A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

GCSE

COMBINED SCIENCE: SYNERGY

F

Foundation Tier Paper 1 Life and environmental sciences

8465/1F

Tuesday 14 May 2019 **Afternoon**

Time allowed: 1 hour 45 minutes

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 1 9 8 4 6 5 1 F 0 1

For this paper you must have:

- **a ruler**
- **a protractor**
- **a scientific calculator**
- **the periodic table (enclosed)**
- **the Physics Equations Sheet (enclosed).**

INSTRUCTIONS

- **Use black ink or black ball-point pen.**
- **Answer ALL questions in the spaces provided. Do not write on blank pages.**
- **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

Answer ALL questions in the spaces provided.

0 1 **The heart pumps blood around the body.**

0 1 . 1 **Which structures prevent blood flowing the wrong way in the heart? [1 mark]**

_____

_____

0 1 . 2 **Which blood vessels take blood away from the heart? [1 mark]**

Tick (✓) ONE box.

☐ **Arteries**

☐ **Capillaries**

☐ **Veins**

0 1 . 3 **In the legs, blood in the arteries is different from blood in the veins.**

What are TWO differences between blood in the arteries and blood in the veins in the legs?
[2 marks]

Tick (✓) TWO boxes.

- ☐ **Blood in arteries has less carbon dioxide**
- ☐ **Blood in arteries has less oxygen**
- ☐ **Blood in arteries has less nitrogen**
- ☐ **Blood in arteries has more carbon dioxide**
- ☐ **Blood in arteries has more oxygen**
- ☐ **Blood in arteries has more nitrogen**

[Turn over]

BLANK PAGE

Heart rate is the number of times the heart contracts each minute.

0 1 . 4 People who exercise regularly have stronger heart muscle than people who do not exercise.

Resting heart rate is measured when the person is at rest.

How would long-term regular exercise affect resting heart rate? [1 mark]

Tick (✓) ONE box.

☐ Resting heart rate would decrease

☐ Resting heart rate would increase

☐ Resting heart rate would stay the same

[Turn over]

A student wore a heart monitor which measured his heart rate all the time.

The heart monitor recorded his lowest heart rate each day for five days.

TABLE 1 shows the results.

TABLE 1

Day	Lowest heart rate in beats per minute
1	62
2	72
3	77
4	59
5	65
Mean	X

0 1 . 5 Calculate mean value X in TABLE 1. [1 mark]

X = _____ beats per minute

0 1 . 6 **Suggest ONE possible reason for the higher heart rate on day 3. [1 mark]**

0 1 . 7 **Another student had a mean heart rate of 82 beats per minute in one day.**

Calculate their total number of heart beats on that day. [3 marks]

Number of heart beats = _____

BLANK PAGE

0 2 **In chemistry, the word 'pure' has a specific meaning.**

0 2 . 1 **Which is a pure substance in chemistry?**
[1 mark]

Tick (✓) ONE box.

☐ **Air**

☐ **Carbon**

☐ **Iodine solution**

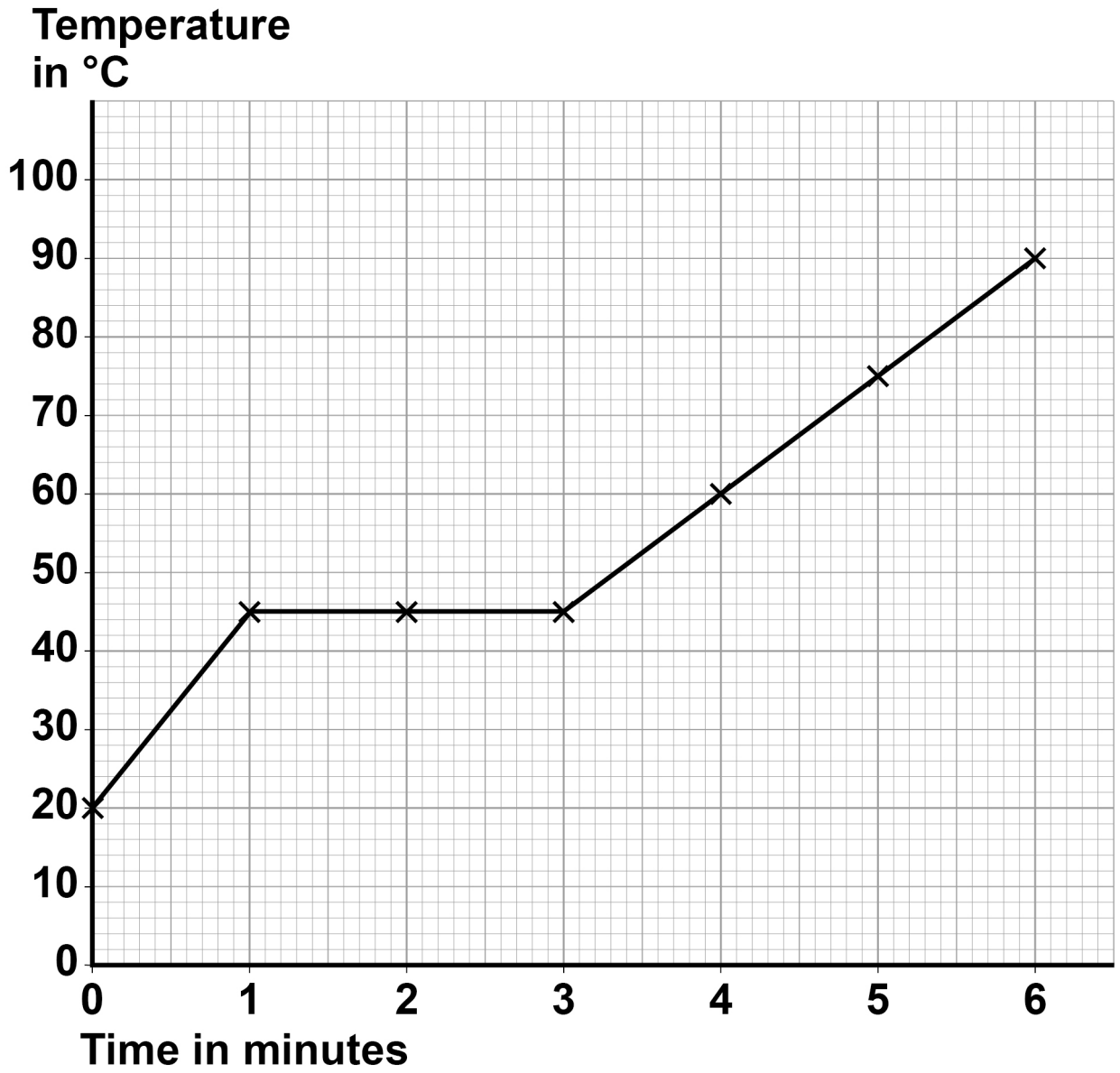
[Turn over]

A student heated two solid substances.

