Surname		Other Names	
Centre Number			Candidate Number									
Candidate Signature												

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General Certificate of Secondary Education
June 2005

ASSESSMENT and QUALIFICATIONS ALLIANCE

SCIENCE: SINGLE AWARD A (MODULAR) 3469/F
FOUNDATION TIER

F

Monday 6 June 2005 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.

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.

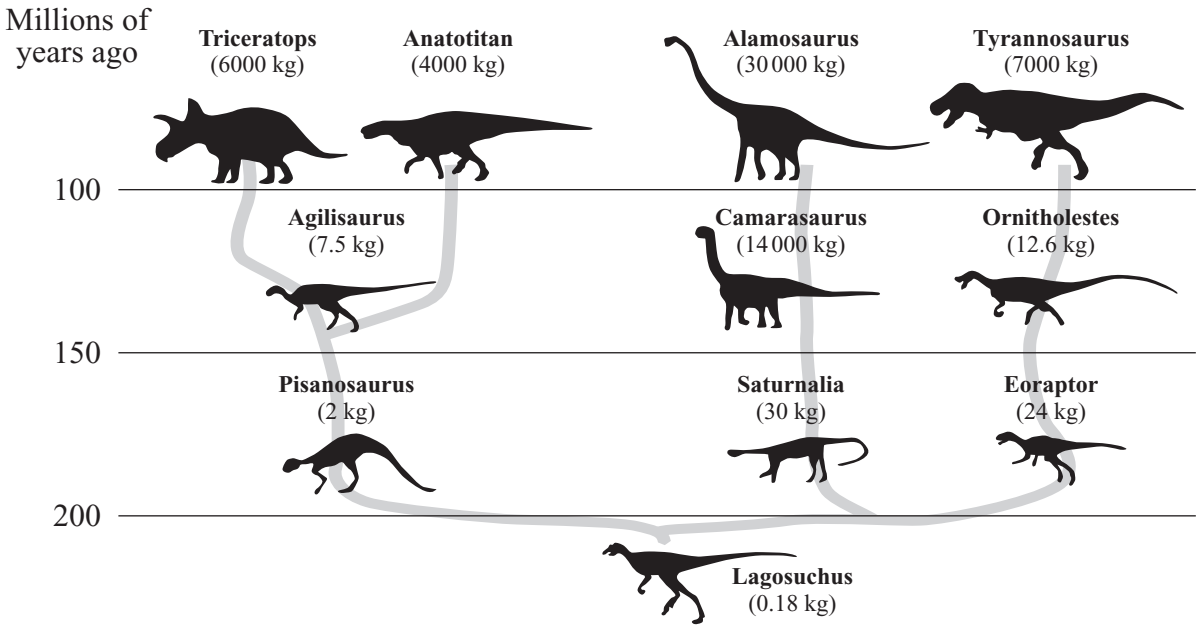
Information
- The maximum mark for this paper is 90.
- Mark allocations are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

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

ENVIRONMENT, INHERITANCE AND SELECTION

1 The diagram shows a timeline for the evolution of some dinosaurs.

The mass of each dinosaur is shown in the brackets by its name.



(a) Name **one** dinosaur which lived between 100 and 150 million years ago.

.....

(1 mark)

(b) Which dinosaur did Ornitholestes evolve from?

.....

(1 mark)

(c) Apart from body size and mass, give **one other** difference between Lagosuchus and Alamosaurus.

.....

.....

(1 mark)

(d) (i) Which dinosaur had the largest mass?

.....

(1 mark)

(ii) What happened to the mass of dinosaurs during evolution?

.....

.....

(1 mark)

(e) We know about dinosaurs from their fossils.

Describe **one** way in which fossils are formed.

.....

.....

(1 mark)

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

billion	**complex**	**large**	**million**	**simple**	**thousand**

The theory of evolution states that all species of living things have evolved from ..... life forms which first developed more than three ..... years ago.

(2 marks)

8

TURN OVER FOR THE NEXT QUESTION

2 The picture shows a forest being cleared so that rice can be grown.

The trees are chopped down and then burned.

(a) Complete the sentences by using the correct words from the box.

acid rain	**carbon dioxide**	**the greenhouse effect**	**methane**	**sulphur dioxide**

Burning trees give off the gas ..... .

The rice crop will increase the amount of the gas ..... in the atmosphere.

These two gases help to cause ..... .

(3 marks)

(b) Burning fossil fuels also causes pollution.

Name **one** fossil fuel.

.....

(1 mark)

4

LEAVE MARGIN BLANK

PATTERNS AND REACTIONS

3 Use the periodic table on the Data Sheet to help you to answer these questions.

(a) Write the symbol for helium.

.....

(1 mark)

(b) Write the name of an element in Group 4.

.....

(1 mark)

(c) Write the name of the element which has a relative atomic **mass** of 64.

.....

(1 mark)

(d) Write the name of the element with the next highest atomic number after Te (tellurium) in the periodic table on the Data Sheet.

