Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2018–2019

Single Award Science: Biology

Unit 1
Higher Tier

MV18

[GSA12]

WEDNESDAY 27 FEBRUARY 2019, MORNING

Time

1 hour, plus your additional time allowance.

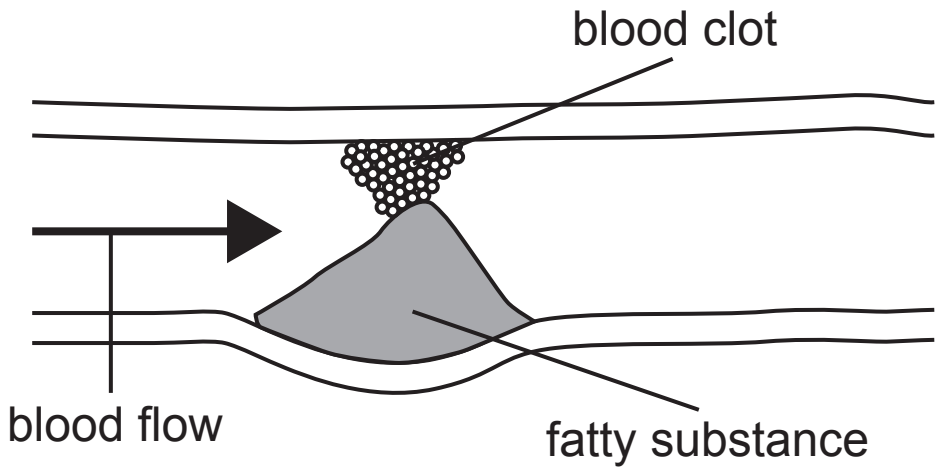
Instructions to Candidates

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write on blank pages.
Complete in black ink only.
Answer **all eight** questions.

Information for Candidates

The total mark for this paper is 60.
Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **1**.

1 The diagram below shows a coronary artery from a person with heart disease.



Explain why this person may have a heart attack.
[6 marks]

Your answer should include:

- the name of the fatty substance
- the steps that lead to a heart attack
- two **lifestyle** factors which can increase the risk of having a heart attack.

In this question you will be assessed on your written communication skills including the use of specialised scientific terms.

2 **(a)** Hormones such as insulin are produced by the body.

(i) Complete the following sentence to define a hormone. [2 marks]

A hormone is a chemical messenger

_____

_____

_____

(ii) Describe and explain the effect of insulin on blood glucose levels. [2 marks]

