

Answer **all** questions in the spaces provided.

0 1

The nervous system allows a person to detect stimuli.

0 1 . 1

Draw **one** line from each stimulus to the sense organ that detects the stimulus.

[2 marks]

Stimulus

Sense organ

Chemicals

Light

Ear

Eye

Tongue

Moving a hand away from a hot object is an example of a reflex action.

0 1 . 2

What is a reflex action?

[2 marks]



0 1 . 3 A muscle in the arm moves the hand away from the hot object.

How does the arm muscle do this?

[1 mark]

Tick (✓) **one** box.

The muscle contracts.

The muscle expands.

The muscle relaxes.

The muscle shrinks.

Question 1 continues on the next page

Turn over ►



Two students investigated the effect of drinking coffee on reaction time.

This is the method used.

1. Student **A** holds a metre rule just above student **B**'s hand, as shown in **Figure 1**.
2. Student **A** lets go of the metre rule.
3. Student **B** catches the metre rule as quickly as possible.
4. Student **A** writes down the reading from the scale on the metre rule.
5. Students **A** and **B** repeat steps 1–4 another four times.
6. Student **B** then drinks a cup of coffee.
7. After 15 minutes, students **A** and **B** repeat steps 1–5.

Figure 1

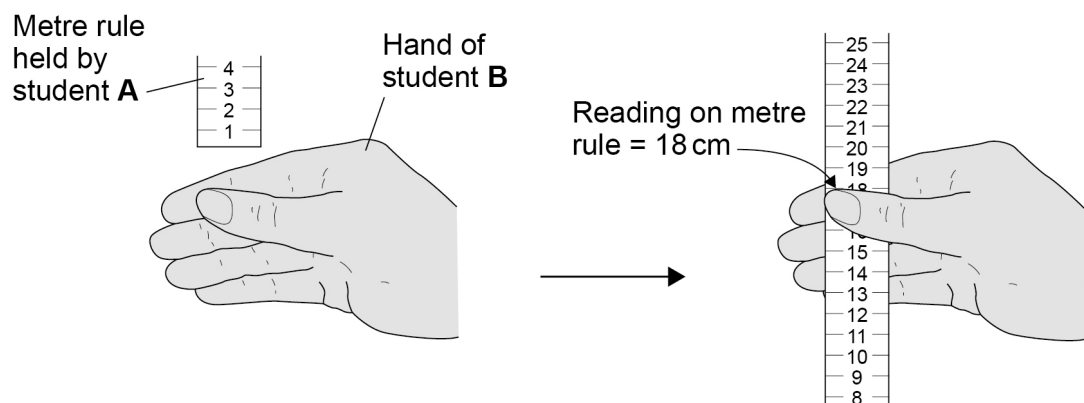


Table 1 shows some of the results.

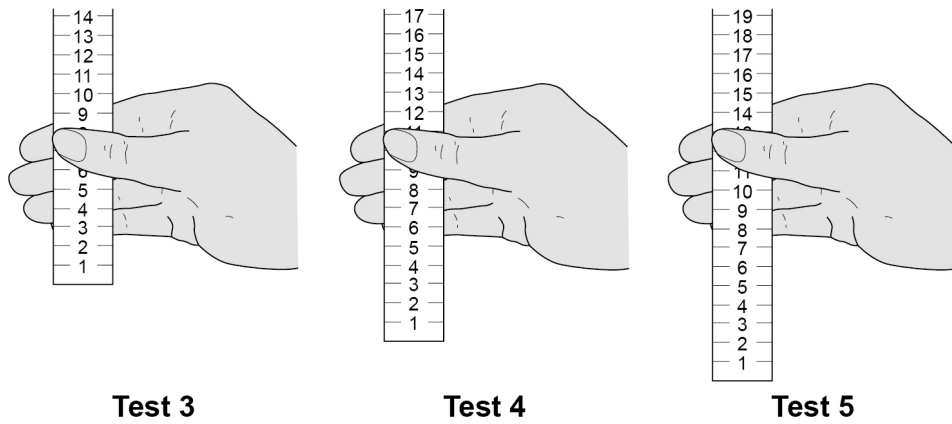
Table 1

Test	Reading from scale on metre rule in cm	
	Before drinking coffee	After drinking coffee
1	18	10
2	21	14
3	15	
4	12	
5	19	



Figure 2 shows the results **after** drinking the coffee for tests 3, 4 and 5.

Figure 2



0 1 . 4 Complete **Table 1**.

Use results from **Figure 2**.

[2 marks]

The students made the following conclusion:

‘Drinking coffee speeds up reactions.’

0 1 . 5 Give evidence from **Table 1** to support the students’ conclusion.

[1 mark]

0 1 . 6 The students’ conclusion may **not** be valid.

Suggest **two** improvements the students could make to their method.

[2 marks]

1 _____

2 _____



Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	<p style="text-align: center;">Stimulus</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">Chemicals</div> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">Light</div> </div>	<p style="text-align: center;">Sense organ</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">Ear</div> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">Eye</div> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">Tongue</div> </div> <p style="text-align: center;">additional lines from a stimulus negates the mark for that stimulus</p>	1 1	AO1 4.5.2.1
01.2	any two from: <ul style="list-style-type: none"> • fast / rapid • protect (from danger / harm) • a response / a <u>reaction</u> • automatic / involuntary or not under conscious control 	ignore 'action' allow not coordinated by conscious part of the brain or allow does not involve thought / thinking ignore not coordinated by the brain	1 1	AO1 4.5.2.1
01.3	the muscle contracts		1	AO1 4.5.2.1
01.4	(10) (14) 8 11 13	in this order all 3 correct = 2 marks 2 correct = 1 mark 0 or 1 correct = 0 mark	2	AO2 4.5.2.1 8.2.7
01.5	(after drinking coffee) ruler falls less far (before being caught)	allow mean before = 17 and mean after = 11(.2) or mean after is only 11(.2) allow (ruler is) caught more quickly	1	AO3 4.5.2.1 8.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	any two from: <ul style="list-style-type: none"> • more repeats • test more students • use ruler with more precise scale – eg mm scale • drop from same height (above the hand) • make sure student B's hand is stationary • same distance between finger(s) and thumb 	ignore accurate allow alternative method – eg use of computer to measure reaction time	2	AO3 4.5.2.1 8.2.7
Total			10	