

4-5 Homeostasis and response – Trilogy

1.0 Diabetes is a disease in which blood glucose (sugar) concentration may rise more than normal.

1.1 Which organ in the body monitors this rise in blood sugar?

[1 mark]

Tick **one** box.

- Adrenal
- Pancreas
- Pituitary
- Thyroid

1.2 One way of treating diabetes is by careful attention to diet.

Figure 1 shows the recommended diet for a person with diabetes.

Figure 2 shows a diet for a person without diabetes.



Give **two** ways in which the recommended diet of a person with diabetes is different from the diet of a person without diabetes.

[2 marks]

Recommendation 1: _____

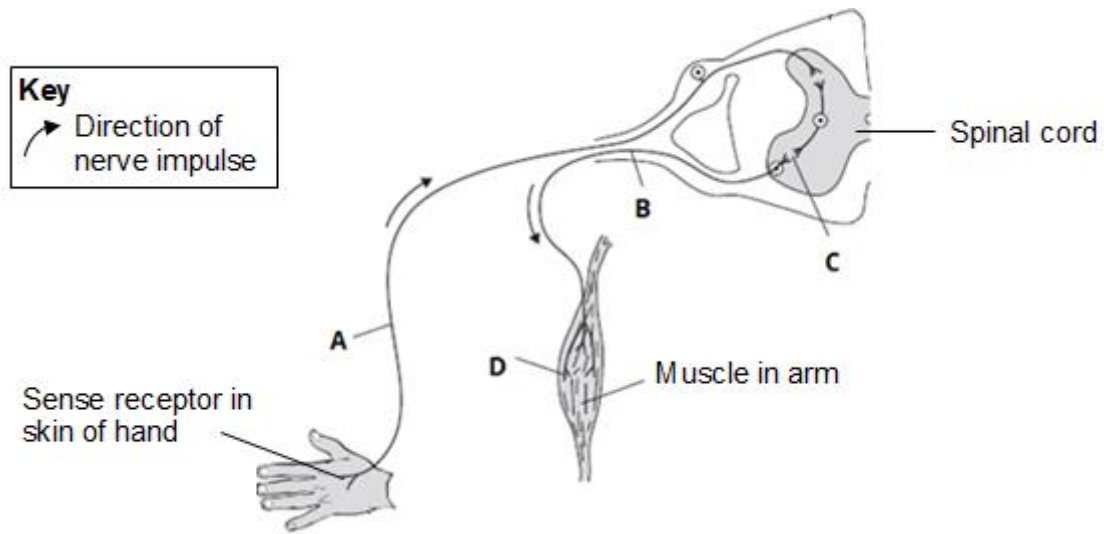
Recommendation 2: _____

1.3 Other than diet, give **one** way in which diabetes may be treated.

[1 mark]

2.0 **Figure 3** shows the neurones and parts of the body involved in a response to touching a hot object.

Figure 3



A neurone is a nerve cell. Neurones carry impulses around the body.

2.1 What is **B**?

[1 mark]

Tick **one** box.

- Effector
- Motor neurone
- Relay neurone
- Sensory neurone

2.2 Synapses are one of the structures in a reflex arc.

Which part, **A**, **B**, **C** or **D** is a synapse?

[1 mark]

Tick **one** box.

A

B

C

D

2.3 The hand touches a hot object.

An impulse travels through the nervous system to the muscle (point **D**). The muscle moves the hand away from the hot object.

What does the muscle do to move the hand away from the hot object?

[1 mark]

2.4 The action described in 2.3 is a reflex action.

How can you tell that this action is **not** a conscious action?

