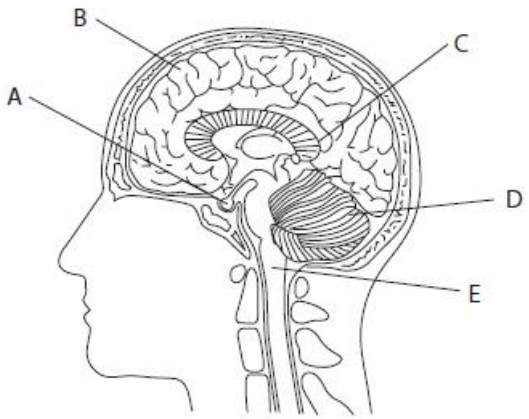
Questions

Q1.

The human brain controls many functions.

The diagram shows a section through a human brain with parts labelled A to E.



Which letter labels the part of the brain that controls heart rate?

(1)

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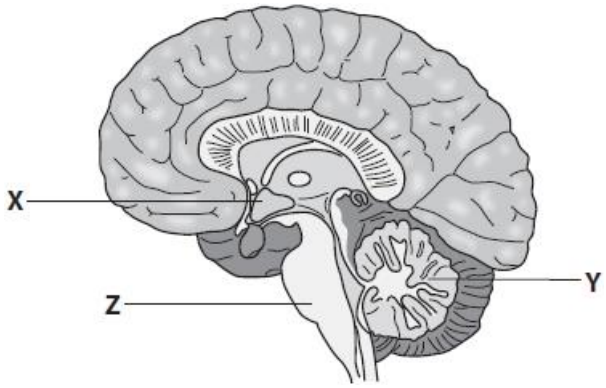
(Total for question = 1 mark)

Q2.

The brain is involved in many homeostatic mechanisms.

The diagram shows a vertical section through a human brain.



Which row of the table correctly matches the regions **X**, **Y** and **Z** with their functions?

(1)

	Control of breathing rate	Control of balance	Temperature regulation
☒ **A**	X	Y	Z
☒ **B**	Y	Z	X
☒ **C**	Z	X	Y
☒ **D**	Z	Y	X

(Total for question = 1 mark)

Q3.

Compare and contrast the central nervous system and the peripheral nervous system.

(3)

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(Total for question = 3 marks)

Q4.

During the First World War, some soldiers received head wounds that damaged one side of the cerebellum.

One soldier said

'The movements of my left hand are done subconsciously but I have to think out each movement of my right arm.'

(i) State one function of the cerebellum.

(1)

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(ii) State the part of the brain the soldier used to think about moving his right arm.

(1)

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(iii) Explain why this soldier had problems moving his right arm.

(2)

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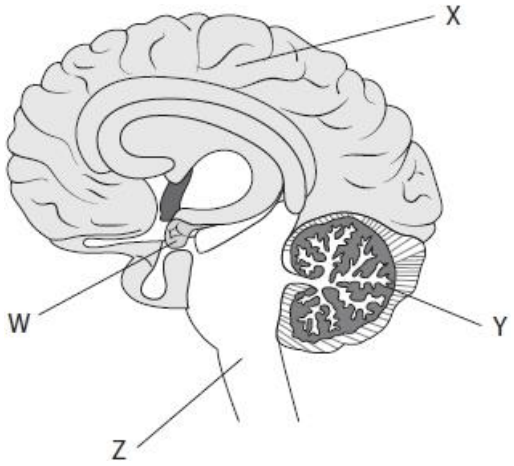
(Total for question = 4 marks)

Q5.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The autonomic nervous system controls the heart rate.

The diagram shows a human brain.



(i) Which region of the brain controls the heart rate?

(1)

- ☒ **A** W
- ☒ **B** X
- ☒ **C** Y
- ☒ **D** Z

(ii) Which one of the following would lead to an increase in heart rate?

(1)

- ☒ **A** release of acetylcholine by the sympathetic nervous system
- ☒ **B** release of acetylcholine by the parasympathetic nervous system
- ☒ **C** release of noradrenaline by the sympathetic nervous system
- ☒ **D** release of noradrenaline by the parasympathetic nervous system

(Total for question = 2 marks)

Q6.

A student investigated the effect of the concentration of sodium chloride solution on blood.

The student set up six test tubes, each with a different concentration of sodium chloride solution.

Five drops of blood were added to each test tube.

The appearance of the solutions was then recorded.

Samples of each solution were observed using a light microscope.

The table shows the results of this investigation.

Concentration of sodium chloride (%)	Appearance of solution after blood was added	Observation with light microscope
3.0	very cloudy	cells seen with shrunken edges
1.0	very cloudy	cells seen
0.9	very cloudy	cells seen
0.7	slightly cloudy	cells seen
0.5	cloudy at first, then went clear	no cells seen
0.3	clear	no cells seen

(i) State the part of the brain responsible for osmoregulation.

(1)

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(ii) Explain how, on a very hot day, the brain ensures that the water potential of the blood remains constant.

