A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE
COMBINED SCIENCE: SYNERGY

H

8465/1H

Higher Tier

Paper 1 Life and Environmental Sciences

Time allowed: 1 hour 45 minutes

MATERIALS
For this paper you must have:
- a ruler
- a protractor
- a scientific calculator
- the periodic table (enclosed)
- the Physics Equations Sheet (enclosed).

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]

J U N 2 1 8 4 6 5 1 H 0 1

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INSTRUCTIONS

- **Use black ink or black ball-point pen.**
- **Pencil should only be used for drawing.**
- **Answer ALL questions in the spaces provided. Do not write on blank pages.**
- **If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).**
- **Do all rough work in this book. Cross through any work you do not want to be marked.**
- **In all calculations, show clearly how you work out your answer.**

INFORMATION

- **The maximum mark for this paper is 100.**
- **The marks for questions are shown in brackets.**
- **You are expected to use a calculator where appropriate.**
- **You are reminded of the need for good English and clear presentation in your answers.**

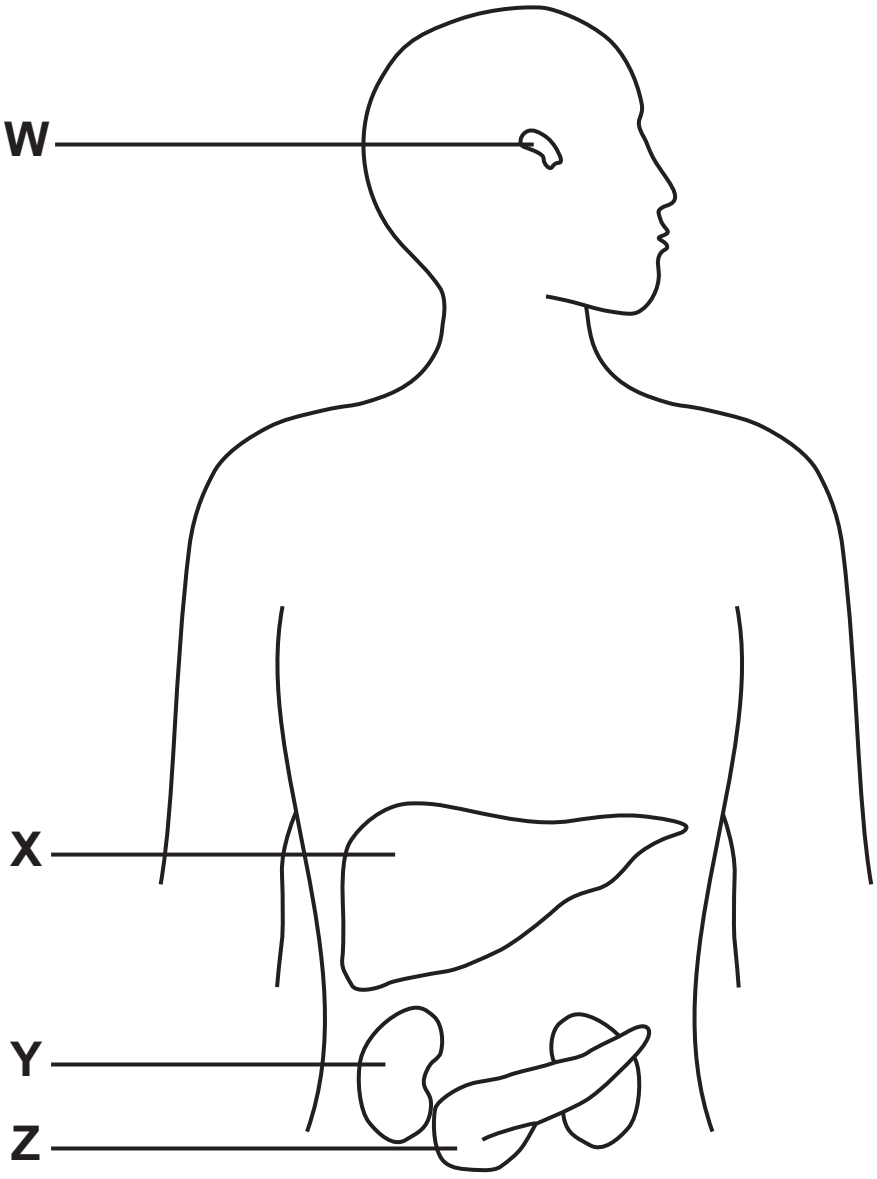
DO NOT TURN OVER UNTIL TOLD TO DO SO

0 1

The endocrine system releases hormones into the blood.

FIGURE 1 shows some endocrine glands and some target organs.

FIGURE 1



0 1 . 1

Which structure is the pituitary gland? [1 mark]

Tick (✓) ONE box.

☐ **W** ☐ **X** ☐ **Y** ☐ **Z**

0 1 . 2

Which is the main TARGET organ of the hormone insulin? [1 mark]

Tick (✓) ONE box.

☐ **Kidney** ☐ **Liver** ☐ **Pancreas**

[Turn over]

0 1 . 3

The endocrine system sends hormones to target organs.

The nervous system sends impulses to target organs.

How does the speed of movement of hormones compare with the speed of transmission of impulses? [1 mark]

Tick (✓) ONE box.