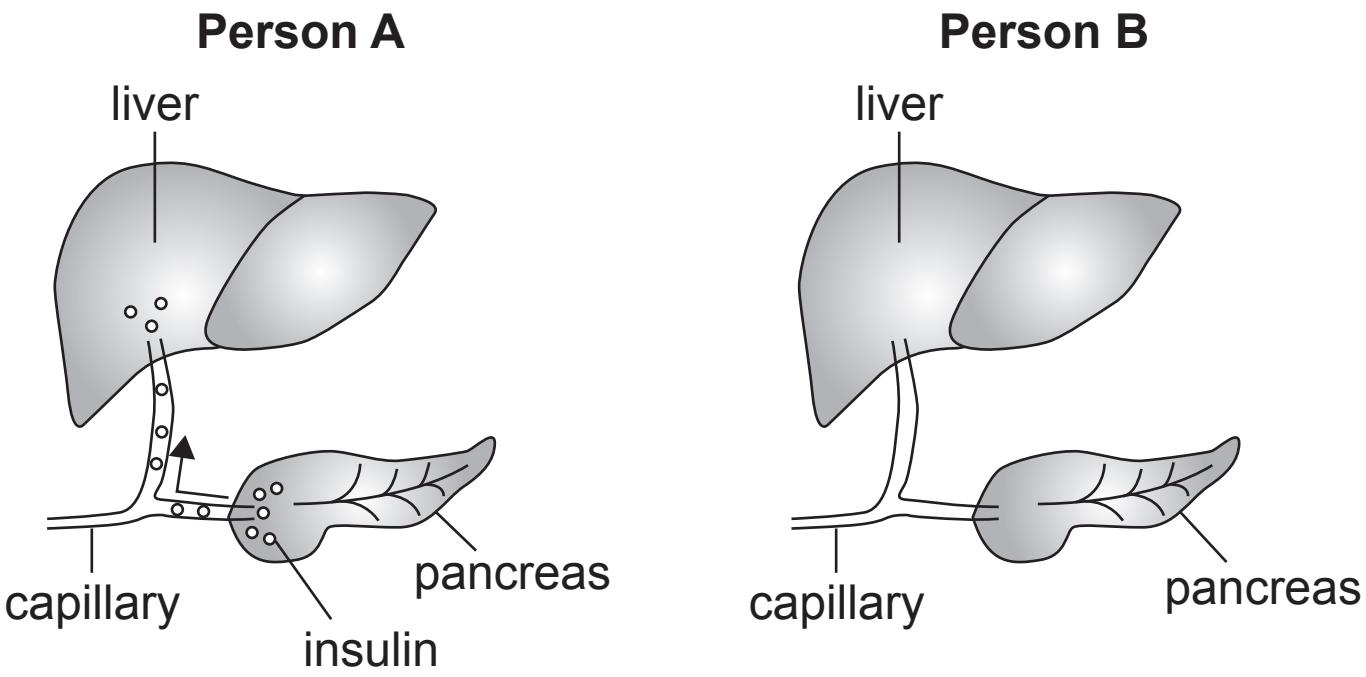
_____

_____

_____

_____

The diagrams below show the pancreas and liver from two different people.



(b) Using the diagram name the medical condition that person **B** has. Explain your answer. [2 marks]

_____

_____

_____

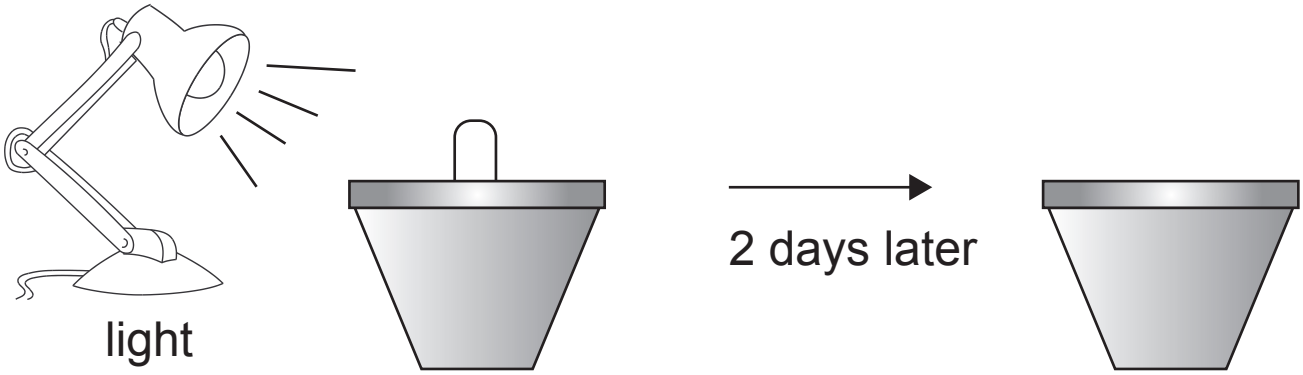
_____

(c) Auxin is a hormone produced in a plant that causes a growth response to light which allows more photosynthesis to take place.

(i) Name this growth response. [1 mark]

_____

The diagram below shows an investigation into a plant's growth response to light.



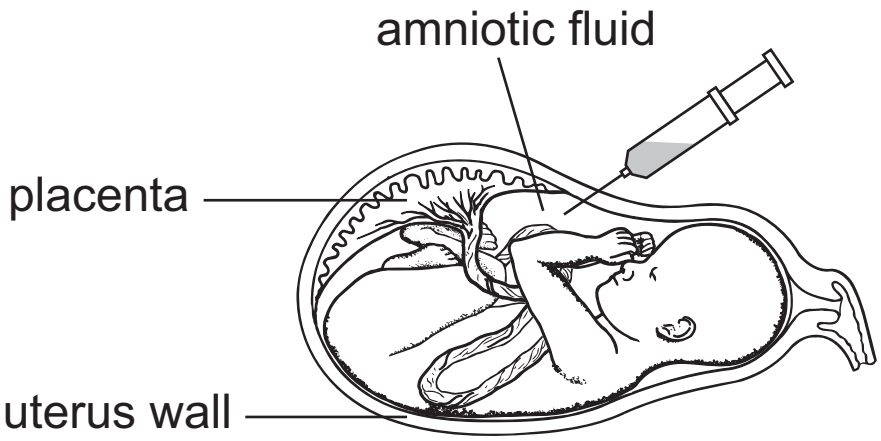
(ii) Complete the diagram to show how the plant has responded to light after 2 days. [2 marks]

(iii) Suggest how the plant would respond if it was receiving light from directly above it. [1 mark]

3 **(a)** The table below shows the relationship between the age of a pregnant woman and the risk of her child having Down's syndrome.

