6.1 Divisions of the Nervous System: Central and Peripheral

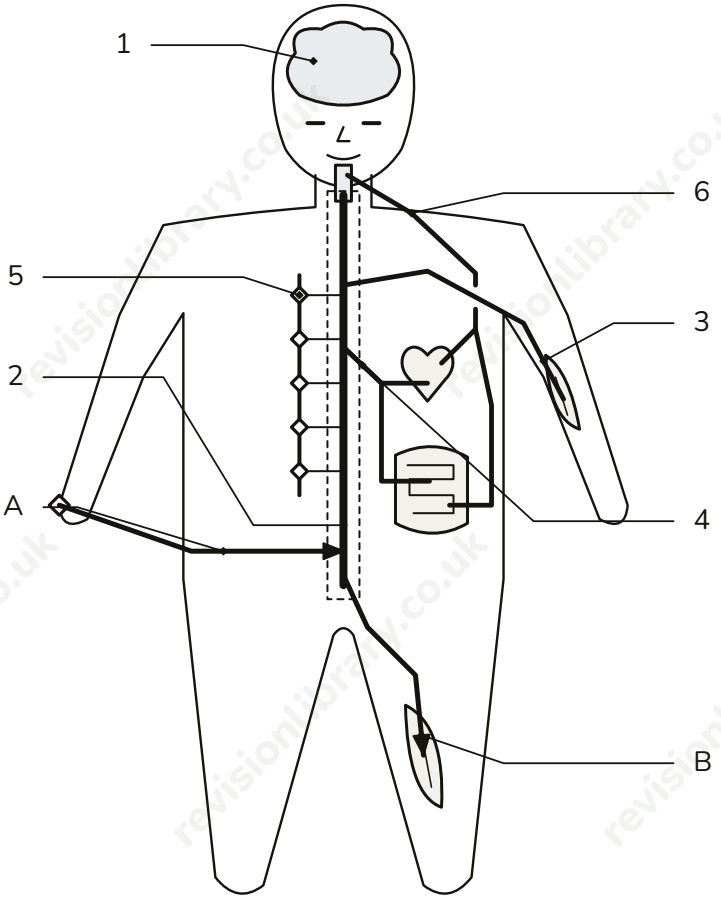
AQA 7182 · about 40 minutes · Write-in edition

Total Marks

Name: _____ Date: ____ / ____ / _____

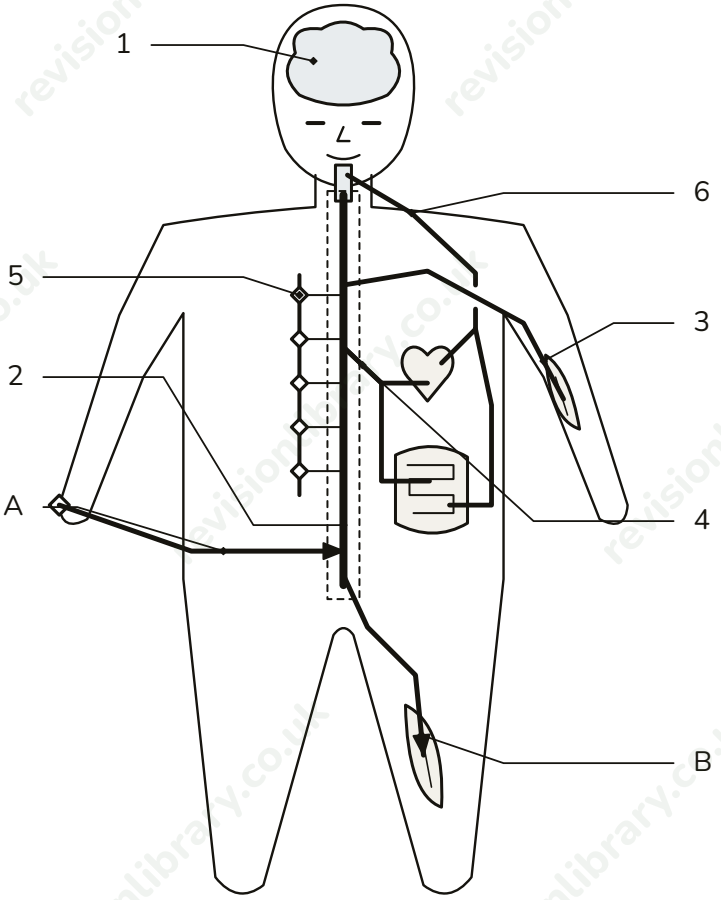
Answer ALL questions.

