Essay Title: *Joseph suffered a stroke when he was 45-years-old. He could move his left arm and leg but was paralysed down his right side. While Joseph could understand what was said to him, he was unable to speak.*

Referring to Joseph, discuss hemispheric lateralisation of language centres in the brain. (16 marks).

Hemispheric lateralisation refers to the understanding that one side of the brain controls the opposite side of the body and processes information in the opposite visual field, and that each hemisphere is responsible for different functions.

A clear introduction that shows understanding of hemispheric lateralisation.

This is evident in the case of Joseph: The right side of his body is paralysed, indicating that the damage following his stroke is localised in the left hemisphere, which controls movement on the right side of his body. Further confirmation is provided by his inability to speak: The area of the brain responsible for speech production (Broca's area) is located in the frontal lobe of the left hemisphere, suggesting that stroke damage has affected this area of his brain.

Hemispheric lateralisation and language centres are detailed, and appropriate links to STEM (Joseph) are explained.

Joseph can, however, still understand speech. This absence of receptive aphasia means that the Wernicke's area, also in the left hemisphere, was not damaged. The stroke did not affect the functioning of the entire hemisphere, only that area dedicated to the production (not the comprehension) of speech.

Effective application of knowledge regarding language centres relevant to Joseph.

There is research to support hemispheric lateralisation. Sperry and Gazzaniga carried out investigations on split-brain patients whose corpus callosum had been cut. The researchers were thus able to isolate each hemisphere to observe its function. They found that when patients were presented with a word in their right visual field, they could say what they saw; they could not say what they saw when presented with a word in their left visual field. From these findings, it was concluded that language functions are located only in the left hemisphere; otherwise, the patient would be able to say what they saw in their left visual field (which goes to the right hemisphere). This research confirms what Joseph's brain damage demonstrated: that language is processed in the left hemisphere and that each hemisphere controls the visual/motor input of its opposite side. However, Turk et al. found evidence of the right hemisphere's ability to process and produce speech. He

Good use of research to support hemispheric lateralisation.

Further appropriate links to STEM are explained.

studied J.W, a patient who suffered damage to the left hemisphere but developed the capacity to speak in the right hemisphere. This indicates the brain's ability to adapt significantly following brain damage, and suggests that Joseph may well be able to recover his speech capability after a period of functional recovery.

An interesting counter-argument is presented and linked to the STEM.

The primary limitation of the research investigating hemispheric lateralisation is its limited scope for generalisation. Split-brain procedures are rarely carried out in modern healthcare which means that split-brain patients are very difficult to recruit. This leads to studies with very limited samples: in some cases, only one person. Therefore, findings from such studies cannot be generalised to the wider population and assumptions regarding lateralisation are based almost solely on individual cases.

Effective use of research findings to challenge the idea of lateralisation. Implications of findings are explored and explained well.

Finally, there is evidence to suggest that lateralisation of function changes with age. Szaflarski et al. (2006) found that language becomes more lateralised to the left hemisphere until the age of 25, at which point lateralisation starts to decrease. This demonstrates that while lateralisation may be predominately found in the left hemisphere until the age of 25, it becomes less lateralised with age; as Joseph was 45 when his stroke took place it is reasonable to assume that his language centre was less lateralised as a result of his age.

A final evaluation point which is appropriately applied to the STEM.

[536 Words]

Examiner style comments: ***Mark Band 4***

This is a well-structured essay that demonstrates advanced knowledge of lateralisation which is clearly applied to the STEM. A range of points are made regarding Joseph's brain damage that clearly explains the functions of each hemisphere. The discussion is thorough and includes a range of points that can be used to challenge and support the theory of lateralisation and how it can be used to explain Joseph's case. Specialist terminology is used throughout, and all points are made relevant to the essay question.