GCSE

Specimen Papers and Mark Schemes

Edexcel GCSE
Science: Double Award A (1522)

For First Examination

Summer 2003

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Contents

Centre Number						Paper Reference **1522/1F**		Surname	Other Names
Candidate Number						Paper Reference **1520/1F**		Signature	

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1522/1F 1520/1F

Edexcel GCSE

Science: Double Award A **[1522]**

Paper 1F

Biology A **[1520]**

Paper 1F

FOUNDATION TIER

Specimen Paper

Time: 1 hour 30 minutes **N0000**

Materials required for the examination
None

Items included with these question papers
None

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total	

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your signature, your surname and other names, then tick the box to show the correct paper reference for your examination.

The paper reference is shown below the boxes. If more than one paper reference is shown, you should tick the one for which you have been entered.

Answer ALL questions in the spaces provided in this book.

Show all stages in any calculations and state the units. Calculators may be used.

Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for the various parts of questions are shown in round brackets: e.g. (**2**).

This paper has 12 questions. There are no blank pages.

Advice to Candidates

This symbol shows where the quality of your written answer will also be assessed.

Additional Answer Sheets may be used.

Turn over

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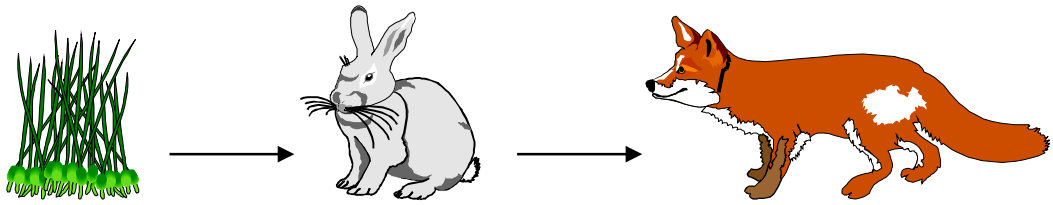
Leave blank

1. The diagram shows a food chain in a field.



(a) In the space below, draw and label a pyramid of biomass for this food chain.

(2)

(b) There are plans to build a factory on the field.

(i) What will happen to the number of rabbits and foxes if the factory is built?

.....

.....

(1)

(ii) Give reasons for your answer.

.....

.....

.....

(2)

(Total 5 marks)

Leave blank

2. Use a word or phrase from the box to complete each sentence.

The first one has been done for you.

increases	**decreases**	**stays the same**

After injecting with a used needle, the chance of getting hepatitis A ……increases……..

After taking an antibiotic, the number of disease-causing microorganisms in the body …….

After taking heroin, the amount of pain felt .....

For regular smokers, the chance of developing lung cancer .....

When a person is healthy, the number of white blood cells .....

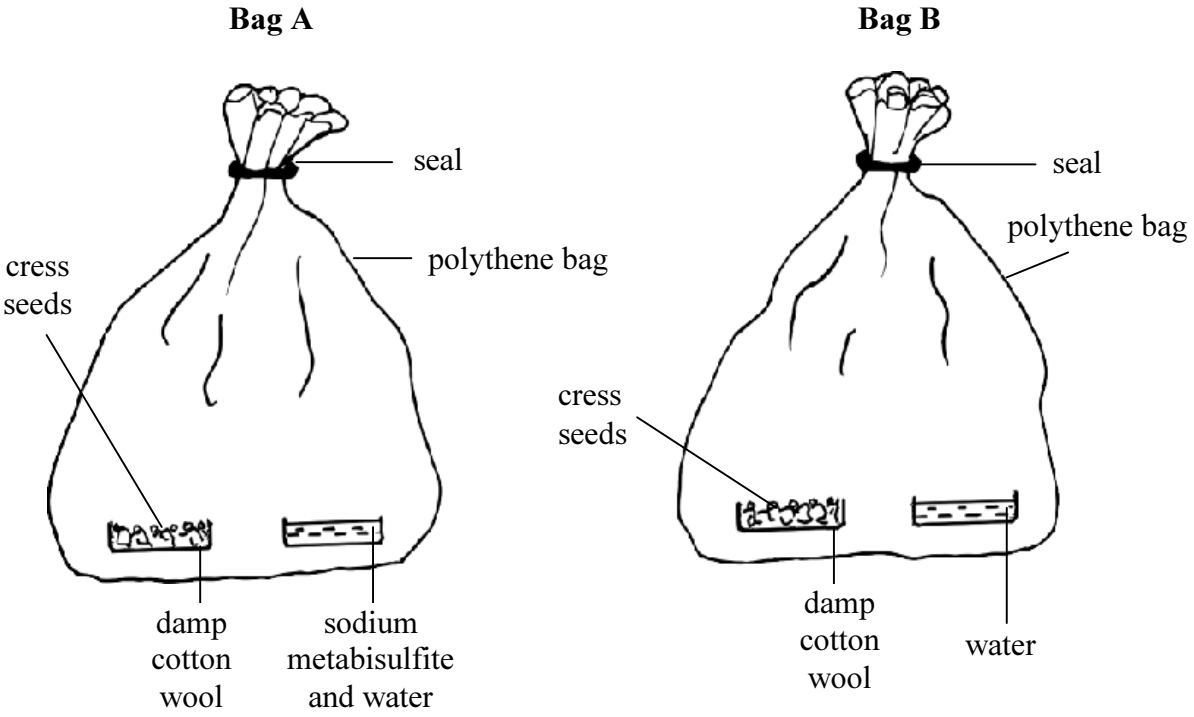
(4)

(Total 4 marks)

TURN OVER FOR QUESTION 3

Leave blank

3. Two bags, **A** and **B**, were used to investigate the effect of sulfur dioxide on the germination of cress seeds. The mixture of sodium metabisulfite and water released sulfur dioxide gas slowly in bag **A**.



(a) Give **one** reason why the bags were sealed.

.....

(1)

(b) What is the purpose of using bag **B**?

.....

(1)

(c) Give **two** conditions that must be kept the same for each bag in this investigation.

1 .....

2 .....

(2)

Leave blank

(d) The sulfur dioxide passed from the dish with the sodium metabisulfite and water to the cress seeds. Tick **one** box to show the correct method.

diffusion ☐

osmosis ☐

evaporation ☐

transpiration ☐

(1)

(e) The table shows the result of the investigation.

	Bag A	**Bag B**
Number of seeds	20	20
Number of seeds germinated	0	15

(i) What percentage of seeds germinated in bag **B**?

.....

(1)

(ii) What effect did sulfur dioxide have on the germination of cress seeds?

.....

(1)

(Total 7 marks)

