Name:

Date:

B5 - Test 3
HOMEOSTASIS AND RESPONSE
Intermediate

GCSE

BIOLOGY

AQA - Combined Science

Mark

Grade

Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

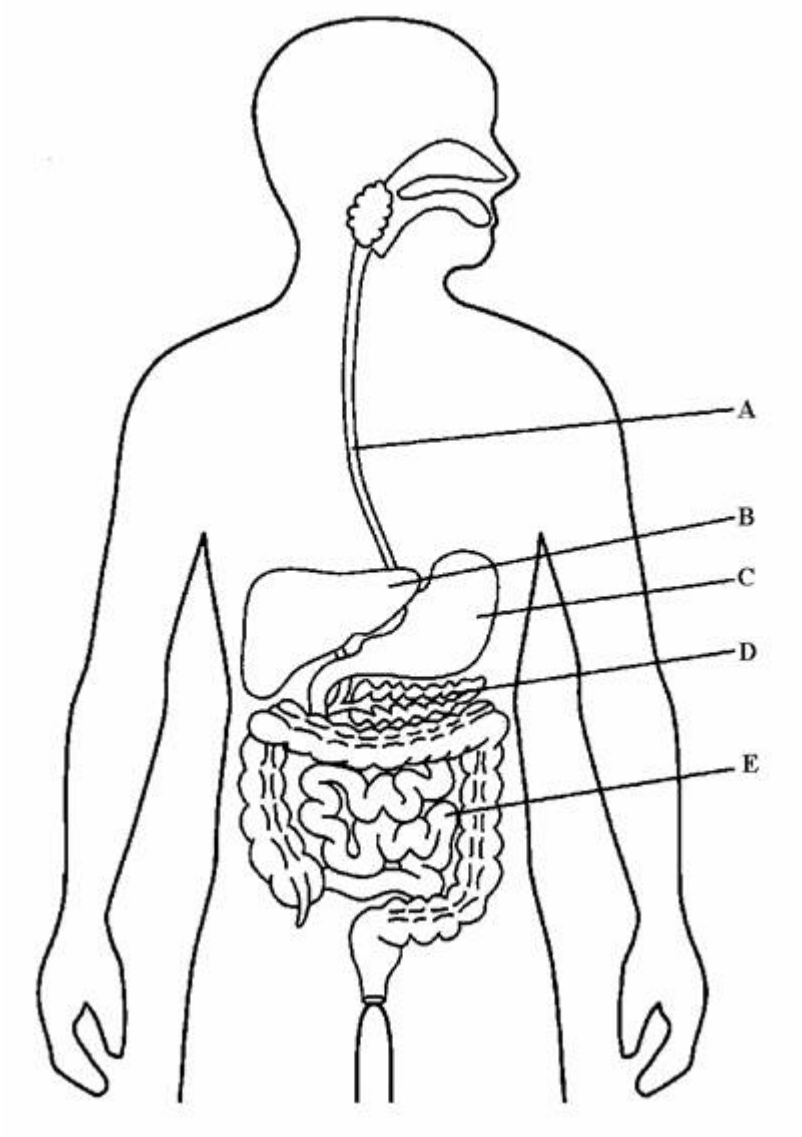
Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

Information

- The marks for the questions are shown in brackets

1. The diagram shows part of the human digestive system.



(i) Name part **B**.

_____

(1)

(ii) Describe the role of **B** and **D** in reducing blood sugar levels.

_____

_____

_____

_____

_____

(2)

(Total 3 marks)

2. In Vitro Fertilisation (IVF) treatment helps infertile women to become pregnant.

(a) Name the **two** hormones in a fertility drug.

1. _____

2. _____

(2)

(b) The table shows the effectiveness of IVF treatment in one clinic in 2010.

Age of women in years	**Under 35**	**35 – 37**	**38 – 40**	**Over 40**
Number of IVF treatments	130.0	100.0	29.0	20.0
Average number of embryos transferred	2.6	2.8	3.3	3.6
Percentage of successful pregnancies	43.0	30.0	21.0	13.0

(i) What is the relationship between the age of women and the success of IVF treatment?