1 A simple labelled diagram shows the human nervous system in outline, with six numbered labels. The labels are positioned at: 1 at the top of the skull region, 2 down the centre of the back within the vertebral column, 3 on nerves leading to a left arm muscle, 4 on nerves leading to the heart and gut, 5 on a chain of ganglia running alongside the spinal cord, 6 on cranial nerve fibres emerging from the brainstem. For the diagram context above, give the name of the structure labelled 1 in the diagram.



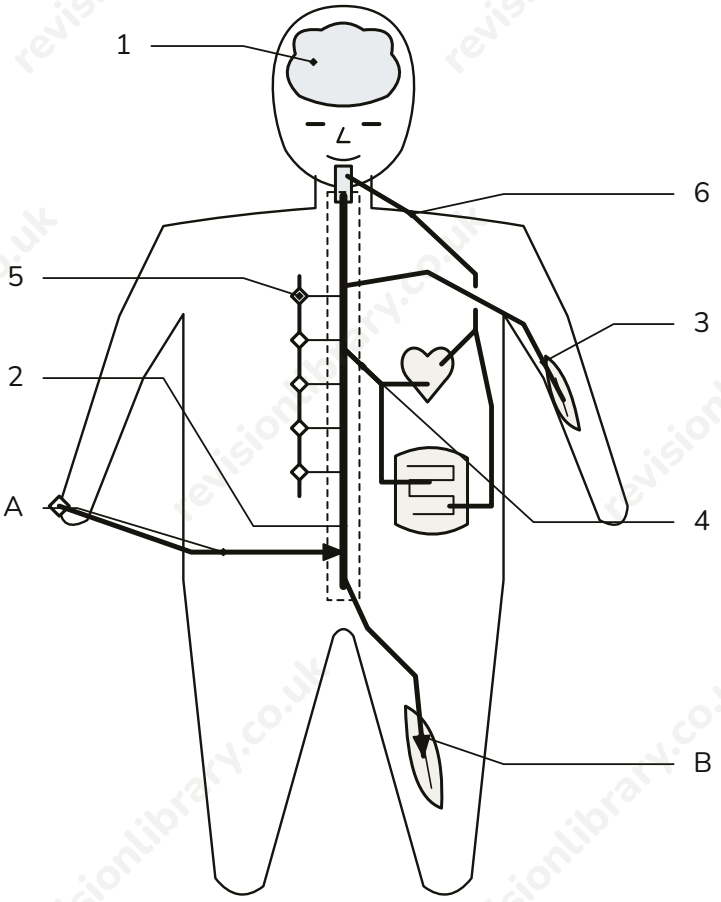
(Total for Question 1 is 1 mark)

2 On the nervous system diagram, give the name of the structure labelled 2, shown running inside the vertebral column.



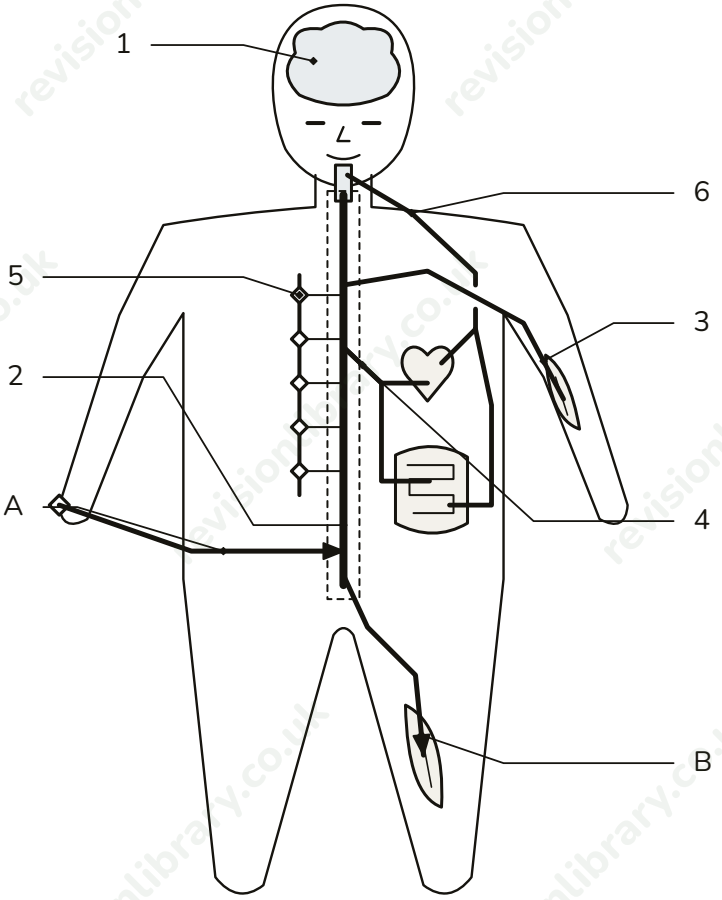
(Total for Question 2 is 1 mark)