(4)

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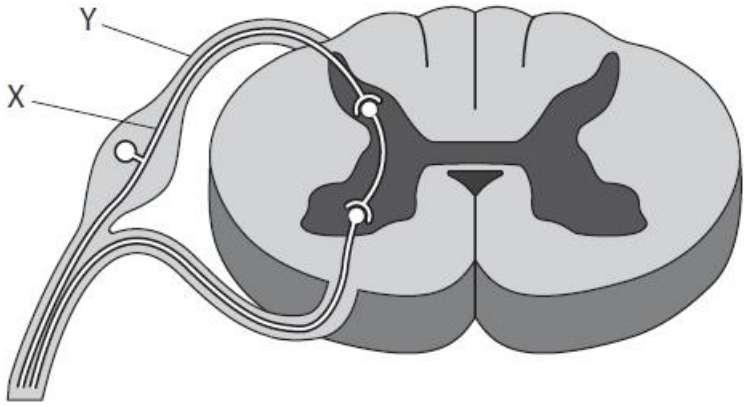
(Total for question = 5 marks)

Q7.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

(i) The diagram shows a section through the spinal cord.



Which row correctly names the structures labelled X and Y?

(1)

	X	Y
☒ **A**	motor neurone	dorsal root
☒ **B**	motor neurone	ventral root
☒ **C**	sensory neurone	dorsal root
☒ **D**	sensory neurone	ventral root

(ii) Which region of the brain only controls breathing and heart rate?

(1)

☒ **A** cerebellum
☒ **B** cerebrum
☒ **C** hypothalamus
☒ **D** medulla oblongata

(Total for question = 2 marks)

Mark Scheme

Q1.

Question Number	Answer	Additional Guidance	Mark
	• E		**(1)**

Q2.

Question Number	Answer	Additional Guidance	Mark
	The only correct answer is **D** (Z,Y,X) **A** is not correct because X regulates temperature and Z controls breathing rate **B** is not correct because Y controls balance and Z controls breathing rate **C** is not correct because X regulates temperature and Y controls balance		**(1)**

Q3.

Question Number	Answer	Additional Guidance	Mark
	An answer that makes reference to at least one similarity and one difference: **Similarities** • both contain {nerve cells / neurones} (1) • both contain synapses (1) **Differences** • PNS is divided into somatic and autonomic systems, butCNS is not (1) • only the PNS has sensory input and motor output (1) • only the CNS carries out processing of information (1)	Allow both carry nerve impulses Allow both use neurotransmitters Allow PNS contains sympathetic and parasympathetic systems, butCNS does not	**(3)**

Q4.

Question Number	Answer	Additional Guidance	Mark
(i)	An answer that makes reference to the following: • (the cerebellum is for) {balance / coordination (ofmuscles) / posture} (1)	Allow {motor memory / learning complexmotor skills}	(1)
(ii)	An answer that makes reference to the following: • cerebrum (1)	Allow {cerebral cortex / motor cortex /cerebral hemisphere}	(1)
(iii)	An explanation that makes reference to two of thefollowing: • the damage is to the left side of the cerebellum (1) • so movement of the right arm is no longer automatic /co-ordinated (1) • therefore the soldier compensates by having to think about it (1)	Allow no impulses from cerebellumto (right) arm Allow impulses pass from cerebrum to right arm (to movearm)	(2)

Q5.

Question Number	Answer	Additional Guidance	Mark
(i)	The only correct answer is: **D** *A is incorrect because W is the hypothalamus* *B is incorrect because X is the cerebrum* *C is incorrect because Y is the cerebellum*		1 comp

Question Number	Answer	Additional Guidance	Mark
(ii)	The only correct answer is: **C** release of noradrenaline by the sympathetic nervous system *A is incorrect because acetylcholine decreases the rate* *B is incorrect because acetylcholine decreases the rate* *D is incorrect because noradrenaline is released by the sympathetic nervous system*		**1 comp**

Q6.

Question Number	Answer	Additional Guidance	Mark
(i)	An answer that makes reference to the following: • hypothalamus		(1)
(ii)	An explanation that makes reference to four of thefollowing: • sweating occurs causing loss of water from the blood (1) • therefore the water potential of the blood falls (1) • osmoreceptors are stimulated (1) • causing the pituitary gland to secrete {antidiuretic hormone /ADH} (into the blood) (1) • causing the {collecting ducts / kidney tubules} in the kidneyto reabsorb more water (into the blood) (1)		(4)

Q7.

Question Number	Answer	Mark
(i)	The only correct answer is C sensory neurone and dorsal root *A is incorrect because X is a sensory neurone* *B is incorrect because X is a sensory neurone and Y is the dorsal root* *D is incorrect because Y is the dorsal root*	1

Question Number	Answer	Mark
(ii)	The only correct answer is D medulla oblongata *A is incorrect because the cerebellum does not control breathing and heart rate* *B is incorrect because the cerebrum does not control breathing and heart rate* *C is incorrect because the hypothalamus does not control breathing and heart rate*	1