

**1** 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)

**2** Hormones regulate the functions of many organs.

Complete the following sentences.

(a) Hormones control the monthly release of an egg from  
the woman's \_\_\_\_\_.

(1)

(b) Hormones also control the thickness of the lining of her \_\_\_\_\_.

(1)

(c) Hormones given to women to stimulate the release of eggs  
are called \_\_\_\_\_ drugs.

(1)

(d) How are hormones transported around the body?

\_\_\_\_\_

\_\_\_\_\_

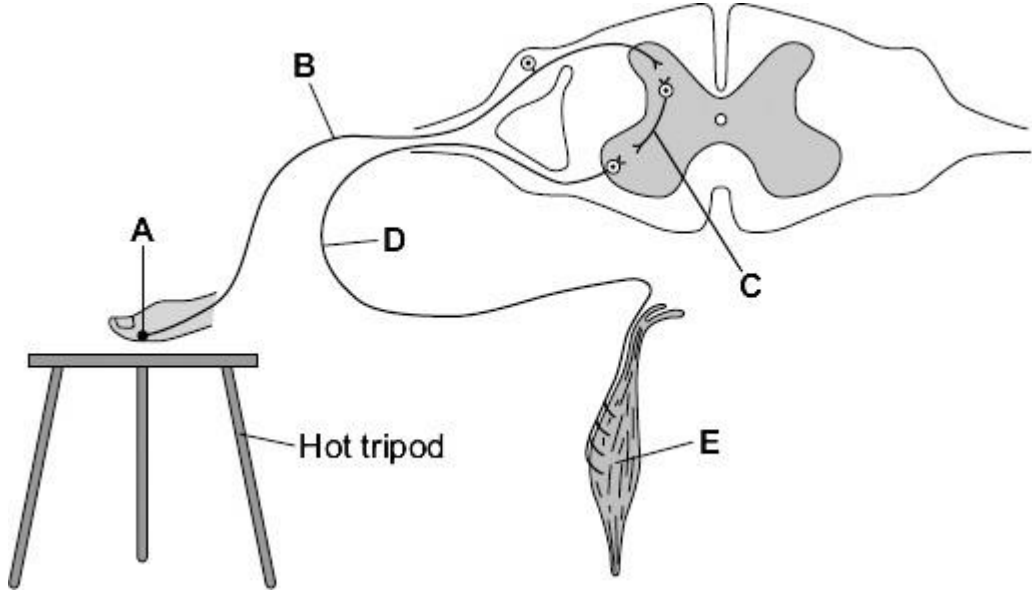
(1)

(Total 4 marks)