- ☐ **Hormones travel more slowly than impulses.**
- ☐ **Hormones travel at the same speed as impulses.**
- ☐ **Hormones travel more quickly than impulses.**

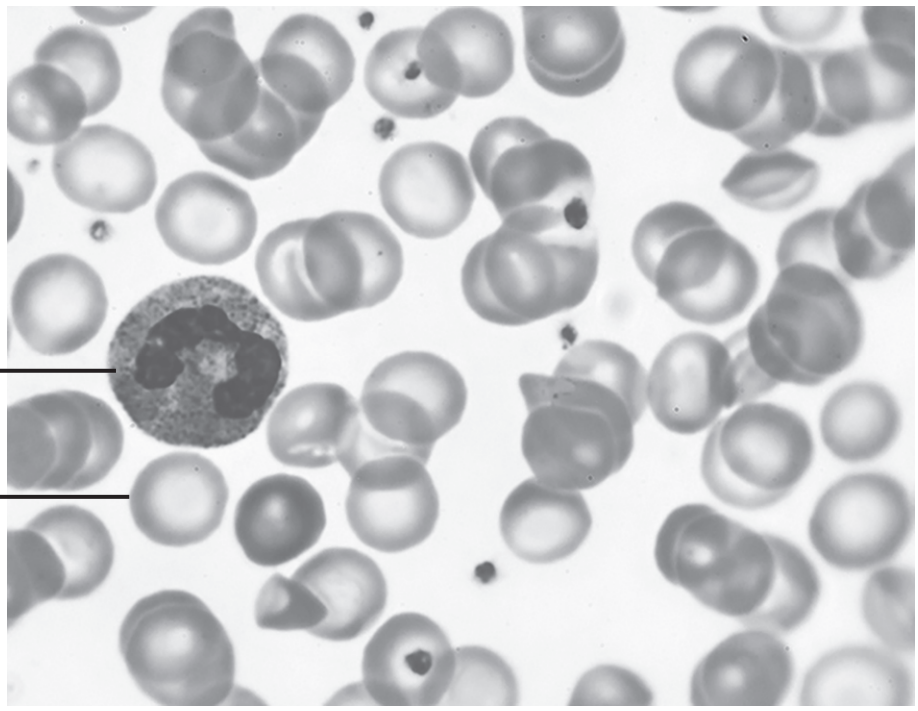
0 1 . 4

The pituitary gland releases hormones, which results in widespread effects on the body.

Explain why the pituitary gland is sometimes called the 'master gland'. [2 marks]

FIGURE 2 shows human blood viewed through a light microscope.

FIGURE 2



0 1 . 5

Name cell A and cell B. [2 marks]

A _____

B _____

[Turn over]

0 1 . 6

The image of a cell has a diameter of 3.5 millimetres.

The magnification of the image is ×500.

Calculate the diameter of the real cell.

Give your answer in micrometres.

Use the equation:

$$\text{magnification} = \frac{\text{diameter of image}}{\text{diameter of real cell}}$$

1 millimetre = 1000 micrometres

[4 marks]