The student recorded the temperature every minute.

FIGURE 1 shows the results for substance A.

FIGURE 1



0 2 . 2 **Describe how the temperature of substance A changes with time.**

Include data from FIGURE 1 in your answer.
[3 marks]

0 2 . 3 **Give the melting point of substance A. [1 mark]**

Melting point = _____ °C

[Turn over]

Repeat of FIGURE 1

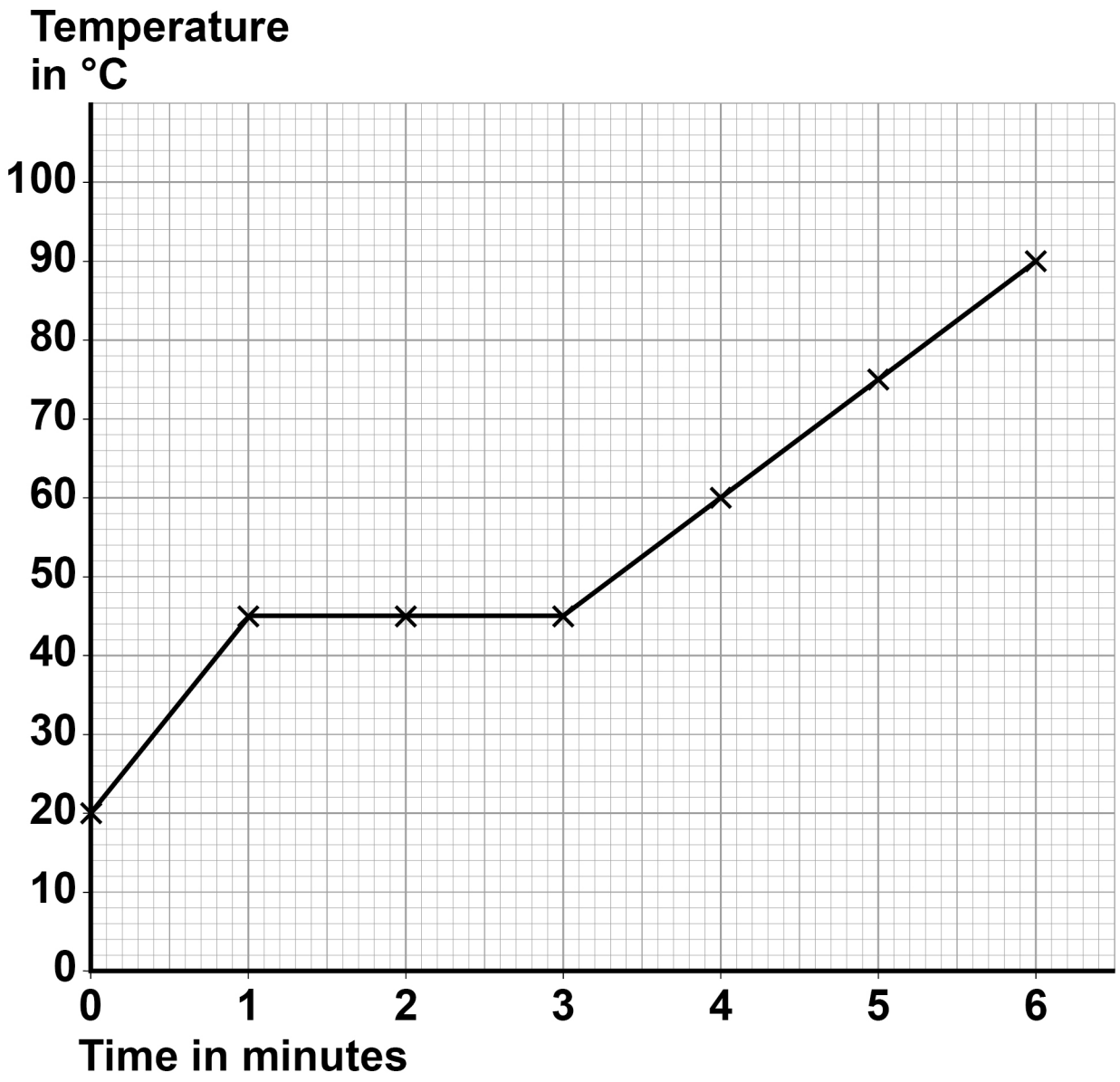


TABLE 2 shows the results for Substance B.

TABLE 2

Time in minutes	Temperature in ^{o}C
0	20
1	38
2	56
3	56
4	68
5	80
6	92

0 2 . 4 Complete FIGURE 1 on page 14.

You should:

- plot the data for substance B from TABLE 2
- join the data points for substance B with straight lines.

