

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

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General Certificate of Secondary Education
June 2003



**SCIENCE: DOUBLE AWARD (MODULAR)
FOUNDATION TIER
Paper 1**

3468/1F

F

Monday 2 June 2003 1.30 pm to 3.00 pm

In addition to this paper you will require:

- the Data Sheet (enclosed);
- a ruler.

You may use a calculator.

For Examiner's Use			
Number	Mark	Number	Mark
1		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	
Total (Column 1)	→		
Total (Column 2)	→		
TOTAL			
Examiner's Initials			

Time allowed: 1 hour 30 minutes

Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

Information

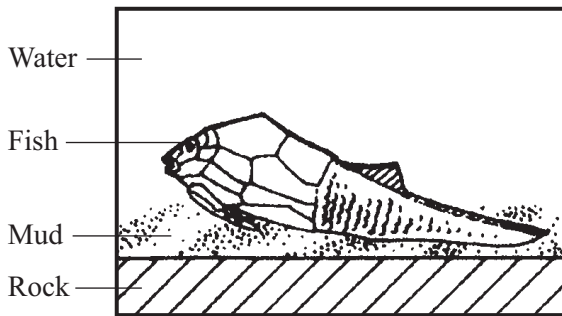
- The maximum mark for this paper is 90.
- Mark allocations are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

INHERITANCE AND SELECTION

1 Fossils give us evidence for the theory of evolution.

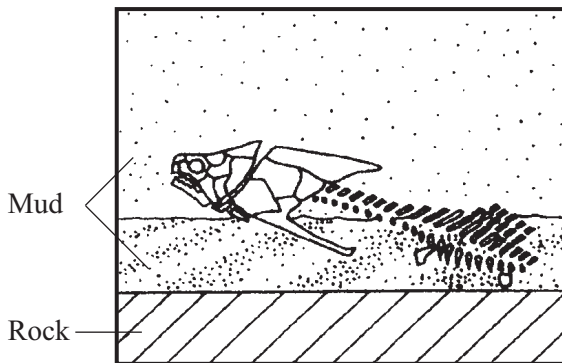
The diagrams show how a fish became a fossil.

(a) In the sentences below, cross out the **two** lines which are wrong in each box.



The fish died and became covered by

ice
mud
rock

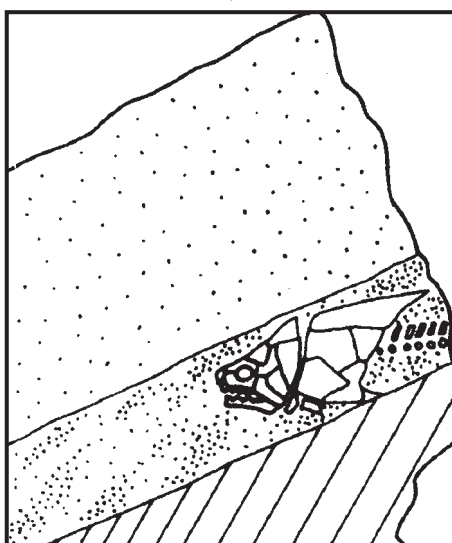


The organs of the fish

decayed
became extinct
mutated

The only part of the fish then left was its

brain
heart
skeleton



The mud surrounding the remains

of the fish turned into

ice
rock
water

(4 marks)

(b) Give **one** way in which fossils provide evidence for the theory of evolution.

.....

.....

.....

(1 mark)