_____

_____

_____

Diameter of the real cell = _____

micrometres

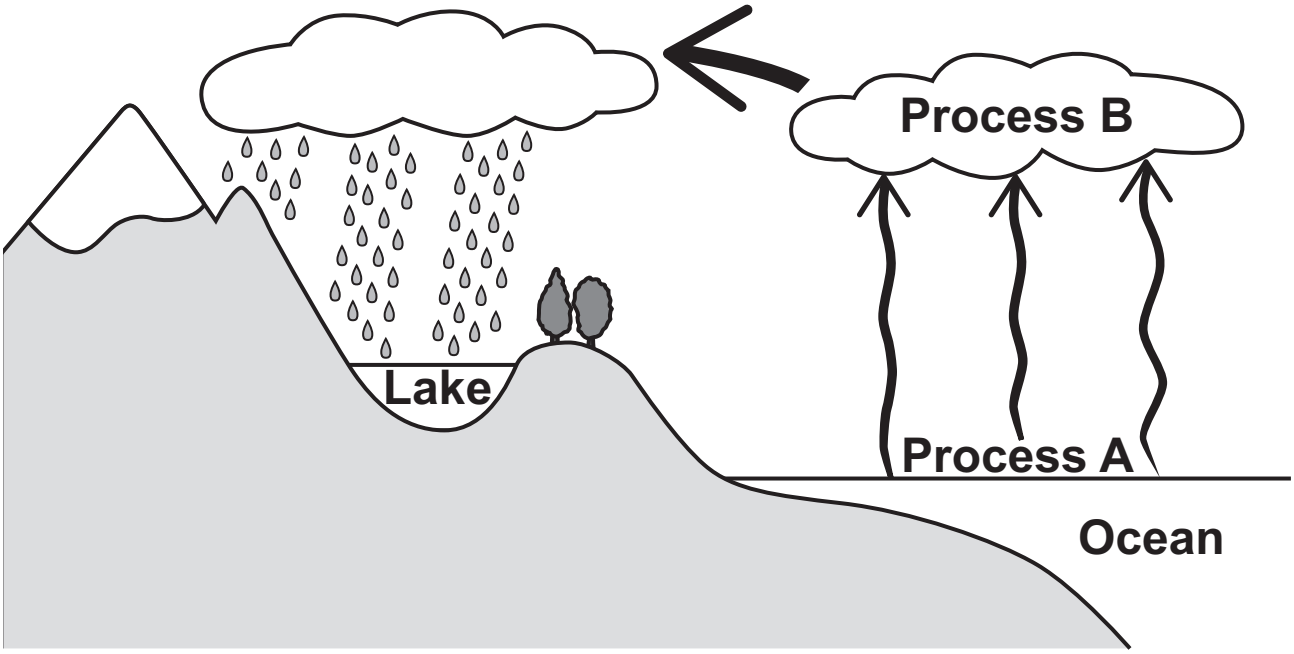
11

[Turn over]

0 2

FIGURE 3 shows some of the processes in the water cycle.

FIGURE 3



0 2 . 1

Name process A and process B. [2 marks]

A _____

B _____

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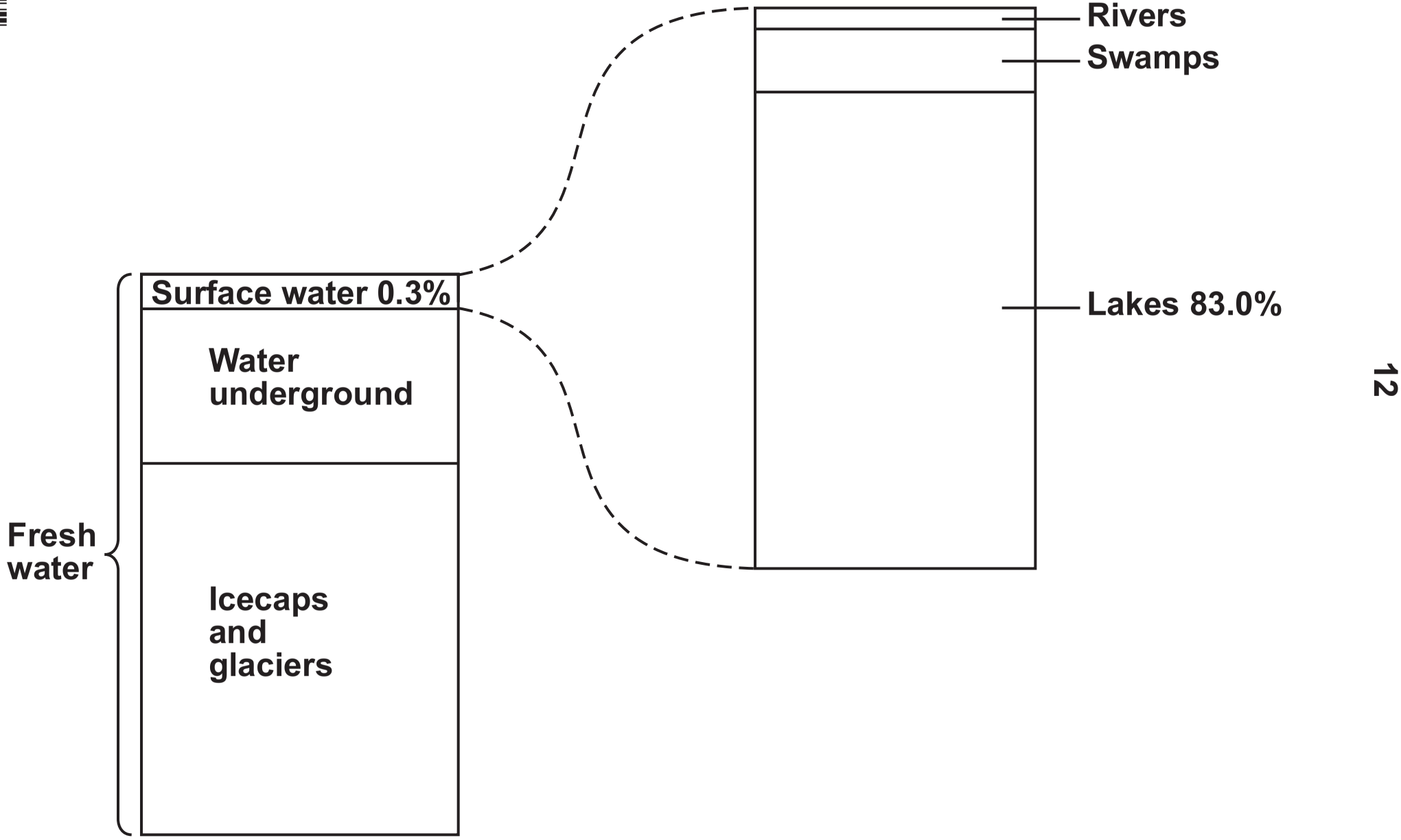
[Turn over]

FIGURE 4


Rivers
Swamps
Lakes 83.0%
Surface water 0.3%
Water underground
Fresh water
Icecaps and glaciers

0 2 . 2

FIGURE 4, on page 12, shows the locations of fresh water on Earth.
The diagram is not drawn accurately.

