Exercise walk-through

5.1

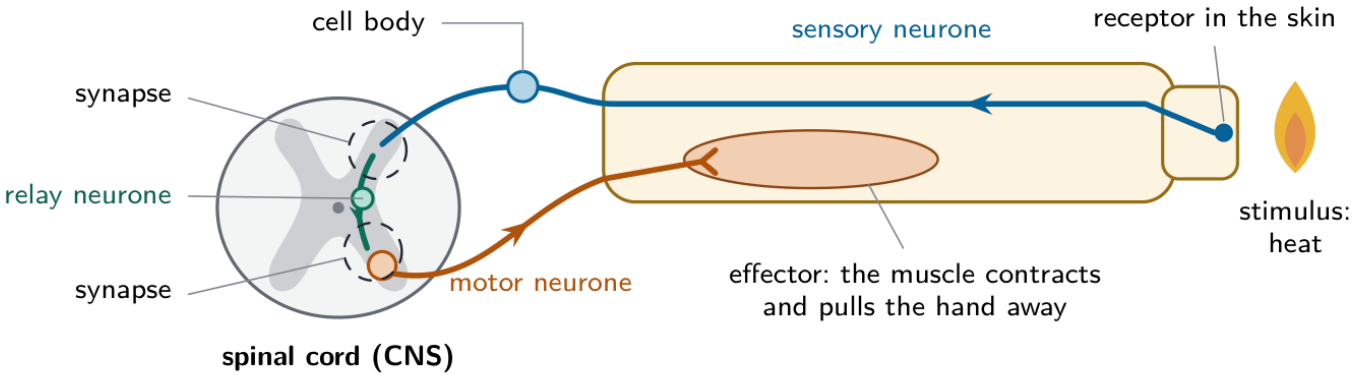
Homeostasis and the nervous system (4.5.1–4.5.2, RP7 reaction time)

AQA · GCSE · Biology

Control systems and the nervous system

- **receptors** , which detect changes, called **stimuli** ;
- **coordination centres** , such as the brain, the **spinal cord** and the **pancreas** , which receive and process the information;
- **effectors** , muscles or glands, which bring about responses that restore the best conditions.

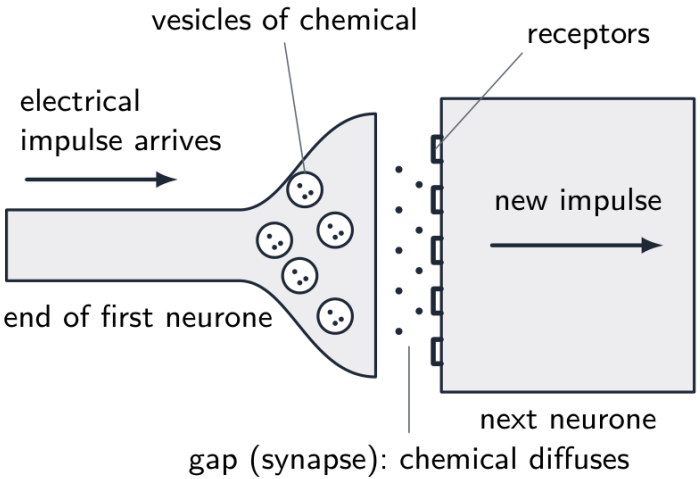
Figure: Control systems and the nervous system



arrows: direction of the impulses; the conscious part of the brain is not involved