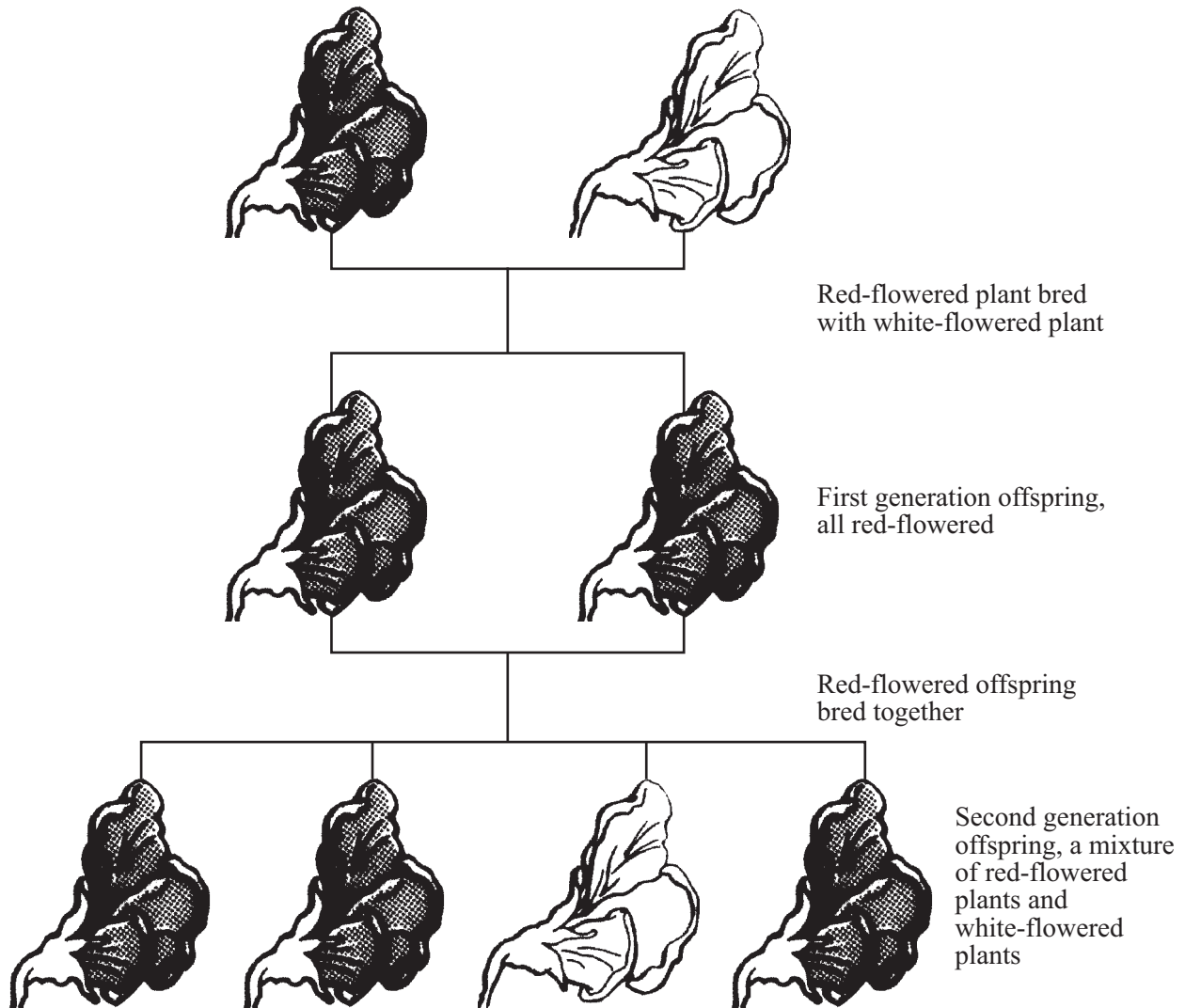


TURN OVER FOR THE NEXT QUESTION

Turn over ►

2 The diagrams show one of the experiments performed by a scientist called Mendel.

He bred sweet pea plants.



In the sentences below, cross out the **two** lines which are wrong in each box.

Mendel proposed that flower colour was controlled by inherited factors.

The first generation plants show that the red factor is

dominant
environmental
recessive

The second generation plants show that the white factor is

dominant
environmental
recessive

We now call inherited factors

chromosomes
gametes
genes

These factors are passed from generation to generation in

gametes
glands
organs

The red-flowered sweet pea plants did not all grow to the same height.

This was due to

dominant
environmental
recessive

factors.