Calculate the amount of fresh water in lakes as a percentage of the total amount of fresh water. [2 marks]

_____

_____

_____

_____

_____

Percentage = _____ **%**

[Turn over]

0 2 . 3

Give TWO ways humans pollute the water in lakes.

Do NOT refer to litter, plastic pollution or rubbish.
[2 marks]

1 _____

_____

_____

2 _____

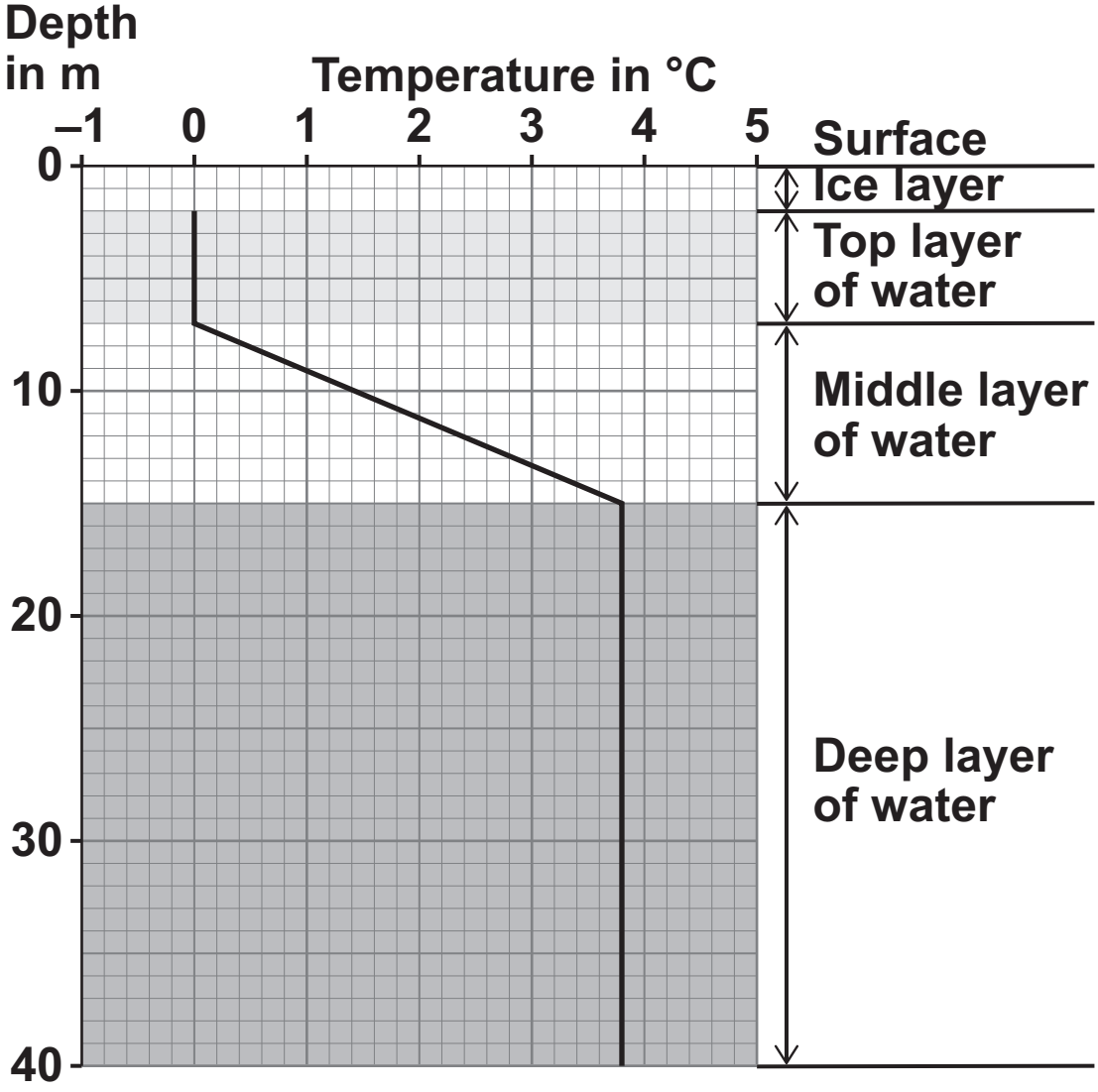
_____

_____

The surface of a lake can freeze if the water at the surface of the lake cools to 0 °C.

FIGURE 5, on page 15, shows the temperature of the water at increasing depth in a lake in winter.

FIGURE 5



0 2 . 4

Suggest why organisms in the lake can survive in winter.

Use FIGURE 5. [1 mark]

_____

_____

_____

[Turn over]

0 2 . 5

The middle layer of water is from 7 metres below the surface to 15 metres below the surface.

The temperature at a depth of 7 metres below the surface is 0 °C.

Determine the change in temperature per metre in the middle layer of water.

Use the equation:

$$\text{change in temperature per metre} = \frac{\text{change in temperature}}{\text{change in depth}}$$

[3 marks]

Change in temperature = _____ °C/m

0 2 . 6

Write down the equation which links density (ρ), mass (m) and volume (V). [1 mark]

_____

_____

0 2 . 7

The density of ice is 920 kg/m^3.