3 On the nervous system diagram, an arrow labelled A points from a skin receptor into the spinal cord. Identify the pathway this arrow represents within the somatic nervous system and give one example of the type of information it carries to the CNS.



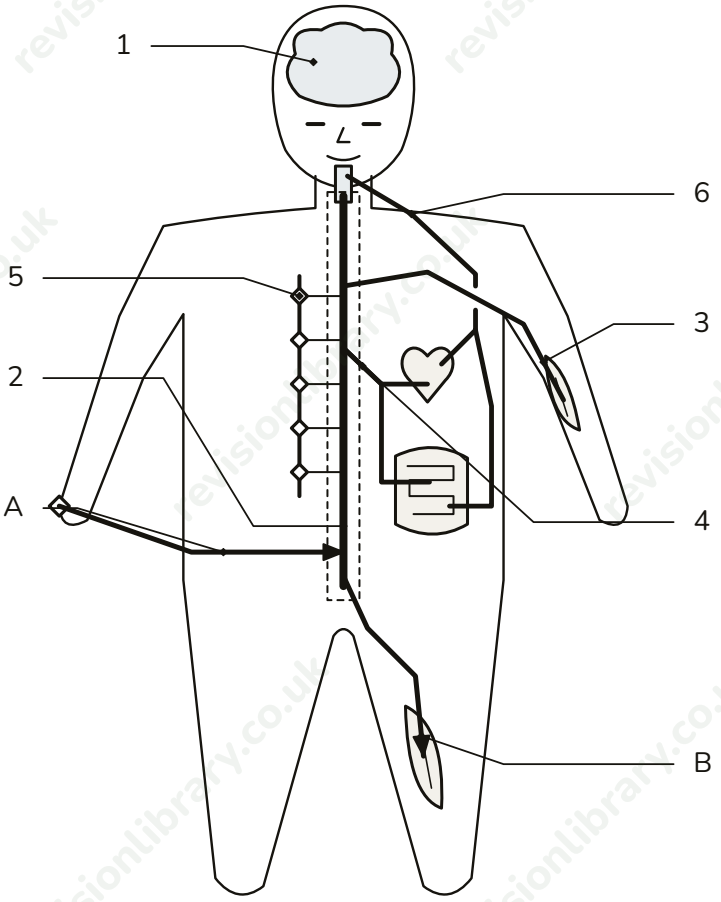
(Total for Question 3 is 1 mark)

4 On the diagram context, an arrow labelled B runs from the spinal cord out to a muscle in the leg. Identify the pathway this arrow represents and name the type of muscle it supplies.