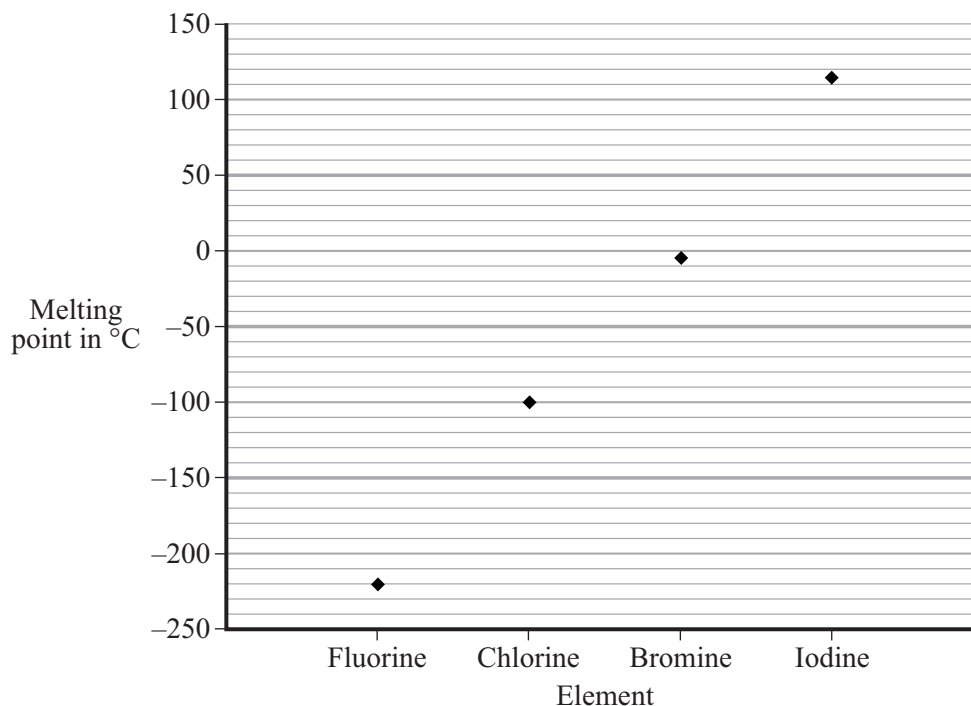
(5 marks)

5

Turn over ►

STRUCTURES AND BONDING

- 3 The graph shows the melting point of four elements in Group 7 of the periodic table.



- (a) What is the melting point of fluorine?

.....
(1 mark)

- (b) Room temperature is 20 °C.

Which element is solid at room temperature?

.....
(1 mark)

- (c) Look at the periodic table on the Data Sheet.

Using data from the graph, describe the trend of melting points of the elements in Group 7.

.....
.....
.....
.....
(2 marks)

(d) The elements in Group 7 are non-metals.

Which **two** of the following are properties of non-metals?

Place a tick (✓) in the box against each correct property.

Brittle (if solid)

Good conductor of heat

High boiling point

Poor conductor of electricity

(2 marks)

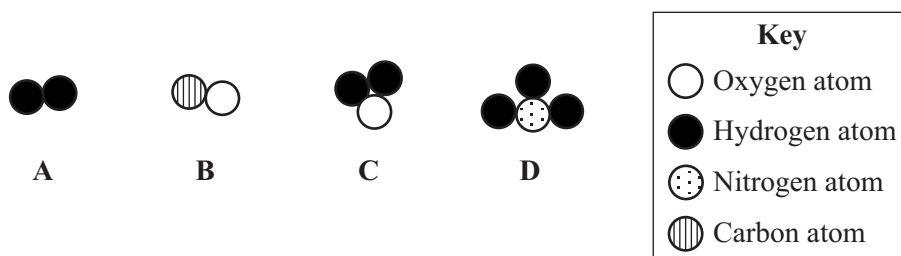
6

TURN OVER FOR THE NEXT QUESTION

Turn over ►

4 The periodic table on the Data Sheet might help you to answer this question.

Diagrams A – D show models of four different molecules.



Complete the table to give the name and the formula of each of the molecules A – D.

The first one has been done for you.

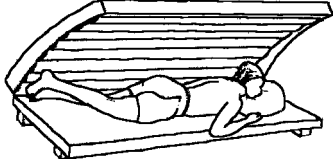

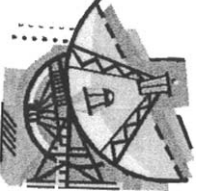
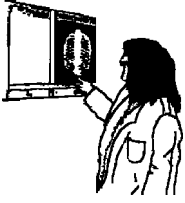

Molecule	Name	Formula
A	Hydrogen	H_2
B		
C		
D		

(6 marks)

6

WAVES AND RADIATION

- 5 List **A** gives the names of five different types of radiation.
List **B** gives uses of different types of radiation in a different order.
Draw a straight line from each type of radiation in List **A** to its use in List **B**.