Calculate the volume of 2.3 kg of ice. [3 marks]

_____

_____

_____

_____

_____

_____

_____

Volume = _____ m^3

[Turn over]

0 2 . 8

Describe a method to measure the mass and volume of a liquid. [4 marks]

0 3

This question is about hormones and reproduction.

0 3 . 1

Hormones are used in some methods of contraception.

Give TWO types of contraception that use hormones.
[2 marks]

1 _____

_____

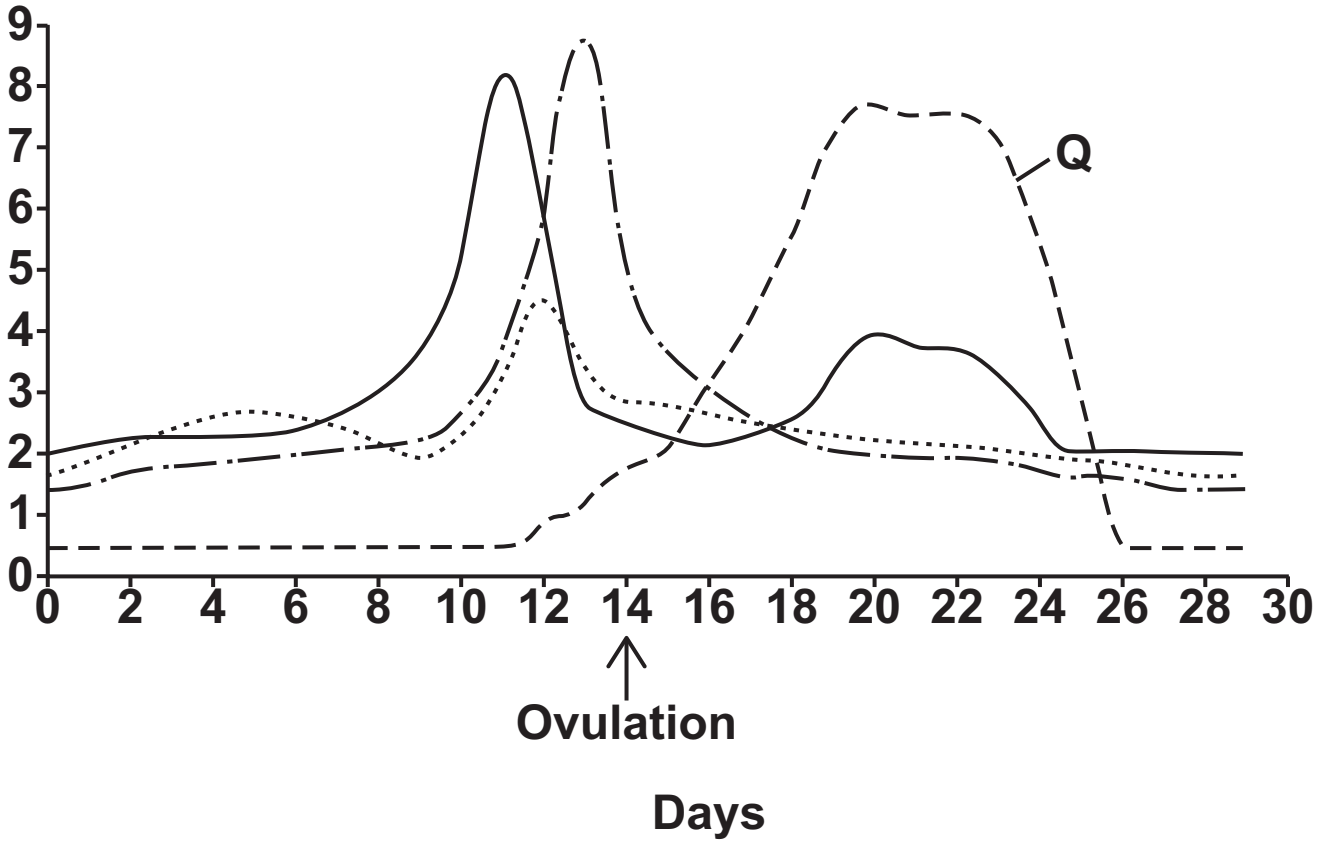
2 _____

_____

[Turn over]

FIGURE 6 shows some of the hormones involved in the menstrual cycle.

FIGURE 6



0 3 . 2

Which hormone peaks on day 13?

Use FIGURE 6. [1 mark]

Tick (✓) ONE box.

- ☐ **Follicle stimulating hormone**
- ☐ **Luteinising hormone**
- ☐ **Oestrogen**
- ☐ **Progesterone**

0 3 . 3

What is the function of hormone Q?

Use FIGURE 6. [1 mark]

Tick (✓) ONE box.

- ☐ **Causes an egg to mature**
- ☐ **Maintains the uterus lining**
- ☐ **Stimulates release of the egg**

The number of twins born increased from the year 1980 to the year 2013.

0 3 . 4

Approximately two-thirds of twins born in the UK are NOT identical twins.

Suggest how non-identical twins are formed. [3 marks]

0 3 . 5

Explain how ONE type of treatment for infertility could have caused the increase in the number of twins born between 1980 and 2013. [4 marks]

11

[Turn over]

0 4

In 1986 an accident at a nuclear power station released radioactive isotopes into the environment.