Age of woman/years	Risk of having a child with Down's syndrome
25	1 in 1350
30	1 in 940
35	1 in 350
40	1 in 85
45	1 in 35
50	1 in 10

The amniocentesis test removes some amniotic fluid from around the foetus which can be used to find out if the foetus has Down's syndrome.



(i) What is the function of the amniotic fluid? [1 mark]

There is a 1 in 100 risk of a miscarriage (loss of foetus) with this test.

(ii) Explain fully why this test is normally only offered to pregnant women over the age of 35 and not offered to pregnant women under 35 years. [2 marks]

Recently a test for Down's syndrome using blood taken from the arm of a pregnant woman has been developed.

(iii) Suggest why pregnant women may prefer to have the blood test and not the amniocentesis test. [1 mark]

(b) Down's syndrome is caused by a mutation.

(i) Describe fully what is meant by the term **mutation**. [2 marks]

_____

_____

_____

(ii) Name **one** other inherited condition caused by a mutation. [1 mark]

_____

(c) The diagram below shows a short section of DNA.

(i) What name is given to the shape of DNA?
[1 mark]

_____

(ii) Complete the following sentence. [1 mark]

The entire genetic material of an organism is called the _____ .

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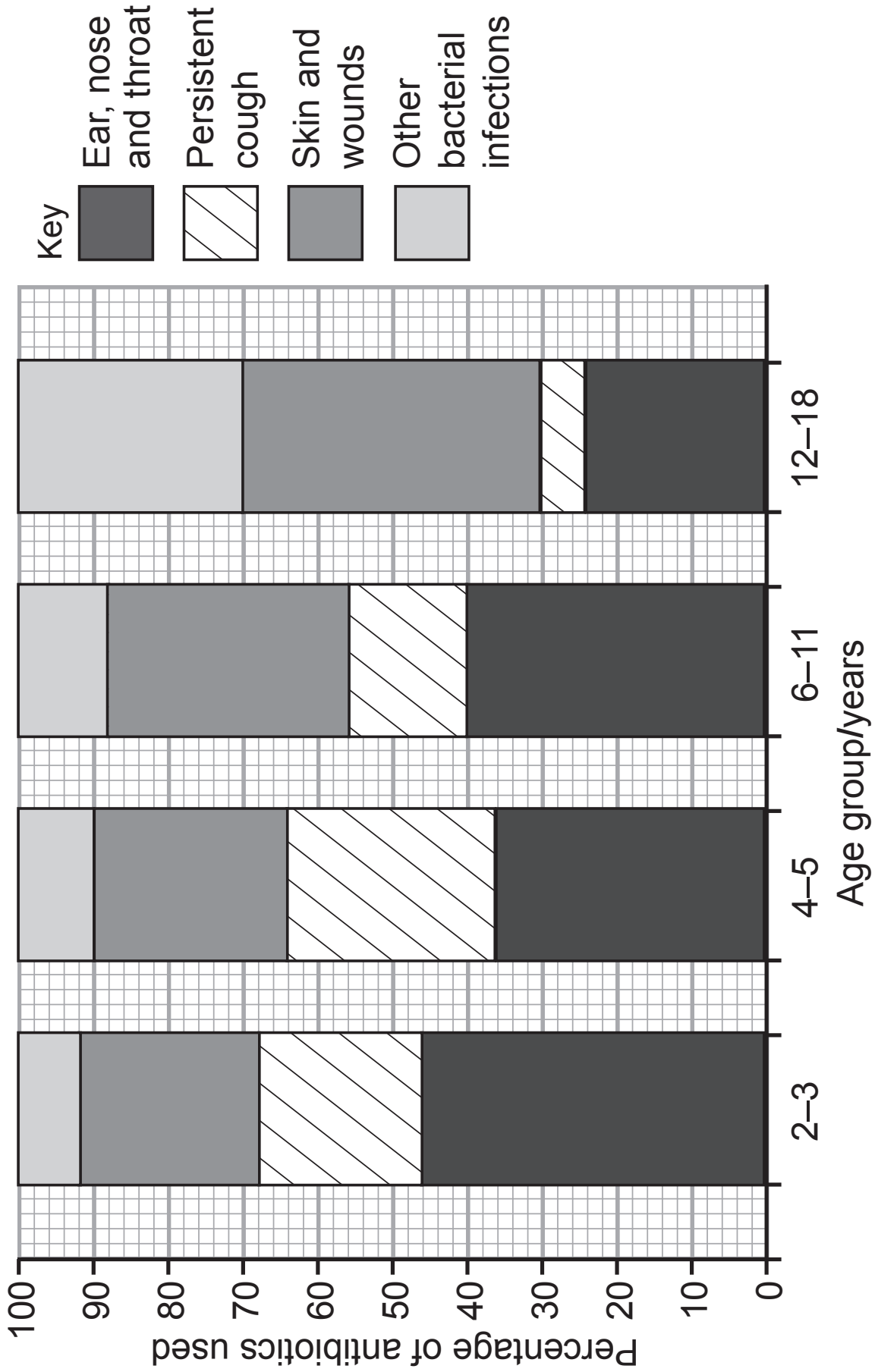
4 The bar chart below shows the percentage of antibiotics used to treat different bacterial infections in different age groups.