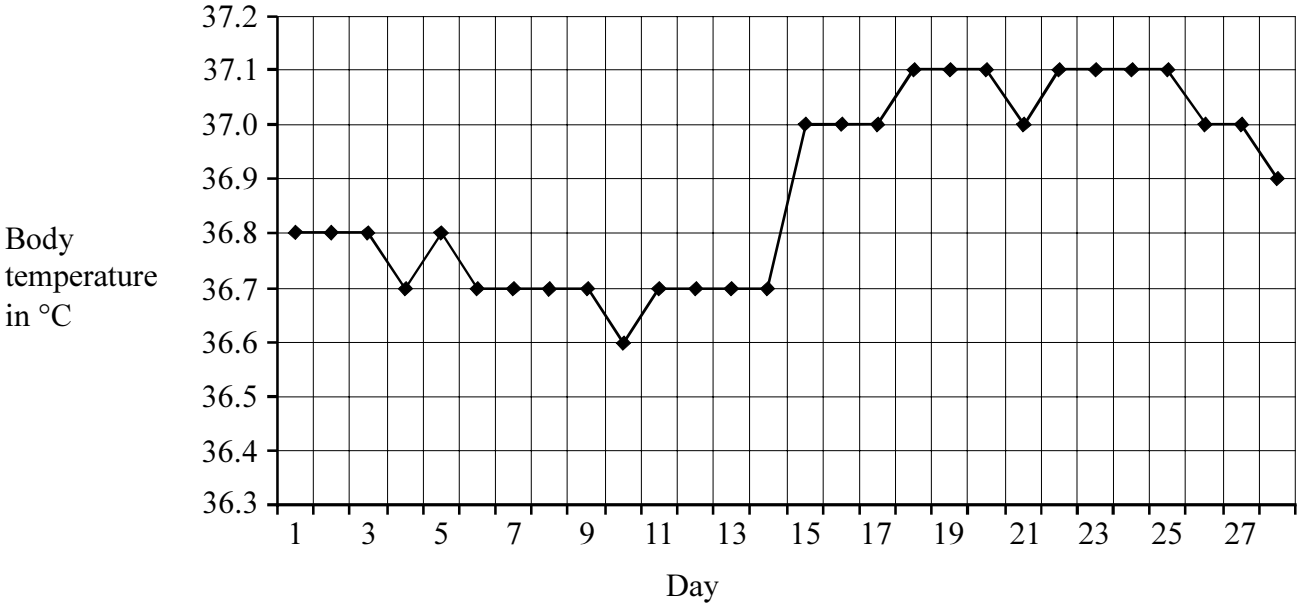
TURN OVER FOR QUESTION 4

Leave blank

4. For a woman to become pregnant, a sperm must fertilise one of her eggs. Just before an egg is released from an ovary, her body temperature rises slightly.

A woman who wanted to become pregnant measured her body temperature each day for 28 days, starting on the first day of her period.

A graph of her body temperature is shown below.



(a) (i) What was the body temperature of the woman on day 19?

..... °C

(1)

(ii) On which day was an egg released from the woman's ovary?

.....

(1)

(iii) What instrument is used to measure her body temperature?

.....

(1)

Leave blank

(b) During the 28 days, the woman's ovary released two different hormones, hormone H and progesterone. The table shows some roles of these hormones.

Hormone H	**Progesterone**
Repairs uterus lining	Maintains uterus lining
Develops secondary sexual characteristics	Prevents release of eggs

(i) Name hormone H.

.....

(1)

(ii) How does hormone H travel from the ovary to the uterus?

.....

(1)

(iii) Give **two** female secondary sexual characteristics.

1 .....

2 .....

(2)

(iv) Why is it important that progesterone maintains the uterus lining during pregnancy?

.....

.....

(1)

(Total 8 marks)

TURN OVER FOR QUESTION 5

Leave blank

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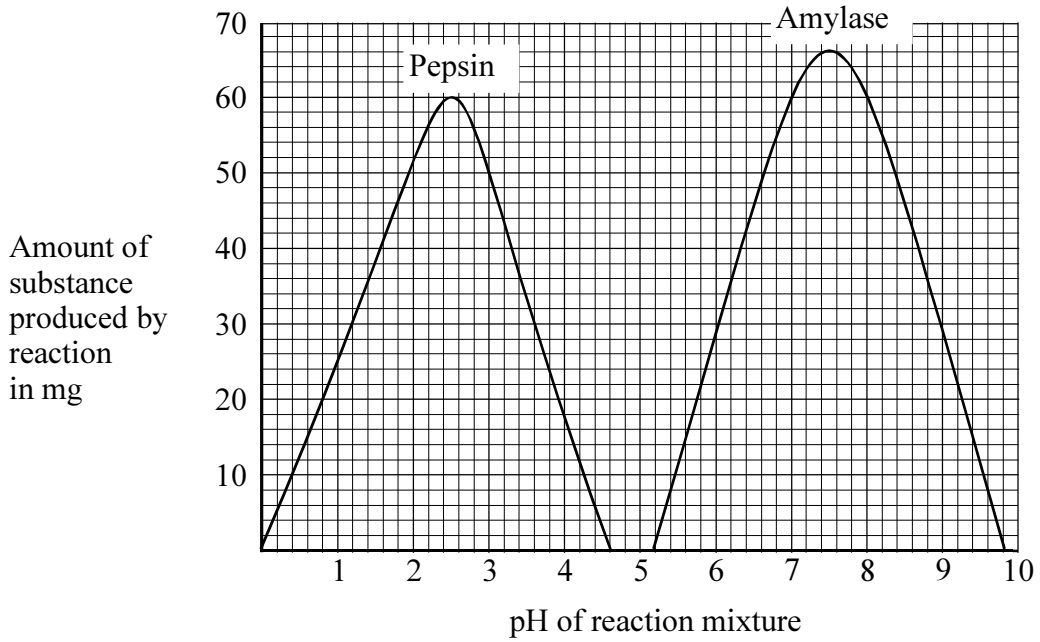
5. Experiments were carried out to investigate the action of two enzymes at different pH values. The enzymes were amylase and pepsin (a protease). All experiments were carried out at 37 °C for 20 minutes. The results are shown on the graph below.



(a) How much substance was produced in the pepsin-controlled reaction at pH3?

.....mg

(1)

(b) At which pH values were 60 mg of substance produced by:

(i) pepsin.....

(1)

(ii) Draw a line on the grid to show what you would expect the result to be with amlyase at 37 °C for 10 minutes.

(2)

(c) Which substance is produced when:

(i) pepsin acts on protein:

.....

(1)

(ii) amylase acts on starch?

.....

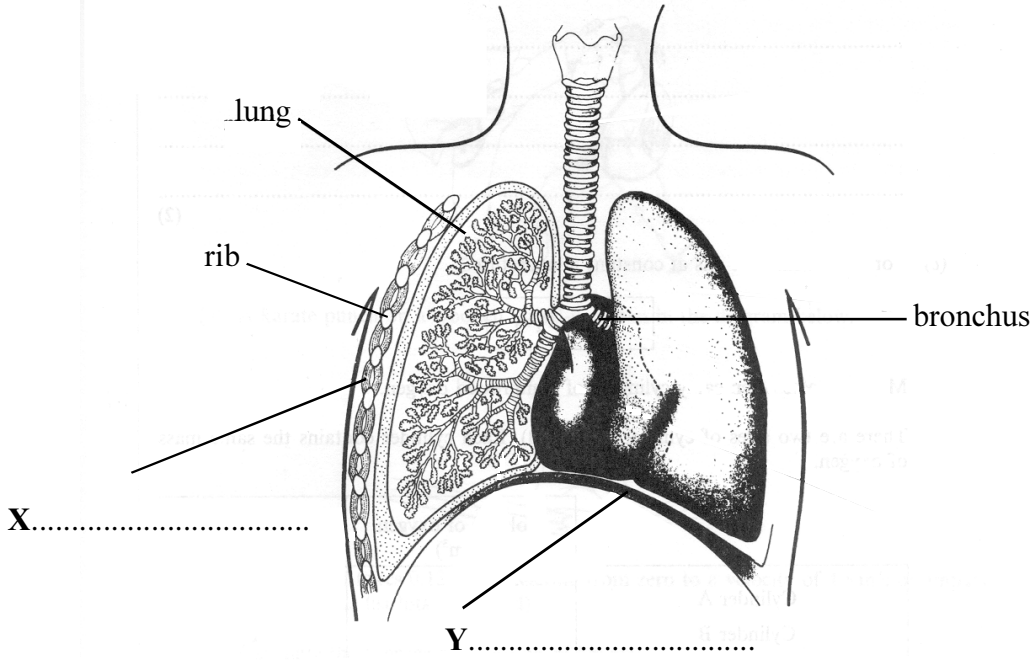
(1)

(Total 6 marks)

TURN OVER FOR QUESTION 6

Leave blank

6. The diagram shows parts of the human thorax.



(a) Label **X** and **Y**.

