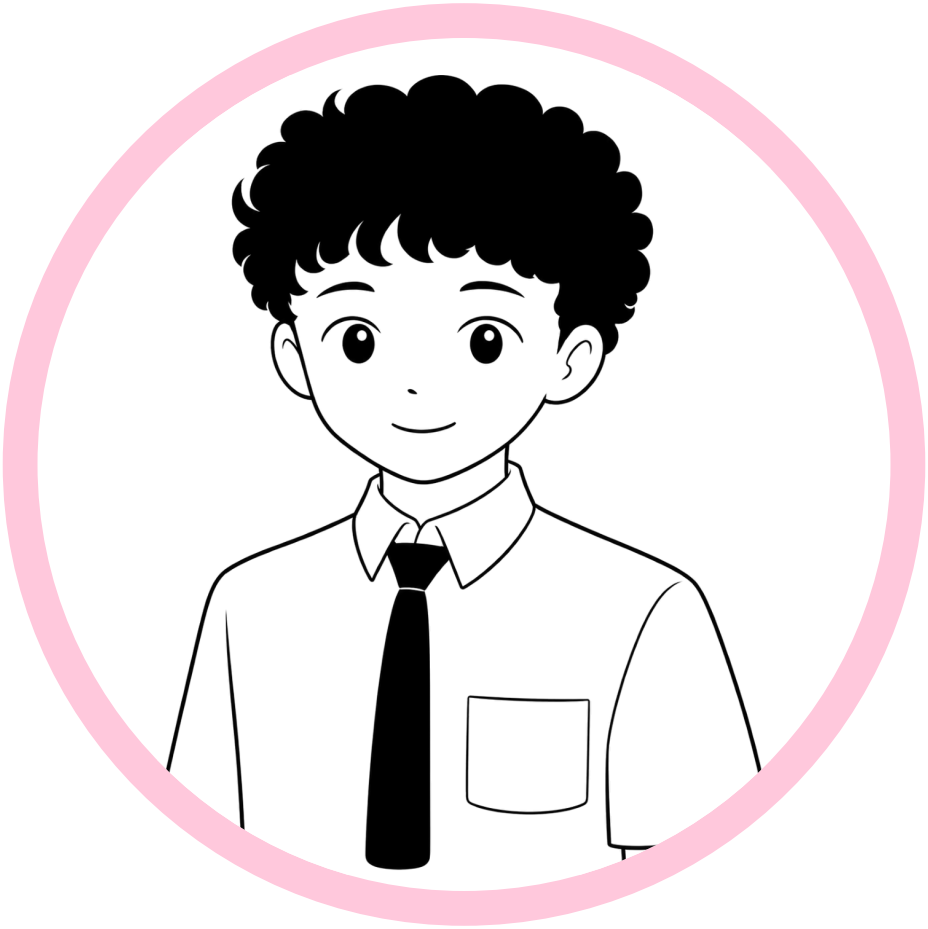
AQA A-LEVEL PSYCHOLOGY · 7182

PSYCHOLOGY



MARK SCHEME

3.2.2 THE BRAIN

SCORE	PERCENTAGE
/50	%

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Q1.

(a) **[AO2 = 4]**

Level	Marks	Description
2	3 – 4	Knowledge of the functions of Broca's area and the motor cortex is clear and mostly accurate. The material is applied appropriately. The answer is generally coherent with effective use of terminology.
1	1 – 2	Some knowledge of the functions of Broca's area and/or the motor cortex is evident. Application is not always appropriate. The answer lacks accuracy and detail. Use of terminology is either absent or inappropriate.
	0	No relevant content.

Possible content:

- as a consequence of damage to Broca's area, Lotta's grandmother is likely to suffer from language/speech problems (Broca's aphasia)
- it will affect her language production (but not her understanding)
- Lotta's grandmother will only be able to talk in short meaningful sentences which take great effort
- speech lacks fluency/difficulty with certain words which help sentences function (e.g. 'it' and 'the')
- as a consequence of damage to the motor cortex, Lotta's grandmother is likely to suffer from loss of muscle function/paralysis
- motor impairments on the **right** side of the body. **This point is essential for 4 marks.**

Credit other relevant material e.g. description of limited impairment due to bilateral language areas in the brains of left-handed patients

Maximum **2 marks** for answers which only address one area of the brain or do not refer to the stem.

Note: reference to difficulties understanding speech, creating made up words or talking nonsense should **not** be credited as this is referring to damage to Wernicke's area.

(b) **[AO2 = 4]**

Level	Marks	Description
2	3 – 4	Knowledge of plasticity/functional recovery of the brain after trauma is clear and mostly accurate. The material is applied appropriately. The answer is generally coherent with effective use of terminology.
1	1 – 2	Some knowledge of plasticity/functional recovery of the brain after trauma is evident. Application is not always

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		appropriate. The answer lacks accuracy and detail. Use of terminology is either absent or inappropriate.
	0	No relevant content.