(a) Calculate the percentage of antibiotics used to treat persistent coughs in the 6–11 age group. [2 marks]

(Show your working out.)

Answer _____ **%**

(b) Penicillin is an example of an antibiotic that is used to treat bacterial infections. What is an antibiotic? [2 marks]

_____

_____

(c) Antibiotic-resistant bacteria like MRSA are usually spread through skin to skin contact with someone who has the infection.

(i) Suggest **one** reason why patients in hospitals are more likely to catch MRSA. [1 mark]

_____

_____

(ii) One way to control the spread of MRSA in hospitals is to use isolation rooms, where infected patients are on their own.
Suggest one reason why this method is **not** widely used in hospitals. [1 mark]

_____

_____

5 **(a)** Leukaemia is a type of cancer of the blood. Bone marrow transplants, to collect stem cells, can be used as a form of treatment. Before the bone marrow transplant a pre-treatment has to be given to the patient to kill the cancerous cells.

(i) Name **one** pre-treatment that can be used to kill cancerous cells. [1 mark]

_____

(ii) Give **two** potential risks involved in the use of stem cells in medicine. [2 marks]

1. _____

_____

2. _____

_____

(b) A clinical trial testing a new treatment for patients with leukaemia has started at the University of Birmingham.

(i) Give **two** reasons why it is necessary to carry out clinical trials (testing on humans). [2 marks]