[3 marks]

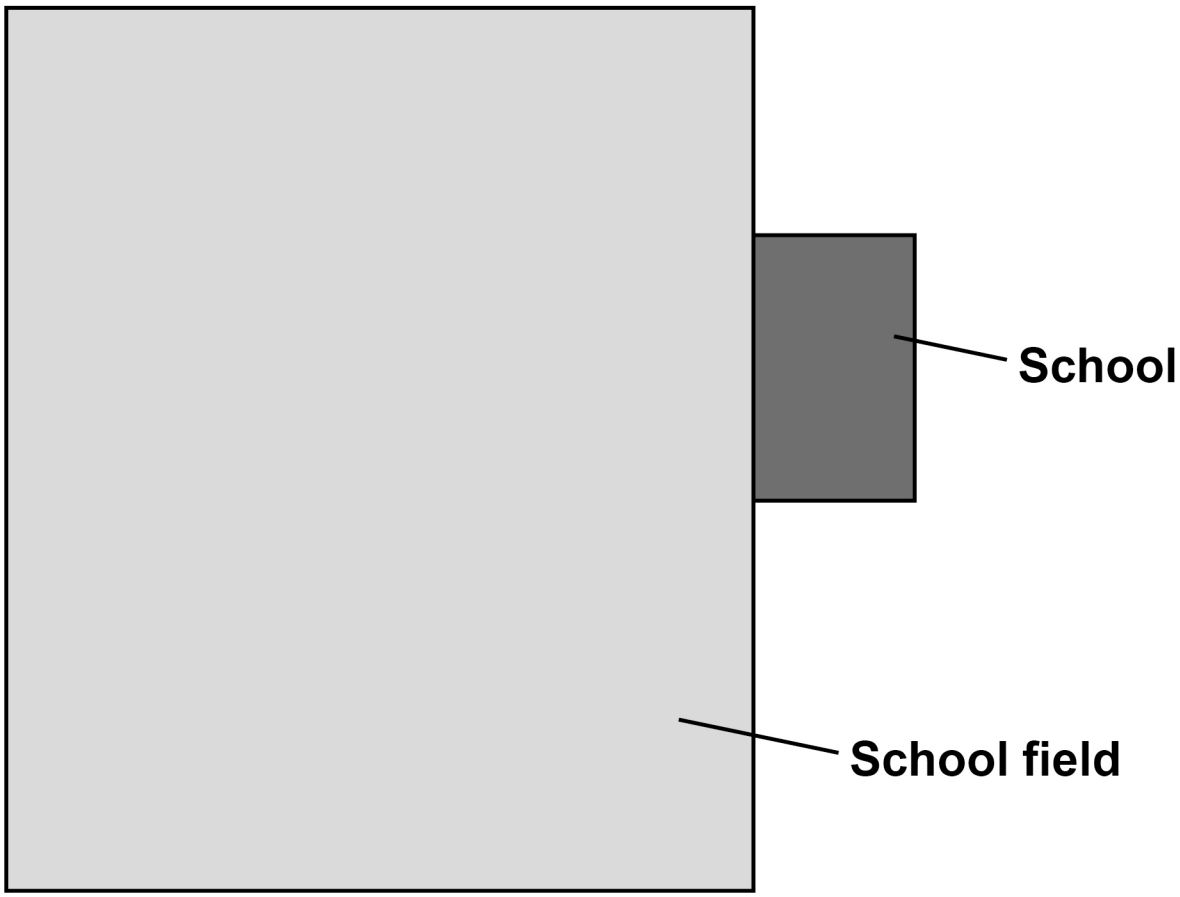
[Turn over]

8

0 3 **Students investigated plants in a school field.**

FIGURE 2 is a diagram of the school building and school field.

FIGURE 2



0 3 . 1 **Draw ONE line from each word to the correct description. [2 marks]**

WORD	DESCRIPTION
Abundance	How tall the plants grow
Distribution	How many plants have flowers
	Number of plants in an area
	Where plants are found in an area

[Turn over]

BLANK PAGE

Students investigated the distribution of plants on the school field at different distances from the school building.

0 3 . 2 What is the independent variable in this investigation? [1 mark]

Tick (✓) ONE box.

- ☐ Area of the school field
- ☐ Distance from the school building
- ☐ Number of plants

The students used a transect.

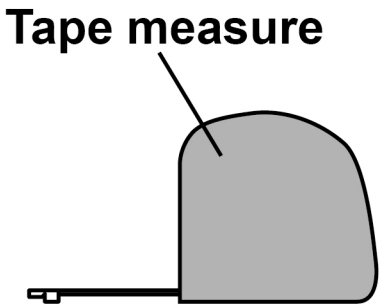
0 3 . 3 Draw ONE line on FIGURE 2, on page 16, to show where the transect could be placed. [1 mark]

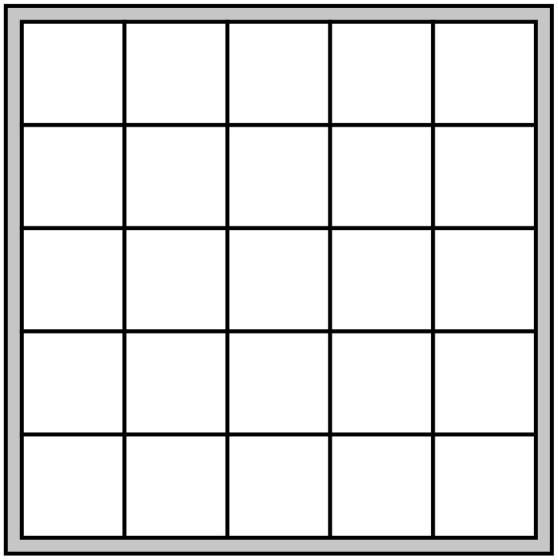
[Turn over]

0 3 . 4 **FIGURE 3 shows the equipment the students used.**

FIGURE 3

The diagram is NOT drawn to scale.





Describe a method to investigate the distribution of plants on the school field at different distances from the school building.
[4 marks]

0 3 . 5 There was a tree in one corner of a field.

Suggest why fewer plants would grow under the tree than in the middle of the field.
[1 mark]

0 3 . 6 Give TWO factors that affect the distribution of plants in a field.