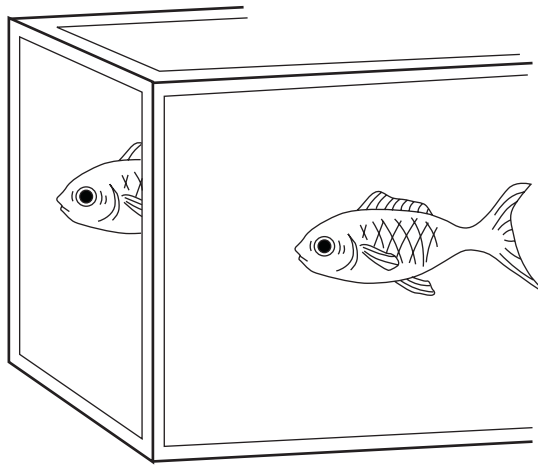
List A Type of radiation	List B Use of radiation
<div style="border: 1px solid black; padding: 5px; width: 80%; margin: 0 auto;">Microwaves</div>	<div style="border: 1px solid black; padding: 5px; width: 80%; margin: 0 auto;"> <p>In sun beds</p>  </div>
<div style="border: 1px solid black; padding: 5px; width: 80%; margin: 0 auto;">Gamma rays</div>	<div style="border: 1px solid black; padding: 5px; width: 80%; margin: 0 auto;"> <p>In radiant heaters</p>  </div>
<div style="border: 1px solid black; padding: 5px; width: 80%; margin: 0 auto;">Infra red waves</div>	<div style="border: 1px solid black; padding: 5px; width: 80%; margin: 0 auto;"> <p>Sending information to satellites</p>  </div>
<div style="border: 1px solid black; padding: 5px; width: 80%; margin: 0 auto;">Ultraviolet rays</div>	<div style="border: 1px solid black; padding: 5px; width: 80%; margin: 0 auto;"> <p>Producing shadows of bones</p>  </div>
<div style="border: 1px solid black; padding: 5px; width: 80%; margin: 0 auto;">X-rays</div>	<div style="border: 1px solid black; padding: 5px; width: 80%; margin: 0 auto;"> <p>Killing cancer cells</p>  </div>

(4 marks)

4

Turn over ►

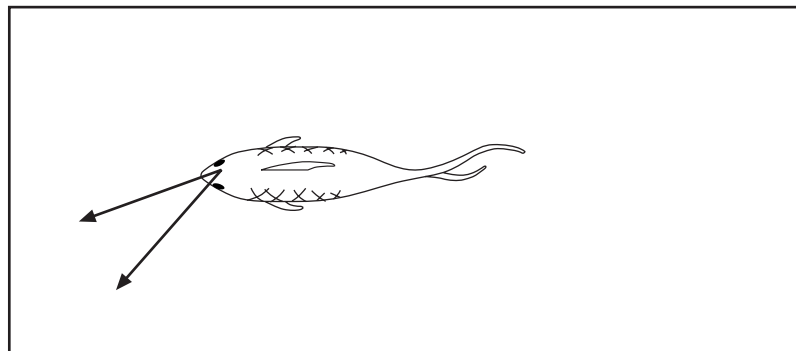
- 6 An aquarium contains only one fish. But if you look at the corner of the aquarium, there seem to be two fish.



The diagram below shows the top of the aquarium.

Two light waves have been drawn from the fish.

- (a) Complete the diagram to show how the light waves reach the eye.



Eye

(2 marks)

(b) Complete each sentence by using the correct words from the box.

colour	diffraction	longitudinal	reflection
refraction	speed	transverse	

When the light waves pass from glass into the air they change

This causes a change in direction called

Light waves are waves.

(3 marks)

5

TURN OVER FOR THE NEXT QUESTION

Turn over ►

7 In some areas of the U.K. people are worried because their houses are built on rocks that release radon.

Read the information about radon.

- It is a gas.
- It is formed by the breakdown of radium.
- It emits alpha radiation.
- Each radon atom has 86 protons.
- Each radon atom has 136 neutrons.

(a) (i) How many electrons has each atom of radon?

(ii) What is the mass (nucleon) number of radon?

(2 marks)

(b) Explain why it may be dangerous to live near rocks that release radon.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

.....

.....

.....

.....