3

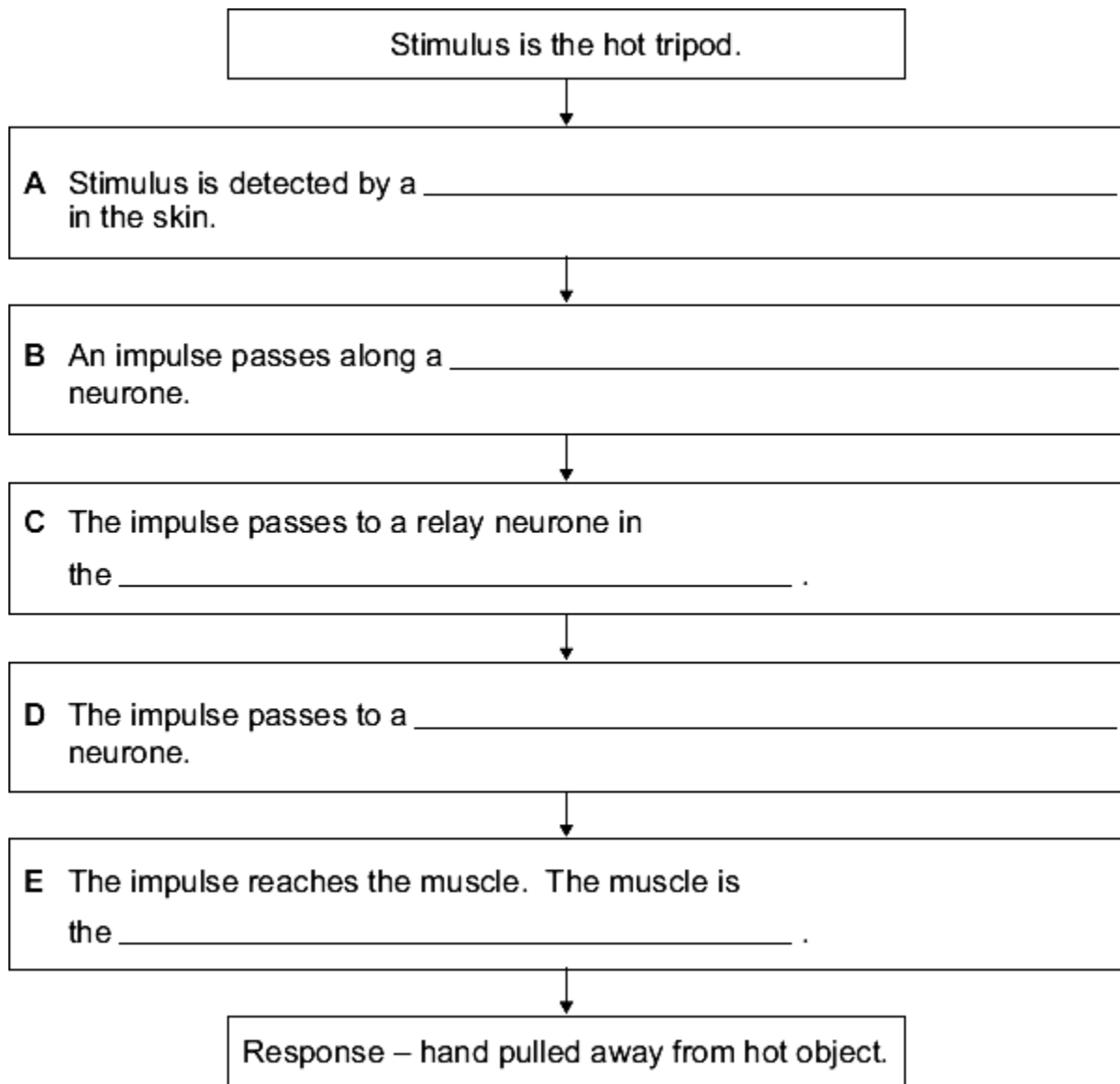
If you touch a hot object you automatically pull your hand away.  
This is called a reflex action.  
The reflex action happens quickly and protects the body from harm.

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)

4

Total cholesterol in the blood contains 'good' and 'bad' cholesterol. High levels of 'bad' cholesterol increase the risk of heart disease. High levels of 'good' cholesterol reduce the risk of heart disease.

Scientists have suggested that chemicals called polyphenols in dark chocolate may help people with Type 2 diabetes.

Polyphenols may reduce high levels of 'bad' cholesterol in the blood.

The scientists investigated the effect of polyphenols on levels of cholesterol in the blood.

- 7 men and 5 women with Type 2 diabetes had the levels of cholesterol in their blood measured.
- They all ate 45 g of dark chocolate every day for 16 weeks.
- 6 of the people ate dark chocolate that contained polyphenols. The other 6 people ate dark chocolate that did not contain polyphenols.
- All 12 people were allowed to eat and drink anything else they wanted, but **no more** chocolate.
- The levels of cholesterol in their blood were measured again after 16 weeks.

The results showed that for the people who ate dark chocolate with polyphenols:

- there were decreases in total cholesterol and 'bad' cholesterol
- there was an increase in 'good' cholesterol.

A newspaper headline reported the research and wrote:

'Research shows that diabetics should eat dark chocolate.'

*In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Was the newspaper's statement justified?

Include in your answer evidence that supports the newspaper's statement and evidence that does **not** support the newspaper's statement.



(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?

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(1)

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

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(1)

(Total 4 marks)

6 Hormones can be used to control human fertility.

Many women take the oral contraceptive pill so they do not become pregnant.



(a) Name **two** hormones used in contraceptive pills.

1. \_\_\_\_\_

2. \_\_\_\_\_

(2)

(b) Explain how these hormones stop a woman from becoming pregnant.