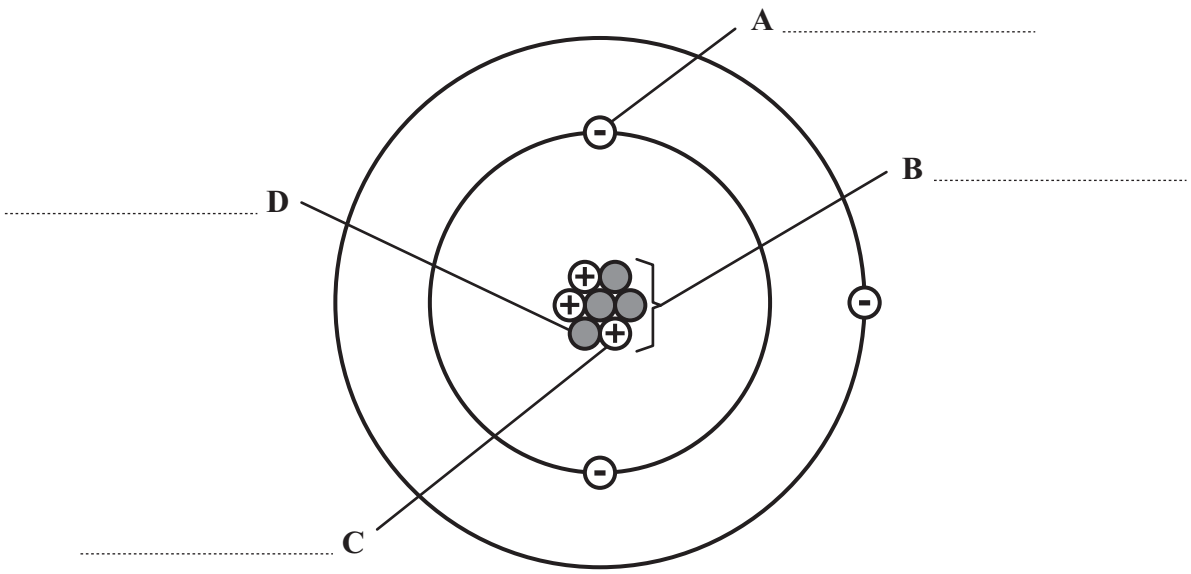
.....

(1 mark)

4

TURN OVER FOR THE NEXT QUESTION

4 The diagram shows an atom.



(a) On the diagram, write the names of structures **A**, **B**, **C** and **D**. *(4 marks)*

(b) To which Group of the periodic table does this atom belong?

.....

Give **one** reason for your answer.

.....

.....

(2 marks)

(c) Name the element which is made up of this type of atom.

.....

(1 mark)

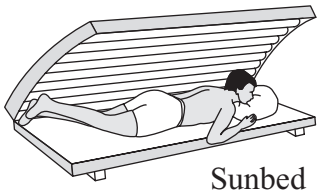
7

FORCES, WAVES AND RADIATION

5 The pictures show devices that use electromagnetic radiation.

Use words from the box to label each picture with the type of radiation used.

gamma rays	**infra red rays**	**light**	**ultraviolet rays**	**microwaves**	**X-rays**



Sunbed

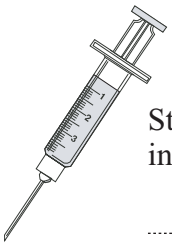
.....

Examining broken bones

.....

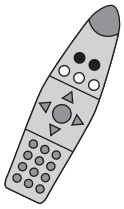
Mobile phone

.....



Sterilising surgical instruments

.....



Television set remote control

.....

(5 marks)

5

TURN OVER FOR THE NEXT QUESTION

6 The table gives information about the planets.

Planet	Diameter in km	Relative distance from the Sun	Time to complete one orbit
Mercury	4 880	0.4	88 days
Venus	12 104	0.7	224 days
Earth	12 786	1.0	1 year
Mars	6 787	1.5	2 years
Jupiter	143 800	5.2	12 years
Saturn	119 300	9.5	29 years
Uranus	51 800	19.0	84 years
Neptune	49 500	30.5	165 years
Pluto	3 000	39.5	248 years

Use information from the table to help you to answer these questions.

(a) Which is the largest planet?

.....

(1 mark)

(b) Which **two** planets have orbits between the Sun and Earth?

..... and ..... *(1 mark)*

(c) Which planet would you expect to have the lowest surface temperature?

.....

(1 mark)

(d) Why does Uranus take longer than Earth to orbit the Sun?

.....

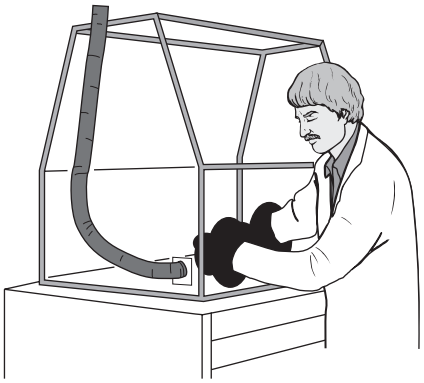
.....

(1 mark)

4

LEAVE MARGIN BLANK

7 The picture shows a man at work in a factory that uses radioactive materials.



The radioactive material is kept behind glass shields. The man wears gloves so that he cannot touch the radioactive material directly.