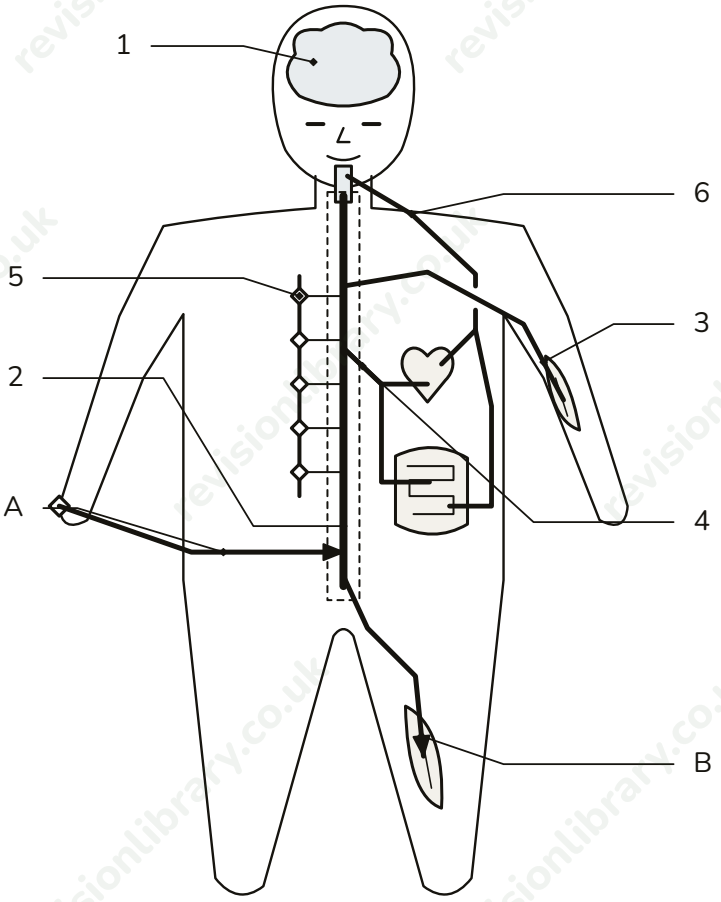
(Total for Question 4 is 1 mark)

5 In the diagram context, label 3 is on nerves leading to a skeletal muscle in the arm. State which division of the peripheral nervous system these nerves belong to and one function of that division in relation to muscles.



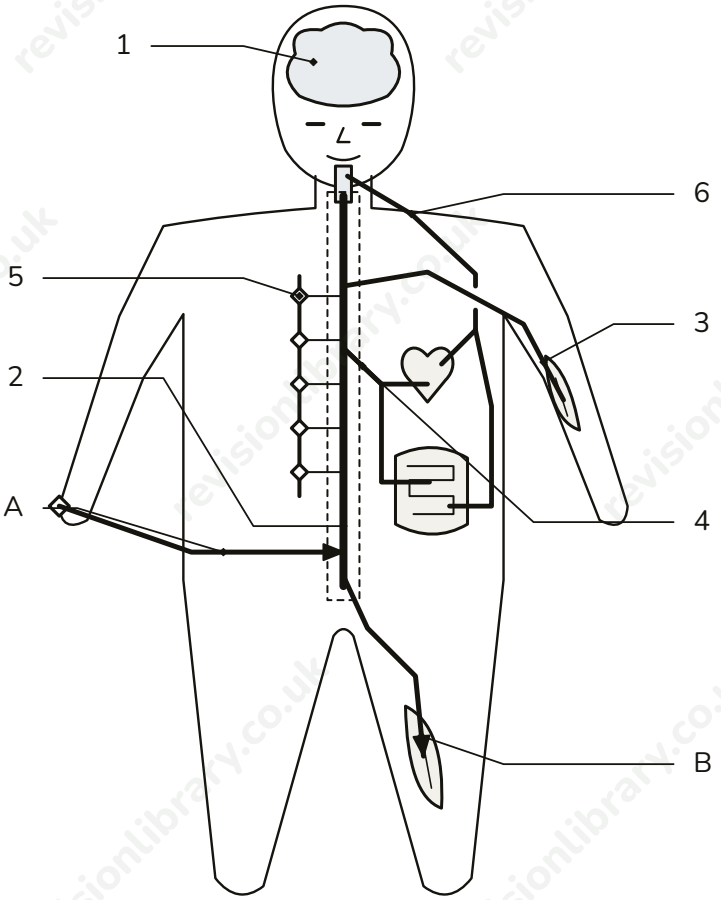
(Total for Question 5 is 2 marks)

6 Label 4 in the diagram context points to nerves connecting the central nervous system to internal organs such as the heart and gut. Identify the name of this part of the peripheral nervous system and give one example of an involuntary function it governs.



