

# AQA Style

## GCSE

## COMBINED SCIENCE: TRILOGY

Foundation Tier

Biology Paper 2

# F

Time allowed: 1 hour 15 minutes

### Materials

- A ruler
- A pen and pencil
- A calculator

### Instructions

- Answer all questions using a black pen.
- Answer the questions in the space available and cross through any work you do not want to be marked.
- In any calculations, make sure you show your working out.
- The marks available for each question are shown in brackets.
- The maximum mark for this paper is 70.
- You must make your work as neat as possible and use good English in your answers.
- You should make sure you leave time to check your answers.

Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
<b>Total</b>	

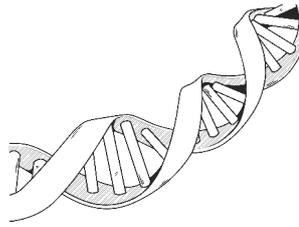
Name \_\_\_\_\_

Date \_\_\_\_\_

0 1

**Figure 1** shows a section of DNA.

**Figure 1**



DNA is contained in structures called chromosomes.

0 1 . 1

In which part of a cell would you find chromosomes?

[1 mark]

Tick **one** box.

cell membrane

cytoplasm

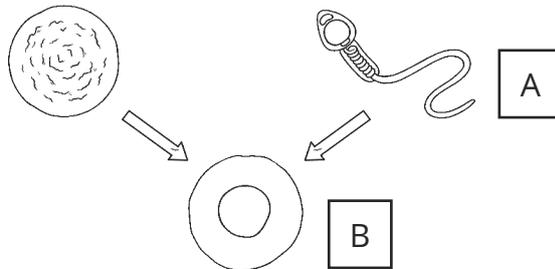
nucleus

ribosomes

0 1 . 2

**Figure 2** shows how a male gamete and a female gamete join together during sexual reproduction.

**Figure 2**



What is the name of the process shown in **Figure 2**?

[1 mark]

Tick **one** box.

cloning

differentiation

fertilisation

meiosis

0 1 . 3 Draw **one** line from each cell to the number of chromosomes the cell contains.

[2 marks]

Cell	Number of Chromosomes
cell A	13
	23
cell B	26
	46

0 1 . 4 Cells can divide by either mitosis or meiosis.

**Table 1** shows some features of mitosis and meiosis.

Place **one** tick (✓) in each row to show if it is a feature of mitosis or meiosis.

[4 marks]

**Table 1**

Feature	Mitosis	Meiosis
Produces gametes.		
Produces genetically identical cells.		
Produces two daughter cells.		
Produces daughter cells with half the number of chromosomes.		

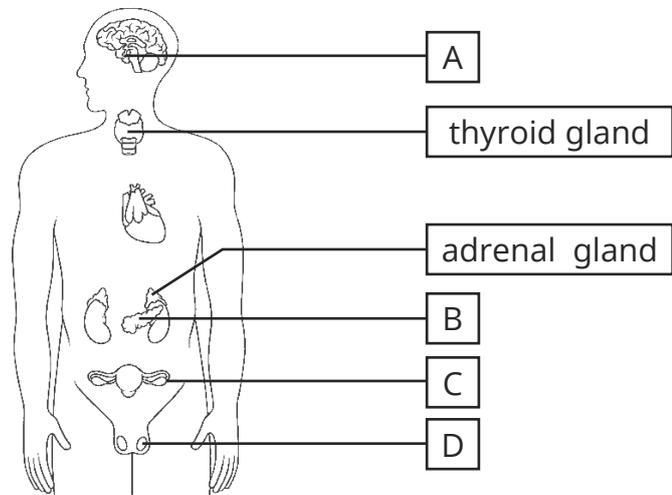
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0 2

The endocrine system is made up of glands which secrete hormones into the bloodstream.

**Figure 3** shows the position of some glands in the human body.

**Figure 3**



0 2 . 1

Four of the glands in **Figure 3** have been labelled **A, B, C** and **D**.

Draw **one** line from each label to the name of the gland.

[4 marks]

Label	Name of Gland
A	ovary
B	pancreas
C	pituitary gland
D	testis
	gall bladder

0 2 . 2

During puberty, reproductive hormones cause secondary sex characteristics to develop.