Explain, as fully as you can, why these precautions are taken.

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.

.....

.....

.....

.....

.....

.....

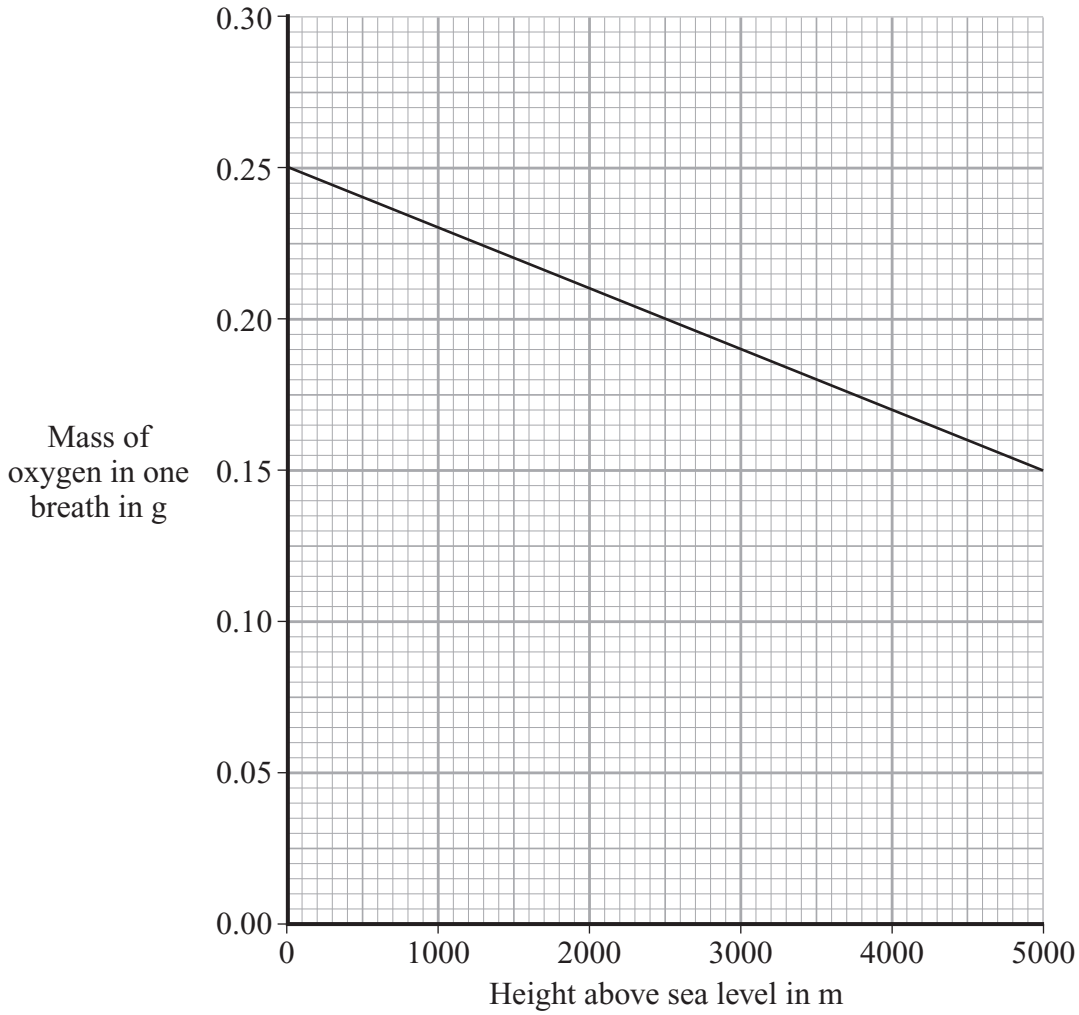
(4 marks)

4

TURN OVER FOR THE NEXT QUESTION

QUESTIONS RELATING TO PREVIOUSLY TESTED MODULES

8 (a) The graph shows how the mass of oxygen you breathe in changes as you climb up a mountain.



Describe, in as much detail as you can, how the mass of oxygen in one breath changes as you climb from sea level to 3000 m.

.....

.....

.....