(3 marks)

5

NO QUESTIONS APPEAR ON THIS PAGE

TURN OVER FOR THE NEXT QUESTION

Turn over ►

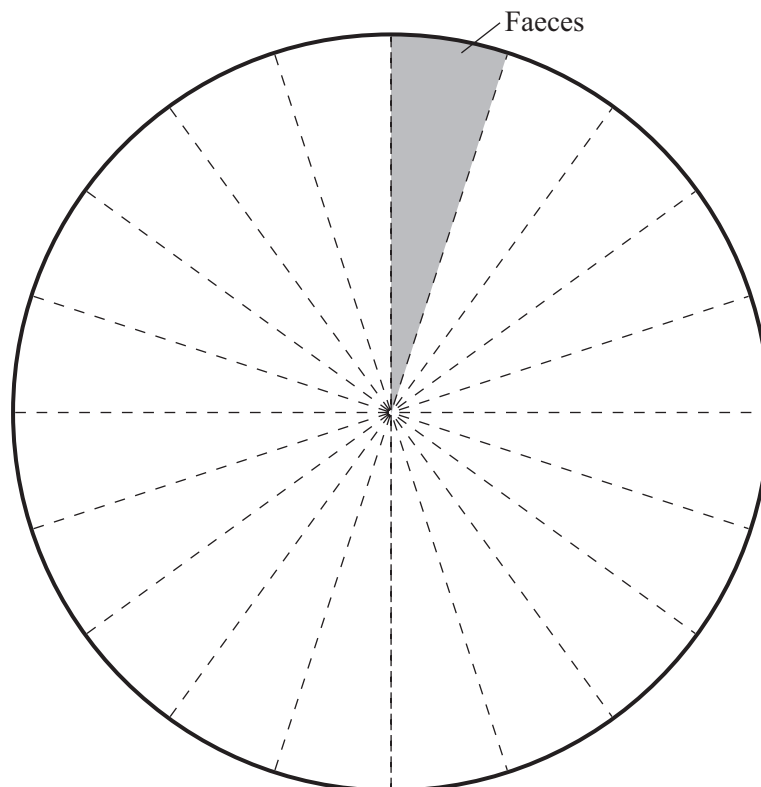
QUESTIONS RELATING TO PREVIOUSLY TESTED MODULES

- 8 The table shows how much water is lost in different ways from a student's body.

Way in which water is lost	Percentage of total
Breath	15
Faeces	5
Sweat	50
Urine	30

- (a) Complete the pie chart.

One part has been done for you. Remember to label the pie chart.



(3 marks)

(b) The table is about waste products which are removed from the student's body.

Complete the table by using the correct words from the box.

amino acids	breath	circulation	digestion	fatty acids
glucose	respiration	sweat	urine	

Waste product	How it is produced	How it leaves the body
carbon dioxide	by	in
urea	from	in

(4 marks)

7

TURN OVER FOR THE NEXT QUESTION

Turn over ►

9 The elements in Group 1 are known as the alkali metals.

Which **three** of the following are properties of alkali metals?

Place a tick (✓) in the box against each correct property.

Hard, tough and strong

Low density

Form hydroxides that dissolve in water

React quickly with water

Used as catalysts

Used to make electric cables

(3 marks)

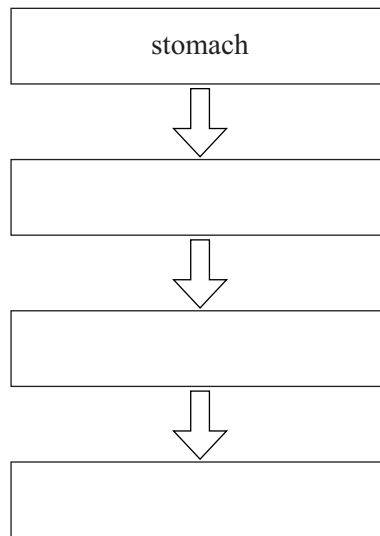
3

10 Food passes through the digestive system.

Use words from the box to complete the flow chart for the organs that food passes through.

The first one has been done for you.

anus large intestine small intestine stomach



(3 marks)

$\frac{\quad}{3}$

TURN OVER FOR THE NEXT QUESTION

Turn over ►

INHERITANCE AND SELECTION

11 The monthly cycle of women is controlled by hormones.

(a) Name the **two** glands that secrete these hormones.