Do NOT refer to any factors you used in your answer to Question 03.5. [2 marks]

1

2

11

0 4 **Hormones control parts of the reproductive system.**

0 4 . 1 **Complete the sentences.**

Choose answers from the list below. [2 marks]

- **amylase**
- **insulin**
- **oestrogen**
- **protease**
- **testosterone**

The main reproductive hormone in males is

_____ .

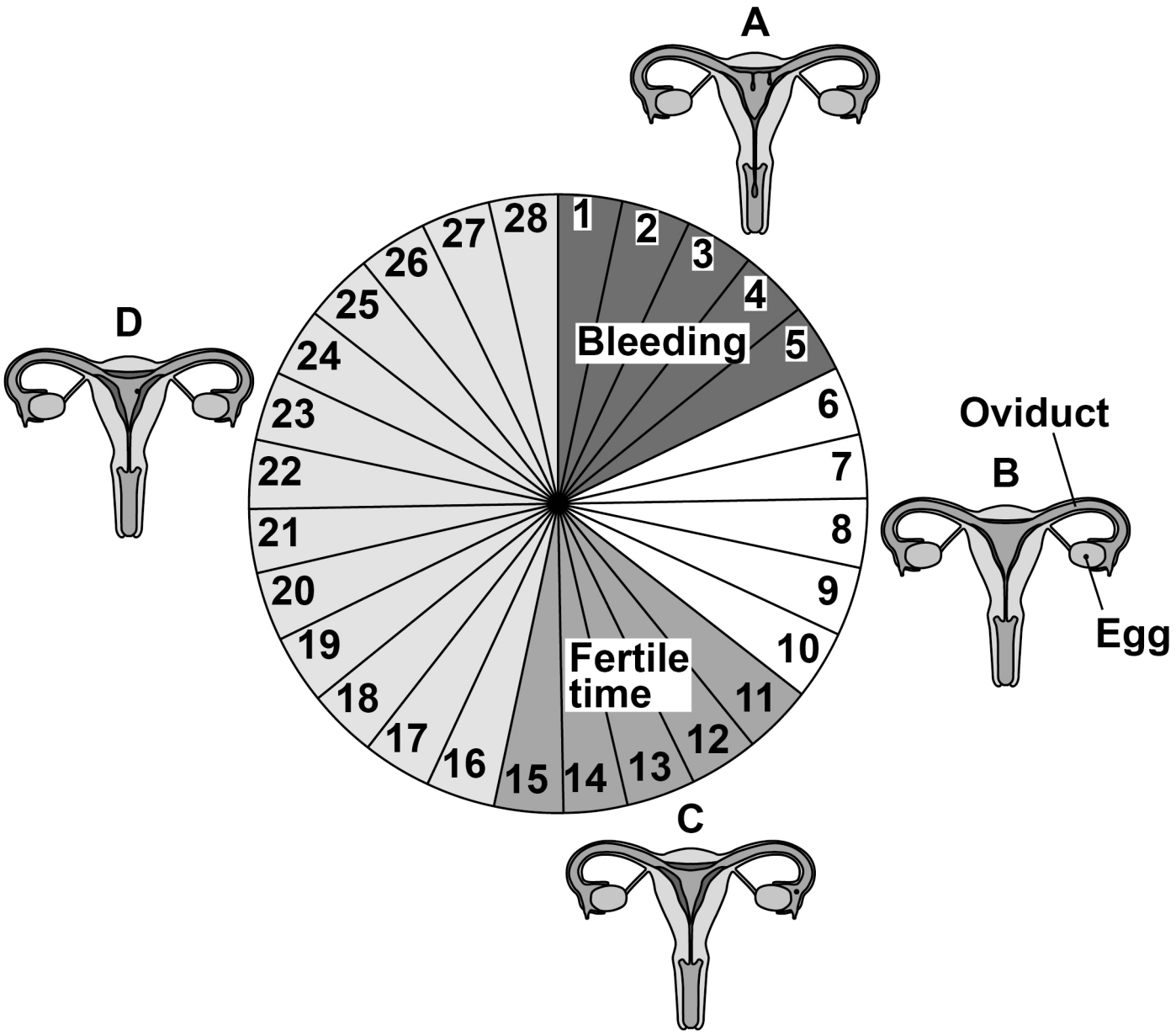
The main reproductive hormone in females is

_____ .

[Turn over]

FIGURE 4 shows the stages of the menstrual cycle and the approximate time each stage takes in days.

FIGURE 4



0 4 . 2 **Calculate the percentage of days in the cycle when bleeding occurs.**

Use FIGURE 4. [2 marks]

Percentage = _____ %

0 4 . 3 **Suggest why the number of days of bleeding shown in FIGURE 4 is only an estimate.**
[1 mark]

[Turn over]

BLANK PAGE

0 4 . 4 What is happening during stage B? [1 mark]

Tick (✓) ONE box.

- ☐ **The egg is being fertilised**
- ☐ **The egg is maturing**
- ☐ **The uterus lining is breaking down**

0 4 . 5 Towards the end of stage C an egg is released.

Which organ is the egg released from? [1 mark]

_____

_____

0 4 . 6 Name the hormone that stimulates the release of an egg. [1 mark]

_____

_____

[Turn over]

0 4 . 7 **Explain how surgery to cut and block the oviducts is an effective form of contraception. [2 marks]**

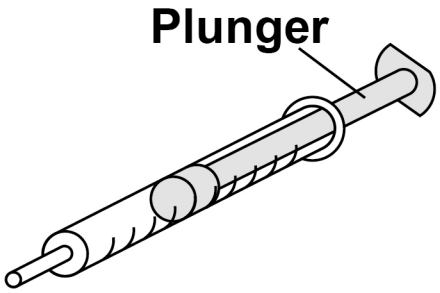
0 4 . 8 **Give ONE method of contraception.**

Do NOT refer to the method given in Question 04.7. [1 mark]

11

0 5 **FIGURE 5 shows a syringe containing air.**

FIGURE 5



The gas particles in the syringe are moving.

0 5 . 1 **What happens to the average kinetic energy of the gas particles if the temperature decreases? [1 mark]**

Tick (✓) ONE box.

☐ **The average kinetic energy decreases**

☐ **The average kinetic energy increases**

☐ **The average kinetic energy stays the same**

[Turn over]

0 5 . 2 **What happens to the average speed of the gas particles if the temperature decreases? [1 mark]**

Tick (✓) ONE box.

- ☐ **The average speed decreases**
- ☐ **The average speed increases**
- ☐ **The average speed stays the same**

0 5 . 3 **The syringe plunger is pulled outwards.**

Why does air move into the syringe as the plunger is pulled outwards? [1 mark]

Tick (✓) ONE box.