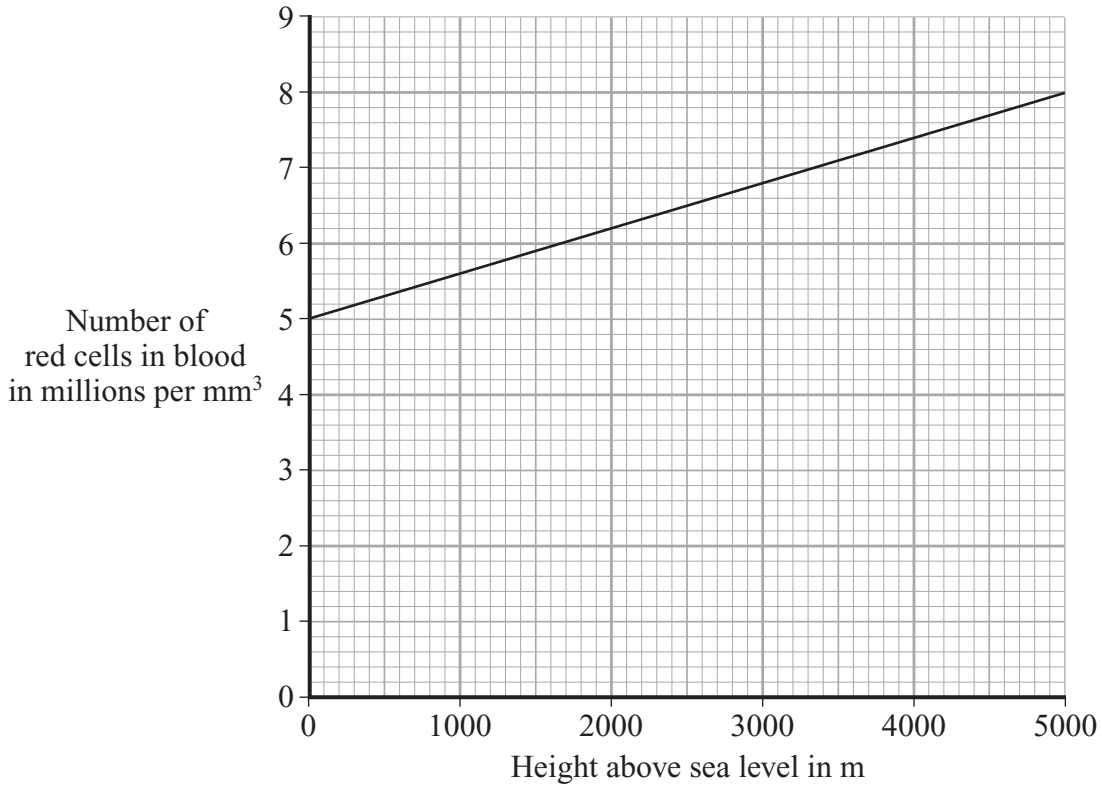
.....

.....

.....

(3 marks)

(b) People who live high up in mountainous areas have more red blood cells than people who live at sea level. The graph below shows how the number of red blood cells changes with height above sea level.



(i) How many more red blood cells does a person living at 3000 m above sea level have than someone living at sea level? Show clearly how you work out your answer.

.....

.....

Increase in number of red blood cells = ... millions per mm^3

(2 marks)

(ii) What is the advantage of having more red blood cells?

.....

.....

(1 mark)

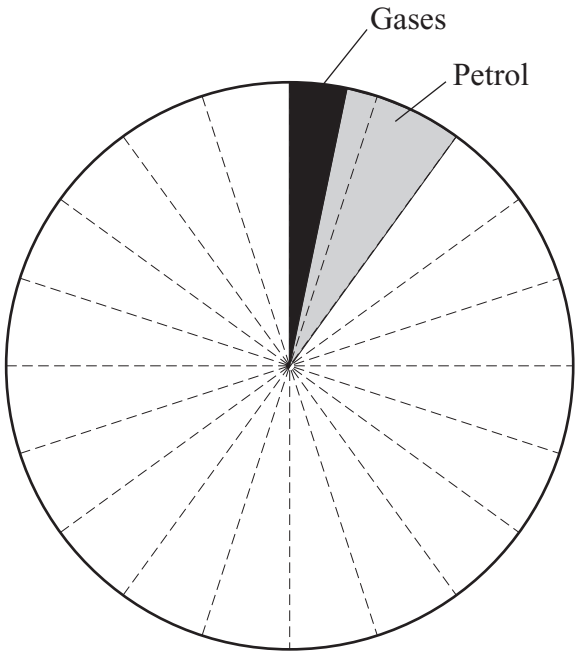
6

Turn over ▶

9 The table shows the composition of some crude oil.

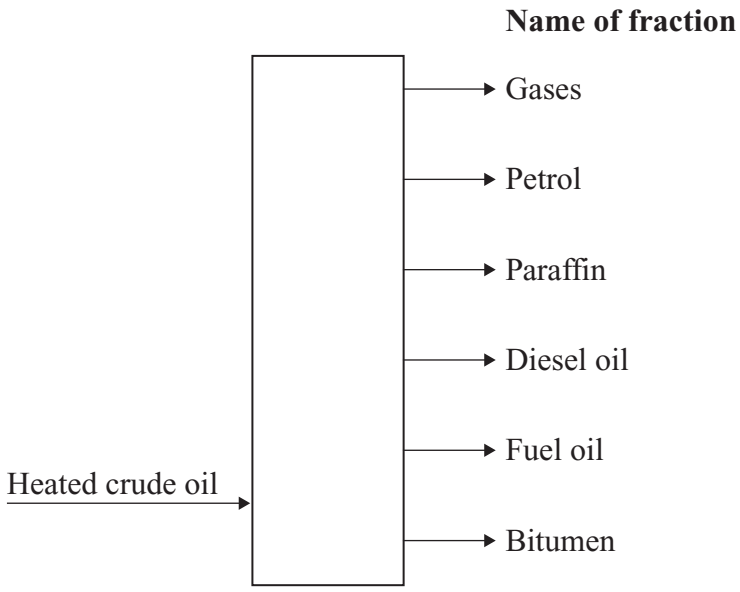
Fraction	Percentage in crude oil
Gases	3
Petrol	7
Naphtha	10
Kerosine	15
Gas oil	20
Fuel oil	45

(a) Complete the pie chart for the composition of this crude oil. Remember to label the chart.