1. _____

_____

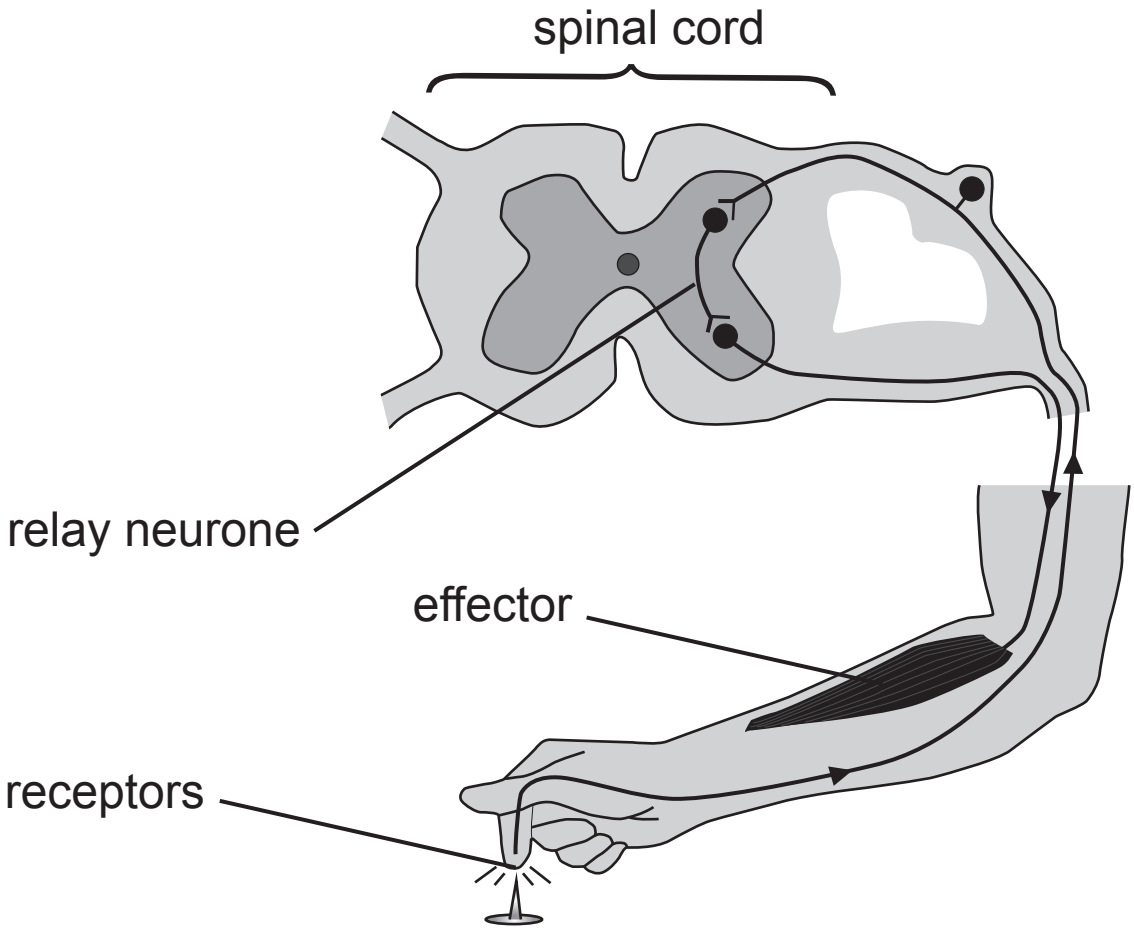
2. _____

_____

Before these clinical trials could take place the drugs involved had to go through other testing stages such as in vitro testing.

(ii) Describe what in vitro testing is and suggest why it is a very expensive process. [2 marks]

6 **(a)** The diagram below shows the nerve pathway involved in a reflex action (reflex arc).



(i) Using the diagram and your knowledge describe the pathway of the nerve impulses from the receptors to the effector. [3 marks]

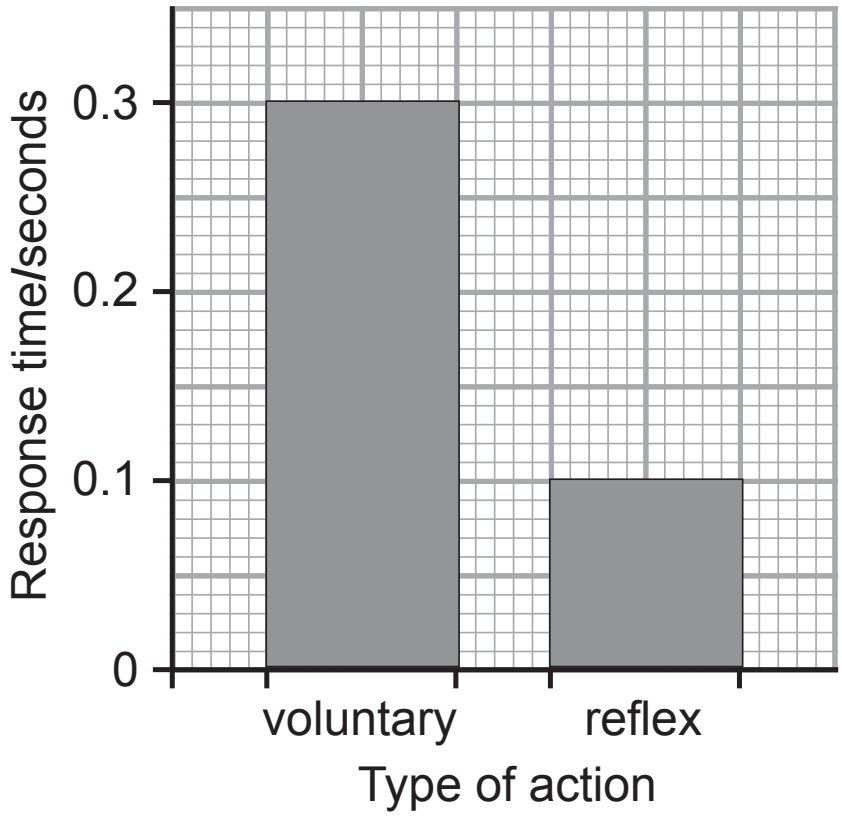
(ii) Using the diagram name the effector in this reflex arc. [1 mark]

_____

(iii) What name is given to the connection between two neurones? [1 mark]

_____

(b) The graph below shows the response times of a voluntary and reflex action.



