

GCSE Combined Science: Trilogy

Worksheet: The human nervous system

TIME 35 min	TOTAL 31 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
-----------------------	--------------------------	------------------------------	-----------------------------------

Topics: The human nervous system

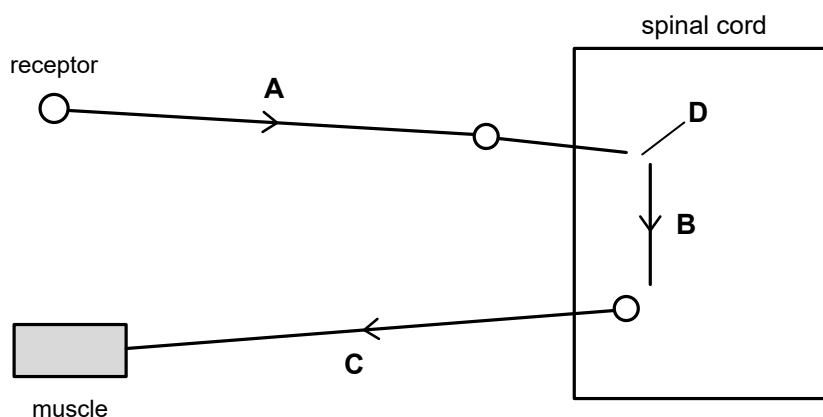
NAME _____ **CLASS** _____ **DATE** _____

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Figure 1 shows a reflex arc.

Figure 1



0 1 . 1

Name neurones **A**, **B** and **C**.

.....

.....

.....

.....

.....

.....

[3 marks]

0 1 . 2

What is the gap labelled **D**?

.....

.....

.....

.....

[1 mark]

0 1 . 3

Name the effector in Figure 1.

.....

.....

.....

.....

[1 mark]

0 1 . 4

Which phrase describes reflex actions?

Tick (✓) **one** box.

Automatic and rapid

Controlled by hormones

Learned by practising

Slow and conscious

☐

☐

☐

☐

[1 mark]

0 2

A stimulus is detected by a receptor, and the nervous system coordinates a response.

0 2 . 1

What is a stimulus?

.....

.....

[1 mark]

0 2 . 2

In a reflex arc, which neurone connects a sensory neurone to a motor neurone in the spinal cord?

Tick (✓) **one** box.

Effector neurone

☐

Relay neurone

☐

Coordinator neurone

☐

Receptor neurone

☐

[1 mark]

0 2 . 3

Complete the sequence.

stimulus → receptor → → → response

.....

.....

.....

.....

[2 marks]

0 3

A student used a ruler-drop test five times. Table 1 shows the reaction time found from each attempt.

Table 1

Attempt	1	2	3	4	5
Reaction time in ms	243	246	262	243	243

0 3 . 1

Calculate the student's mean reaction time.

.....

.....

.....

.....

Mean reaction time = ms

[2 marks]

0 4

A student used the ruler-drop test to measure their reaction time. A partner held a ruler vertically just above the student’s open hand and dropped it without warning. The student caught the ruler as quickly as possible.

Table 2 shows the distance the ruler fell in five attempts.

Table 2

Attempt	1	2	3	4	5
Distance the ruler fell in cm	17	13	13	11	16

0 4 . 1

Calculate the mean distance the ruler fell.

.....

.....

.....

.....

Mean distance = cm

[2 marks]

0 4 . 2

Table 3

Distance the ruler fell in cm	Reaction time in s
8	0.128
10	0.143
12	0.156
14	0.169
16	0.181
18	0.192
20	0.202

Table 3 is a conversion table for changing the distance the ruler fell into a reaction time.

Use Table 3 to find the student's mean reaction time.

.....

.....

.....

Mean reaction time = s

[1 mark]

0 5

The blink reflex causes the eyelid to close very quickly if the cornea is touched or an object approaches the eye. Tears also help to defend the eye.

0 5 . 1

Explain how the blink reflex and tear production could work together to protect the eye from a foreign particle, such as a speck of dust.

.....

.....

.....

.....

[2 marks]

0 5 . 2

Suggest why it is an advantage that the blink reflex does not need input from the conscious part of the brain.

.....

.....

.....

.....