(3 marks)

(b) The diagram shows the process of separating a different sample of crude oil into fractions.



(i) What is the name given to this process?

.....

(1 mark)

(ii) Which fraction has the lowest boiling point?

.....

(1 mark)

(iii) Which fraction is the least volatile?

.....

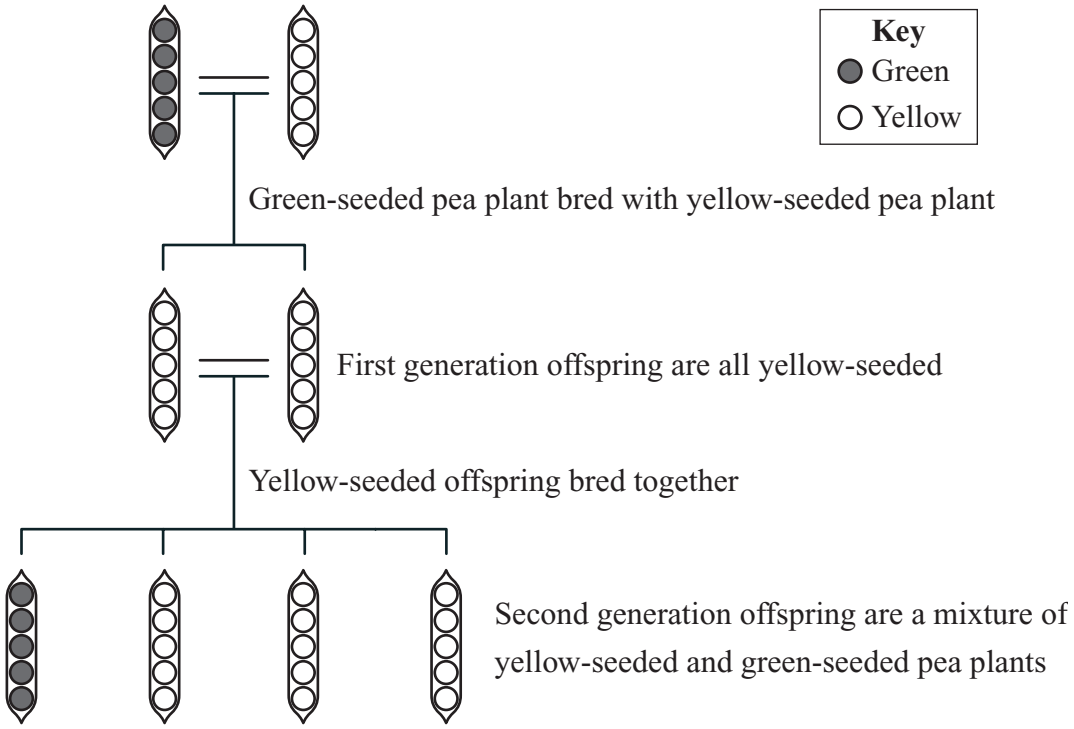
(1 mark)

6

TURN OVER FOR THE NEXT QUESTION

ENVIRONMENT, INHERITANCE AND SELECTION

10 The diagram shows one of the experiments performed by a scientist called Mendel in the 1850s. He bred pea plants which had different coloured pea seeds.



(a) Use words from the box to help you to explain the results of this experiment.

dominant	**factor**	**recessive**

.....

.....

.....

.....

.....

.....

(3 marks)

(b) Mendel explained these results in terms of *inherited factors*.

(i) What do we now call *inherited factors*?

.....

(1 mark)

(ii) Where, in a cell, are these *inherited factors* found?

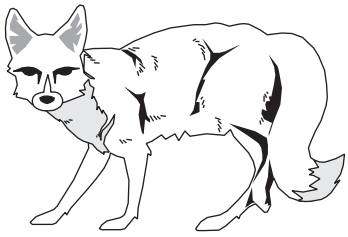
.....

(1 mark)

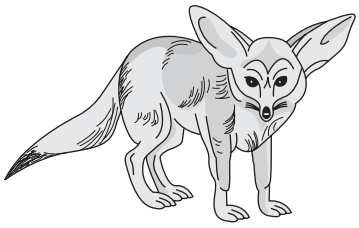
5

TURN OVER FOR THE NEXT QUESTION

11 The drawings show an arctic fox and a fennec fox.



Arctic fox



Fennec fox

(a) The arctic fox lives in cold, snowy conditions.

Explain how each of the following helps the arctic fox to survive in these conditions.

1 Long, thick fur

.....

.....

2 A white coat

.....

.....

(2 marks)

(b) The fennec fox lives in hot deserts.

Explain how each of the following helps it to survive in hot conditions.