- ☐ **gas pressure outside the syringe = gas pressure inside the syringe**
- ☐ **gas pressure outside the syringe < gas pressure inside the syringe**
- ☐ **gas pressure outside the syringe > gas pressure inside the syringe**

0 5 . 4 **Write down the equation that links density, mass and volume. [1 mark]**

The mass of air in the syringe is 0.031 g

0 5 . 5 **Which mass is the same as 0.031 g? [1 mark]**

Tick (✓) ONE box.

- ☐ **0.000031 kg**
- ☐ **0.00031 kg**
- ☐ **3.1 kg**
- ☐ **31 kg**

[Turn over]

0 5 . 6 **The volume of the air in the syringe is $0.000025\ m^3$**

Calculate the density of the air inside the syringe.

Give your answer to 2 significant figures.
[3 marks]

Density = _____ kg/m^3

0 5 . 7 **A helium balloon is released and rises through the air.**

What does this show about the density of the helium in the balloon compared with the density of the surrounding air? [1 mark]

Tick (✓) ONE box.

- ☐ **The density of helium is the same as the density of air**
- ☐ **The density of helium is less than the density of air**
- ☐ **The density of helium is more than the density of air**

[Turn over]

0 5 . 8 **Describe how the water displacement method could be used to determine the density of a small stone. [3 marks]**

12

0 6 **This question is about seawater.**

0 6 . 1 **How is fresh water obtained from seawater? [1 mark]**

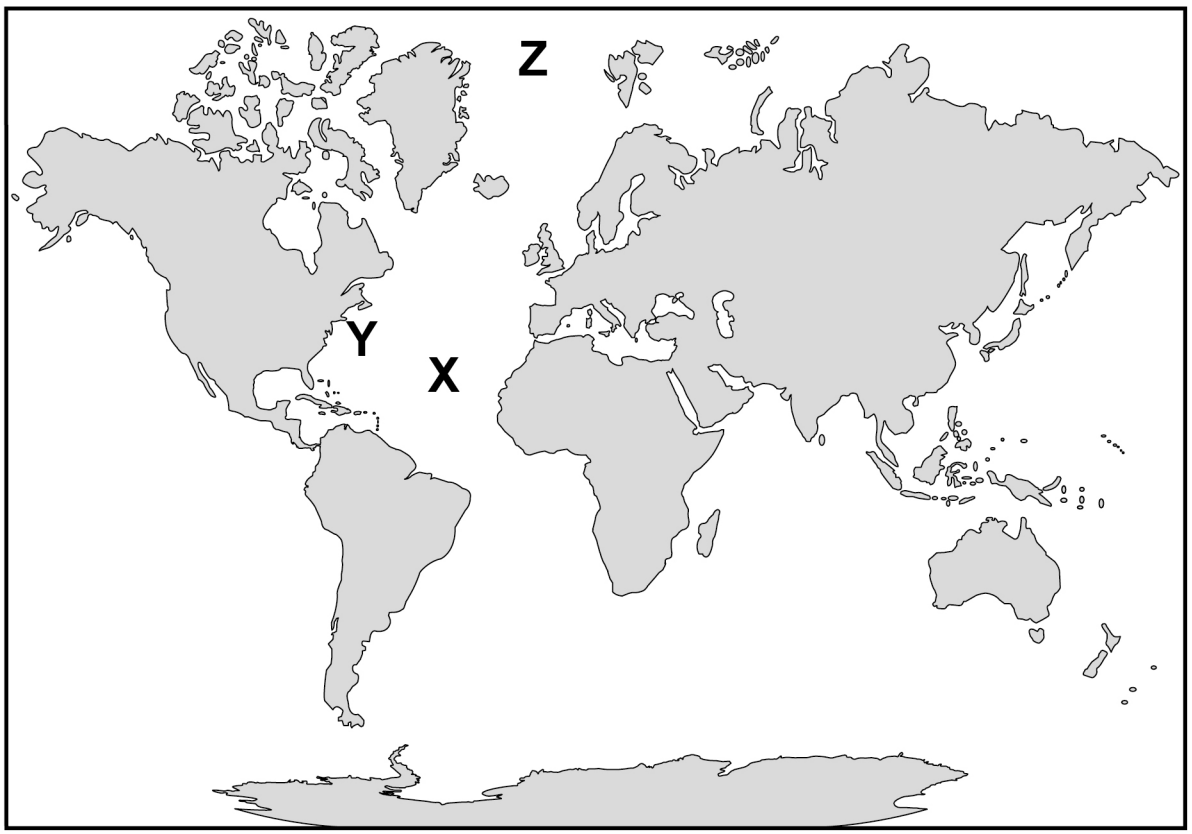
Tick (✓) ONE box.

- ☐ **Desalination**
- ☐ **Filtration**
- ☐ **Sedimentation**
- ☐ **Sterilisation**

[Turn over]

FIGURE 6 shows a map of the world.

FIGURE 6



0 6 . 2 **The seawater at location X is warmer than the seawater at location Z.**

Why would the salt concentration at location X be greater than the salt concentration at location Z? [1 mark]

Tick (✓) ONE box.

☐ **Increased condensation at location X**

☐ **Increased evaporation at location X**

☐ **Increased rainfall at location X**

0 6 . 3 **Location X is in the middle of the ocean.**

Location Y is near a large city.