[1 mark]

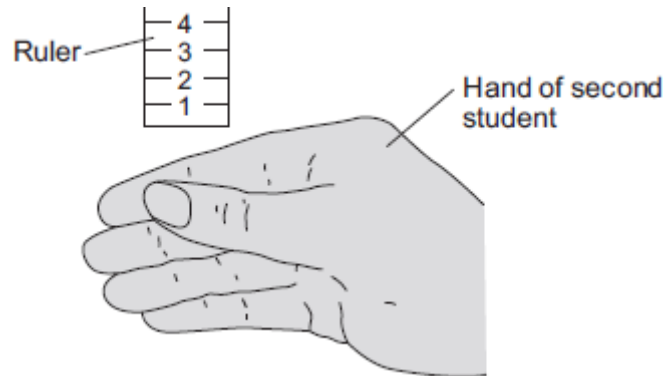
Use information from the diagram.

2.5 Some students investigated the effect of caffeine on a person's reaction time.

The students used the following steps.

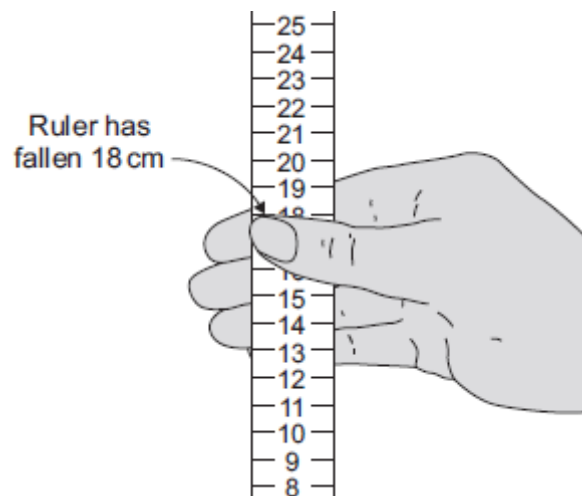
1. One student held a ruler just above a second student's hand, as shown in **Figure 4**.

Figure 4



2. The student let go of the ruler. The second student caught it as soon as possible, as shown in **Figure 5**.

Figure 5



3. The students repeated this experiment seven more times.
4. The student catching the ruler then drank a cup of strong coffee. Coffee contains caffeine.
5. Fifteen minutes after drinking the coffee the students repeated steps 1 to 3.

Table 1 and Table 2 show the students' results.

Distance ruler fell before it was caught in cm
Before drinking coffee
17
21
24
16
20
16
13
21
Mean = 18.5

Distance ruler fell before it was caught in cm
After drinking coffee
8
13
11
16
9
14
13
13
Mean = 12.2

What is the mode for the results after drinking coffee?

[1 mark]

2.6 The students used the reading on the ruler as a measure of the reaction time. What can you conclude about the effect of caffeine on reaction time?

[1 mark]

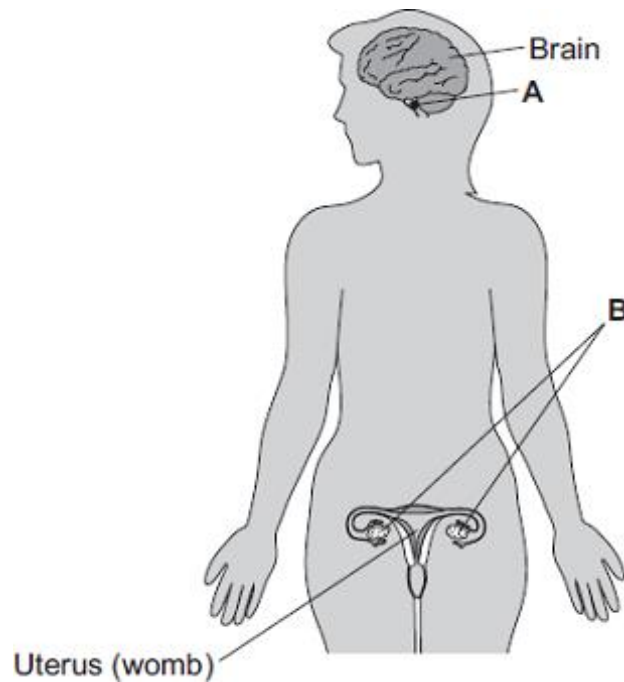
2.7 Which of the statements below show that the experiment was repeatable, and which show that it was reproducible?