Name the main reproductive hormone found in each sex.

[2 marks]

males \_\_\_\_\_

females \_\_\_\_\_

0 2 . 3 Several hormones are involved in the menstrual cycle of a woman.

Draw **one** line from each function to the hormone responsible for that function.

[3 marks]

**Function**

Involved in maintaining  
the uterus lining.

Stimulates the release  
of an egg.

Causes the egg to  
mature in the ovary.

**Hormone**

follicle stimulating  
hormone (FSH)

luteinising hormone (LH)

progesterone

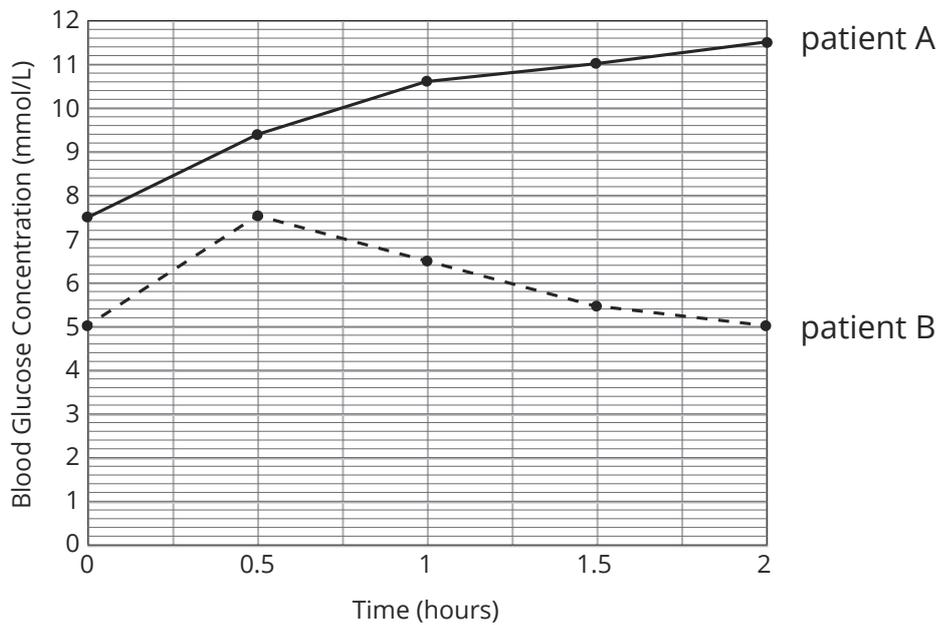
testosterone

9

03

Two patients were given a glucose solution to drink. **Figure 4** shows how their blood glucose concentration changed after they drank the glucose solution.

**Figure 4**



03.1

Write down the maximum blood glucose concentration of patient **A**.

[1 mark]

\_\_\_\_\_ mmol/L

03.2

Write down the time taken for the blood glucose concentration of patient **B** to reach its maximum level.

[1 mark]

\_\_\_\_\_ hours

03.3

Patient **A** has Type 1 diabetes.  
Patient **B** does **not** have Type 1 diabetes.

Name the hormone that patient **A** does not produce enough of.

[1 mark]

\_\_\_\_\_

0 3 . 4 A different patient, patient C, has Type 2 diabetes.

Describe how Type 2 diabetes is different to Type 1 diabetes.

You should refer to the hormone you named in **03.3** in your answer.

[2 marks]

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0 3 . 5 Give **two** ways that Type 2 diabetes can be treated.

[2 marks]