_____

_____

(1)

(ii) Use information from the table to give **one** ethical problem with IVF.

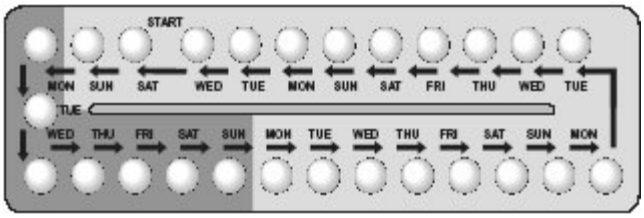
_____

_____

(1)

(Total 4 marks)

3. The picture shows some birth control (contraceptive) pills for women.



These are some facts about using the birth control pills:

- birth control pills are 99 per cent effective in preventing pregnancy
- the hormones in the pills have some rare but serious side effects
- this method of birth control gives no protection against sexually transmitted diseases
- the hormones in the pills give protection against some women's diseases
- the woman has to remember to take the pill every day
- the woman's monthly periods become more regular.

Use the information above to answer these questions.

(a) Give **two** advantages of using birth control pills.

1. _____

_____

2. _____

_____

(2)

(b) Give **two** disadvantages of using birth control pills.

1. _____

_____

2. _____

_____

(2)

(Total 4 marks)

4. Diabetes is a disease in which a person's blood glucose concentration may rise.

Doctors give people drugs to treat diabetes.

The table shows some of the side effects on the body of four drugs, **A, B, C** and **insulin,** used to treat diabetes.

Drug	Side effects on the body
A	Weight loss Liver, kidney and heart damage Feeling of sickness
B	Weight gain Damage to some cells in pancreas
C	More water is kept in the body Weight gain Increased chance of bone breakage in women
Insulin	A little more water is kept in the body Weight gain Increased risk of lung damage

(a) Which drug, **A, B, C** or **insulin,** is most likely to result in an increase in blood sugar concentration in some people?

Explain your answer.

Drug _____

Explanation

_____

_____

(2)

(b) (i) Drugs **A, B and C** can be taken as tablets.

The chemicals in the tablets are absorbed into the blood from the digestive system.

Insulin is a protein.

Insulin **cannot** be taken as a tablet.

Why?

_____

(1)

(ii) Other than using drugs, give **two** methods of treating diabetes.