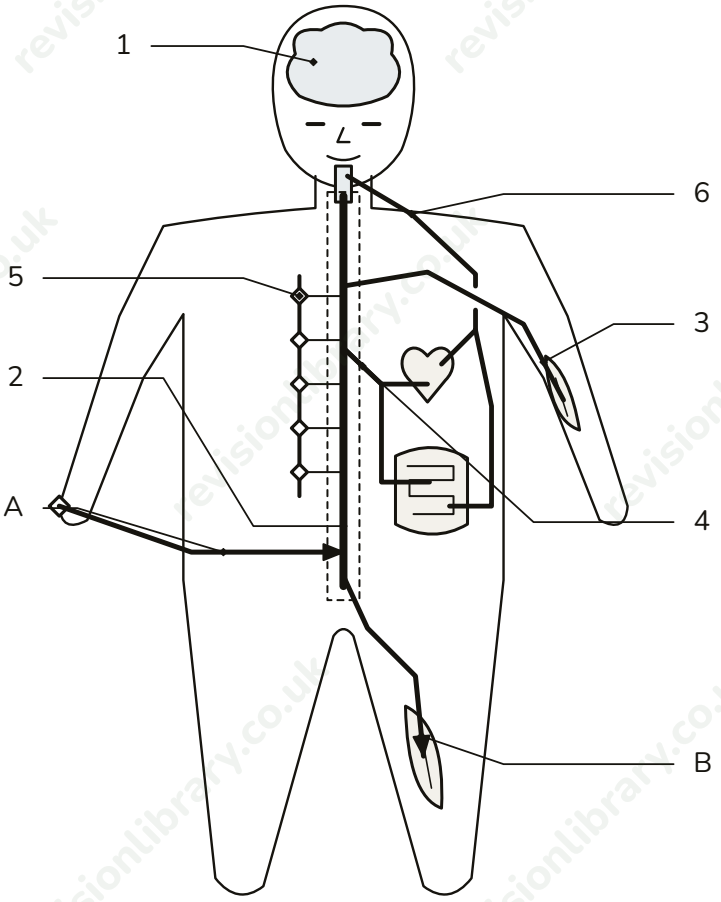
(Total for Question 6 is 2 marks)

7 Label 5 in the diagram context marks a chain of small ganglia running alongside the spinal cord. Name the autonomic branch this chain belongs to and state its typical general effect on the body.



(Total for Question 7 is 2 marks)

8 Label 6 in the diagram context points to cranial nerve fibres emerging from the brainstem that influence the heart and digestive organs. Name the autonomic branch these fibres are chiefly associated with and describe its general effect on organ activity.



(Total for Question 8 is 3 marks)

9 Outline two ways in which the central nervous system (CNS) differs from the peripheral nervous system (PNS) in structure and function, using the CNS and PNS terms explicitly in your answer.

(Total for Question 9 is 3 marks)

10 Distinguish between the general effects of the sympathetic and parasympathetic branches of the autonomic nervous system on the heart and on the digestive system. Give one effect for the heart and one for digestion for each branch.

(Total for Question 10 is 4 marks)

11 Give two labelled examples showing how the sympathetic and parasympathetic branches act antagonistically on named organs. For each example, name the organ and state one sympathetic effect and the opposing parasympathetic effect.

(Total for Question 11 is 4 marks)

12 Describe the overall organisation of the human nervous system, including the major divisions and sub-divisions named and a clear statement of their principal roles. Do not describe neuron anatomy or synaptic transmission; focus on system-level structure and function.

(Total for Question 12 is 6 marks)

Mark scheme · 6.1 Divisions of the Nervous System: Central and Peripheral

Question 1

brain or central nervous system: brain cao **B1**

Answer: Brain

Question 2

spinal cord cao **B1**

Answer: Spinal cord

Question 3

sensory (afferent) pathway of the somatic nervous system oe; e.g. carries touch, pain, temperature or proprioceptive information to the CNS oe **B1**

Answer: A sensory (afferent) somatic pathway; it carries information such as touch, pain, temperature or proprioceptive signals to the CNS.

Question 4

motor (efferent) pathway of the somatic nervous system oe; supplies skeletal (voluntary) muscle cao **B1**

Answer: A motor (efferent) somatic pathway supplying skeletal (voluntary) muscle.

Question 5

identifies the somatic nervous system oe **M1**

states a function: transmits sensory information to the CNS or carries motor commands to skeletal muscles (either is acceptable) oe **A1**

Answer: Somatic nervous system; it carries sensory information to the CNS and/or transmits motor commands to skeletal muscles.

Question 6

identifies the autonomic nervous system oe **M1**

gives an involuntary function: controls heart rate, digestion, pupil size or breathing rate (any one valid example) oe **A1**

Answer: Autonomic nervous system; example function: controls heart rate (or digestion, pupil size, breathing rate).