(2)

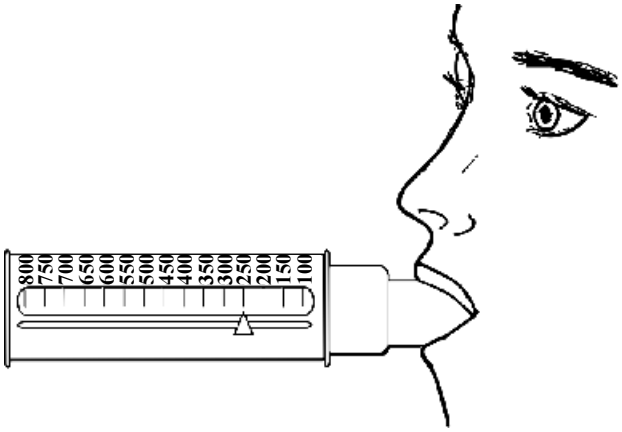
(b) People with asthma sometimes have difficulty in breathing. This happens when the small air tubes of their lungs become narrow. This makes it more difficult to get air into and out of their lungs.

Underline the name for the small air tubes in the lungs.

alveoli **bronchioles** **capillaries** **trachea**

(1)

(c) It is possible to find out how asthma affects breathing by using apparatus called a peak flow meter. The person blows as hard as possible into the meter as shown in the diagram below. If the person has asthma, low readings are obtained.



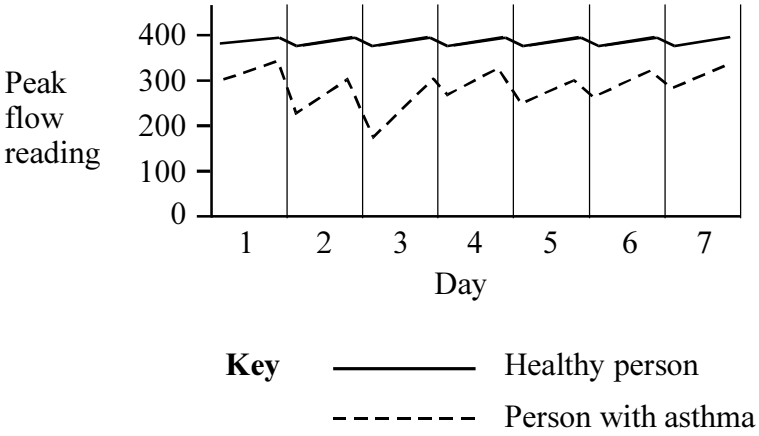
What is the reading on the peak flow meter?

.....

(1)

Leave blank

(d) Readings were taken every morning and evening for seven days from a healthy person and from a person with asthma. The results are shown on the peak flow chart below.



(i) Use the chart to find the day on which breathing was most difficult for the person with asthma.

Day .....

(1)

(ii) The healthy person's readings are different from the person's with asthma.
State **two** ways in which they are different.

1 .....

2 .....

(2)

(iii) A person blowing into a peak flow meter obtained a reading of 230.
Does this suggest that this person suffers from asthma?
Give a reason for your answer.

.....

.....

(1)

(e) Drugs used to relieve asthma are called bronchodilators. Suggest what these drugs do.

.....

.....

.....

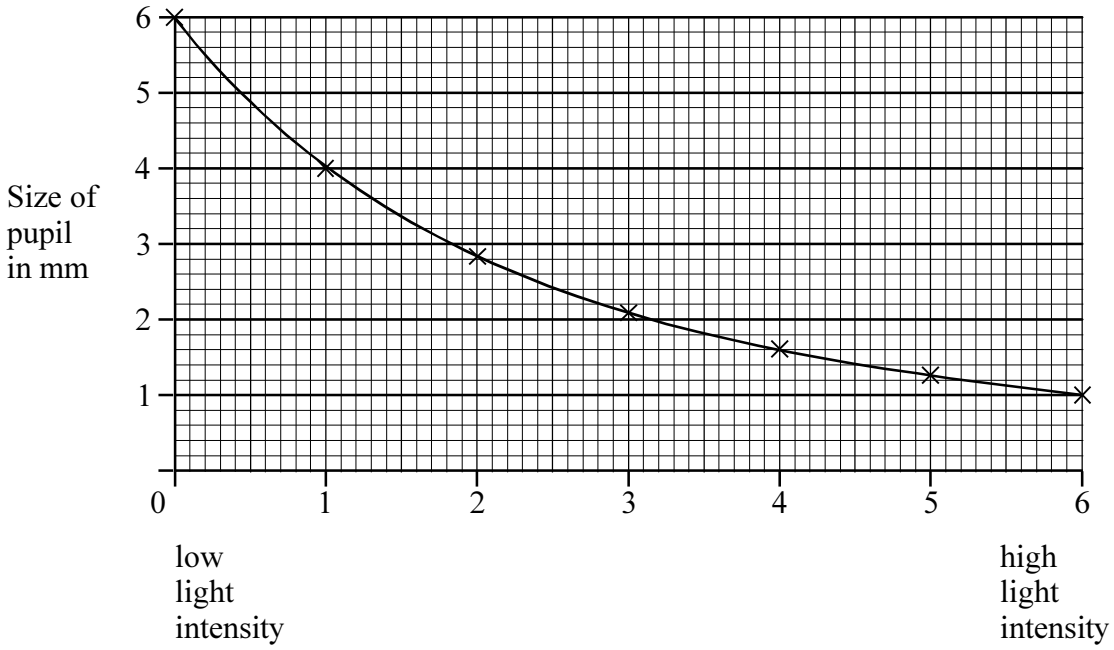
(2)

(Total 10 marks)

TURN OVER FOR QUESTION 7

Leave blank

7. The graph shows the size of the pupil in a student's eye in different light intensities.



(a) Use the graph to answer the questions below.

(i) How many readings were taken to produce the data for the graph?

.....

(1)

(ii) What was the size of the pupil at a light intensity of 6?

Answer……mm

(1)

(iii) How does the size of the pupil vary with the light intensity?

.....

.....

(2)

(b) Use words from the box to complete the passage.

brain	**iris**	**muscle**	**optic**	**retina**

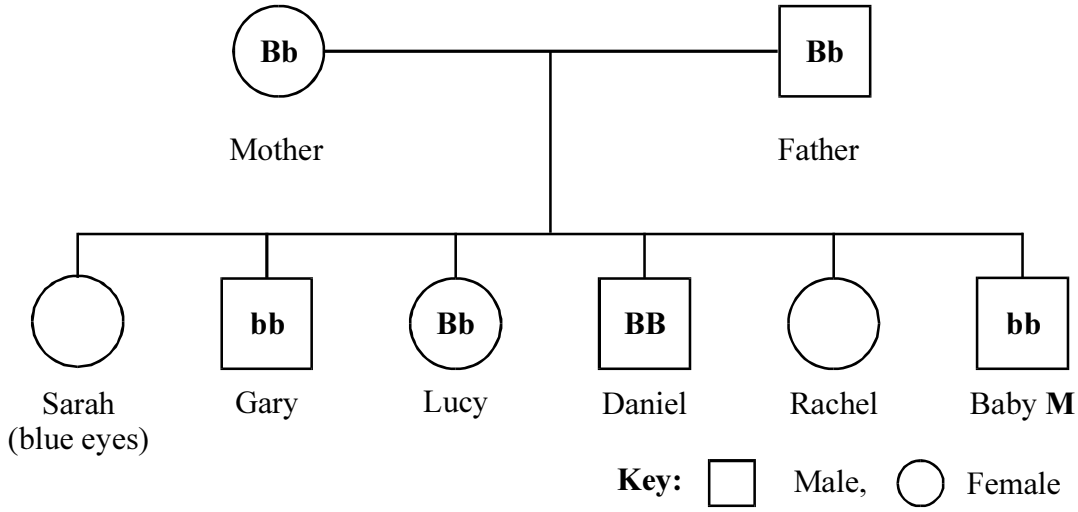
Light is detected by cells in the ……. An electrical impulse is then sent to the ……. along the ……. nerve. Another impulse is then sent to the ……. tissue of the …….

(5)

(Total 9 marks)

Leave blank

8. The diagram below shows the inheritance of eye colour in a family The allele for brown eyes is dominant (**B**) and the allele for blue eyes is recessive (**b**).