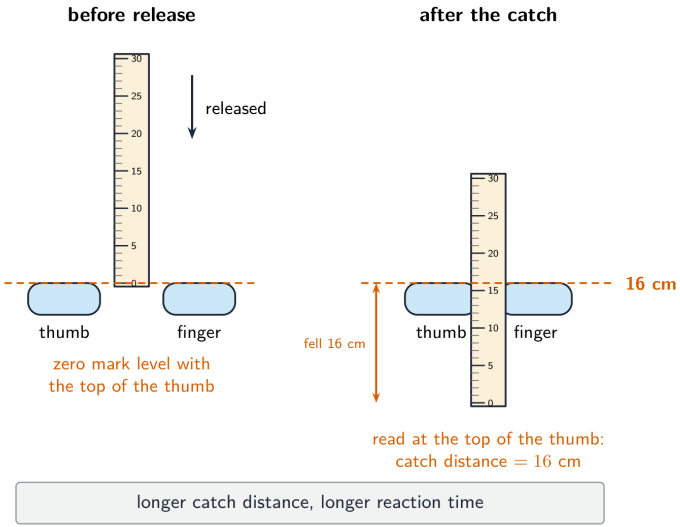
- Spinal withdrawal reflex: impulses pass from the receptor to the effector through the **spinal cord**; the conscious part of the brain is not involved.
- Match each part of the diagram to the text.

Figure: Control systems and the nervous system (2)



- A chemical crosses the gap and triggers a new electrical impulse in the next **neurone**.
- Match each part of the diagram to the text.

Figure: Control systems and the nervous system (3)



- The zero mark starts at thumb level; catch distance is read at the thumb.
- Match each part of the diagram to the text.

Exercises 2.1·2.2

2.1 Write these parts of a nerve pathway in the right order, starting with the stimulus. [2]

effector | receptor | motor neurone | sensory neurone | CNS

2.2 Name the **two** kinds of effector. [2]



muscle



gland

Exercises 2.1·2.2

2.1 Write these parts of a nerve pathway in the right order, starting with the stimulus. [2]

effector | receptor | motor neurone | sensory neurone | CNS

2.1

- receptor → sensory neurone → CNS; → motor neurone → effector

2.2 Name the **two** kinds of effector. [2]



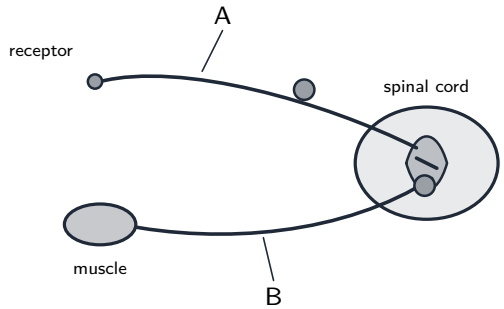


2.2

- muscles; glands

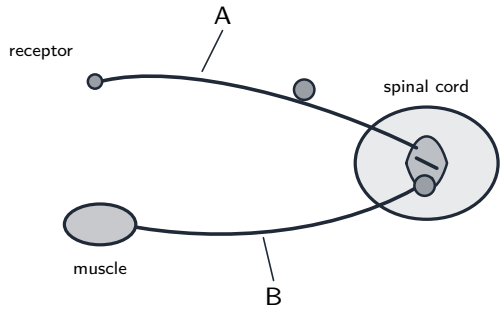
Exercise 2.3

2.3 The diagram shows a reflex arc. Name neurone A and neurone B. [2]



Exercise 2.3

2.3 The diagram shows a reflex arc. Name neurone A and neurone B. [2]

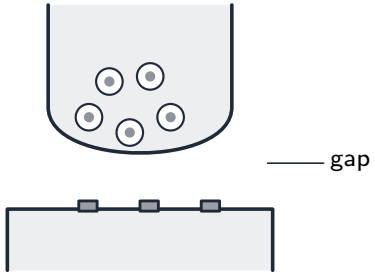


2.3

- A: **sensory** neurone; B: **motor** neurone

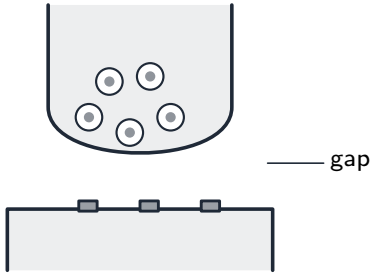
Exercise 3.1

3.1 The diagram shows a synapse. Explain how an impulse passes from one neurone to the next. [3]



Exercise 3.1

3.1 The diagram shows a synapse. Explain how an impulse passes from one neurone to the next. [3]



3.1

- the impulse reaches the end of the first neurone, and a chemical is released
- the chemical diffuses across the gap
- it binds to receptors on the next neurone and starts a new impulse