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

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

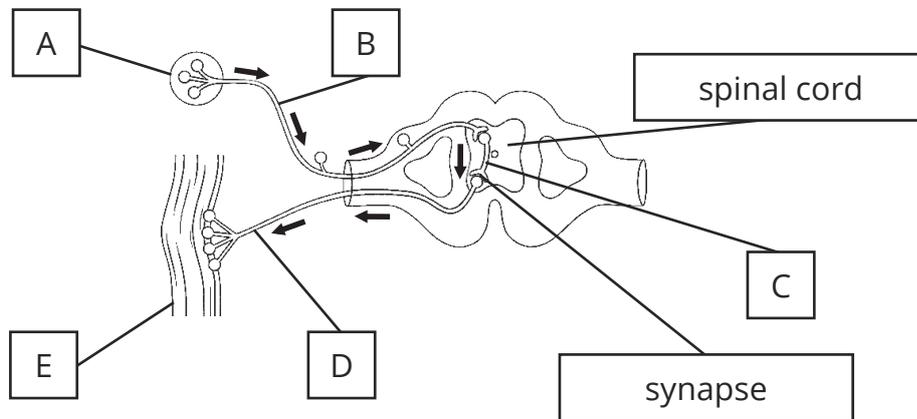
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0 4

The nervous system enables humans to react to their surroundings and coordinate their behaviour.

Figure 5 shows a reflex arc.

Figure 5



0 4 . 1

Complete the sentence.

[1 mark]

Messages are sent along neurones by \_\_\_\_\_.

0 4 . 2

Some parts of the reflex arc have been labelled on Figure 5.

Draw **one** line from each part of the reflex arc to the correct label.

[3 marks]

Part of Reflex Arc	Label
motor neurone	A
receptor	B
relay neurone	C
	D
	E

0 4 . 3

Explain why reflex actions are important.

[2 marks]

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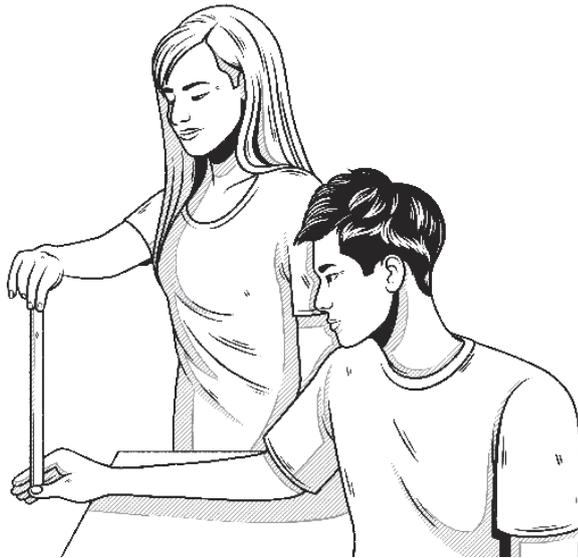


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0 4 . 4 Some students investigated the effect of caffeine on reaction times. They used the following method.

- Student 1 sits on the chair and places their arm on the table so that their hand is hanging over the edge.
- Student 2 places a ruler vertically between Student 1's thumb and first finger, with the 0cm mark level with the top of the thumb as shown in **Figure 6**.
- Student 2 drops the ruler with no warning.
- Student 1 catches the ruler as quickly as possible.
- The students record how many centimetres the ruler falls before student 1 catches it.
- The students repeat the experiment four more times.
- Student 1 drinks a caffeine drink.
- 15 minutes later, the students repeat the experiment.

**Figure 6**



Write down the dependent variable in this investigation.

[1 mark]

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0 4 . 5 Table 2 shows the students' results.

**Table 2**

	Drop Distance (cm)					Mean
	Repeat 1	Repeat 2	Repeat 3	Repeat 4	Repeat 5	
<b>Before Caffeine</b>	21	18	20	16	20	19
<b>After Caffeine</b>	14	11	13	10	12	

Calculate the mean drop distance after caffeine.

[1 mark]

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mean = \_\_\_\_\_cm

0 4 . 6 Describe what the results show about the effect of caffeine on reaction times.

[1 mark]

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0 4 . 7 Suggest **two** improvements that the students could make to their method.