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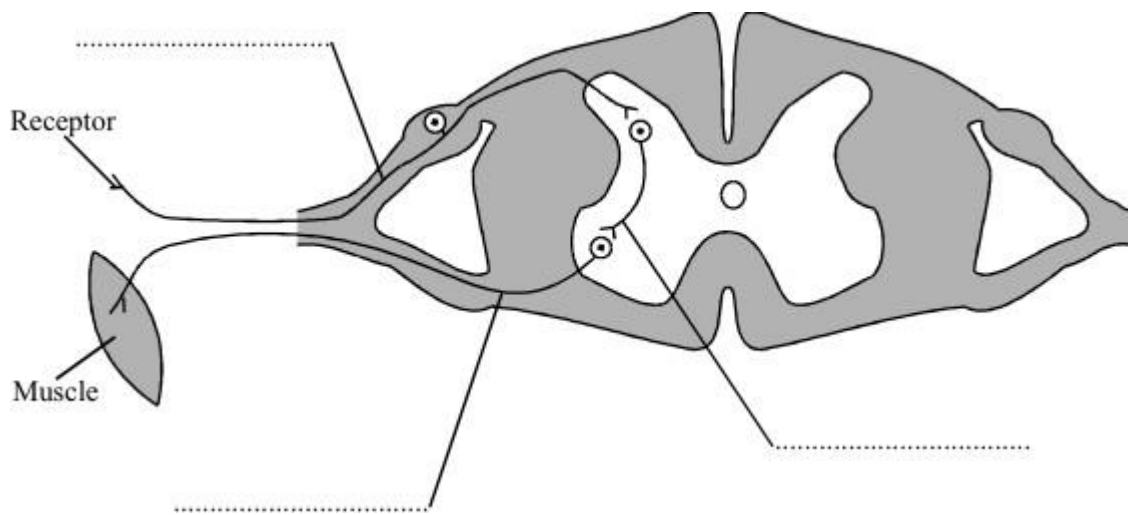
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(2)  
(Total 4 marks)

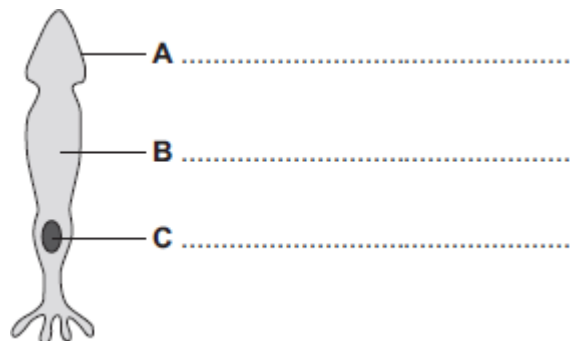
7 Information is also passed by impulses in the nervous system. Neurones carry impulses very rapidly. The diagram shows a reflex arc.

Label the diagram by adding the names of the neurones.



(Total 3 marks)

8 (a) The diagram shows a light receptor cell.



Label structures **A**, **B** and **C** on the diagram.

(3)

(b) It is important that the nervous system can detect stimuli.

Give **two** reasons why.

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(2)

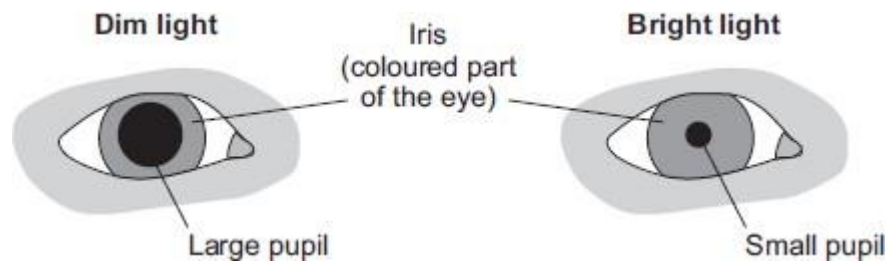
(Total 5 marks)

9

The pupil is the black part of the eye.  
It is the opening for light to enter the eye and reach the receptor cells.  
If bright light is shone into the eye, the pupil decreases in size.

This is an example of a reflex action.

The figure below shows two eyes, one reacting to dim light, the other reacting to bright light.



(a) Suggest how the reflex action of the eye to bright light is useful to the body.

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(2)

(b) Picking up a book is a voluntary action.

Describe **two** differences between a reflex action and a voluntary action.