1. _____

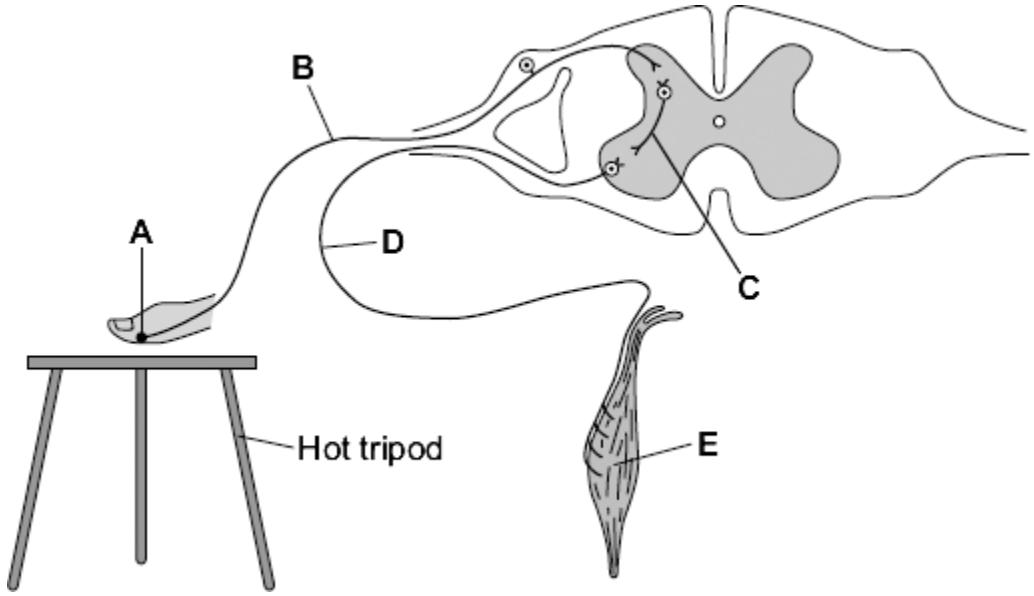
2. _____

(2)

(Total 5 marks)

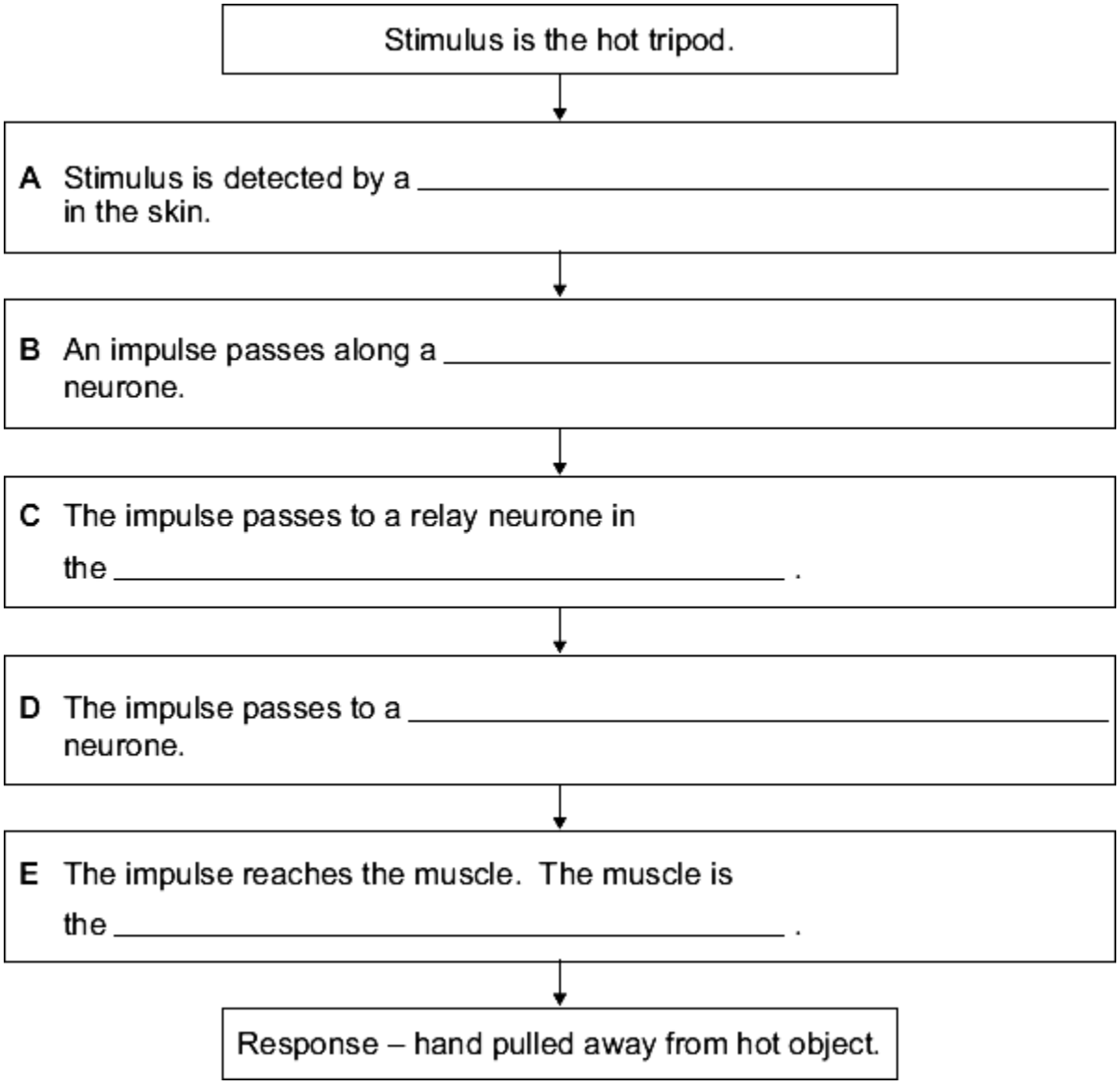
5. If you touch a hot object you automatically pull your hand away.
This is called a reflex action.
The reflex action happens quickly and protects the body from harm.