Setup for exercise 3.2

3.2 A student tests reaction time. A partner drops a ruler and she catches it as fast as she can. The graph converts the distance the ruler falls into a reaction time.

test	**1**	**2**	**3**	**4**	**5**
right hand: distance / cm	14	16	15	13	17
left hand: distance / cm	21	19	20	22	18

Exercise 3.2 (a)

(a) Calculate the mean distance for the right hand. [2]



Exercise 3.2 (a)

(a) Calculate the mean distance for the right hand. [2]



(a) $\frac{14+16+15+13+17}{5} = \frac{75}{5} = \mathbf{15}$ cm

Exercise 3.2 (b)

3.2 A student tests reaction time. A partner drops a ruler and she catches it as fast as she can. The graph converts the distance the ruler falls into a reaction time.

test	**1**	**2**	**3**	**4**	**5**
right hand: distance / cm	14	16	15	13	17
left hand: distance / cm	21	19	20	22	18

(b) The mean for the left hand is 20 cm. Use the graph to find the reaction time for each hand, and the difference between them. [3]

Exercise 3.2 (b)

3.2 A student tests reaction time. A partner drops a ruler and she catches it as fast as she can. The graph converts the distance the ruler falls into a reaction time.

test	**1**	**2**	**3**	**4**	**5**
right hand: distance / cm	14	16	15	13	17
left hand: distance / cm	21	19	20	22	18

(b) The mean for the left hand is 20 cm. Use the graph to find the reaction time for each hand, and the difference between them. [3]

(b) right hand (15 cm): about **0.175** s; left hand (20 cm): about **0.20** s; difference about 0.025 s

Exercise 3.2 (c)

3.2 A student tests reaction time. A partner drops a ruler and she catches it as fast as she can. The graph converts the distance the ruler falls into a reaction time.

test	**1**	**2**	**3**	**4**	**5**
right hand: distance / cm	14	16	15	13	17
left hand: distance / cm	21	19	20	22	18

(c) Give **two** variables the student should keep the same. [2]

Exercise 3.2 (c)

3.2 A student tests reaction time. A partner drops a ruler and she catches it as fast as she can. The graph converts the distance the ruler falls into a reaction time.

test	**1**	**2**	**3**	**4**	**5**
right hand: distance / cm	14	16	15	13	17
left hand: distance / cm	21	19	20	22	18

(c) Give **two** variables the student should keep the same. [2]

(c) any two: the same ruler; the same starting position of the hand; the same person dropping; no warning before the drop; the same time of day or no caffeine

Exercise 3.2 (d)

3.2 A student tests reaction time. A partner drops a ruler and she catches it as fast as she can. The graph converts the distance the ruler falls into a reaction time.

test	**1**	**2**	**3**	**4**	**5**
right hand: distance / cm	14	16	15	13	17
left hand: distance / cm	21	19	20	22	18

(d) A person touches a hot plate and moves their hand away. Describe the reflex arc that causes this, and explain why reflexes are important. [6]

Exercise 3.2 (d)

3.2 A student tests reaction time. A partner drops a ruler and she catches it as fast as she can. The graph converts the distance the ruler falls into a reaction time.

test	**1**	**2**	**3**	**4**	**5**
right hand: distance / cm	14	16	15	13	17
left hand: distance / cm	21	19	20	22	18

(d) A person touches a hot plate and moves their hand away. Describe the reflex arc that causes this, and explain why reflexes are important. [6]

(d) points to include:

- receptors in the skin detect the heat (the stimulus)
- an impulse travels along a sensory neurone to the spinal cord
- a relay neurone in the spinal cord passes the impulse to a motor neurone; chemicals cross the synapses
- the impulse reaches the effector, a muscle in the arm, which contracts and moves the hand
- the brain is not involved in the decision, so the response is automatic and very fast
- reflexes protect the body from harm, e.g. burns

Levels: **5–6** a full, logical answer with correct biology and correct terms; **3–4** several correct points, partly linked; **1–2** one or two relevant points.