(i) Calculate how many times faster a reflex action is compared to a voluntary action. [1 mark]

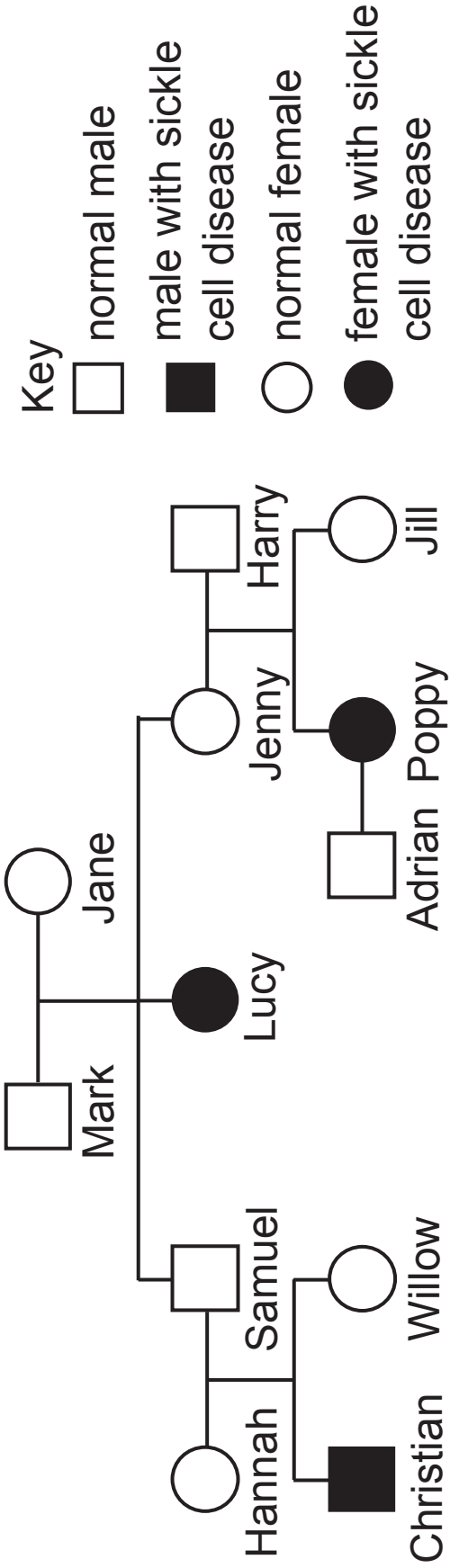
_____

(ii) Give **one** reason why reflex actions are faster than voluntary actions. [1 mark]

_____

_____

7 **(a)** Sickle cell disease is an inherited condition which affects red blood cells.
Below is a pedigree diagram showing how this condition is passed through a family.



(i) How many children do Mark and Jane have?
[1 mark]

_____

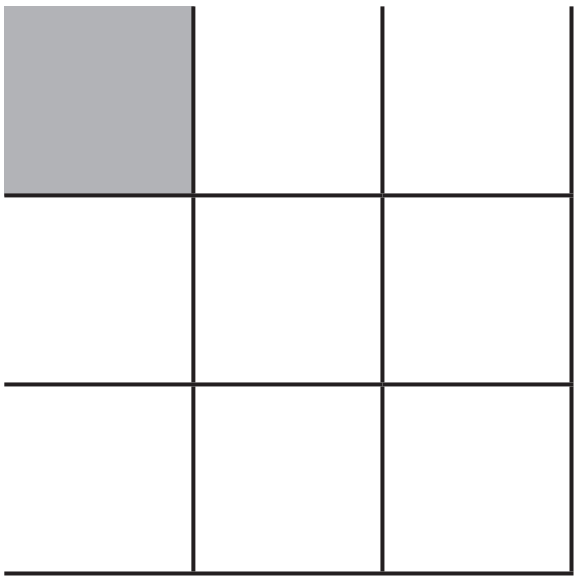
(ii) What is the relationship of Jane to Christian?
[1 mark]

_____

(iii) Using the symbols:

T = normal allele
t = sickle cell disease allele,

complete the Punnett square to show how it is possible for Mark and Jane to have a child (Lucy) with sickle cell disease. [2 marks]



(iv) What is the percentage probability of Mark and Jane having a child with sickle cell disease? [1 mark]