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(2)

(Total 4 marks)



## Mark schemes

- 1** (a) (i) in blood **or** the circulation system **or** plasma  
*accept arteries and veins or blood vessels*  
*do not accept slowly or in blood cells* 1
- (ii) glands  
*accept endocrine glands or endocrine*  
*do not accept a named gland* 1
- (b) the pancreas  
*accept islets of Langerhans* 1
- any **one** from  
does not produce (sufficient) insulin  
(blood) sugar is not (properly) controlled 1
- insulin injections **or** inhalers  
*accept diet or tablets to make the*  
*pancreas produce insulin* 1
- [5]**
- 2** (a) ovary 1
- (b) womb / uterus 1
- (c) fertility 1
- (d) by the blood system 1
- [4]**
- 3** A – receptor  
*ignore organ / nerve* 1
- B – sensory  
*allow sensor* 1

C – CNS / central nervous system	
<i>accept spinal cord</i>	
<i>allow coordinator</i>	
<i>ignore brain</i>	
<i>do <b>not</b> accept spine</i>	1
D – motor	1
E – effector	1

**[5]**

**4**

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on the marking guidance (see Reference Material), and apply a 'best-fit' approach to the marking.

**0 marks**

No relevant content.

**Level 1 (1-2 marks)**

There is a brief description of the evidence for or against the newspaper's claim, including either evidence for or evidence against.

**Level 2 (3-4 marks)**

There is a description of some of the evidence for and evidence against the newspaper's claim, with at least one example of evidence for and one example of evidence against. There is an attempt at a conclusion.

**Level 3 (5-6 marks)**

There is a clear and detailed description of the evidence for and evidence against the newspaper's claim, with at least one example for and at least two examples against. A reasoned conclusion is given. The description must include reference to polyphenols.

## Examples of the chemistry points made in the response

Evidence supporting the newspaper claim:

- the study included a control group / one group given a placebo
- all participants ate the same amount of chocolate each day
- results showed a decrease in total cholesterol / an increase in 'good' cholesterol / a decrease in 'bad' cholesterol in the group that ate the dark chocolate  
*allow (dark) chocolate worked / reduced (risk of) heart disease*

Evidence against the newspaper claim:

- no results given for (dark) chocolate without polyphenols
- only type 2 diabetes patients tested
- small sample tested / only 12 tested
- unequal numbers of males and females
- other health issues / age not controlled
- rest of diet not controlled
- chocolate contains high levels of fat / sugar / could cause other health issues eg weight gain
- long term effects not known / trial only 16 weeks

Argued conclusion made with an attempted justification

[6]

5

- (a) *allow lower case*  
*answers can be in either order*

FSH

*accept follicle stimulating hormone*  
*ignore FHS*

1

LH

*accept luteinising hormone*  
*do **not** accept oestrogen / progesterone*

1

- (b) (i) the older the woman, the less successful the treatment  
*OWTTE*  
*relationship needed to obtain mark*

1

(ii) *answer must relate to data in table*

(many) embryos die / destroyed / do not survive  
*allow low success rate / often does not work*  
*allow could lead to multiple births*  
*ignore older women should not have babies*  
*ignore not natural / finance*  
*ignore religion / 'against God's will'*

1

[4]

6 (a) oestrogen

*in either order*  
*allow phonetic spellings*

1

progesterone

*accept progestin / progestogen*  
*do **not** allow proestrogen*

1

(b) (oestrogen / progesterone) inhibits FSH production

*if no hormones mentioned credit any effect listed in mark scheme*

1

(so) no eggs mature

*ignore for oestrogen: no eggs mature*  
*do **not** accept oestrogen*  
*inhibits ovulation*  
*accept (progesterone) thickens mucus around cervix*  
**or**  
*inhibits maturation / ovulation of egg*

1

[4]

7 top left label sensory

*credit afferent*  
*do not accept receptor*

1

bottom right label connector **or** relay

*credit intermediate*

1

bottom left label motor **or** effector

*credit efferent*

1

[3]

- 8** (a) A – (cell) membrane  
*allow phonetic spelling* 1
- B – cytoplasm 1
- C – nucleus 1
- (b) any **two** from:
- to react / respond (to the surroundings)  
*ignore brain / nervous system reacts*  
*ignore adapt*
  - avoid dangers / prevent harm to body  
*allow examples eg to prevent body being burned by hot object*
  - to coordinate behaviour / process information  
*ignore send messages* 2

[5]

- 9** (a) reduces / controls amount of light entering the eye  
*ignore stops light entering the eye* 1
- (so) less chance of damage  
*accept protects the retina allow*  
*(so) can see better (in bright light)* 1
- (b) any **two** from:  
*allow converse statements*

A reflex action is:

- fast(er)
- automatic / not thought about
- involves few(er) neurones
- involves few(er) synapses
- does not (always) involve the brain  
*allow nerves*  
*do **not** allow reference to hormones*

2

[4]