(a) Which of the following statements is true?

A Lucy and Daniel both have blue eyes
B Lucy and Daniel have different coloured eyes
C Lucy and Daniel have the same coloured eyes
D All the males in the family have brown eyes

Write the correct answer (**A**, **B**, **C** or **D**) in the box. ☐

(1)

(b) (i) What is the sex and eye colour of baby **M**?

.....

(2)

(ii) How was the sex of baby **M** determined at fertilisation?

.....

.....

(2)

(c) In the family shown, Rachel has an identical twin. Rachel has brown eyes.

(i) Who is Rachel's identical twin?.....

(1)

(ii) Explain how you decided on your answer.

.....

.....

.....

(2)

(Total 8 marks)

Leave blank

9. The passage below is about Charles Darwin.

Who Inspired Darwin?

Thomas Malthus lived in the early 19th century. He wrote 'An Essay on the Principle of Population.' In this essay he pointed out that human beings produce far more offspring than ever survive. However, the adult population tends to remain stable from generation to generation.

Darwin realised that this idea applies to other animals. For example, one fish, which lays thousands of eggs in a year, would over-populate an area with its offspring if they all survived.

The work of Malthus helped Darwin to develop his own ideas of how a species changes. He produced his theory of natural selection. Darwin realised that there must be a reason why some offspring survived but others did not. He suggested that small variations between individuals of a species might give certain individuals a better chance of survival. For example, those organisms with characteristics that made them better at escaping from predators or finding food would have a better chance of survival.

(a) (i) What is meant by the phrase "the adult population tends to remain stable from generation to generation"?

.....

.....

.....

.....

(2)

(ii) Suggest why fish lay thousands of eggs rather than just a few.

.....

.....

.....

.....

(2)

(iii) What can cause "small variations between individuals of a species"?

.....

.....

(1)

Leave blank

(iv) What is meant by the phrase **natural selection**?

.....

.....

.....

.....

.....

.....

.....

.....

(4)

(b) Here are four statements about evolution. Tick the box beside the statement that is false.

The theory of evolution was developed by Darwin	☐
DNA is the genetic material that transfers information from generation to generation	☐
Acquired characteristics **cannot** be passed on from parent to offspring	☐
Nature plays an important part in artificial selection	☐

(1)

(c) Suggest **two** ways that scientists can let other groups of scientists know about their ideas.

1 .....

2 .....

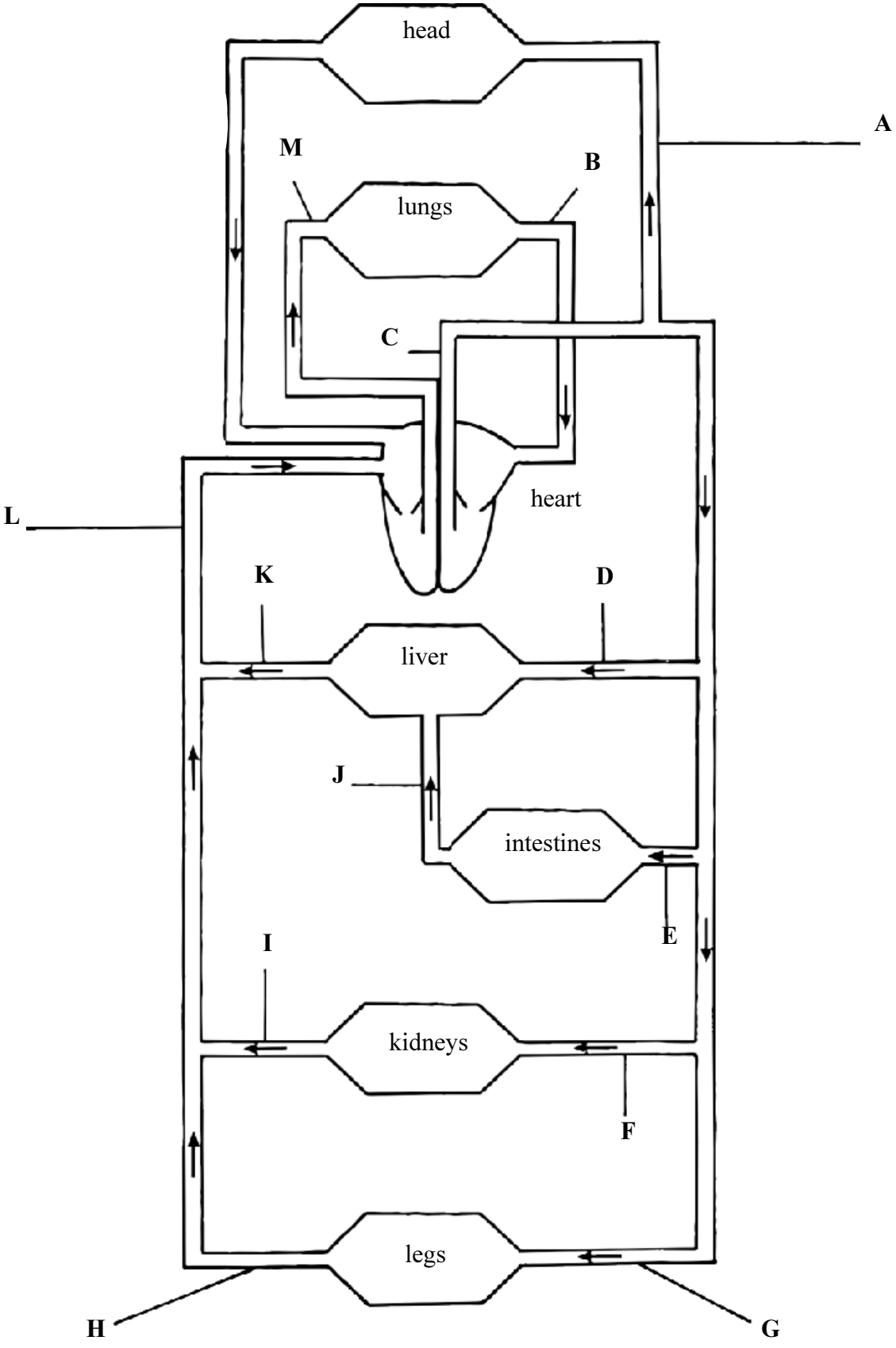
(2)

(Total 12 marks)

TURN OVER FOR QUESTION 10

Leave blank

10. The diagram shows a plan of the circulatory system. The blood vessels are labelled with letters.



Use the letters on the diagram to complete the sentences in the table.

Leave blank

The first one has been done for you.

Sentence	Letter
The blood vessel named the aorta is	**C**
The blood vessel containing blood pumped from the right ventricle is	
The blood vessel carrying blood with **least** carbon dioxide is	
The blood vessel carrying blood with **most** amino acids after a meal is	
The blood vessel containing blood at **lowest** pressure is	
The **first** blood vessel to transport inhaled solvents is	