_____ **%**

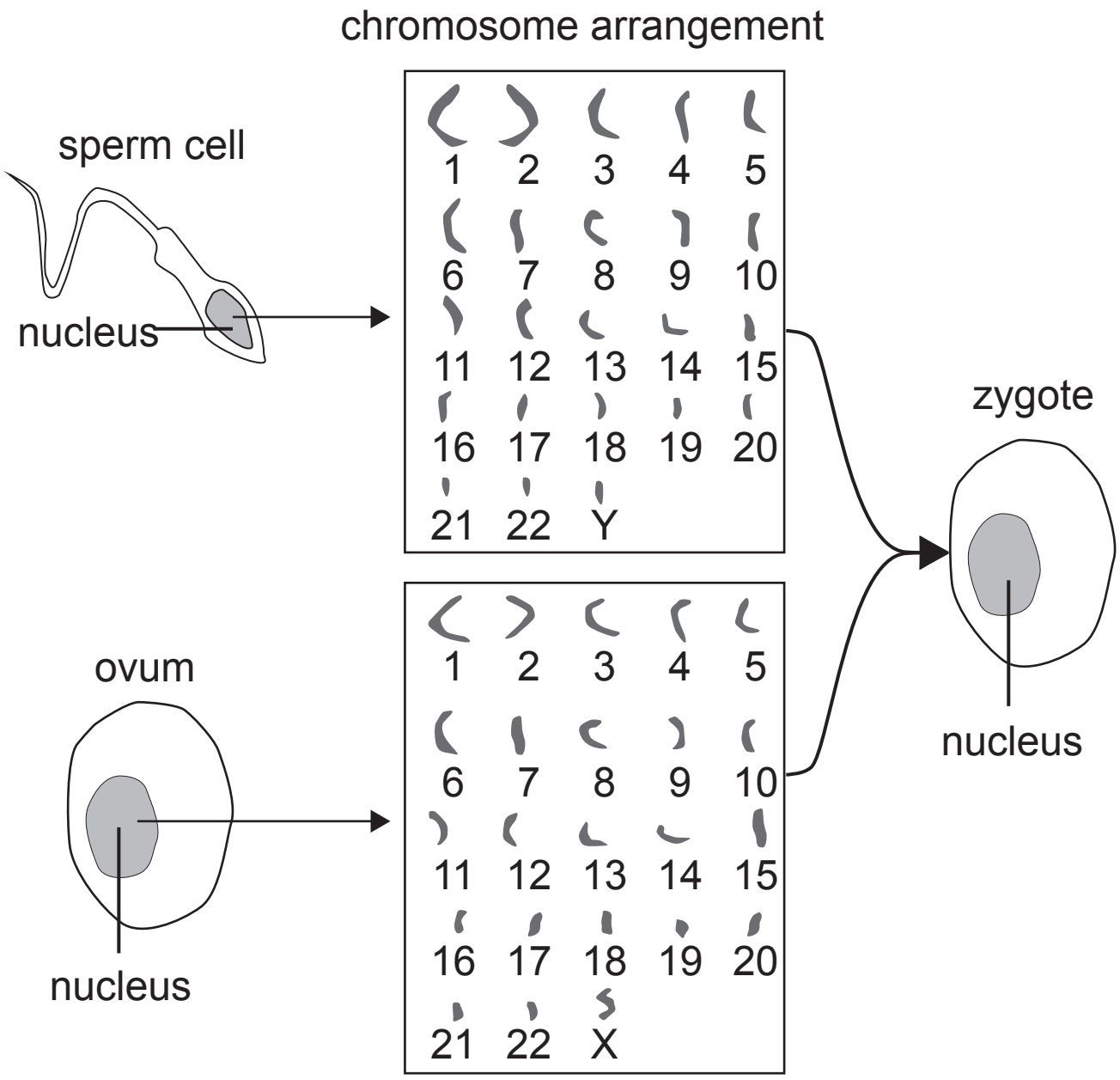
(b) Define the genetic term **homozygous**. [1 mark]

_____

_____

_____

8 The diagram below shows the chromosome arrangement in the nucleus of a sperm cell and an ovum.



(a) (i) What term is used to describe the number of chromosomes in the nucleus of the sperm cell or ovum? [1 mark]

_____

(ii) Describe how the zygote is formed and what happens to the zygote as it moves from the oviduct to the uterus. [2 marks]

_____

_____

_____

_____

(b) Oestrogen is a hormone involved in the menstrual cycle.