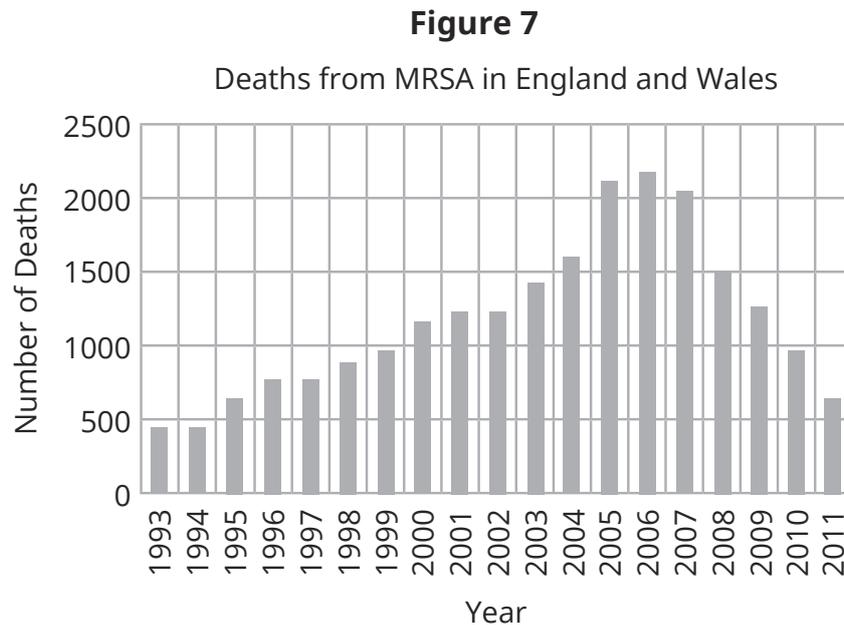
[2 marks]

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

0 5

MRSA is a type of bacteria which is resistant to certain antibiotics.

**Figure 7** shows the number of deaths from MRSA in England and Wales between 1993 and 2011.



0 5 . 1

Describe the trend shown in **Figure 7**.

[3 marks]

You should include data from the graph in your answer.

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0 5 . 2

In 2006, there were 2150 deaths from MRSA in the UK. In 2011, the number of deaths fell to 638.

Calculate the percentage change in deaths from MRSA between 2006 and 2011.

Show your working.

[2 marks]

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percentage change = \_\_\_\_\_%

0 5 . 3 Why are bacteria able to evolve rapidly?

[1 mark]

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0 5 . 4 MRSA is resistant to antibiotics.

Give **two** ways that the rate of development of antibiotic resistant strains of bacteria can be reduced.

[2 marks]

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

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

8

0 | 6

Haemochromatosis is an inherited condition that causes an accumulation of excess iron in the body.

Haemochromatosis is caused by a recessive allele.

0 | 6 | . | 1

What is an allele?

[1 mark]

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0 | 6 | . | 2

When does a recessive allele control the development of a characteristic?

[1 mark]

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0 | 6 | . | 3

A man with haemochromatosis wants to have a child with a heterozygous woman.

Complete **Figure 8** to determine the probability of the child having haemochromatosis.

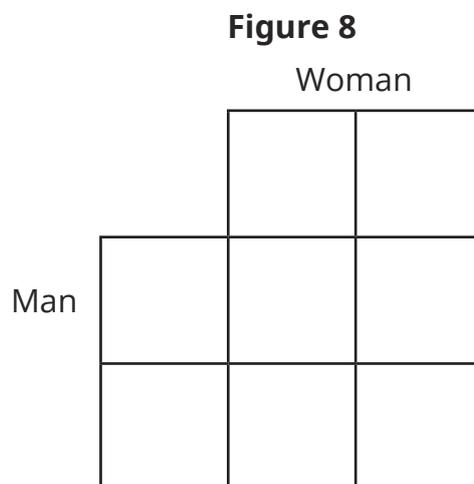
Circle any children who would have haemochromatosis.

Use the following symbols to represent the alleles:

**H** = dominant allele

**h** = recessive allele

[4 marks]



probability of a child having haemochromatosis = \_\_\_\_\_

- 06.4 Doctors can screen embryos for haemochromatosis. **Table 3** gives details of two methods of embryo screening.