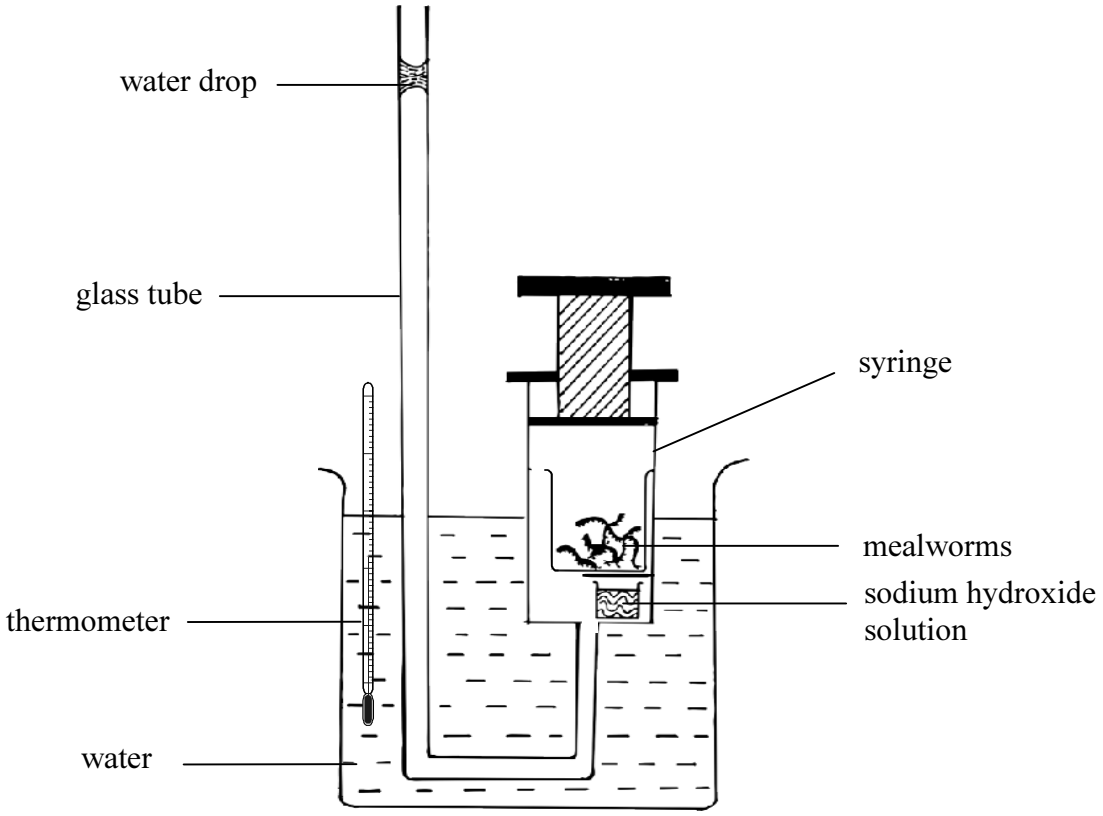
(5)

(Total 5 marks)

TURN OVER FOR QUESTION 11

Leave blank

11. This apparatus was used to measure the effect of temperature on the respiration rate of mealworms.



(a) (i) Name the gas absorbed by sodium hydroxide solution.

.....

(1)

(ii) Show on the diagram the direction of movement of the water drop.

(1)

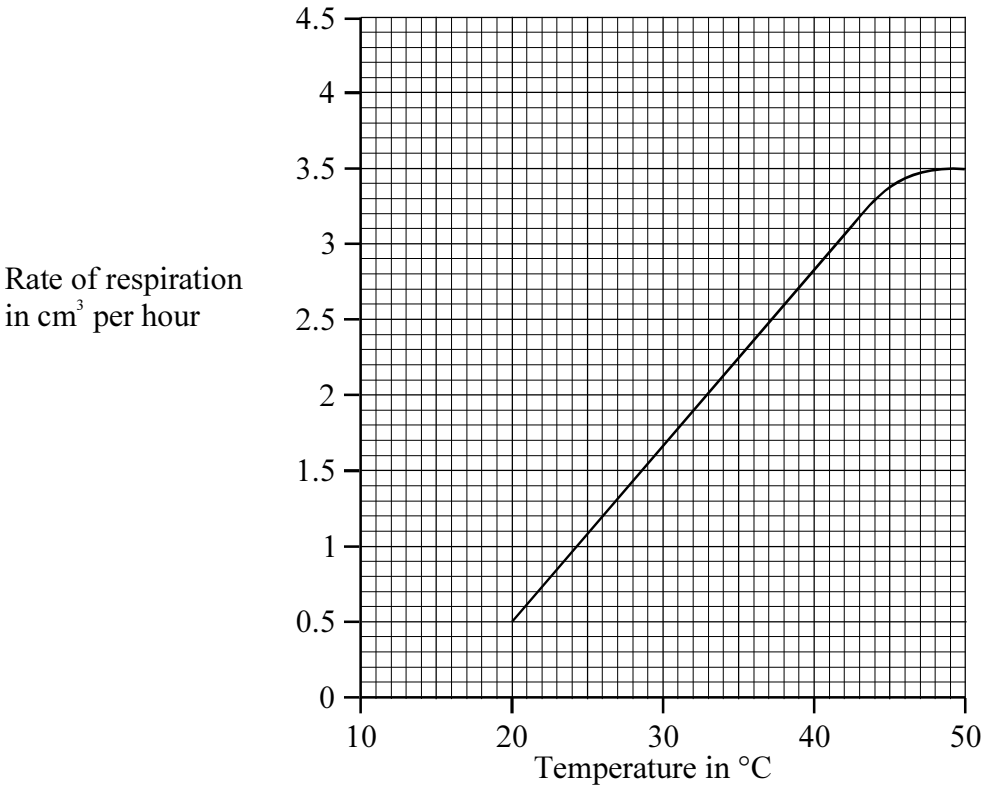
(iii) Give **one** difference between the apparatus shown and a suitable control apparatus.

.....

(1)

Leave blank

(b) The rate of respiration was measured at intervals from 20 °C to 50 °C. The graph shows the results of the investigation.



(i) Explain the results shown on the graph.

.....

.....

.....

.....

(2)

(ii) What was the rate of respiration at 37 °C?

.....

(1)

(iii) Suggest what would happen if temperatures above 50 °C were used.
Give a reason for your answer.

.....

.....

.....

.....

(2)

(Total 8 marks)

Leave blank

12. Algae are microscopic plants often found in water. They produce food by photosynthesis.

Researchers plan to grow large numbers of algae to help solve the world's energy crisis.

(a) Write a letter suggesting what the researchers could do in order to grow large numbers of the algae.

Dear Researchers,

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(5)

(b) The algae can be used to make petrol. This would reduce the need to obtain fuel by destroying the world's forests.

Suggest **three** advantages of reducing the destruction of the world's forests.

1 .....

.....

2 .....

.....

3 .....

.....

(3)

(Total 8 marks)

TOTAL MARK 90

END

Centre Number						Paper Reference **1522/2F**		Surname	Other Names
Candidate Number						Paper Reference **1530/1F**		Signature	

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1522/2F 1530/1F

Edexcel GCSE

Science: Double Award A
[1522]
Paper 2F

Chemistry A [1530]
Paper 1F

FOUNDATION TIER
Specimen Paper

Time: 1 hour 30 minutes **N0000**

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total	

Materials required for the examination
None

Items included with these question papers
None

Instructions to Candidates

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Answer ALL questions in the spaces provided in this book.

Show all stages in any calculations and state the units. Calculators may be used.

Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for the various parts of questions are shown in round brackets: e.g. (**2**).

This paper has 10 questions. There are no blank pages.

Advice to Candidates

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Additional Answer Sheets may be used.

Turn over

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THE PERIODIC TABLE

Period	Group 1	2											3	4	5	6	7	8
1	1 H Hydrogen 1																	4 He Helium 2
2	7 Li Lithium 3	9 Be Berylium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
3	23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
4	39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	63.5 Cu Copper 29	65.4 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
5	85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	99 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
6	133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86
7	223 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89															

Key

Relative atomic mass
Symbol
Name
Atomic number

Leave blank

1. (a) Use the periodic table to give:

(i) the symbol for an atom of sulfur; .....

(1)

(ii) an element in the same group as sodium; .....

(1)

(iii) an element in group 2; .....

(1)

(iv) an element in group 6; .....

(1)

(v) the atomic number of neon; .....

(1)

(vi) an element in period 2. .....

(1)

(b) Elements in the periodic table are classified as metals or non-metals.

Give the names of **two** non-metallic elements.

1 .....

2 .....

(2)

(Total 8 marks)

TURN OVER FOR QUESTION 2

Leave blank

2. (a) Circle the correct formula for each of the following gases.

water vapour	HO	H_2O	HO_2
nitrogen	N	N_2	N_3
carbon monoxide	CO	C_2O	CO_2

(3)

(b) Millions of years ago, the atmosphere contained:

carbon dioxide	**carbon monoxide**	**hydrogen**
nitrogen	**water vapour**	

(i) What originally produced these gases?

