



Neurones, reflexes and the nervous system: practice questions

6 questions · 20 marks · mark scheme at the back

For Pearson Edexcel International AS Biology XBI11 and International A Level Biology YBI11. **A Level only** is IA2 content (Units 4 to 6), not needed for the International AS.

Name

Total / 20

1 UNIT 5 STYLE [1 mark]

In a spinal reflex arc, where is the cell body of the motor neurone found?

- A. ☐ In the dorsal root ganglion
- B. ☐ In the grey matter of the spinal cord
- C. ☐ In the white matter of the spinal cord
- D. ☐ In the effector

2 UNIT 5 STYLE [3 marks]

Describe how the myelin sheath of a neurone is formed and state its function.

3 UNIT 5 STYLE [4 marks]

Compare and contrast the structure and function of a sensory neurone and a motor neurone.

4

UNIT 5 STYLE

[5 marks]

A person touches a hot plate and pulls their hand away. Describe the pathway taken by the nerve impulse through a spinal reflex arc, from stimulus to response.

5

UNIT 5 STYLE

[3 marks]

The person in question 4 pulled their hand away before they felt any pain. Explain why, and state the role of the white matter of the spinal cord in feeling the pain.

6

UNIT 5 STYLE

[4 marks]

- (a) Name the two parts of the mammalian nervous system and state what makes up each.
(2) (b) State the roles of a receptor and an effector in a response to a stimulus. (2)

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

B B (1) Cell bodies of relay and motor neurones are in the grey matter.

2. [3]

- Schwann cells wrap around the axon (1)
- many times / many layers of (lipid-rich) plasma membrane form the sheath (1)
- acts as an electrical insulator / ions cannot cross it, except at nodes of Ranvier (1)
- so impulses are conducted faster (1)
- Max 3

3. [4]

- similarity: both have a cell body / axon / are myelinated / conduct action potentials (1)
- sensory carries impulses from receptor to CNS; motor carries impulses from CNS to effector (1)
- sensory cell body is in the dorsal root ganglion / outside the spinal cord; motor cell body is in the grey matter of the CNS (1)
- sensory has a long dendron (and short axon); motor has many short dendrites and a long axon (1)
- Max 4. Accept any other valid difference of structure or position

4. [5]

- pain / temperature receptor in the skin detects the stimulus and generates an impulse (1)
- impulse travels along a sensory neurone to the spinal cord, entering through the dorsal root (1)
- sensory neurone synapses with a relay neurone in the grey matter (1)
- relay neurone synapses with a motor neurone (1)
- motor neurone carries the impulse out through the ventral root to the effector / muscle (1)
- muscle (in arm) contracts and hand is withdrawn (1)
- Max 5

5. [3]

- reflex arc is short / has few synapses, so the response is fast (1)
- the reflex does not involve the brain / conscious thought, so the response occurs before the brain is aware (1)
- white matter (axons) carries impulses up the spinal cord to the brain, so pain is felt later (1)

6. [4]

- central nervous system, made up of the brain and spinal cord (1)
- peripheral nervous system, made up of the neurones / nerves outside the brain and spinal cord (1)
- receptor detects a stimulus / converts energy of stimulus into an electrical impulse (1)
- effector (muscle or gland) responds / contracts or secretes (1)