[2 marks]

	Repeatable	Reproducible
The same student repeated the experiment		
The same student got similar results each time		
A different student repeated the experiment		
A different student got similar results each time		

3.0 Figure 6 shows the position of two glands, **A** and **B**, in a woman.

Figure 6



3.1 Name glands **A** and **B**.

[2 marks]

A _____

B _____

3.2 Gland **A** produces the hormone Follicle Stimulating Hormone (FSH).
FSH controls changes in gland **B**.

Describe how FSH moves from gland **A** to gland **B**.

[1 mark]

3.3 Oestrogen is a reproductive hormone.
Which gland secretes oestrogen?

[1 mark]

3.4 A woman is not able to become pregnant.

The woman does not produce mature eggs. The doctor treats the woman by giving her injections of hormones.

Which **two** hormones will help the woman produce and release mature eggs?

[2 marks]

Tick **two** boxes.

- Follicle Stimulating Hormone (FSH)
- Luteinising Hormone (LH)
- Oestrogen
- Progesterone
- Testosterone

3.5 Hormones control some actions in the body. The nervous system controls some actions as well. Reflex actions are part of the nervous system.

Give **two** ways in which a hormone-controlled action is different from a reflex action.

[2 marks]

1 _____

2 _____

3.6 There are different types of contraception that are used to prevent pregnancy.

Explain how hormonal and non-hormonal methods of contraception prevent pregnancy occurring.

[2 marks]

Hormonal methods _____

Non-hormonal methods _____

3.7 A new fertility treatment that could allow women to have IVF in their lunch hour has been developed.

Figure 7 shows the *Invozell* device.

Figure 7



Invozell is a sealed capsule that allows fertilisation to take place inside the woman's body, in the vagina.

- Eggs are removed from the ovaries while the woman is under sedation.
- The eggs and sperm are put into the *Invozell* capsule.
- The capsule is placed inside her vagina.
- After three days the capsule is removed and the best embryo is transferred to the woman's womb.

This IVF treatment can be performed in a doctor's surgery because at no time are eggs, sperm or embryo stored outside the body. No costs are involved for laboratory incubation.

Evaluate the use of the *Invozell* technique compared with standard IVF treatment.

[4 marks]

4.1 Blood glucose concentration is monitored and controlled by the pancreas.

Explain what would happen to maintain blood glucose concentration if somebody ate some glucose tablets.

[4 marks]

MARK SCHEME

Qu No.		Extra Information	Marks
1.1	pancreas		1
1.2	(person with diabetes), should get more energy from fats should get less energy from carbohydrates	allow converse if clearly describing person without diabetes allow eat more fats allow eat less carbohydrate.	1 1
1.3	any one from: <ul style="list-style-type: none"> • exercise • (injecting) insulin • pancreas transplant • artificial pancreas 		1

Qu No.		Extra Information	Marks															
2.1	motor neurone		1															
2.2	C		1															
2.3	contract		1															
2.4	not connected to the brain or coordinated <u>only</u> by the spinal cord		1															
2.5	13		1															
2.6	caffeine decreases reaction time	allow caffeine speeds up reactions	1															
2.7	<table border="1"> <thead> <tr> <th></th> <th>Repeatable</th> <th>Reproducible</th> </tr> </thead> <tbody> <tr> <td>The same student repeated the experiment</td> <td>✓</td> <td></td> </tr> <tr> <td>The same student got similar results each time</td> <td>✓</td> <td></td> </tr> <tr> <td>A different student repeated the experiment</td> <td></td> <td>✓</td> </tr> <tr> <td>A different student got similar results each time</td> <td></td> <td>✓</td> </tr> </tbody> </table>		Repeatable	Reproducible	The same student repeated the experiment	✓		The same student got similar results each time	✓		A different student repeated the experiment		✓	A different student got similar results each time		✓	one mark per correct column	2
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