.....

(1)

(ii) The amounts of these gases have changed over millions of years.
State **two** of these gases which have decreased.

1 .....

2 .....

(2)

(iii) Name the gas, **not** on the list, which now makes up about 20% of the atmosphere.

.....

(1)

(c) Describe a test for carbon dioxide.

.....

.....

.....

.....

(2)

(d) Photosynthesis changes the amount of oxygen and carbon dioxide in the atmosphere.
How does photosynthesis change the amount of:

(i) oxygen; .....

(1)

(ii) carbon dioxide? .....

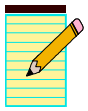
(1)

(Total 11 marks)

Leave blank

3. A small piece of sodium is dropped into a large beaker of water.
It reacts to form sodium hydroxide solution and a gas.

(a) Describe **three** things you would **see** in this experiment.



.....

.....

.....

.....

.....

.....

.....

.....

(4)

(b) Give the name of the gas formed by this reaction.

.....

(1)

(c) Sodium hydroxide solution has a pH of 14.

Complete the sentence using a word from the box.

acidic	**alkaline**	**neutral**

Sodium hydroxide solution is .....

(1)

(d) The reaction between sodium and water is exothermic.

How would the temperature of the water change during the reaction?

.....

(1)

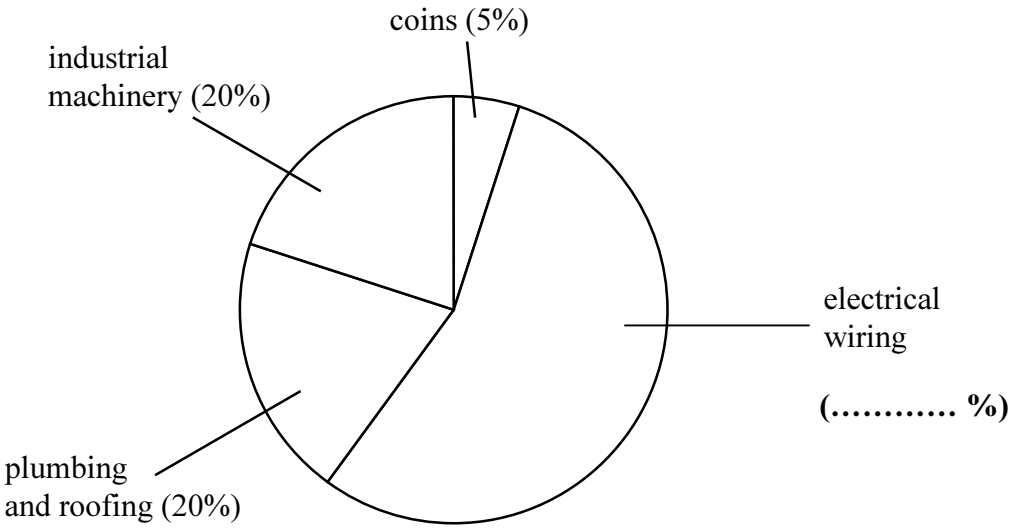
(Total 7 marks)

TURN OVER FOR QUESTION 4

Leave blank

4. (a) The pie chart shows some of the main uses of copper.

(i) Complete the pie chart to show the percentage of copper used in electrical wiring.



(1)

(ii) What property of copper makes it suitable for use in electrical wiring?

.....

(1)

(iii) What property of copper makes it suitable for use in water pipes?

.....

(1)

Leave blank

(b) Copper can be made by reduction of copper oxide.

In this process copper oxide is heated strongly with another substance.

(i) Complete the word equation for the process.

copper oxide + ……... ⟶ copper + carbon dioxide

(1)

(ii) Write the chemical formula, with state symbol, for carbon dioxide gas.

.....

(2)

(iii) What is meant by reduction?

A addition of oxygen to a compound

B conversion of a compound into its elements

C heating a compound strongly

D removal of oxygen from a compound

Write the correct answer (**A**, **B**, **C** or **D**) in the space provided.

.....

(1)

(Total 7 marks)

TURN OVER FOR QUESTION 5

Leave blank

5. The table gives information about four hydrocarbons.

Name of hydrocarbon	Number of carbon atoms in one molecule	Boiling point (°C)
ethane	2	-90
propane	3	-40
butane	4	0
hexane	6	+70

(a) (i) Which element, other than carbon, is present in hydrocarbons?

.....

(1)

(ii) Which of these hydrocarbons has the lowest boiling point?

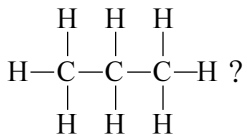
.....

(1)

(iii) Which of these hydrocarbons has the biggest molecules?

.....

(1)

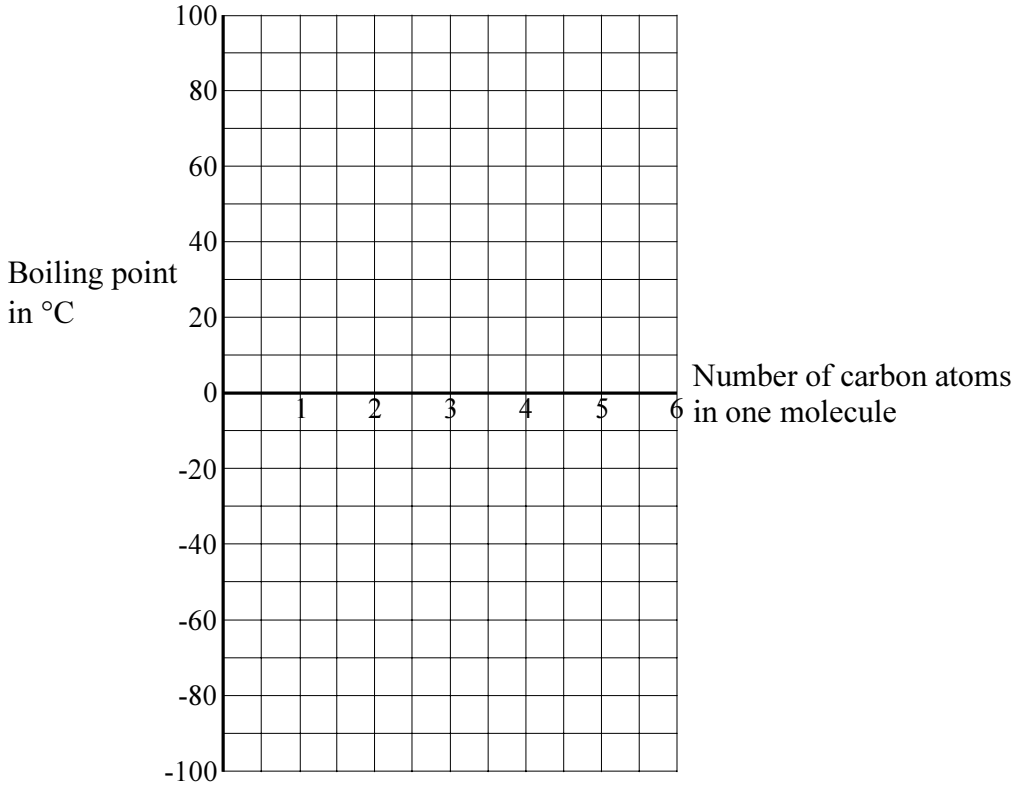
(iv) Which of these hydrocarbons has molecules with the structure  ?

.....

(1)

Leave blank

(b) (i) Use the information in the table opposite to draw a graph on the grid.



(3)

(ii) Pentane is a hydrocarbon with five carbon atoms in each molecule.
Use your graph to estimate the boiling point of pentane.

..... °C

(1)

(c) Some of these hydrocarbons are present in petroleum gas which is obtained from crude oil.

(i) Name the process used to separate petroleum gas from crude oil.

.....

(2)

(ii) Name **two** other fuels obtained from crude oil by this process.