(i) State **one** function of oestrogen in the menstrual cycle. [1 mark]

_____

_____

(ii) Name **one** other female hormone in the menstrual cycle and describe the function of this hormone. [2 marks]

_____

_____

_____

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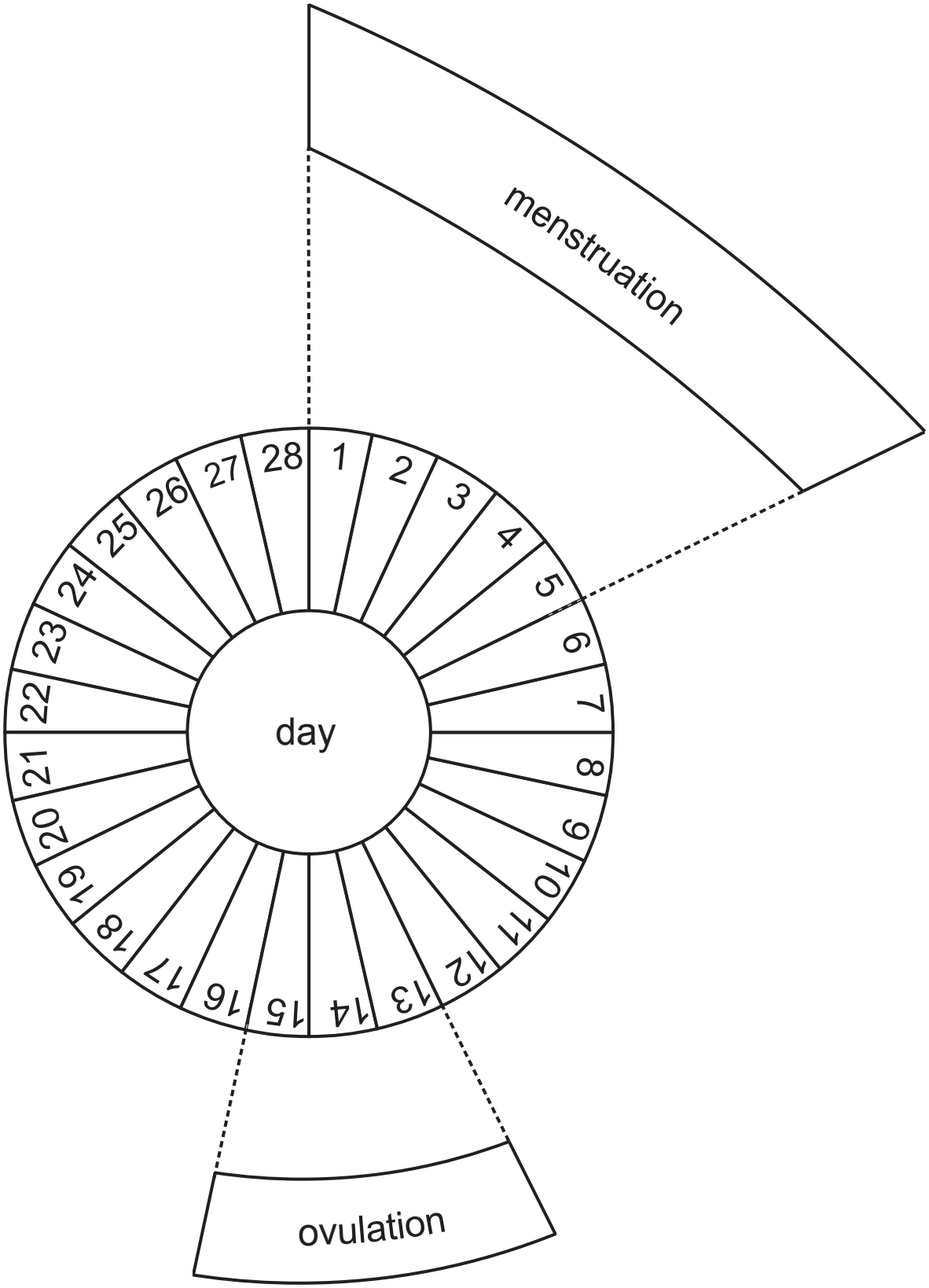
The diagram below shows the menstrual cycle.



(c) Would it be possible for a female to get pregnant if sexual intercourse took place on day 16? Explain your answer. [1 mark]

(d) Name **one** chemical method of contraception and explain how this prevents pregnancy. [2 marks]

THIS IS THE END OF THE QUESTION PAPER

SOURCES

Q2(a) . . . . Source: *Principal Examiner*
Q2(c)(ii). . . Source: *Principal Examiner*
Q3(a) . . . . Source: *Principal Examiner*
Q3(c). . . . . © *luismolina / iStock / Thinkstock*
Q6(a) . . . . © *Barking Dog Art. Used with permission*

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

Examiner Number