

1.2 Overview of the Nervous System

Name: _____ Class: _____ Date: _____

Total: 12 marks

KEY WORDS nervous system 神经系统 • sympathetic 交感 • somatic 躯体 • autonomic 自主 • parasympathetic 副交感

Objective

Build the skills to answer exam questions on the **nervous system** 神经系统 and the **endocrine system** 内分泌系统.

You must be able to:

- divide the nervous system into **central** 中枢 and **peripheral** 外周 parts
- distinguish the **somatic** 躯体 from the **autonomic** 自主 nervous system
- contrast **sympathetic** 交感 and **parasympathetic** 副交感 activation
- explain how the **endocrine system** differs from neural signalling

1 Worked examples

Study these first. Each one shows the method for a task used later.

■ The two main divisions

The **central nervous system** is the brain and spinal cord. The **peripheral nervous system** is everything else — the nerves carrying signals to and from the body.

■ Somatic and autonomic

The **somatic** division carries sensory information in and controls voluntary skeletal muscle. The **autonomic** division controls involuntary processes: heart rate, digestion, breathing rate.

■ Sympathetic against parasympathetic

The **sympathetic** branch mobilises the body — heart rate up, pupils dilated, digestion suppressed. The **parasympathetic** branch restores it — heart rate down, digestion resumed. They oppose each other, and a healthy body moves between them.

■ Hormones against neurotransmitters

Neural signals are fast and targeted: milliseconds, along a specific pathway. **Hormones** travel in the bloodstream, reach every tissue, act more slowly, and last longer.

2 Practice

2.1 Name the two structures that make up the central nervous system. [2]

2.2 State one function of the somatic nervous system and one of the autonomic. [2]

2.3 A student is startled by a loud noise.

(a) State which autonomic branch is activated. [1]

(b) State two bodily changes that branch produces. [2]

3 Exam-style questions

3.1 Slowing of the heart after a stressful event is produced mainly by the [1]

- **A** sympathetic nervous system
- **B** parasympathetic nervous system
- **C** somatic nervous system
- **D** central nervous system

3.2 Compared with neural signalling, endocrine signalling is [1]

- **A** faster and more targeted
- **B** slower and more widespread
- **C** identical in speed
- **D** confined to the brain

3.3 A person's hand jerks back from a hot surface before they feel pain.

(a) State which division carries the motor command to the muscle. [1]

(b) Explain why the movement can occur before the brain registers pain. [2]

Solutions

2.1 the brain; the spinal cord.

2.2 somatic: carries sensory information and controls voluntary skeletal muscle; autonomic: controls involuntary processes such as heart rate or digestion.

2.3 (a) the sympathetic branch. (b) any two of: heart rate rises; pupils dilate; digestion is suppressed; breathing quickens.

3.1 B. the parasympathetic branch restores the body after arousal.

3.2 B. hormones travel in the bloodstream to every tissue and act over a longer period.

3.3 (a) the somatic nervous system. (b) a reflex arc is completed in the spinal cord, so the motor command is issued before the signal reaches the brain for conscious processing.