Radioactive isotopes have a half-life.

0 4 . 1

What is meant by 'half-life'? [2 marks]

0 4 . 2

During the accident, 28 kg of caesium-137 was released into the environment.

Caesium-137 has a half-life of 30 years.

Calculate the mass of the caesium-137 released in 1986 that will still be present in the environment in 2136.

Give your answer in grams. [4 marks]

Mass = _____ grams

[Turn over]

After the accident scientists investigated the effect of ionising radiation on the population of dragonflies.

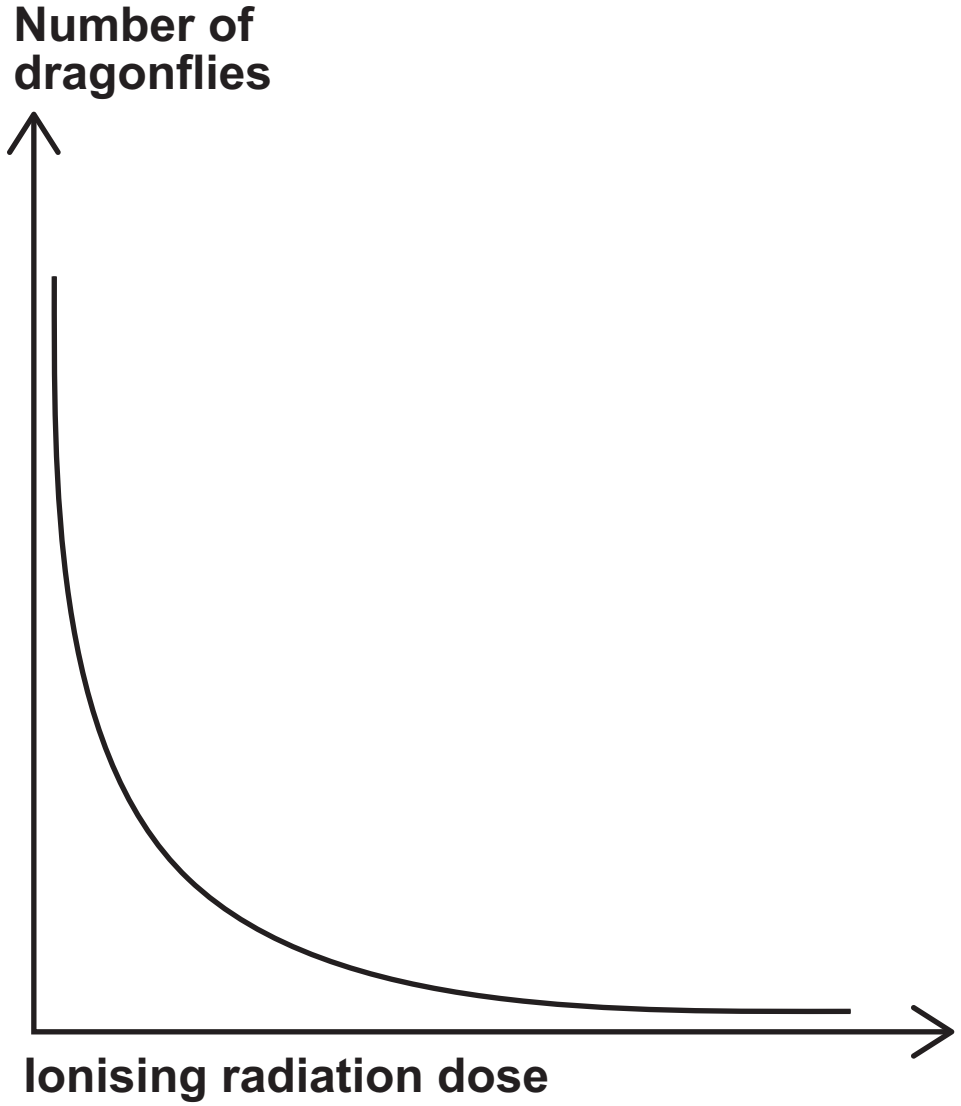
Dragonflies are insects.

The scientists placed transects in different directions from the site of the nuclear power station.

The scientists recorded the number of dragonflies and the ionising radiation dose along the transects.

FIGURE 7 shows the results.

FIGURE 7



0 4 . 3

Describe the relationship between the ionising radiation dose and the number of dragonflies. [2 marks]

0 4 . 4

Suggest ONE ABIOTIC factor that could affect this investigation.

Do NOT refer to ionising radiation dose in your answer. [1 mark]

[Turn over]

0 4 . 5

Explain how the ionising radiation dose can affect the dragonfly population. [3 marks]

12

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[Turn over]

0 5

Water that is safe to drink is called potable water.

0 5 . 1

Why is some potable water NOT pure water? [1 mark]

0 5 . 2

Explain how potable water is obtained from sea water by distillation. [4 marks]

Potable water can be obtained from sea water using reverse osmosis.

0 5 . 3

Describe the function of the membrane in reverse osmosis. [2 marks]

0 5 . 4

Give ONE reason why the process of reverse osmosis is expensive.

Do NOT refer to the cost of the membrane. [1 mark]

_____

_____

_____

0 5 . 5

A new method involving solar panels can be used to obtain potable water.