1 Very large ear flaps

.....

.....

2 Hairs on the soles of its feet

.....

.....

(2 marks)

4

PATTERNS AND REACTIONS

12 The table shows some properties of four Group 7 elements.

Element	Boiling point in °C	Melting point in °C	State at room temperature	Reaction with hydrogen	
				Description	Product
Fluorine	– 218	– 188	gas	Explosive reaction in dim light	Hydrogen fluoride
Chlorine	– 34	– 101	gas	Explosive reaction in sunlight	Hydrogen chloride
Bromine	+ 59	– 7		Reacts if heated	
Iodine	+ 185	+ 114		Reacts if heated strongly	Hydrogen iodide

(a) What is the state at room temperature of:

(i) bromine; .....

(ii) iodine? .....

(2 marks)

(b) Which **one** of the four elements is most reactive?

.....

(1 mark)

(c) Name the compound formed when hydrogen reacts with bromine.

.....

(1 mark)

4

13 (a) Living cells are used in the manufacture of food materials.

(i) Name **one** food material which is made using yeast.

.....

(1 mark)

(ii) Name **one** food material which is made using bacteria.

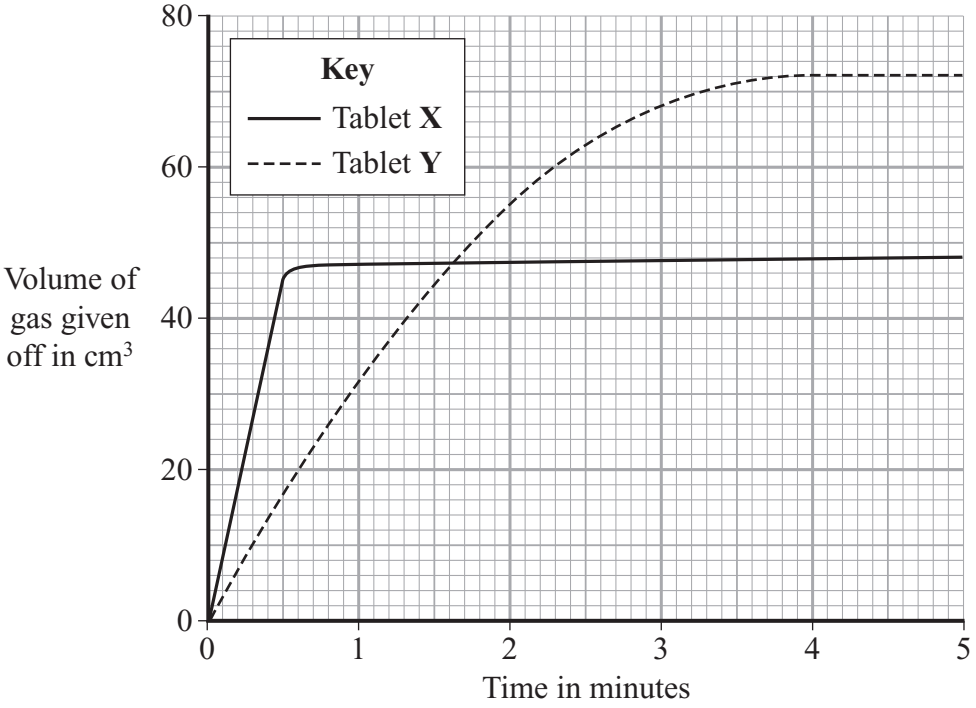
.....

(1 mark)

(b) Many indigestion tablets contain calcium carbonate as their only active ingredient. Calcium carbonate neutralises some of the hydrochloric acid in the stomach.

Two different indigestion tablets, **X** and **Y**, were separately reacted with excess hydrochloric acid. The volume of gas given off in each reaction was measured every minute.

The results are shown in the graph.



(i) Which tablet, **X** or **Y**, contained most calcium carbonate? .....

Explain the reason for your answer.

.....

.....

(1 mark)

(ii) Which tablet, **X** or **Y**, reacted faster with hydrochloric acid? .....

Explain the reason for your answer.

.....

.....

(1 mark)

(iii) Explain the shape of the graph for tablet **X** between 3 and 5 minutes.

.....

.....

.....

.....

(1 mark)

(iv) The gas given off during the reaction is carbon dioxide.

Describe the test for carbon dioxide.

.....

.....

.....

.....

(2 marks)

7

FORCES, WAVES AND RADIATION

14 (a) Complete the sentences about atoms.

In an atom, the number of electrons is equal to the number of ..... .

