

## 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?

Tick <b>one</b> 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 mark]



**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.



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

## **2.1** What is **B**?



[1 mark]



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

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

	Tick <b>one</b> box.	[1 mark]
	A	
	B	
	c	
	D	
2.3	The hand touches a hot object.	
	An impulse travels through the nervous system to the muscle (point <b>D</b> ). 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 <b>2.3</b> is a reflex action.	
	How can you tell that this action is <b>not</b> 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**.



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



- 3. The students repeated this experiment seven more times.
- 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.

Table 1			
Distance ruler fell before it was caught in cm			
Before drinking coffee			
17			
21			
24			
16			
20			
16			
13			
21			
Mean = 18.5			

Table 2
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 Brain В Uterus (womb) Name glands **A** and **B**. 3.1 [2 marks] Α В\_\_\_\_\_ **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.

Tick two boxes.

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]

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 *Invocell* device.



*Invocell* 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 *Invocell* 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 *Invocell* 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	allow converse if clearly describing person without diabetes allow eat more fats	1
	should get less energy from carbohydrates	allow eat less carbohydrate.	1
1.3	any <b>one</b> from: • exercise • (injecting) insulin • pancreas transplant • artificial pancreas		1

Qu No.				Extra Information	Marks
2.1	motor neuron	е			1
2.2	С				1
2.3	contract				1
2.4	not connected coordinated <u>c</u> cord	d to the brain <b>o</b> only by the spin	<b>r</b> al		1
2.5	13				1
2.6	caffeine decre	eases reaction	time	allow caffeine speeds up reactions	1
2.7		Repeatable	Reproducible	one mark per correct column	2
	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		¥		



		Extra Information	Marka
QUINO.			IVIdi KS
3.1	(A) pituitary		1
	(B) ovary / ovaries		1
3.2	in blood (stream) or in (blood)	ignore dissolved	1
	plasma		
3.3	ovary / ovaries		1
3.4	Follicle Stimulating hormone FSH	in either order	1
	Luteinising hormone / LH		1
3.5	(hormone controlled action is a) slower	allow converse if clearly describing	1
	action	nervous action	
	lasts longer		1
3.6	(hormonal methods)		1
	some release hormones / oestrogen /		
	progesterone to stop eggs being matured		
	and/or released (such as the contraceptive		
	(non-hormonal methods)		1
	stop sperm reaching the egg (such as		
	condoms, spermicidal cream, abstinence or		
	sterilization)		
	stop the fertilized eag implanting in the		
	womb (such as some IUDs)		
3.7			
Level 2:	A coherent evaluation is provided which cons	siders a range of points both advantages	3–4
	and disadvantages of Invocell. If a conclusion	n is given, it is consistent with the	
	reasoning.		
Level 1:	Discrete relevant point made. The logic may	be unclear and the conclusion, if present,	1–2
	may not be consistent with the reasoning.		
	No relevant content.		0
Indicativ	e content		
Advanta	ges of Invocell		
• low(e	r) cost		
<ul> <li>quick</li> </ul>	(er)		
<ul> <li>labor</li> </ul>	atory / incubator / equipment not needed		
<ul> <li>more</li> </ul>	convenient		
Discolute			
Disadvar	trages of invoceil		
	yo development cannot be monitored		
	or be used where male is intertile		
- (156)	or meetion of pair in vayina		
• argue	ed conclusion		

Qu No.		Extra Information	Marks
4.1	glucose levels in blood will rise		1
	pancreas releases insulin	do <b>not</b> allow liver releasing insulin	1
	glucose is converted to glycogen (in liver)	allow glucose is taken up by cells	1
	glucose level falls <b>or</b> returns to normal		1