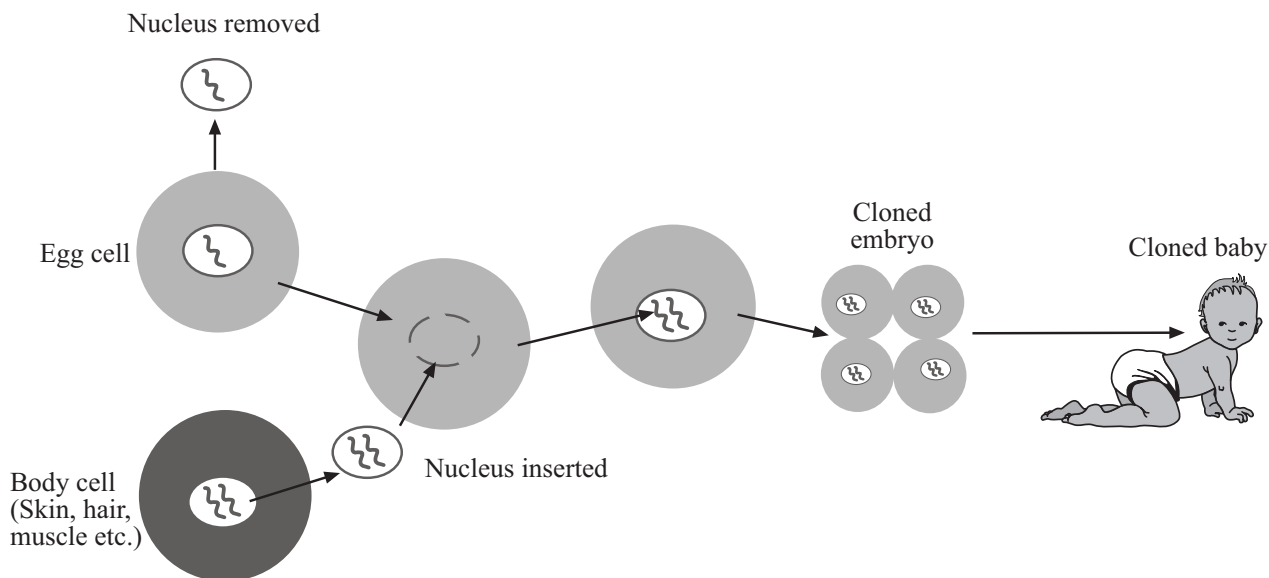
- 1
- 2 *(2 marks)*

(b) Describe **two** ways in which fertility in women can be controlled by giving hormones.

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

4

12 It is now possible to clone humans. The diagram shows one way in which this can be done.



(a) What type of reproduction is this?

.....
(1 mark)

(b) Will the baby have the characteristics of the egg cell or the body cell?

.....

Explain the reason for your answer.

.....
.....
.....
.....
.....

(2 marks)

(c) The procedure in the diagram could be used to produce several cloned embryos.

Suggest how this might be done.

.....
.....

(1 mark)

13 Read the passage about antibiotics.

People do not always agree about the use of antibiotics in food production.

If we put low doses of antibiotics in feed for animals such as cattle and sheep, it helps to produce high-quality, low-cost food. Antibiotics help to keep animals disease-free. They also help animals to grow. Animals get fatter quicker because they do not waste energy trying to overcome illness.

The use of antibiotics in livestock feed means that there is a higher risk of antibiotic-resistant bacteria developing. The rapid reproduction of bacteria means there is always a chance that a population of bacteria will develop which is antibiotic-resistant. These could be dangerous to human health.

- (a) *To gain full marks for this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.*

Explain how a population of antibiotic-resistant bacteria might develop from non-resistant bacteria.

.....
.....
.....
.....
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.....
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(3 marks)

- (b) Do you think that farmers should be allowed to put low doses of antibiotics in animal feed?

Explain the reasons for your answer.

.....
.....
.....
.....

(2 marks)



STRUCTURES AND BONDING

14 Use the periodic table on the Data Sheet to answer these questions.

The table below gives the electronic structures of four elements, **W**, **X**, **Y** and **Z**.