1 .....

2 .....

(2)

(d) Ethane gas burns in air.

Complete the word equation for this reaction.

ethane + ……... ⟶ carbon dioxide + ……

(2)

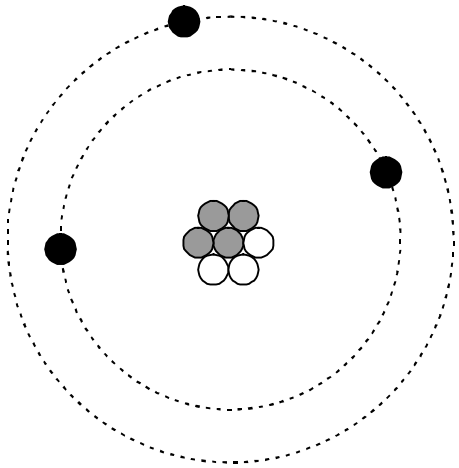
(Total 14 marks)

Leave blank

BLANK PAGE

Leave blank

6. (a) The diagram shows the arrangement of particles in an atom of the element lithium.



(i) Identify the particles **A**, **B** and **C**.

Particle **A** .....

Particle **B** .....

Particle **C** .....

(3)

(ii) What is the mass number of the atom in the diagram?

.....

(1)

(iii) Use the diagram to explain why this element is in group 1 of the periodic table.

.....

.....

(1)

(b) Another element in group 1 is sodium.
Sodium reacts with chlorine (Cl_2) to form sodium chloride (NaCl).
Write a balanced equation for this reaction.

.....

(2)

(Total 7 marks)

TURN OVER FOR QUESTION 7

Leave blank

7. (a) Use the periodic table provided to give the electronic structure of a chlorine atom and a chloride ion.

chlorine atom	chloride ion

(4)

(b) Sodium chloride is an ionic compound containing sodium ions and chloride ions.

Explain why ionic compounds have high melting points.

.....

.....

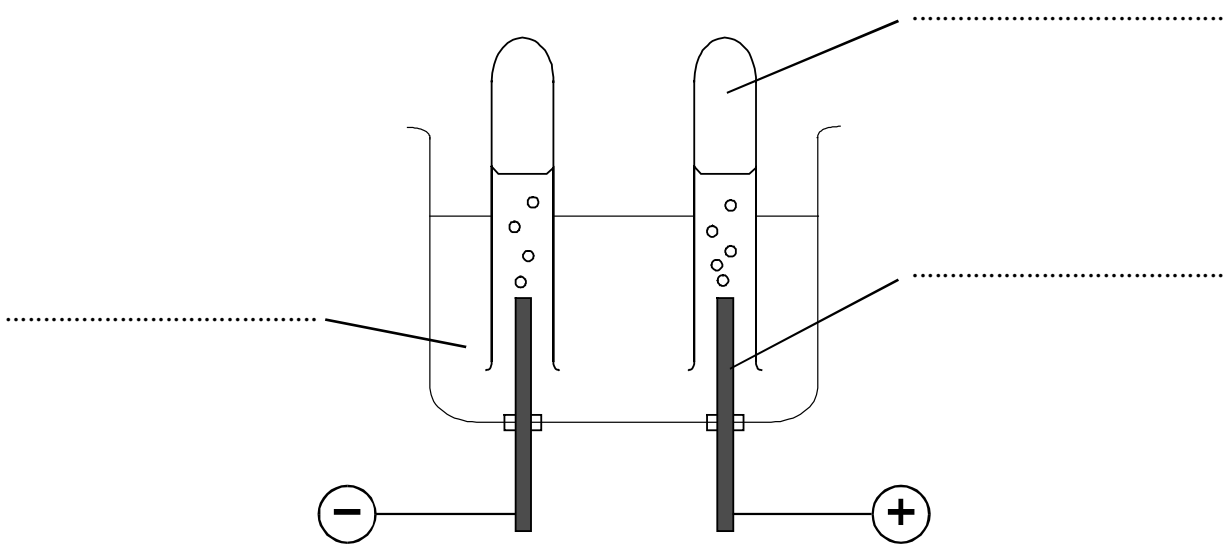
.....

.....

(2)

Leave blank

(c) When aqueous sodium chloride is electrolysed, hydrogen and chlorine gases are produced.
Label this diagram which shows the apparatus used to electrolyse aqueous sodium chloride.



(3)

(d) Describe a test for each of the gases formed.

Test for hydrogen .....

.....

.....

.....

Test for chlorine.....

.....

.....

.....

(4)

(e) In the industrial electrolysis of concentrated sodium chloride solution, three products are formed. Hydrogen and chlorine are two of the products.

Name the other product.

.....

(1)

(Total 14 marks)

Leave blank

8. The passage below is about the extraction of aluminium.

> Aluminium is the most common metallic element in the Earth's crust. In 1886, an inexpensive process for obtaining aluminium from its ores was invented by Charles Hall in the USA.
>
> As a 22 year old college student, Hall had become interested in the problem of producing aluminium. At that time, despite the abundance of aluminium compounds in nature, metallic aluminium was selling for about the same price as silver.
>
> Hall reasoned that aluminium oxide would be a good starting material from which to make aluminium. Some years later he said, 'The idea formed itself in my mind that if I could get a solution of aluminium oxide in something which contained no water, this would probably give a liquid from which aluminium could be obtained by electrolysis'.
>
> Working with home-made equipment, Hall made his first tiny globules of aluminium in a woodshed behind his parents' house. Within five years, the price of the metal had dropped to about a tenth of its former price.

(a) Suggest why silver is still expensive.

.....

(1)

(b) Hall's first reaction in February 1886 was done on a very small scale.

Give **one** piece of evidence from the passage to support this.

.....

(1)

(c) Large amounts of heat energy are taken in during the production of aluminium.

What word is used to describe this energy transfer?

A decomposition

B electrolysis

C endothermic

D exothermic

Write the correct answer (**A**, **B**, **C** or **D**) in the space provided.

.....

(1)

Leave blank

(d) Explain, using the passage and your knowledge of the reactivity series, why aluminium has only been used on a large scale since about 1890.

.....

.....

.....

.....

.....

.....

.....

.....

(4)

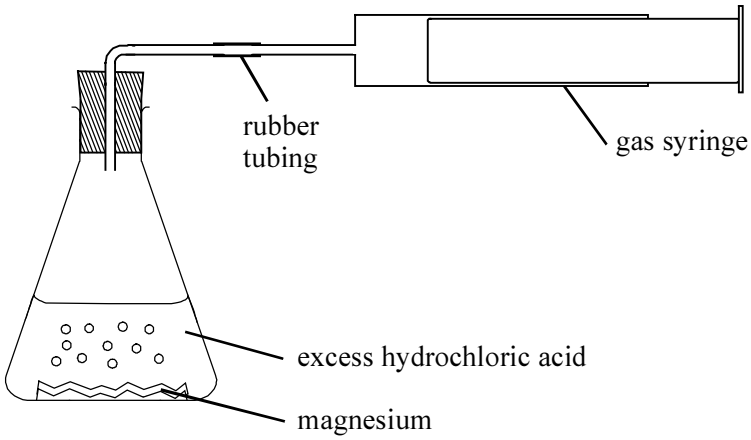
(Total 7 marks)