Suggest why seawater near a large city has more dissolved solids than seawater in the middle of the ocean. [1 mark]

_____

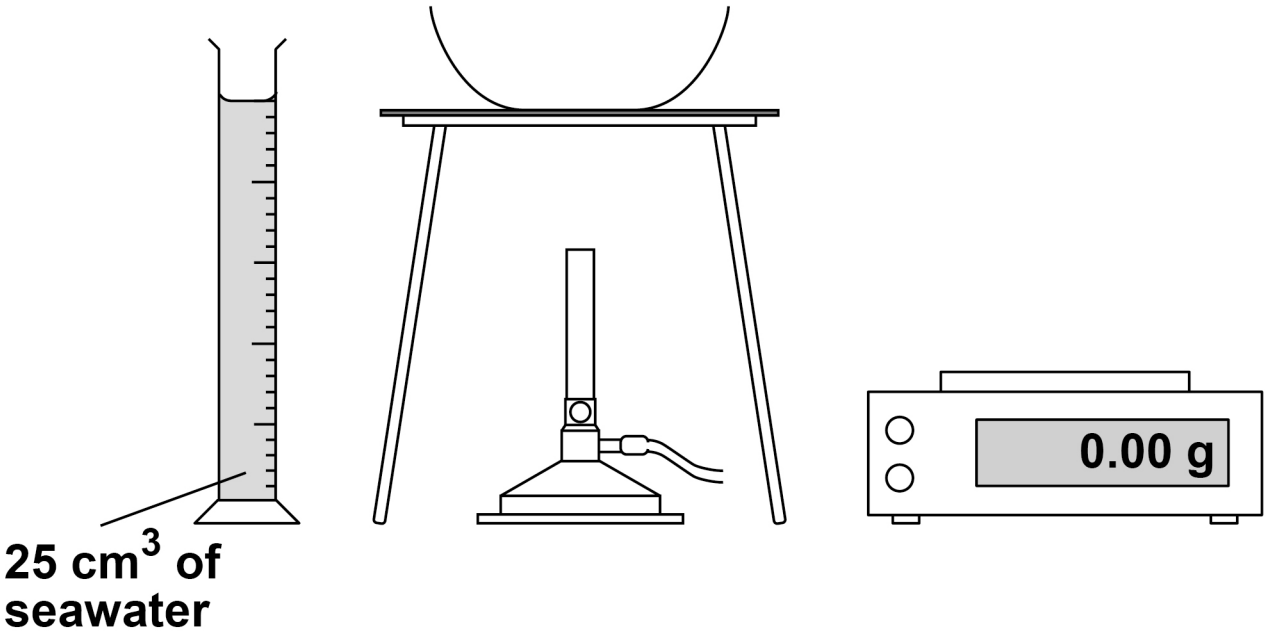
_____

_____

0 6 . 4 **Students separated the dissolved solids from a sample of seawater.**

FIGURE 7 shows some of the equipment used.

FIGURE 7



Describe a method to measure the mass of dissolved solids in a 25 cm^3 sample of seawater. [5 marks]

8

0 7 **Bacteria and viruses can cause communicable diseases.**

0 7 . 1 **Bacterial cells are different from animal cells.**

Which structure is found in bacterial cells and NOT in animal cells? [1 mark]

Tick (✓) ONE box.

- ☐ **Cell membrane**
- ☐ **Mitochondrion**
- ☐ **Nucleus**
- ☐ **Plasmid**

0 7 . 2 **Which scientific process uses part of bacterial cells? [1 mark]**

Tick (✓) ONE box.

- ☐ **Breeding programmes**
- ☐ **Genetic engineering**
- ☐ **Selective breeding**
- ☐ **Stem cell treatment**

[Turn over]

0 7 . 3 **TABLE 3 lists four communicable diseases.**

Which diseases are caused by a bacterium and which are caused by a virus?

Put ONE tick in each row.

One row has been completed for you.
[2 marks]

TABLE 3

Disease	Caused by a bacterium	Caused by a virus
Measles		✓
Gonorrhoea		
AIDS		
Salmonella		

0 7 . 4 **A virus causes measles.**

Give THREE symptoms of measles. [3 marks]

1 _____

_____

2 _____

_____

3 _____

_____

0 7 . 5 **Bacteria can be killed with antibiotics.**

Give ONE problem linked to the overuse of antibiotics. [1 mark]

_____

_____

_____

[Turn over]

0 7 . 6 **A fungus causes an infection called athlete's foot.**

- **The fungus infects the skin.**
- **The fungus grows in moist, warm conditions.**

Describe how athlete's foot can be transmitted from one person to another person. [2 marks]

0 7 . 7 **Bacteria and viruses can enter the body through the nose and mouth.**

Describe how mucus and cilia in the trachea prevent most of these pathogens from reaching the lungs. [2 marks]

Mucus _____

_____

_____

Cilia _____

_____

_____

[Turn over]

12

0 8 **Grey wolves (‘Canis lupus’) can be found in the USA.**

0 8 . 1 **Give the genus name of the grey wolf. [1 mark]**

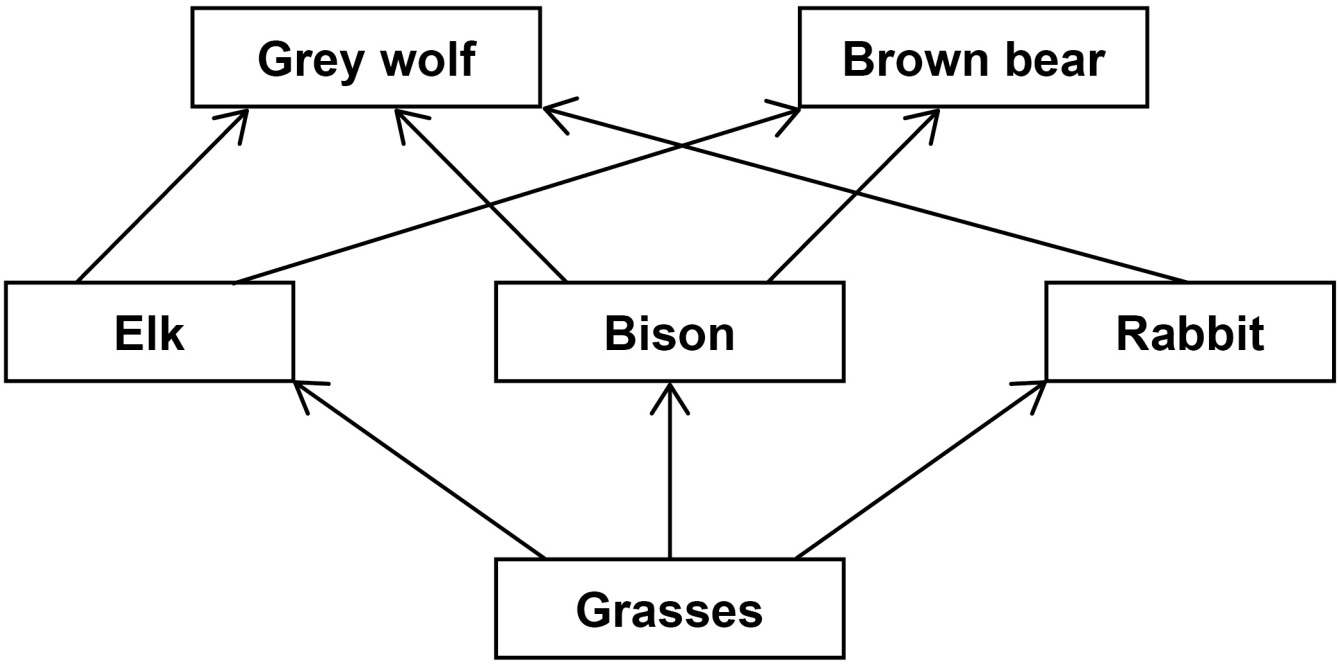
0 8 . 2 **Describe how biological classification systems have changed over time. [4 marks]**