Element	Electronic structure
W	2,5
X	2,7
Y	2,8,8
Z	2,8,8,1

(a) Which element **W**, **X**, **Y** or **Z**:

- (i) is a Group 0 gas?
- (ii) is nitrogen?
- (iii) is a Group 7 gas?
- (iv) reacts violently with water?

(3 marks)

(b) Which **two** Groups of the periodic table do **not** contain any non-metals?

.....

(1 mark)

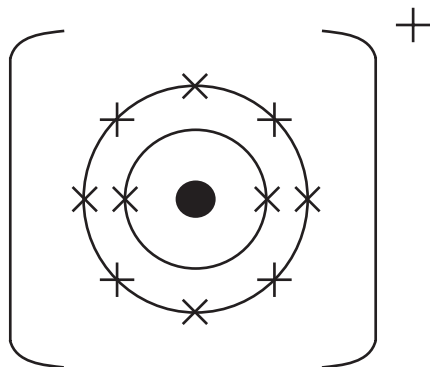
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TURN OVER FOR THE NEXT QUESTION

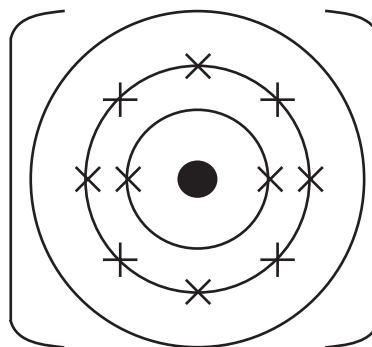
Turn over ►

- 15 (a) Sodium chloride is an ionic compound.

This is a diagram of a sodium ion.



Complete this diagram of a chloride ion.

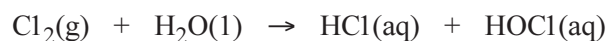


(2 marks)

- (b) The electrolysis of sodium chloride produces chlorine.

Chlorine is used to produce bleach (HOCl).

This equation represents the reaction.



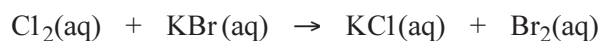
Give the meaning of the state symbols (l) and (aq).

(l)

(aq).....

(2 marks)

- (c) The equation below represents the reaction between chlorine and potassium bromide.



- (i) Balance this equation. (1 mark)

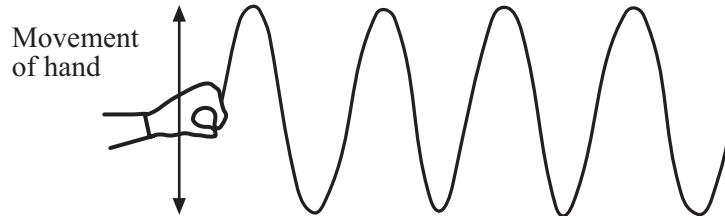
- (ii) Why does chlorine displace bromine from potassium bromide solution?

.....
.....

(1 mark)

WAVES AND RADIATION

16 The diagram shows a wave travelling along a rope.



(a) On the diagram:

- (i) show the wavelength and label it **W**;
- (ii) show the amplitude and label it **A**.

(2 marks)

(b) The wavelength of the wave is 0.1 m. Its frequency is 2 Hz.

Calculate the speed of the wave. Show clearly how you work out your answer and give the unit.

.....

.....

.....

Speed of wave

(3 marks)