**Table 3**

<b>Preimplantation Genetic Diagnosis (PGD)</b>	<b>Chorionic Villus Sampling (CVS)</b>
Egg and sperm cells are collected from the couple and used for IVF. The embryos will be tested for haemochromatosis at 3 days old. Only the healthy embryos will be implanted into the woman.	The couple would conceive naturally. Ten weeks into the pregnancy, a sample of blood would be taken from the placenta and tested for haemochromatosis.
It costs the NHS between £8000 and £12 500.	It costs the NHS around £500.
Affected embryos are discarded. Extra unaffected embryos can be frozen for later use.	If the embryo has the disorder parents can choose whether to terminate the pregnancy or allow it to continue.
There is a 15% chance of a false-positive result, which would result in destroying a healthy embryo.	There is a 1% chance of a false-positive result, which may result in aborting a healthy embryo.
	The procedure has a 1% risk of causing a miscarriage.

Evaluate the **benefits** of the two methods of embryo screening.

[4 marks]

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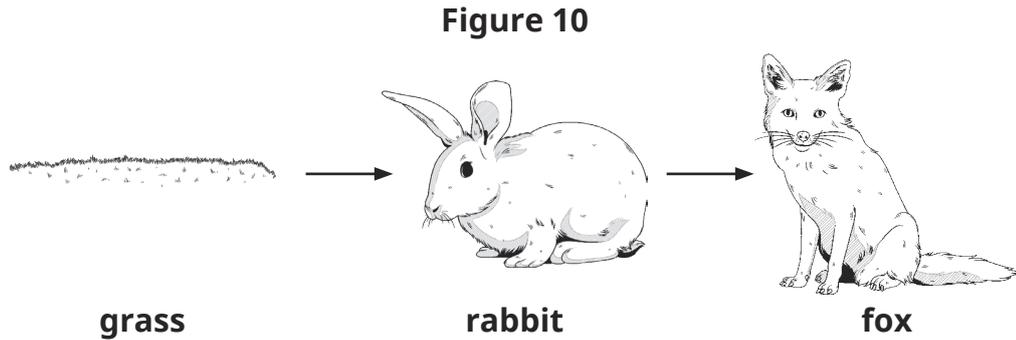
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- 07.2 The hillside is the habitat for a population of rabbits. **Figure 10** shows a food chain for the hillside.



Name the producer in **Figure 10**.

[1 mark]

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- 07.3 What is the role of a producer in a food chain?

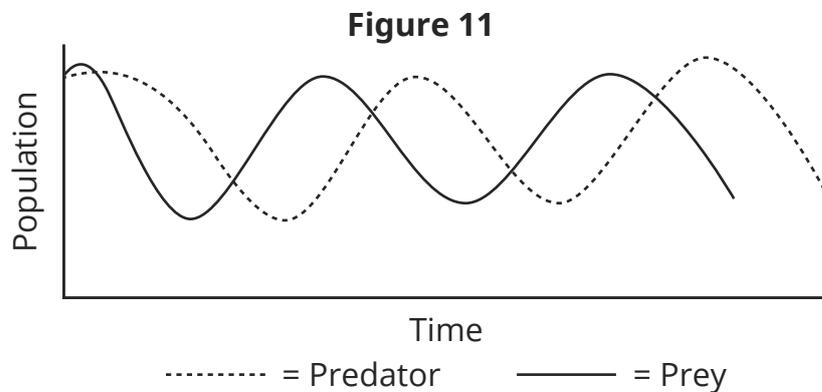
[1 mark]

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- 07.4 The numbers of rabbits and foxes rise and fall in cycles, as shown in **Figure 11**.



Explain why the population numbers in **Figure 11** rise and fall over time.

[4 marks]

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0 8

Mutations can result in variation between individuals.

0 8 . 1

What is a mutation?

[1 mark]

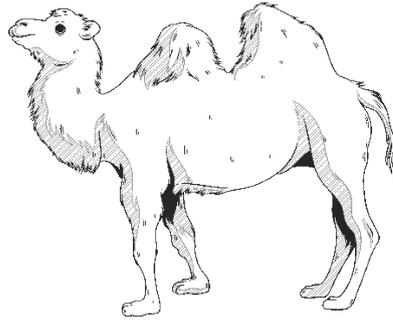
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0 8 . 2

**Figure 12** shows a camel with two humps.

**Figure 12**



The camel's humps are mounds of fat which allow them to travel for long periods in the desert without stopping to eat.

Use Darwin's theory of evolution to explain how camels may have evolved to have two large humps.

[4 marks]

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5

**END OF QUESTIONS**