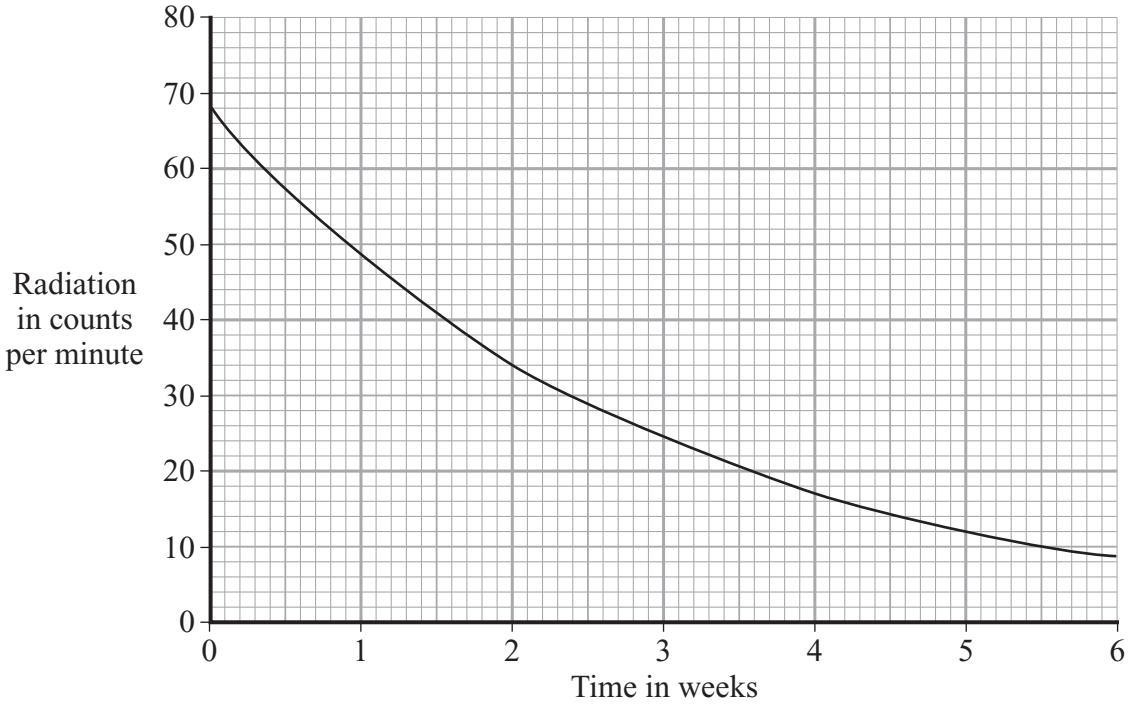
All atoms of an element have the same number of ..... .

Isotopes of the same element have different numbers of ..... .

(3 marks)

(b) A teacher measured the amount of radiation from a radioactive source, during the same lesson each week, over a period of six weeks.

The results are shown on the graph.



(i) How long does it take for the radiation to fall from 68 counts per minute to half that value?

Show clearly how you work out your answer.

.....

.....

.....

Time taken for radiation to halve .....

(3 marks)

(ii) Complete the sentence.

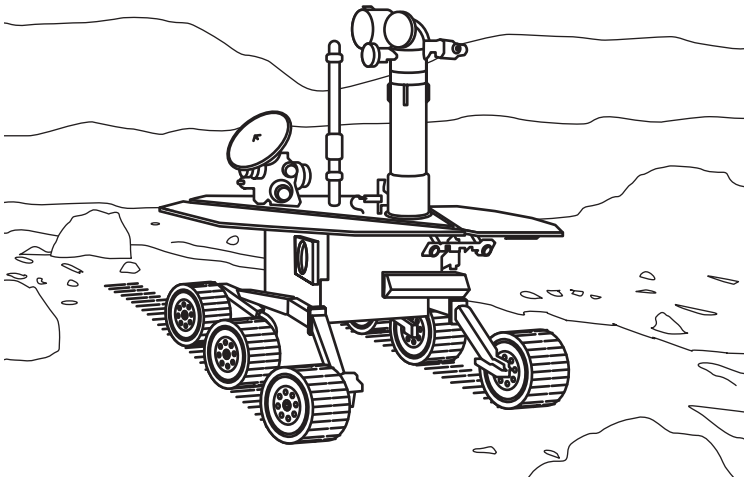
When an atom of a radioactive element emits alpha radiation, an atom of a different element is formed. A different element is formed because the radioactive element has lost ..... .

(1 mark)

7

TURN OVER FOR THE NEXT QUESTION

15 The picture shows a robot exploring Mars.



Describe what the robot might investigate on Mars.

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.

.....

.....

.....

.....

.....

.....

