

GCSE Biology A (Gateway)

J247/03 B1-B3 and B7 Higher (Higher Tier)

Question Set 19

1 (a)

Investigating brain function may involve the following techniques:

- External recording of the brain using EEG.
- Scanning techniques such as CAT and MRI.
- Case studies of humans with accidental damage.
- Deliberate damage in animal experimentation.

(i) Understanding of brain function has increased in recent years. However, there are still problems that scientists face that are preventing a complete understanding.

Evaluate the reasons why understanding has increased but also why problems still exist.

[4]

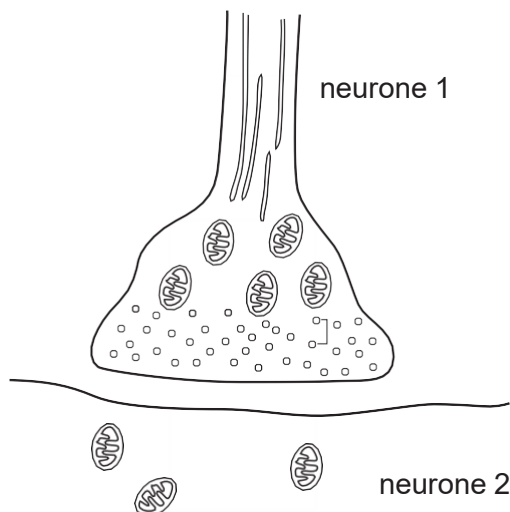
(ii) When scientists complete their research, they usually publish it in journals or online.

Give **two** reasons why scientists publish their results.

[2]

- (b) Alzheimer's disease involves damage to nerve transmission.

Symptoms include difficulties in judging distance, concentrating and making decisions. The diagram shows a synapse between two neurones in the brain.



Acetylcholine is a neurotransmitter in the brain. It diffuses across the 32 nanometre synaptic gap.

In a brain from a person with Alzheimer's disease, the time for acetylcholine to diffuse between neurones is 6.4×10^{-7} s.

1 metre = 10^9 nanometres

- (i) Calculate the speed of diffusion in a person with Alzheimer's disease.

Use this formula: speed = distance \div time

Give your answer in metres per second.

[3]

- (ii) In the brain of a healthy person the speed of diffusion is 0.2 metres per second.

How does the result obtained in part (i) account for the symptoms of Alzheimer's disease?

[2]

Total Marks for Question Set 19: 11

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