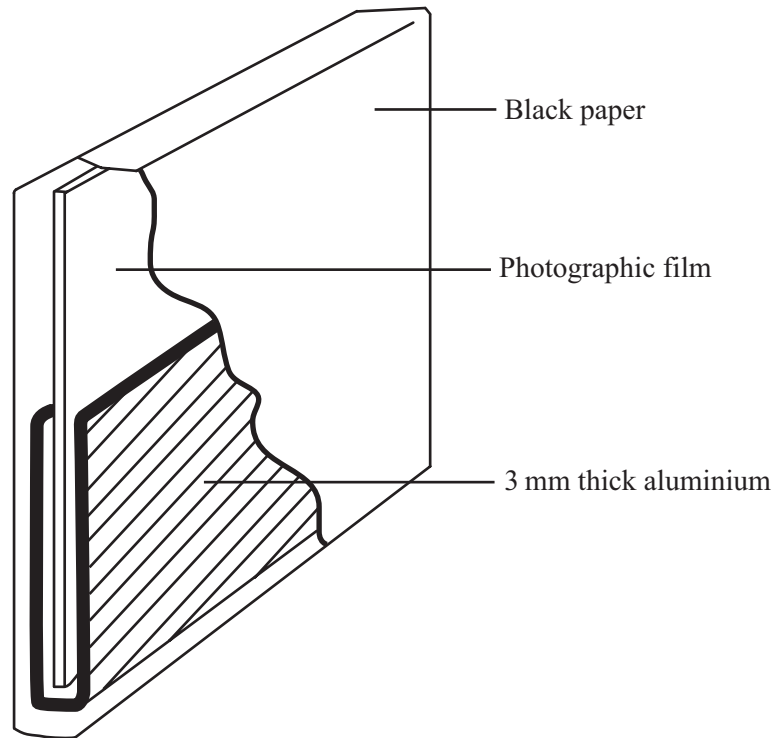
5

TURN OVER FOR THE NEXT QUESTION

Turn over ►

17 The diagram shows a badge worn by a worker at a nuclear power station.

Part of the outer black paper has been removed so that you can see the inside of the badge.



Scientists examined the worker's badge at the end of a day's work.

They found that the top part of the badge had been affected by radiation, but the bottom half had not.

What type of radiation had the worker been exposed to? Explain the reasons for your answer.

.....

.....

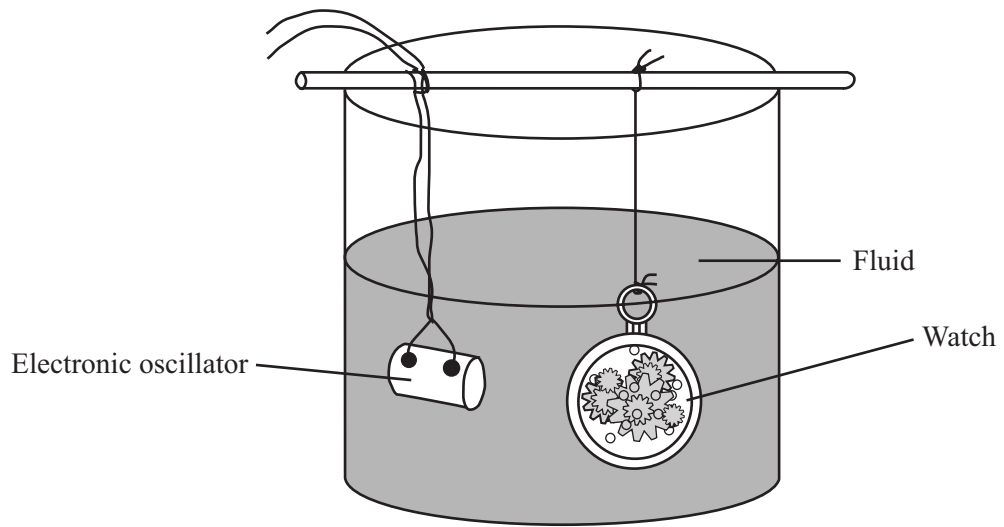
.....

.....

(2 marks)

2

18 The diagram shows how ultrasonic waves can be used to clean a watch.



Suggest how this method cleans the watch.

.....

.....

.....

.....

(2 marks)

2

TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTIONS RELATING TO PREVIOUSLY TESTED MODULES

19 The table shows the composition of blood entering and leaving the lungs.

Gas	Concentration in arbitrary units	
	Blood entering lungs	Blood leaving lungs
Oxygen	40	100
Carbon dioxide	46	40

(a) Describe, in as much detail as you can, the changes that take place in the composition of blood as it passes through the lungs.

.....

.....

.....

.....

.....

.....

(3 marks)

(b) Which part of the blood:

(i) transports most carbon dioxide;

(ii) transports most oxygen?

(2 marks)

20 Use the Formulae of Some Common Ions table on the Data Sheet to help you to answer this question.

Acids react with alkalis to form salts and water.

Complete the table below by writing in the name and formula of the salt formed in each reaction.

The first one has been done for you.

Acid	Alkali	Salt	Formula of salt
Hydrochloric acid	Sodium hydroxide	Sodium chloride	NaCl
Nitric acid	Sodium hydroxide		
Sulphuric acid	Potassium hydroxide		

(4 marks)

4

END OF QUESTIONS

THERE ARE NO QUESTIONS PRINTED ON THIS PAGE