0 8 . 3 **Population and community are terms used to describe the organisms in an area.**

Describe the difference between the terms population and community. [2 marks]

FIGURE 8 shows part of a food web.

FIGURE 8



0 8 . 4 Look at FIGURE 8.

Explain how killing all the grey wolves could affect the populations of the other organisms. [6 marks]

In Yellowstone Park in the USA, grey wolves were hunted and killed until there were none left by 1926.

Grey wolves were reintroduced to Yellowstone Park in 1995.

The wolves came from several family groups in different parts of Canada.

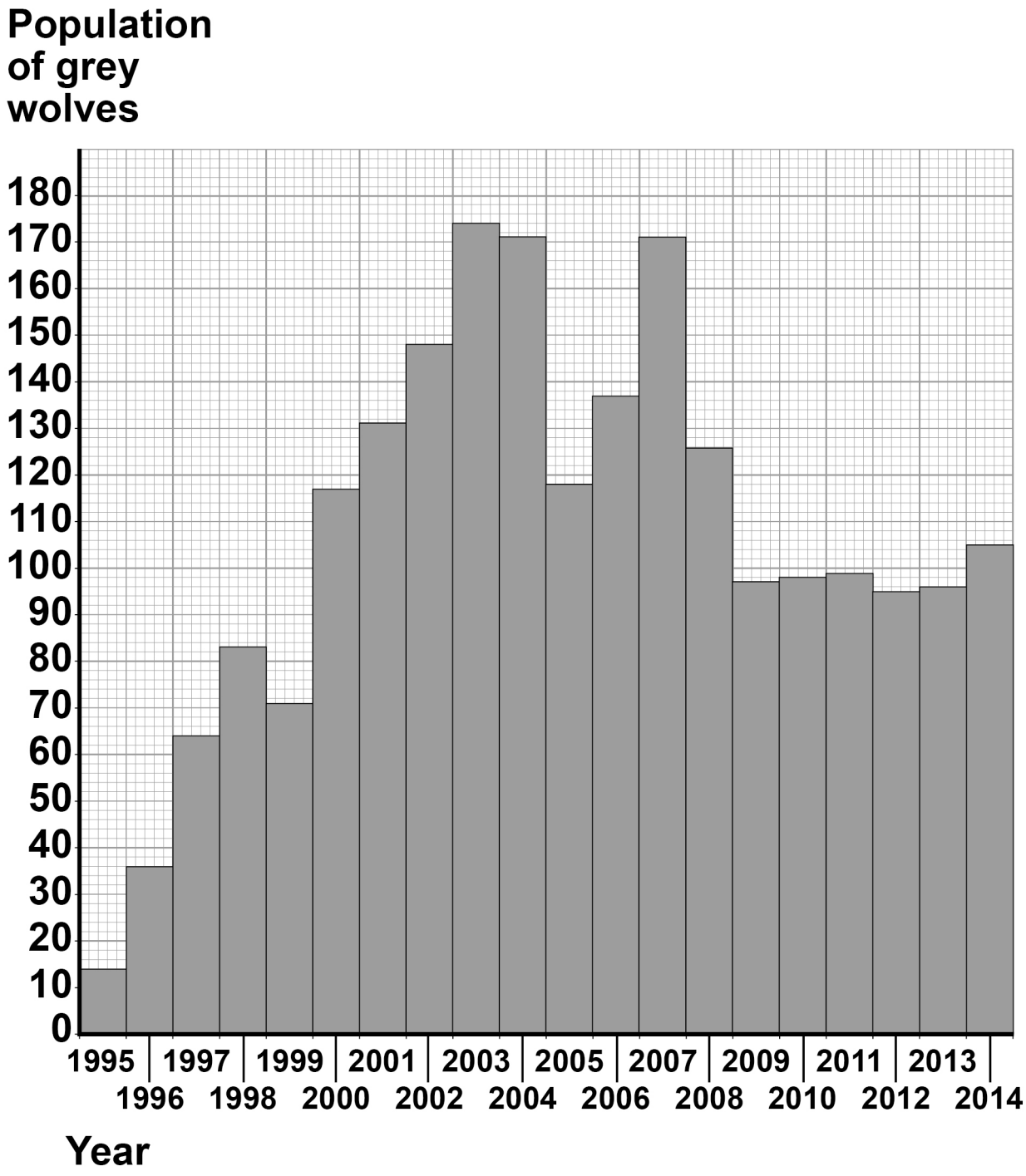
0 8 . 5 Why should scientists select animals from more than one area for reintroduction programmes? [1 mark]

Tick (✓) ONE box.

- ☐ **To reduce the effect of inbreeding**
- ☐ **To choose similar characteristics**
- ☐ **To reduce genetic diversity**

FIGURE 9 shows the change in the population of grey wolves in Yellowstone Park since 1995.

