look at the diagram of the divisions of the human nervous system in **Figure 2** and answer the questions that follows:

12) Evaluate the James-Lange Theory of Emotion

[4 marks]

Neurons are nerve cells that carry messages.

Explain the specific function of a sensory neuron.

13) Give **one** example of a situation that would cause the sensory neuron to send a message.

[3 marks]

Explanation:

Example:

Read the following.

Vijay passed his driving test 6 months ago. When he first started having driving lessons, he had to concentrate really hard to steer the car and change gear. Now he can do these things almost without thinking.

14) Use your knowledge of Hebb’s theory of learning and neuronal growth to explain Vijay’s behaviour.

[3 marks]

15) Describe Penfield's case study of the interpretive cortex.

Evaluate the research method used in this study.

[9 marks]

16) Describe how a PET scan is used to look at brain functioning.

[3 marks]

Past Paper Questions 2019

Read the following information:

Rhys was walking to school on the morning of his psychology exam. He realised that he was breathing faster than normal and wondered if that was because he was in a hurry, or because he was worried about his exam. As he reached the school gates, Rhys noticed someone from his class he thought was really attractive. Even though he felt his heart start to beat faster and he started to sweat, he tried to look confident by smiling and standing up straight.

17) From the information, identify **two** examples of functions of the autonomic nervous system and **two** examples of functions of the somatic nervous system. Write your answers in the correct boxes

[4 marks]

Autonomic nervous system examples	Somatic nervous system examples

Read the following information:

Researchers wanted to understand more about how the fight or flight response affects heart rates. They asked 10 participants to wear heart monitors and to go on a roller coaster ride. The researchers recorded the beats per minute (bpm) of the participants' heart rates at three different times. The first time was 20 minutes before the ride, the second time was halfway through the ride and the last time was just as the ride finished.

The results from all three times are shown in **Table 1.**

Table 1: bpm recorded at each point of the roller coaster ride.

Participant	Before the ride	Halfway through the ride	As the ride finished
1	80	125	100
2	70	140	115
3	90	135	110
4	70	115	95
5	80	135	100
6	70	145	100
7	70	140	105
8	60	130	110
9	90	150	125
10	80	135	105

18) Calculate the mean for the participants bpm recordings taken 20 minutes before the ride. Show your workings.

[2 marks]

Workings:

Answer:

19) What is the median for the participants' bpm recordings taken when they were halfway through the ride?

[1 mark]

20) Identify the mode for the participants bpm recordings taken when the ride had just finished. Circle **one** answer.

A. 100
B. 105
C. 110
D. 115

[1 mark]

21) Look at the changes in the heart rates recorded in **Table 1**. Use your knowledge of the fight or flight response to explain these changes.

[4 marks]

22) Describe and evaluate Hebb's theory of learning and neuronal growth.

[6 marks]

23) Give a definition of cognitive neuroscience.

[1 mark]

24) A neuropsychologist is trying to find out why a patient is suddenly experiencing difficulties moving one side of their body.

Use your knowledge of psychology to:

- Name which lobe of the brain the neuropsychologist should investigate **and** explain your answer.
- Suggest a possible cause of the neurological damage that the patient seems to be experiencing.

[3 marks]

Lobe of the brain and explanation:

Possible cause:

25) Name an appropriate scanning technique that the neuropsychologist could use as part of his investigation. Justify your answer.

[3 marks]

Revision Timetable	Mon	Tues	Weds	Thurs	Fri	Sat	Sun	Subject or topic
9am								
10am								
11am								
12pm								
1pm								
2pm								
3pm								
4pm								
5pm								
6pm								
7pm								
8pm								

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