[2 marks]

0 6

A student’s reaction time was measured using a computer test, first with no distraction and then while listening to someone talking on the phone. Table 4 shows the mean reaction time from five attempts in each condition.

Table 4

Condition	No distraction	With distraction
Mean reaction time in ms	215	287

0 6 . 1

Calculate the percentage increase in the student’s mean reaction time caused by the distraction.

.....

.....

.....

.....

Percentage increase = %

[2 marks]

0 6 . 2

Suggest why the distraction increased the student’s reaction time.

.....

.....

.....

.....

[2 marks]

0 6 . 3

Suggest **one** real-life situation where this effect could be dangerous.

[1 mark]

0 7

Receptors in different sense organs detect different types of stimulus.

0 7 . 1

Name the type of stimulus detected by receptors in:

- the eye
- the tongue
- the skin.

[3 marks]

0 7 . 2

The receptors in the fingertips are packed very close together.
Suggest why this is useful.

[1 mark]

0 7 . 3

Some motor neurones are more than 1 m long. Each one runs from the spinal cord to a muscle.
Suggest why it is an advantage that each motor neurone is one long cell.

.....

.....

.....

.....

[2 marks]

0 7 . 4

The CNS coordinates the response of effectors.
Give **one** example of a response in which the effector is a gland.

.....

.....

[1 mark]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: The human nervous system · 31 marks

Question 1 (6 marks)

01.1 [3 marks]

Answer: A sensory neurone; B relay neurone; C motor neurone

- A: sensory (neurone) (1)
 - B: relay (neurone) (1)
 - C: motor (neurone) (1)
-

01.2 [1 mark]

Answer: Synapse

- synapse (1)
-

01.3 [1 mark]

Answer: Muscle

- muscle (1)
-

01.4 [1 mark]

Correct: Automatic and rapid

Question 2 (4 marks)

02.1 [1 mark]

- a change in the environment that can be detected and responded to (1)
-

02.2 [1 mark]

Correct: Relay neurone

02.3 [2 marks]

- coordinator (1)
 - effector (1)
-

Question 3 (2 marks)

03.1 [2 marks]

Answer: 247.4 ms

- $(243 + 246 + 262 + 243 + 243) \div 5$ (1)
 - 247.4 (ms) (1)
-

Question 4 (3 marks)

04.1 [2 marks]

Answer: 14 cm

- $(17 + 13 + 13 + 11 + 16) \div 5$ (1)
 - 14 (cm) (1)
-

04.2 [1 mark]

Answer: 0.169 s

- 0.169 (s) (1)

Notes: Allow ECF: the time from Table 3 for an incorrect mean distance.

Question 5 (4 marks)

05.1 [2 marks]

- the blink reflex quickly closes the eyelid, which can prevent the particle reaching the surface of the eye or reduce the force of impact (1)
 - tears, produced by glands as an effector response, can then wash away any particle that does reach the eye (1)
-

05.2 [2 marks]

- it can happen faster, because fewer neurones and synapses are involved and no time is used deciding whether to respond (1)
 - this gives the best chance of protecting the eye before it is damaged (1)
-

Question 6 (5 marks)

06.1 [2 marks]

Answer: 33.5%

- $(287 - 215) \div 215 \times 100$ (1)
 - 33.5 (%) (1)
-

06.2 [2 marks]

- the brain (coordinator) is processing information from the distraction, e.g. the conversation, at the same time as the test (1)
 - this can slow down how quickly the brain processes the stimulus from the test and sends a signal to respond (1)
-

06.3 [1 mark]

- e.g. driving while talking on a phone, which could slow down a driver's reaction time to a hazard (1)
-

Question 7 (7 marks)

07.1 [3 marks]

- eye: light (1)
 - tongue: chemicals (1)
 - skin: temperature / touch / pressure / pain (1)
-

07.2 [1 mark]

- the fingertips are very sensitive / can detect fine detail by touch (1)
-

07.3 [2 marks]

- the impulse does not have to cross synapses (along the way) (1)
 - (so) the impulse reaches the muscle faster (1)
-

07.4 [1 mark]

- salivary glands release saliva when food is smelled / tasted (1)
 - sweat glands release sweat when the body is hot (1)
 - any other correct example, e.g. adrenal glands secreting a hormone (1)
-

Any 1 of the points above.
