19 Co-ordination - answers

1 The nervous system and endocrine system help to co-ordinate the body's actions.

2 The central nervous system consists of the brain and spinal cord.

3 (a) The nerve fibres which carry impulses from the sense organs to the central nervous system are called *sensory* fibres (A).
(b) The nerve fibres which carry impulses from the central nervous system to the glands and muscles are called *motor* (B) fibres.

4 A neurone consists of *a cell body* (A) containing a nucleus surrounded by *cytoplasm* (B). Branching filaments, called *dendrites* (C), extend from the cell surface and make *synapses* (D) with other neurones. In *sensory* (E) and *motor* (F) neurones, one of the filaments is very long and is called a *nerve fibre* (G).

5 Of the three speeds suggested, 50 metres per second is the most likely speed of conduction of a nerve impulse.

6 (b) 'Each part of the body is connected to its own region of the brain', is the best explanation of our ability to identify the source of a nerve impulse.

7 Diagram A represents nerve fibres cut in cross-section and therefore comes from white matter. Diagram B shows multipolar neurones which constitute much of the grey matter.

8 Examples of reflex actions are change in size of the pupil of the eye in response to light intensity, blinking in response to foreign particles on the cornea, coughing or sneezing in response to irritation of the nasal passages and trachea or bronchi, knee jerk in response to a blow on the tendon of the leg extensor muscle, rapid removal of the hand from a hot or sharp object (any three).

9 In a spinal reflex, a *sense organ* (A) is stimulated to produce a nerve impulse which travels in a *sensory fibre* (B) to the *spinal cord* (C). Here, the fibre makes a *synapse* (D) with a relay *neurone* (E) which transmits the impulse to a *motor* (F) fibre. This fibre conducts the impulse to an *effector* (G) organ such as a muscle.

10 In a reflex knee jerk (a) the receptor is a stretch receptor in the leg extensor muscle,
(b) the effector is the leg extensor muscle itself.

11 (a) Cerebellum - (ii) Balance and muscular co-ordination, (b) Medulla - (iii) Control of heart beat and breathing, (c) Cerebral hemisphere - (i) - Memory and reasoning, (d) Mid-brain - (iv) Eye movements.

12

	Nervous system	Endocrine system
Speed of conduction	faster	slower
Route of conduction	nerves	blood system
Area affected	very localised	rather general
Duration of response	short-lived	longer lasting

Co-ordination - answers (continued)

13 The correct statement is (a). Adrenaline increases the heart rate and the rate at which glucose is released from the liver.

14 The pancreas produces the hormones glucagon and insulin.
(a) Glucagon is produced in response to a fall in the concentration of glucose in the blood; it stimulates the liver to release glucose.
(b) lnsulin is produced in response to a rise in the concentration of glucose in the blood; it stimulates the liver to convert glucose to glycogen.

15 (a) The testes produce testosterone.
(b) The ovaries produce oestrogen and progesterone.

16 (a) Diabetes (insulin-dependent diabetes) is the condition which results from insufficient insulin.
(b)The diabetic is unable to control effectively the glucose concentration of the blood. The glucose concentration therefore fluctuates from dangerously high to dangerously low.
(c) Insulin-dependent diabetes is treated by regular injections of insulin, plus some dietary control.

17 ADH-anti-diuretic hormone, causes the kidneys to reabsorb more water from the renal tubules, so reducing the production of urine.
FSH-follicle-stimulating hormone, acts on the ovaries and promotes the maturation of the follicles.
LH-luteinising hormone, acts on the follicles to cause ovulation.
TSH-thyroid-stimulating hormone, stimulates the thyroid gland to produce thyroxine.

19 Co-ordination

1 Name the two systems which help to co-ordinate the body's actions.

2 Name the two structures which make up the central nervous system.

3 (a) The nerve fibres which carry impulses from the sense organs to the central nervous system are called ….. A ….. fibres.
(b) The nerve fibres which carry impulses from the central nervous system to the glands and muscles are called ….. B ….. fibres.

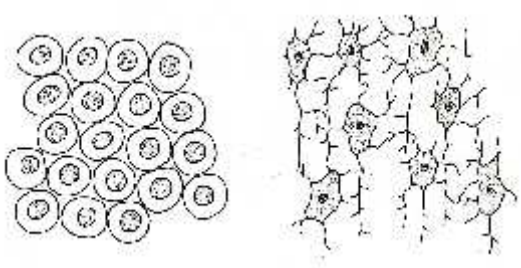
4 Complete the passage below, selecting the appropriate words from the list below.
A neurone (nerve cell) consists of a ….. A ….. containing a nucleus surrounded by ….. B ….. Branching filaments, called ….. C ….., extend from the cell surface and make ….. D ….., with other neurones. In ….. E ….. and ….. F ….. neurones, one of the filaments is very long and is called ,,,,, G …..

sensory, nerve fibre, cell body, impulses, dendrons, dendrites, motor, contact, axons, synapses, cytoplasm

5 Which one of the following is the **most** likely speed of conduction of a nerve impulse?
10 metres per second
50 metres per second
1000 metres per second.

6 Which one of the following best explains how we can tell which part of the body a sensory nerve impulse comes from?
(a) Impulses from each part of the body are different.
(b) Each part of the body is connected to its own region of the brain.
(c) Sensations of touch, heat, light etc. are carried by nerve fibres to the brain.
(d) We learn from experience where the impulses come from.

7 A transverse section through the spinal cord is examined under the high power of the microscope. Part of it looks like diagram A and part looks like diagram B. Which is grey matter and which is white matter? Give reasons for your decision.



A B

(not to same scale)

8 Give three examples of reflex actions.

9 Complete the passage below, selecting the most appropriate words from the list below.
In a spinal reflex a …..A …..is stimulated to produce a nerve impulse which travels in a ….. B ….. fibre to the ….. C ….. Here, the nerve fibre makes a …..D ….. with a relay (association) …… E …..which transmits the impulse to a ….. F ….. fibre. This fibre conducts the impulse to an …..G ….. organ such as muscle.

effector, tendon, sensory, sense organ, motor, nerve, brain, spinal cord, active, synapse, neurone

Co-ordination (continued)

10 In a reflex knee-jerk, what is (a) the receptor, (b) the effector?

11 Match the following structures and functions of the brain.

(a) Cerebellum.	(i) Memory and reasoning.
(b) Medulla.	(ii) Balance and muscular co-ordination.
(c) Cerebral hemisphere	(iii) Control of heart beat and breathing.
(d) Mid-brain.	(iv) Eye movements.

12 In the table below, enter some general points of contrast between the nervous and. endocrine systems.

	Nervous system	Endocrine system
Speed of conduction		
Route of conduction		
Area affected		
Duration of response		

13 Which one of the following statements about adrenaline is correct?
(a) It increases heart rate and increases release of glucose from the liver.
(b) It increases heart rate and reduces release of glucose from the liver.
(c) It reduces heart rate and increases release of glucose from the liver.
(d) It reduces heart rate and reduces release of glucose from the liver.

14 Name the two hormones produced by the pancreas and say (a) in what circumstances, (b) in what way, they adjust the glucose concentration in the blood.

15 Name the hormones produced by (a) the testes, (b) the ovaries.

16 (a) Name the condition and
(b) describe the effects of the failure of the pancreas to produce sufficient-insulin.
(c) How is this condition treated? .

17 The pituitary gland produces several hormones, including ADH, FSH, LH and TSH. Give the full name of each of these hormones and say briefly what each one does.