Question 7

identifies the sympathetic nervous system oe **M1**

states general effect: prepares the body for arousal or action, e.g. increases heart rate and mobilises energy oe **A1**

Answer: Sympathetic nervous system; it prepares the body for action, increasing arousal such as raising heart rate and mobilising energy.

Question 8

identifies the parasympathetic nervous system oe **M1**

states its general effect: promotes rest and digest functions, decreasing heart rate and increasing digestion oe **A1**

makes clear it calms or conserves bodily resources (antagonistic to sympathetic) oe **A1**

Answer: Parasympathetic nervous system; it promotes rest and digest functions, decreasing heart rate and increasing digestion. It calms and conserves bodily resources, acting antagonistically to the sympathetic system.

Question 9

states a structural difference, e.g. CNS consists of brain and spinal cord located within skull and vertebral column, PNS consists of nerves and ganglia outside the CNS oe **M1**

states a functional difference, e.g. CNS processes and integrates information and issues commands, PNS transmits sensory information to the CNS and carries motor commands to effectors oe **A1**

may give a further brief example to show the difference, e.g. CNS interprets information from sensory nerves of the PNS and sends motor instructions back through the PNS oe **A1**

Answer: CNS (brain and spinal cord) is housed within skull and vertebral column and integrates and processes information; PNS is nerves and ganglia outside the CNS that transmit sensory information to the CNS and carry motor commands to effectors, allowing the CNS to receive input and send output.

Question 10

sympathetic effect on heart: increases heart rate/force of contraction oe **M1**

sympathetic effect on digestion: decreases digestive activity or inhibits peristalsis/secretions oe **M1**

parasympathetic effect on heart: decreases heart rate/promotes restoration/relaxation oe **A1**

parasympathetic effect on digestion: increases digestive activity/promotes peristalsis and secretions oe **A1**

Answer: Sympathetic: heart - increases heart rate and contractility; digestion - reduces digestive activity, inhibiting peristalsis and secretions. Parasympathetic: heart - decreases heart rate, promoting rest; digestion - increases digestive activity, promoting peristalsis and secretions.

Question 11

example one: organ named (heart) and sympathetic effect stated (increases heart rate) oe **M1**

parasympathetic opposing effect for same organ stated (decreases heart rate) oe **A1**

example two: organ named (pupil or digestive system) and sympathetic effect stated (dilates pupil or inhibits digestion) oe **M1**

parasympathetic opposing effect for that organ stated (constricts pupil or stimulates digestion) oe **A1**

Answer: Example 1: Heart - sympathetic increases heart rate; parasympathetic decreases heart rate. Example 2: Pupil - sympathetic dilates pupil; parasympathetic constricts pupil. (Alternative valid organ pair: digestive system, sympathetic inhibits digestion, parasympathetic stimulates digestion.)

Question 12

Level 3 Clear, accurate and well-developed description of the organisation of the nervous system. Major divisions (CNS and PNS) and sub-divisions (somatic and autonomic, and within autonomic the sympathetic and parasympathetic) are named and their principal roles are explained with good detail and correct use of terminology. The answer is coherent and covers system-level structure and function. **5-6**

Level 2 Basic description present, naming CNS and PNS and at least one correct sub-division. Roles are stated but explanations lack depth or some detail is missing. Terminology is generally correct but coverage may be partial. **3-4**

Level 1 Limited description with only brief or partial naming of divisions. Roles are vague or imprecise. Organisation is poorly developed. **1-2**

Level 0 No relevant content. **0**

Indicative content:

- Name the two major divisions: central nervous system (CNS) consisting of brain and spinal cord, and peripheral nervous system (PNS) consisting of all nerves and ganglia outside the CNS.
- State principal roles: CNS integrates and processes information and issues commands; PNS transmits sensory information to the CNS and carries motor commands from the CNS to muscles and glands.
- Within the PNS, name the somatic nervous system which carries voluntary motor commands to skeletal muscles and sensory information from receptors, and the autonomic nervous system which governs involuntary functions such as heart rate and digestion.
- Within the autonomic nervous system, name the sympathetic branch which prepares the body for action or arousal and the parasympathetic branch which promotes rest and digestion; explain that they act antagonistically on organs to regulate physiological state.
- Make clear the organisational relationship: CNS at centre, PNS connects body to CNS, somatic handles voluntary and conscious movement and sensory input, autonomic handles involuntary regulation with sympathetic and parasympathetic balancing activity.