The diagram shows the structures involved in this reflex action.



The flow diagram shows the pathway of a nerve impulse in a reflex action.

Use information from the diagram to complete the flow diagram.



(Total 5 marks)

6. Information is passed to target organs in the body by hormones.

(a) (i) How do hormones travel around the body?

_____

(1)

(ii) What name is given to the organs that secrete hormones?

_____

(1)

(b) Explain the cause of diabetes and how it is controlled.

(3)

(Total 5 marks)

7. (a) Fill in the table about receptors. The first answer has been done for you.

RECEPTORS IN THE	SENSITIVE TO
Eyes	Light
Skin	
	Sound
Tongue	

(3)

(b) Describe, in as much detail as you can, how information is transmitted from light receptors in the retina to the brain.

(3)

(Total 6 marks)

8. This question is about the nervous system.

(a) Describe the function of receptors in the skin.

(2)

(b) A response is caused when information in the nervous system reaches an effector.

(i) There are two different types of effector.

Complete the table to show:

- the two different types of effector
- the response each type of effector makes.

Type of effector	Response the effector makes
1 _____	_____ _____
2 _____	_____ _____

(4)

(ii) Some effectors help to control body temperature.

Give **one** reason why it is important to control body temperature.

_____

_____

(1)

(Total 7 marks)

9. This question is about the human nervous system.

(a) A ball is thrown towards a boy.

As the ball is thrown, information passes along a pathway to allow the boy to catch the ball.

Draw **one** line from each action to the correct part of the pathway.

Action	Part of the pathway
Retina cells in the eye detect the light from the ball	Coordinator
The impulse reaches the brain which 'sees' the ball and sends an impulse to the arm muscle	Effector
The muscle in the arm contracts	Response
The arm stretches to catch the ball	Receptor
	Stimulus

(3)

Students in a college made this hypothesis:

'reaction time will increase as the time you have been awake increases.'

The students set up an investigation to test their hypothesis.

This is the method used.

1. Find 5 volunteers willing to stay awake for 24 hours.
2. Keep the volunteers in a room where they can study, use an exercise bike or watch TV as they wish.
3. Provide food, water, coffee and tea as requested.
4. Measure the volunteers' reaction time every 4 hours using a computer program.

(b) What was the independent variable in this investigation?

_____

(1)

The students used a computer program to test reaction time.

(c) Describe one **other** method that can be used to measure reaction time.

_____

_____

_____

_____

_____

_____

(3)

(d) Which method would you choose to use at your school?

Tick **one** box.

Computer program ☐

Method described in part (c) ☐

Give **one** reason for your choice.

_____

_____

(1)

The table shows the students' results.

Time awake in hours	Reaction time in seconds					
	Volunteer					Mean
	A	B	C	D	E	
0	0.25	0.33	0.35	0.21	0.27	0.28
4	0.20	0.30	0.31	0.19	0.26	0.25
8	0.21	0.28	0.33	0.20	0.27	0.26
12	0.26	0.40	0.58	0.22	0.30	0.35
16	0.44	0.49	0.83	0.27	0.75	**X**
20	0.64	0.55	1.11	0.39	1.40	0.82
24	0.92	0.61	1.15	0.45	1.35	0.90

(e) Calculate value **X** in the table.