Possible content:

- Lotta's grandmother might still be capable of functional reorganisation/plasticity
- functional compensation by other undamaged areas
- although she is older her brain might still be able to form new connections (axons and dendrites) between neurons
- neuronal loss may be compensated for by regeneration (axon sprouting)
- denervation supersensitivity to reduce the severity/extent of Lotta's grandmother's impairment
- plasticity allows the brain to cope better with 'indirect' effects of brain damage resulting from inadequate blood supply following a stroke
- references to increased brain stimulation of the opposite hemisphere, physiotherapy, etc to enhance Lotta's grandmother's recovery
- reference to relevant studies on plasticity, eg suggesting women recover quicker than men would be an effective way to illustrate key points, if directly linked to Lotta's grandmother's recovery.

Credit other relevant material.

Note: not all the above are necessary for full marks.

Q2.

[AO1 = 5]

(a) A

(b) C

(c) D

(d) E

(e) B

Q3.

[AO2 = 2]

2 marks for a clear, brief explanation including detail of an appropriate experimental procedure and what patients would be required to do.

1 mark for a vague explanation which has some detail about an appropriate experimental procedure and what patients would be required to do.

Possible suggestions:

- plausible experimental situation / set-up – eg split visual field, dichotic listening
- plausible stimulus – visual, faces, words, auditory, digits, music etc
- plausible task for patient – verbal or visuospatial response, eg drawing,

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matching etc.

Q4.

[AO3 = 4]

Level	Marks	Description
2	3 – 4	Evaluation is relevant and well explained. Answer focuses on the usefulness of split brain research for the study of hemispheric lateralisation. The answer is generally coherent with effective use of terminology.
1	1 – 2	Evaluation is relevant although there is limited explanation and / or limited focus on the purpose of the research. Specialist terminology is not always used appropriately. Award one mark for answers consisting of a single point briefly stated or muddled.
	0	No relevant content.

Possible evaluation points:

- the disconnection between the hemispheres was greater in some patients than others
- some patients had experienced drug therapy for much longer than others
- the comparison groups were not considered to be valid as they were often people with no history of epileptic seizures
- the data were artificially produced as in real life a severed corpus callosum can be compensated for by the unrestricted use of two eyes
- the research has added to the unity of consciousness debate
- research relates to small sample sizes.

Credit other relevant evaluation points.

Q5.

[AO1 = 6 AO2 = 4 AO3 = 6]

Level	Marks	Description
4	13 – 16	Knowledge of hemispheric lateralisation and language centres in the brain is accurate and generally well detailed. Discussion is thorough with effective reference to cases of aphasia. Answer is clear, coherent and focused. Specialist terminology is used effectively. Minor detail and/or expansion of argument sometimes lacking.
3	9 – 12	Knowledge of hemispheric lateralisation and language centres in the brain is evident. There are occasional inaccuracies. Discussion is apparent and reference to cases of aphasia is mostly effective. The answer is mostly clear and organised. Specialist terminology mostly used effectively. Lacks focus in places.

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2	5 – 8	Some knowledge of hemispheric lateralisation and language centres in the brain is present. Focus is mainly on description. Any discussion and reference to cases of aphasia is only partly effective. The answer lacks clarity, accuracy and organisation in places. Specialist terminology used inappropriately on occasions.
1	1 – 4	Knowledge of biological explanations of offending behaviour is limited. Discussion is limited, poorly focused or absent. The answer as a whole lacks clarity, has many inaccuracies and is poorly organised. Specialist terminology either absent or inappropriately used.
	0	No relevant content.

Possible content

- Systematic research from Wernicke and Broca onwards has demonstrated that in most people language centres are lateralised to the left hemisphere.
- Wernicke's area seems to be responsible for the interpretation of speech – damage leads to receptive or sensory aphasia
- Broca's area was thought to be responsible for the production of speech this is now thought to involve a wider network than just Broca's area – damage leads to production (expressive) or motor aphasia

Possible application

- The presence of a right sided paralysis confirms that in cases such as Robert's there is lateralised damage to the left hemisphere
- Robert, can understand speech so we conclude that he does not have Wernicke's, receptive, aphasia; caused by damage to Wernicke's area in the left hemisphere.
- Robert cannot produce speech so we conclude that Broca's area has been damaged leading to Broca's, production or expressive aphasia.