TABLE 1 compares the costs involved with the solar panel method and the reverse osmosis method.

TABLE 1

	Solar panel method	Reverse osmosis method
Cost to install in £	3942	1538
Cost of replacement parts each year in £	0	270
Cost of electricity each year in £	0	230

Calculate the time in years until the solar panel method becomes as cost effective as reverse osmosis. [3 marks]

_____

_____

_____

_____

_____

_____

_____

Time = _____ **years**

11

[Turn over]

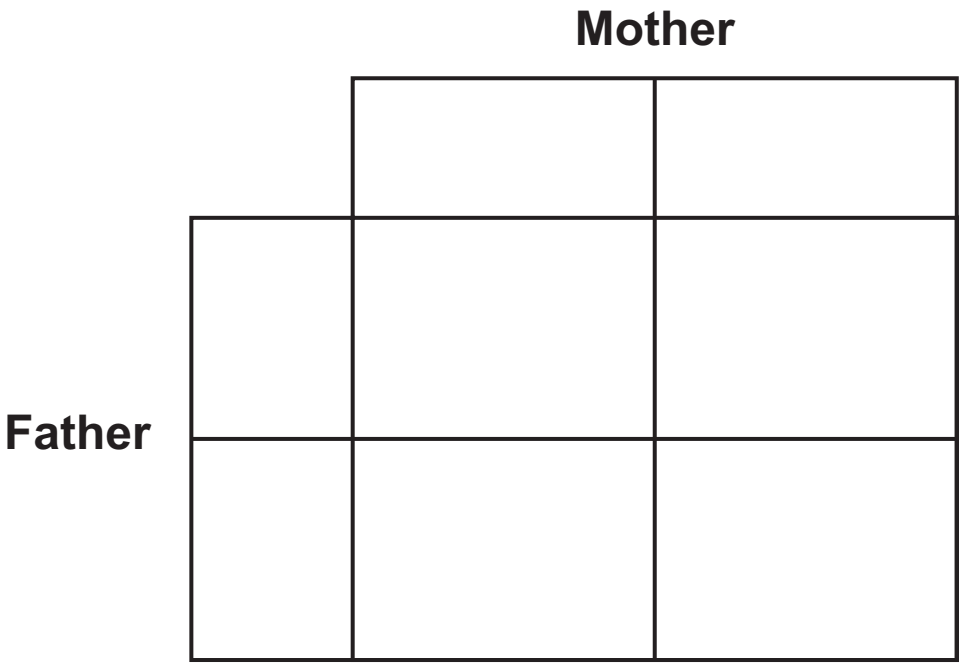
0 6

This question is about inheritance.

0 6 . 1

Complete FIGURE 8 to show why the probability of a child being a male is 0.5 [2 marks]

FIGURE 8



Cystic fibrosis is an inherited disorder.

The allele for cystic fibrosis is recessive, r.

The dominant allele is R.

A man and a woman plan to have a child.

The man and the woman are both heterozygous for cystic fibrosis.

0 6 . 2

Determine the probability that the child will be a male with cystic fibrosis.

You should:

- **use the symbols R and r**
- **draw a Punnett square diagram**
- **identify which of the offspring genotypes will have cystic fibrosis.**

[5 marks]

Probability of male with cystic fibrosis = _____

[Turn over]

Some sheep have been genetically modified to develop the symptoms of cystic fibrosis.

0 6 . 3

Give ONE ethical argument FOR the production of sheep with the symptoms of cystic fibrosis.

Do NOT refer to religion in your answer. [1 mark]

_____

_____

_____

0 6 . 4

Give ONE ethical argument AGAINST the production of sheep with the symptoms of cystic fibrosis.

Do NOT refer to religion in your answer. [1 mark]

_____

_____

_____

0 6 . 5

The sheep were genetically modified as embryos.

Describe the stages involved in producing a genetically modified sheep that shows symptoms of cystic fibrosis. [4 marks]

13

0 7

On aeroplanes, pathogens can easily spread from one person to another person.

0 7 . 1

Suggest ONE way pathogens can spread from one person to another person on an aeroplane. [1 mark]

_____

_____

The manufacturer of a nose spray claims that:

'The nose spray defends against diseases such as the common cold.'

The nose spray puts a thin layer of gel in the airways between the nose and the lungs.

0 7 . 2

Describe how the nose spray and the body's natural defences in the airways work in similar ways to defend against pathogens. [3 marks]

_____

_____

_____

_____

0 7 . 3

The nose spray was tested as a new medical drug.

The manufacturer of the nose spray claims:

‘The nose spray can decrease the number of days that a person has symptoms of the common cold.’

Suggest ONE reason why this claim is difficult to test.
[1 mark]

0 7 . 4

The nose spray contains a mixture of ingredients.

Suggest TWO reasons why the nose spray is a mixture of ingredients. [2 marks]

1 _____

_____

_____

2 _____

_____

_____

0 7 . 5

Late-stage HIV (AIDS) affects the immune system.

A person with AIDS is more likely to suffer from another infectious disease.

Give ONE other example of how having one disease can affect the development of a different disease.

