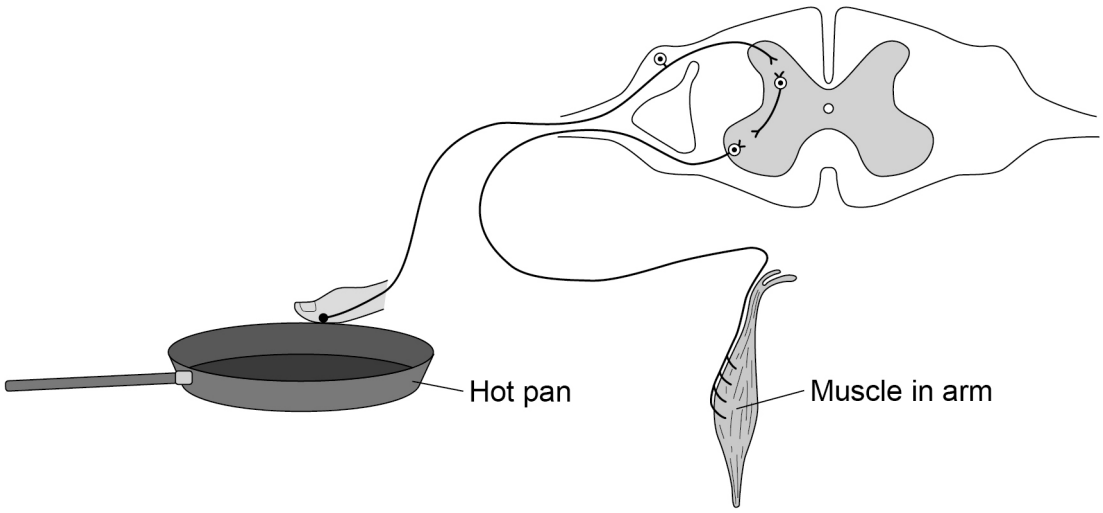
Do not write outside the box

0 2 Human reactions are a response to an external change.

0 2 . 1 Reflex actions help to protect the body against damage.

Figure 2 shows the nervous pathway for a reflex action.

Figure 2



A stimulus from the hot pan will cause the muscle in the arm to contract and move the finger away.

Describe how the stimulus from the hot pan reaches the muscle in the arm.

[4 marks]

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0 2 . 2 A student investigated whether using the right hand or the left hand had an effect on reaction time.

The student only tested right-handed people.

Describe a method for the student's investigation.

Include details of the test you would use for reaction time**.**

[4 marks]

Question 2 continues on the next page

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A different student carried out an investigation to see if playing tennis improved reaction time.

The student used two groups of six people.

Table 1 shows the results.

Table 1

Person	Reaction time in seconds	
	People who play tennis	People who do not play tennis
1	0.2	0.3
2	0.4	0.4
3	0.3	0.6
4	0.4	0.5
5	0.2	0.3
6	0.3	0.2
Mean	**X**	0.4

0 2 . 3 Calculate mean value **X** in **Table 1**.

[2 marks]

X = _____ seconds

0 2 . 4 What is the dependent variable in the student's investigation?

[1 mark]

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The student concluded:

'Playing tennis improves reaction time.'

0 2 . 5 Give **one** piece of evidence which supports the conclusion.

[1 mark]

0 2 . 6 Give **one** piece of evidence which does **not** support the conclusion.

[1 mark]

13

Turn over for the next question

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	any **four** from: • (stimulus is) detected by the receptor • (initiates) an electrical impulse • (impulse) travels via the neurones • sensory, relay and motor • crosses synapses • (crosses synapses) as a chemical	allow in this order only	4	AO1 AO2 4.5.2
02.2	**Level 2:** The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.		3–4	AO2
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.		1–2	AO1
	No relevant content		0	4.5.2 RPA 6
	Indicative content • select at least 3 people • do reaction time test at least 3 times using right hand • details on how to do test in valid manner • find a mean • remove anomalous readings • repeat for each person for left hand • select people of same age • select people of same gender • same time of day • other control such as amount of coffee, sleep. To access level 2 the right hand and left hand of each person must be compared			
02.3	$\frac{(0.2 + 0.4 + 0.3 + 0.4 + 0.2 + 0.3)}{6}$ **or** $\frac{1.8}{6}$ 0.3		1 1	AO2 4.5.2 RPA 6

02.4	reaction time	allow time	1	AO2 4.5.2 RPA 6
02.5	students who play tennis (regularly) had shorter / faster (mean) reaction time(s)		1	AO3 4.5.2 RPA 6
02.6	any **one** from: • overlap in times between two groups • small difference in (mean) times • small sample used	allow correctly described as comparative data allow students who did not play tennis may have played other (ball) games	1	AO3 4.5.2 RPA 6
Total			**13**	