FIGURE 9



0 8 . 6 **The wolf population in 2014 was greater than the wolf population in 1995.**

Calculate how many times greater. [1 mark]

Number of times greater = _____

0 8 . 7 **Scientists now believe the population of wolves in Yellowstone Park is NOT likely to decrease to zero.**

Describe how the data since 2009 support this belief. [1 mark]

BLANK PAGE

0 9 **Polonium is an element with 33 isotopes.**

0 9 . 1 **What is the difference between isotopes of the same element? [1 mark]**

Tick (✓) ONE box.

- ☐ **The number of electrons**
- ☐ **The number of neutrons**
- ☐ **The number of protons**

[Turn over]

0 9 . 2 An isotope of polonium is $^{210}_{84}Po$ (polonium-210).

Polonium-210 emits alpha radiation.

Alpha particles can be represented by the symbol $^{4}_{2}He$

An alpha particle consists of sub-atomic particles.

What are these sub-atomic particles? [2 marks]

Tick (✓) TWO boxes.

- ☐ Electrons
- ☐ Gamma rays
- ☐ Neutrons
- ☐ Protons
- ☐ X-rays

0 9 . 3 **Complete the nuclear equation to show the radioactive decay of polonium-210**

Use the periodic table to help you. [3 marks]

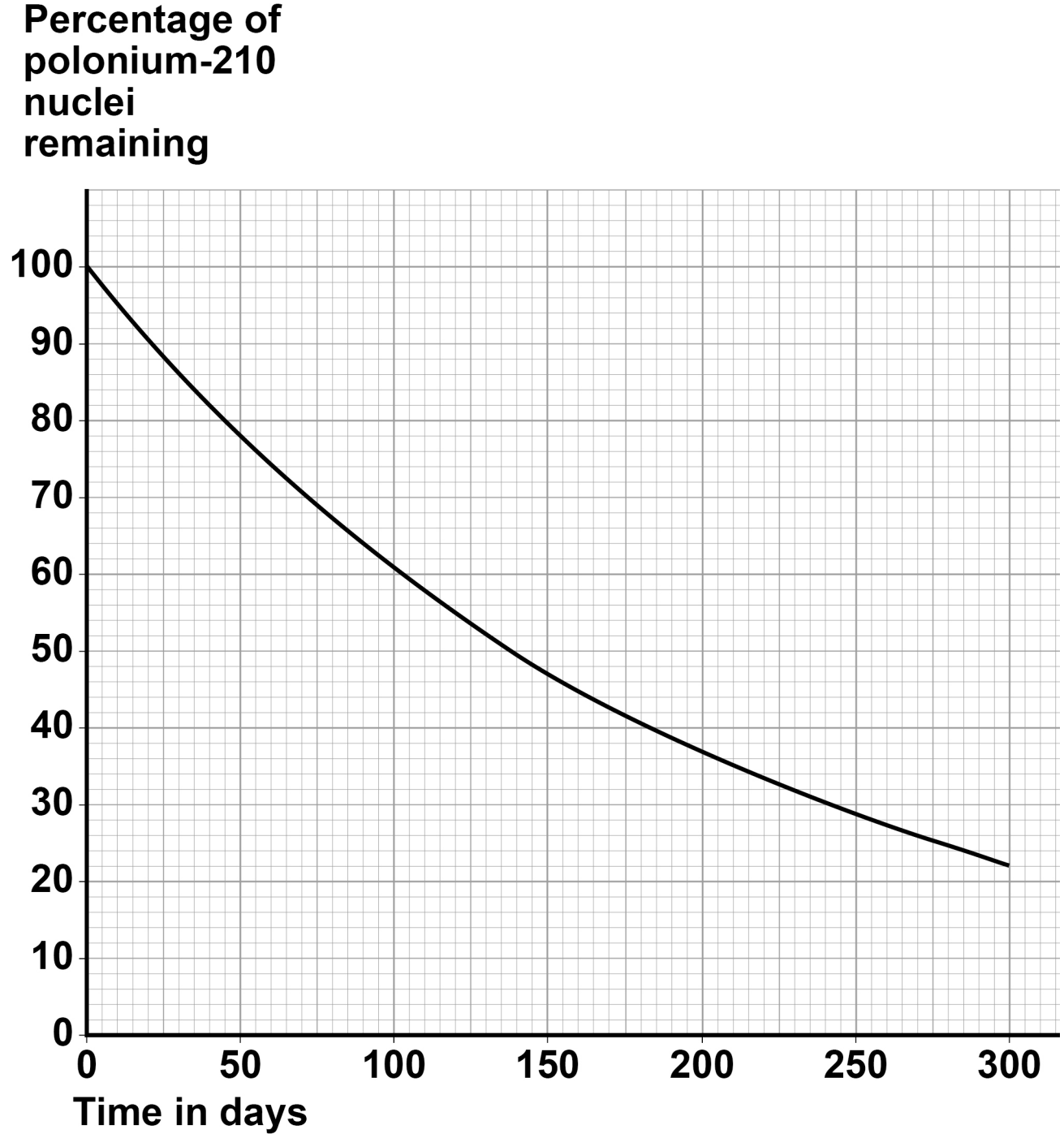
$$^{210}_{84}\text{Po} \longrightarrow \ ^{\_\_\_\_}_{\_\_\_\_}\,\_\_\_\_ \ + \ ^{4}_{2}\text{He}$$

[Turn over]

0 9 . 4 **A sample of polonium-210 decays.**

FIGURE 10 shows how the percentage of polonium-210 nuclei remaining varies with time.

FIGURE 10



Determine the half-life of polonium-210 [1 mark]

_____

_____

_____

Half-life = _____ days

[Turn over]

0 9 . 5 **Another isotope of polonium, polonium-206, has a half-life of 8.8 days.**

A 5.0 mg sample of polonium-206 was left to decay.

Calculate what mass of polonium-206 remained after 44 days. [2 marks]

Mass of polonium-206 after 44 days =

_____ mg

0 9 . 6 **If polonium-210 were to enter the body, the alpha radiation it emits would cause harm.**

Explain why alpha radiation emitted inside the body is harmful. [2 marks]

0 9 . 7 **Isotopes that emit alpha radiation can be transported safely in a glass bottle.**

Suggest why. [1 mark]

END OF QUESTIONS

12

BLANK PAGE

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	