Do NOT refer to HIV or AIDS. [1 mark]

_____

_____

_____

8

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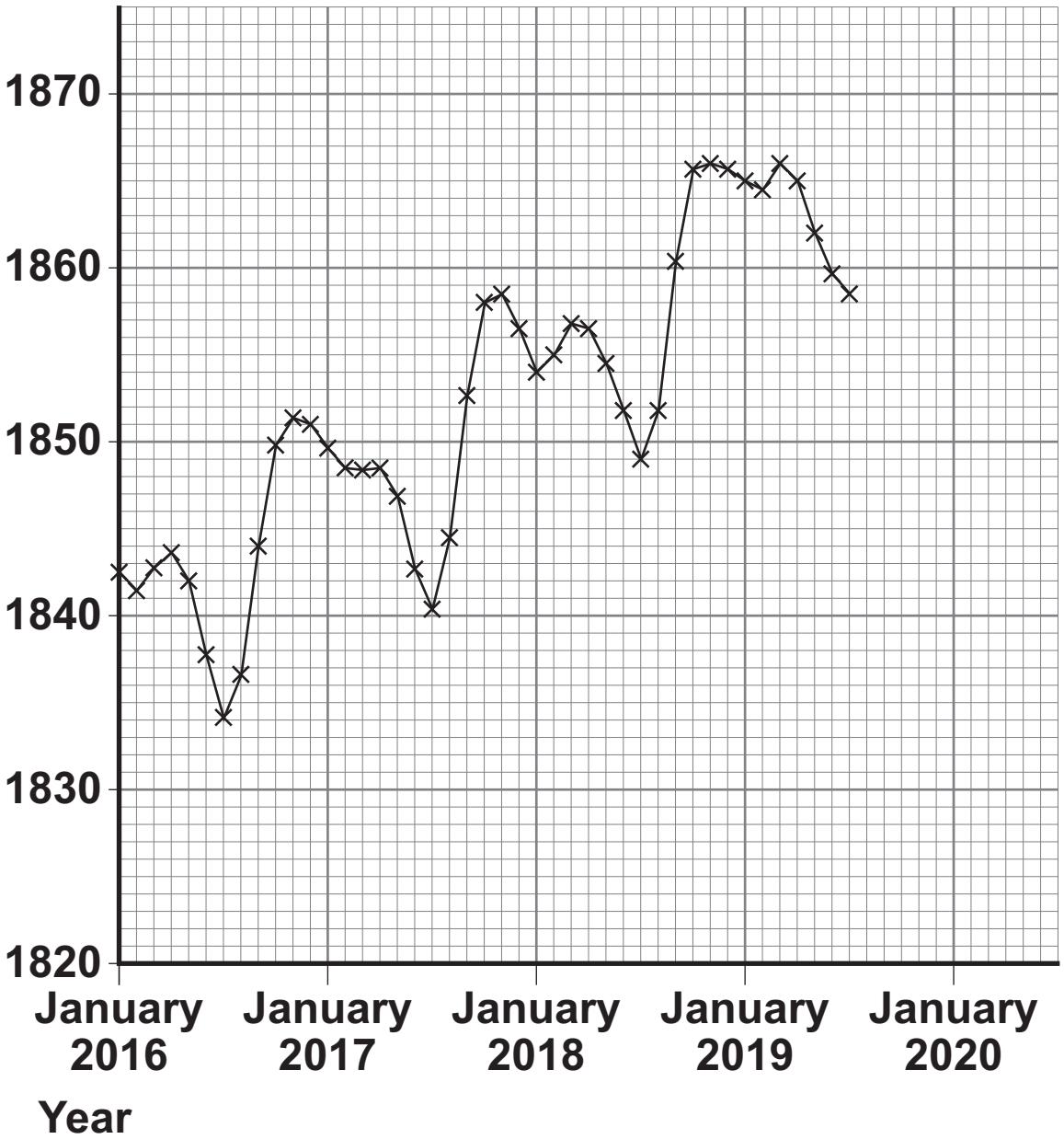
[Turn over]

0 8

FIGURE 9 shows recent changes in the methane concentration in the Earth's atmosphere.

FIGURE 9



0 8 . 1

Determine the percentage increase in methane concentration in the Earth's atmosphere from January 2018 to January 2019. [3 marks]

Percentage increase = _____ %

[Turn over]

0 8 . 2

Methane is a greenhouse gas.

Scientists CANNOT make accurate predictions about the concentration of methane in the Earth's atmosphere in the future.

Give ONE reason why.

Use FIGURE 9. [1 mark]

0 8 . 3

Explain why protecting peat bogs may reduce global warming. [2 marks]

0 8 . 4

Greenhouse gases maintain temperatures on Earth high enough to support life.

Describe the greenhouse effect in terms of the interaction of short-wavelength and long-wavelength radiation with matter. [4 marks]

0 8 . 5

The Earth is estimated to be 4.6 billion years old.

The Earth's early atmosphere changed over time.

Describe the evidence scientists use to form theories about:

- **how the Earth's atmosphere was formed**
- **how the composition of the Earth's atmosphere changed.**

[6 marks]

16

END OF QUESTIONS

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Additional page, if required.
Write the question numbers in the left-hand margin.

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For Examiner's Use	
Question	Mark
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