Possible discussion

- As language centres are lateralised they can be impaired by damage to the left hemisphere, not to the right. The left hemisphere also controls the muscles of the right side of the body therefore, when brain damage leads to speech problems combined with paralysis of body muscles, it is usually a right sided paralysis.
- Damage to Broca's area can lead to production/expressive aphasia combined with right sided paralysis.
- Damage to Broca's and Wernicke's areas may lead to global aphasia (inability to understand or to produce speech), combined with right sided paralysis.
- Use of research evidence to support explanation.
- Problems associated with different types of research evidence.

Q6.

[AO2 = 4]

Level	Marks	Description
2	3 – 4	Knowledge of plasticity and functional recovery of the brain after trauma is clear and mostly accurate. The material is applied appropriately. The answer is generally coherent

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		with effective use of terminology.
1	1 – 2	Some knowledge of plasticity and functional recovery of the brain after trauma is evident. Application is not always effective. The answer lacks accuracy and detail. Use of terminology is either absent or inappropriate.
	0	No relevant content.

Possible content:

- When the brain is still maturing recovery from trauma is more likely. Josie is young.
- Transfer of functions to undamaged areas ('neural reorganisation') which can explain her recovery.
- Growth of new neurons and/or connections to compensate for damaged areas ('neural regeneration') which can explain her recovery.
- Plasticity allows the brain to cope better with 'indirect' effects of brain damage eg swelling, haemorrhage following road accident.

Top band answers may refer to one of the above points in detail or to more in less detail. Reference to relevant studies on plasticity, would be an effective way to illustrate key points, but is not necessary for full marks.

Q7.

[AO1 = 3 AO3 = 5]

Level	Marks	Description
4	7 – 8	Outline of what research has shown about localisation of function in the brain is accurate and generally well detailed. Discussion is effective. The answer is clear, coherent and focused. Specialist terminology is used effectively. Minor detail and/or expansion of argument sometimes lacking.
3	5 – 6	Outline of what research has shown about localisation of function in the brain is evident. There are occasional inaccuracies. There is some effective discussion. The answer is mostly clear, organised and focused. Specialist terminology mostly used effectively.
2	3 – 4	Outline of what research has shown about function in the brain is present. Focus is mainly on description. Any discussion is of limited effectiveness. The answer lacks clarity, accuracy and organisation in places. Specialist terminology used inappropriately on occasions.
1	1 – 2	Outline what research has shown about of localisation of function in the brain is limited. Discussion is limited, poorly focused or absent. The answer as a whole lacks clarity, has many inaccuracies and is poorly organised. Specialist terminology either absent or inappropriately used.

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	0	No relevant content.

Possible content:

- Some functions are more localised than others eg somatosensory and motor functions are highly localised to particular areas of cortex
- Other functions seem more widely distributed eg the language system (though some components may be localised eg speech comprehension)
- Localisation can involve restricted areas of cortex eg motor control, or broader aspects eg right hemisphere visuo-spatial functions

Possible discussion

- Use of research evidence eg Lashley's classic work on equipotentiality of the cortex; Hubel and Wiesel's work on distributed functions of the visual system
- Human clinical case studies of loss of specific abilities after restricted brain damage eg aphasia, amnesia
- Simpler functions are likely to be more localised in the brain, eg motor control as compared with eg personality, consciousness
- The brain is so complex that no one part acts independently of the rest, so strict localisation is impossible
- General commentary on whether localisation or "holistic" approaches are more appropriate
- Limitations of methods/scanning techniques used to investigate localisation

Credit other relevant material.

Q8.

[AO1 = 3]

One mark each for the correct area of cortical specialisation.

D = Somatosensory centre
C = Visual centre
B = Auditory centre

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Q1.

(a) Overall, a well answered question indicating sound knowledge of anatomy and function with accuracy and detail, as well as appropriate application. Most students achieved level two. However, many failed to mention the implications of a left hemisphere stroke in terms of right-sided movement. Surprisingly, whilst descriptions of the problems resulting from damage to Broca's area were mainly accurate and detailed, some confused the function of the motor cortex or failed to refer to the motor cortex at all.

(b) This question required students to apply their knowledge of plasticity and functional recovery of the brain after trauma to explain why Lotta's grandmother may still be able to make some recovery in spite of her age. Generally there was a good knowledge of the concepts but weaker students struggled to move beyond level 1 due to a lack of appropriate application. Many simply described what plasticity and functional recovery were, with application limited to inclusion of the term "Lotta's grandmother", rather than focussing on age. However, there were some excellent answers, where students had thought about the question and selected and shaped material accordingly. Students often went above and beyond what was required, clearly linking their knowledge to the scenario. There were refreshingly good accounts of processes and factors, including well detailed information about plasticity alongside research evidence regarding the effects of age, gender and education.

Q8.

Only a quarter of the responses for this question gained full marks and many students annotated the diagram in terms of lobes rather than areas of cortical specialisation.

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