Give your answer to 2 significant figures.

_____

_____

X = _____ seconds

(2)

(f) Describe the pattern of results for mean reaction time as the time awake increases.

_____

_____

_____

_____

(2)

(g) Do these results support the students' hypothesis: 'reaction time will increase as the time you have been awake increases'?

Give **one** reason for your answer.

_____

_____

(1)

(g) Give **two** ways the students could improve their investigation to make it more valid.

1. _____

_____

2. _____

_____

(2)

(Total 15 marks)

10. (a) Control systems help to keep conditions in the human body relatively constant.

What is the general name for the processes that keep body conditions relatively constant?

Draw a ring around the correct answer.

eutrophication **homeostasis** **hydrotropism**

(1)

(b) The concentration of glucose in the blood is controlled by hormones.

Use the correct answer from the box to complete each sentence.

glucagon	**glycerol**	**glycogen**
kidney	**liver**	**pancreas**

When the blood glucose concentration increases, an organ called

the _____ releases the hormone insulin.

Insulin causes glucose to move from the blood into the cells of the muscles

and the _____ .

Inside these organs, the glucose is changed into a carbohydrate called

_____ , which can be stored.

When the blood glucose concentration falls, another hormone is released,

which causes the storage carbohydrate to break down into glucose again.

This hormone is called _____ .

(4)

(c) A person with Type 1 diabetes does not make enough insulin.

The person needs to test their blood at intervals throughout the day.

If the concentration of glucose in their blood is too high, the diabetic person needs to inject insulin.

(i) Insulin is a protein.

It must be injected and cannot be taken by mouth.

Explain why.

_____

_____

_____

_____

(2)

(ii) Apart from injecting insulin, give **one other** way that a diabetic person could help to control the concentration of glucose in their blood.

_____

_____

(1)

(d) Pet dogs have been trained to detect if the concentration of glucose in the blood of their diabetic owners is outside the normal healthy range. These dogs are called 'medical response dogs'.
The dogs respond in different ways. They may bark, jump up, or stare at their owners. They may even fetch a blood-testing kit.

(i) Suggest what stimulus the dogs might be responding to when they behave like this.

_____

_____

(1)

(ii) **Table 1** shows how the concentration of glucose varied in blood samples from five diabetic people. Measurements were made both before and after getting a medical response dog.

Table 1

		Mean percentage of blood samples with different concentrations of glucose from the five diabetic people		
	Number of blood samples measured	**Low glucose**	**Within normal range of glucose**	**High glucose**
Before getting a dog	1704	32.6	54.8	12.6
After getting a dog	1724	18.6	61.6	19.8

A survey was made of the effect of a medical response dog on the lives of 16 diabetic people.

Table 2 shows how well these diabetic people agreed with each statement in the survey.

Table 2

Statement in survey	**Totally agree**	**Somewhat agree**	**Neither agree nor disagree**	**Somewhat disagree**	**Totally disagree**
I am more independent since getting my dog.	12	2	2	0	0
There are disadvantages to having a medical response dog.	0	0	4	4	8
I trust my dog to alert me when my sugar levels are low.	11	3	1	0	1
I trust my dog to alert me when my sugar levels are high.	6	7	0	1	2

Evaluate how useful medical response dogs are for warning diabetic people that the concentration of glucose in their blood is outside the normal range.

Use information from **Tables 1** and **2**.

(5)

(e) **Table 3** shows the concentrations of some substances in the urine of a non-diabetic person and in the urine of a diabetic person.

Table 3

	Concentration of substance in urine in g per dm^3	
Substance	**Non-diabetic person**	**Diabetic person**
Protein	0	0
Glucose	0	2.0
Urea	20.0	19.5
Sodium ions	6.0	5.8

Compare the results for the non-diabetic person and the diabetic person.
Give reasons for any differences.

Use your knowledge of how the kidney works.

(5)

(Total 19 marks)