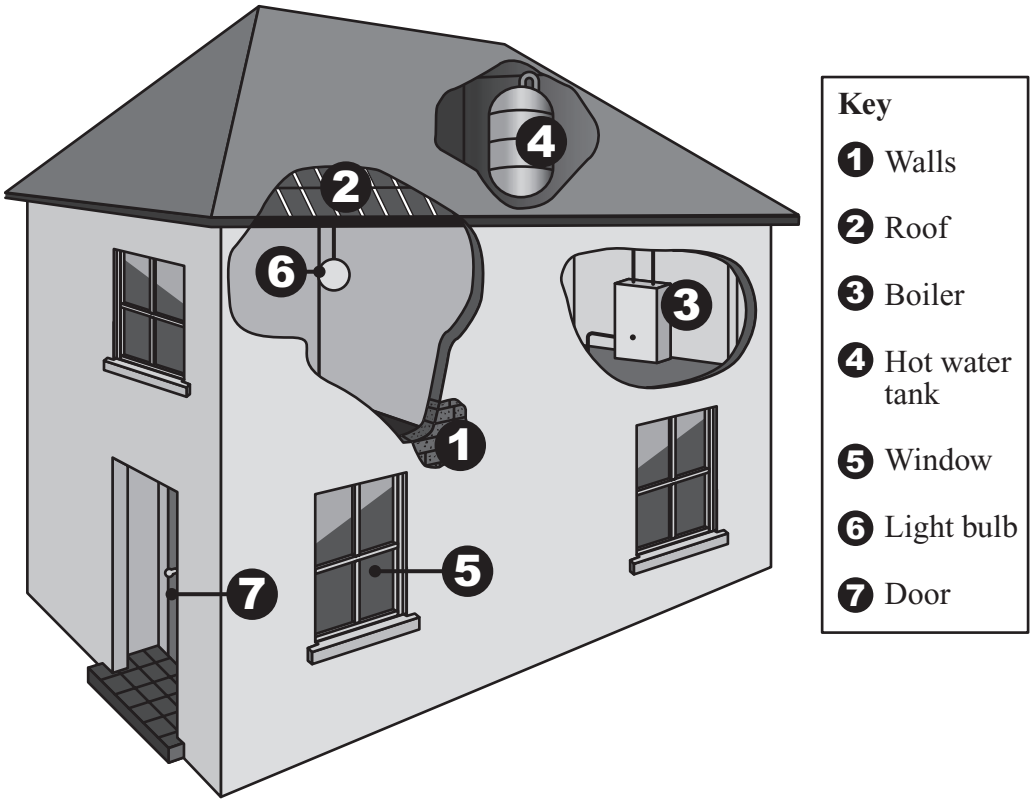
(4 marks)

4

LEAVE MARGIN BLANK

QUESTIONS RELATING TO PREVIOUSLY TESTED MODULES

16 The drawing shows parts of a house where it is possible to reduce the amount of energy lost.



(a) Give **one** way in which the amount of energy lost can be reduced from each of the following parts of the house.

1, **2** and **4** .....

5 .....

7 .....

(3 marks)

(b) Energy consumption can be reduced by using a more efficient boiler or more efficient light bulbs.

What is meant by a *more efficient* light bulb?

.....

.....

(1 mark)

4

Turn over ▶

17 (a) 'Life expectancy' is the age to which a person can expect to live.

The table shows the life expectancy, in years, of smokers and of people who have never smoked.

Life expectancy at age	Females who have never smoked	Female smokers	Males who have never smoked	Male smokers
25 – 29	87.6	80.7	79.7	72.2
30 – 34	87.7	80.9	80.1	72.7
35 – 39	87.9	81.1	80.3	73.3
40 – 44	88.1	81.3	80.7	73.8
45 – 49	88.3	81.6	81.1	74.5
50 – 54	88.6	82.0	81.4	75.2
55 – 59	89.0	83.0	82.0	76.4
60 – 64	89.5	84.2	83.0	78.1
65 – 69	90.4	85.4	84.3	79.9
70 – 74	91.5	87.3	85.7	82.4

(i) A woman is 43. She has never smoked.

To what age can she expect to live?

.....

(1 mark)

(ii) What happens to our life expectancy as we get older?

.....

.....

(1 mark)

(iii) Describe, in as much detail as you can, the effect of smoking on the life expectancy of male smokers.

.....

.....

.....

.....

.....

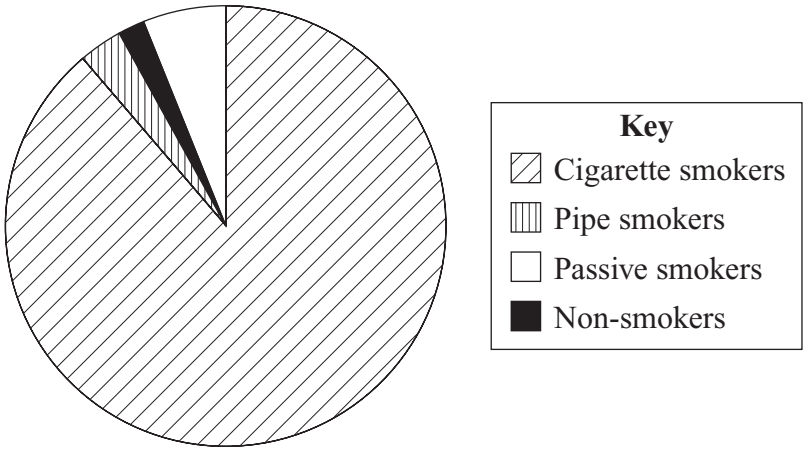
.....

(3 marks)

(b) The pie chart shows the smoking habits of people who get lung cancer.

'Passive smokers' are people who do not smoke, but who live or work with people who do smoke.

People Who Get Lung Cancer



Some people say that this data proves that smoking causes lung cancer.

Others say that it provides evidence for a link between smoking and lung cancer.

Which group is right? Explain the reasons for your answer.

.....

.....

.....

.....

(2 marks)

7

END OF QUESTIONS

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