TURN OVER FOR QUESTION 9

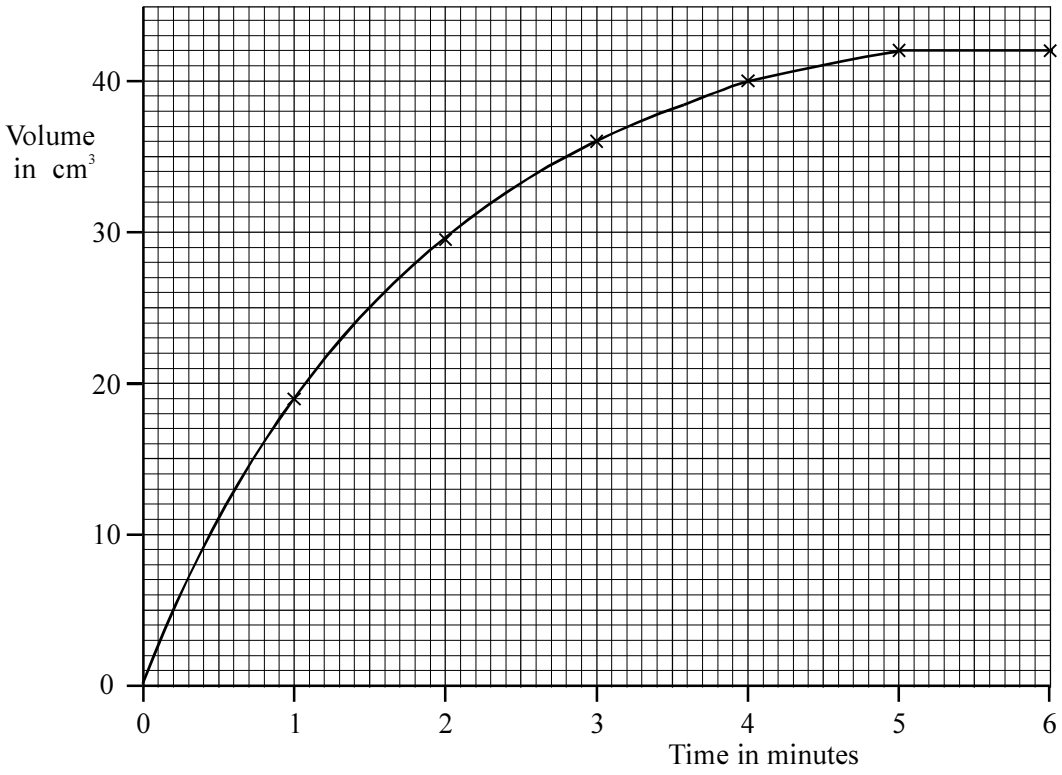
Leave blank

9. Magnesium ribbon reacts with hydrochloric acid to produce hydrogen.

A student used an excess of hydrochloric acid in the apparatus below to investigate this reaction.



His results are shown on the graph.



(a) What volume of gas was in the syringe at the end of the reaction?

.....

(1)

Leave blank

(b) State how the rate of reaction changes during the first **four** minutes and explain the change.

.....

.....

.....

.....

(2)

(c) The experiment was repeated using the same quantities of reagents but with the acid at a higher temperature.

Draw on the graph the line that should be obtained at this temperature.

(2)

(d) Some power stations burn coal in the production of electricity. The coal is ground to a fine powder before being burned in the furnace.

Use your knowledge of rates of reaction to suggest why the coal is ground to a fine powder rather than used in large lumps.

.....

.....

.....

.....

(2)

(Total 7 marks)

TURN OVER FOR QUESTION 10

Leave blank

10. Ammonia is made using the Haber process.

(a) The equation for the reversible reaction is:

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

What is the source of the nitrogen used in the Haber process?

.....

(1)

(b) The hydrogen used in the Haber process is obtained by heating methane with steam:

$$CH_4(g) + H_2O(g) \longrightarrow 3H_2(g) + CO(g)$$

What is the source of the methane gas for this reaction?

.....

(1)

(c) (i) Most of the ammonia produced is reacted with acids to form fertilisers.

Write a balanced equation for the reaction of ammonia with nitric acid.

.....

(3)

(ii) Why do most farmers add fertilisers to their crops?

.....

(1)

(iii) Excess fertiliser is washed off fields into rivers.

State **two** consequences of this.

1 .....

.....

2 .....

.....

(2)

(Total 8 marks)

TOTAL MARKS 90

END

Centre Number						Paper Reference **1522/3F**		Surname	Other Names
Candidate Number						Paper Reference **1540/1F**		Signature	

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1522/3F 1540/1F

Edexcel GCSE

Science: Double Award A **[1522]**

Paper 3F

Physics A **[1540]**

Paper 1F

FOUNDATION TIER

Specimen Paper

Time: 1 hour 30 minutes **N0000**

Question Number	Leave Blank
1	
2	
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10	
Total	

Materials required for the examination
None

Items included with these question papers
None

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your signature, your surname and other names, then tick the box to show the correct paper reference for your examination.

The paper reference is shown below the boxes. If more than one paper reference is shown, you should tick the one for which you have been entered.

Answer ALL questions in the spaces provided in this book.

Show all stages in any calculations and state the units. Calculators may be used.

Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for the various parts of questions are shown in round brackets: e.g. (**2**).

This paper has 10 questions. There are no blank pages.

Advice to Candidates

This symbol shows where the quality of your written answer will also be assessed.

Additional Answer Sheets may be used.

Turn over

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FORMULAE

You may find the following formulae useful.

$$\text{power} = \frac{\text{work done}}{\text{time taken}} \qquad P = \frac{W}{t}$$

$$\text{frequency} = \frac{1}{\text{time period}} \qquad f = \frac{1}{T}$$

Leave blank

1. The table shows some data about the planets of the Sun.

Planet	Distance from Sun (millions of km)	Average surface temperature (°C)	Density (kg/m^3)	Surface gravity (N/kg)	Time of orbit (years)
Venus	108	470	5200	9	0.6
Earth	150	15	5500	10	1.0
Mars	228	-30	4000	5	1.9
Jupiter	778	-150	1300	26	12
Saturn	1427	-180	700	11	30
Pluto	5900	-230	500	4	248

Use information from the table to answer the following questions.

(a) Which planet takes the longest time to go round the Sun?

.....

(1)

(b) Use words from the box to complete the paragraph.

decreases	**Earth**	**heat**	**increases**	**light**	**Pluto**

The planet …….. has the lowest surface temperature. This is because less ……..energy arrives at the surface of a planet as the distance from the Sun …… **(3)**

(c) Pluto is mainly gas.
How can we tell this from the table?

.....

(1)

(d) (i) What information suggests that Jupiter has the largest mass?

.....

(1)

(ii) On which planet would you have the least weight?

.....

(1)

(Total 7 marks)

Leave blank

2. (a) The table shows the power rating and operating current for a number of household electrical appliances.

Appliance	**Power (watt)**	**Current (ampere)**
cooker	6000	25.0
iron	960	4.0
food mixer	480	2.0
television	180	0.75
table lamp	60	0.25

(i) Which appliance costs most to run for an hour?

Give a reason for your answer.

Appliance.....

Reason .....

.....

(2)

(ii) Each of the appliances listed uses 240 volts.

Explain why the cooker has the smallest resistance of these appliances.

.....

.....

.....

.....

(2)

Leave blank

(iii) A cooker is always on a separate circuit with a thick cable.

Tick the two boxes to show the reasons for this.

- ☐ Thick cables have a lower resistance.
- ☐ Thick cables are easy to insulate.
- ☐ Thick cables melt at a higher temperature.
- ☐ Thick cables produce less heat.

(2)

(b) Electrical lighting in a house uses parallel circuits instead of series circuits.

State **two** reasons why parallel circuits are used for domestic lighting circuits.

1. .....

.....

2. .....

.....

(2)

(Total 8 marks)

TURN OVER FOR QUESTION 3

Leave blank

3. (a) Complete the table below to describe how friction is used in the situation described. As an example, the first line has been completed for you.

Situation	Part played by friction
A person walking along a footpath	The frictional force between the soles of the shoe and the ground allows the foot to push back on the ground and the person to move forward
A car travelling along a road.	…… …… …… ……
Rubbing your hands together on a cold day	…… …… …… ……

(5)

(b) The diagram shows a book resting on a table.

Add arrows to the diagram to show the forces that are acting on the book.

Label the arrows with the names of the forces.

(4)

(Total 9 marks)

Leave blank

4. (a) Use words from the box to complete the passage below.

attract	**electrons**	**electrostatic**	**friction**	**protons**	**repel**

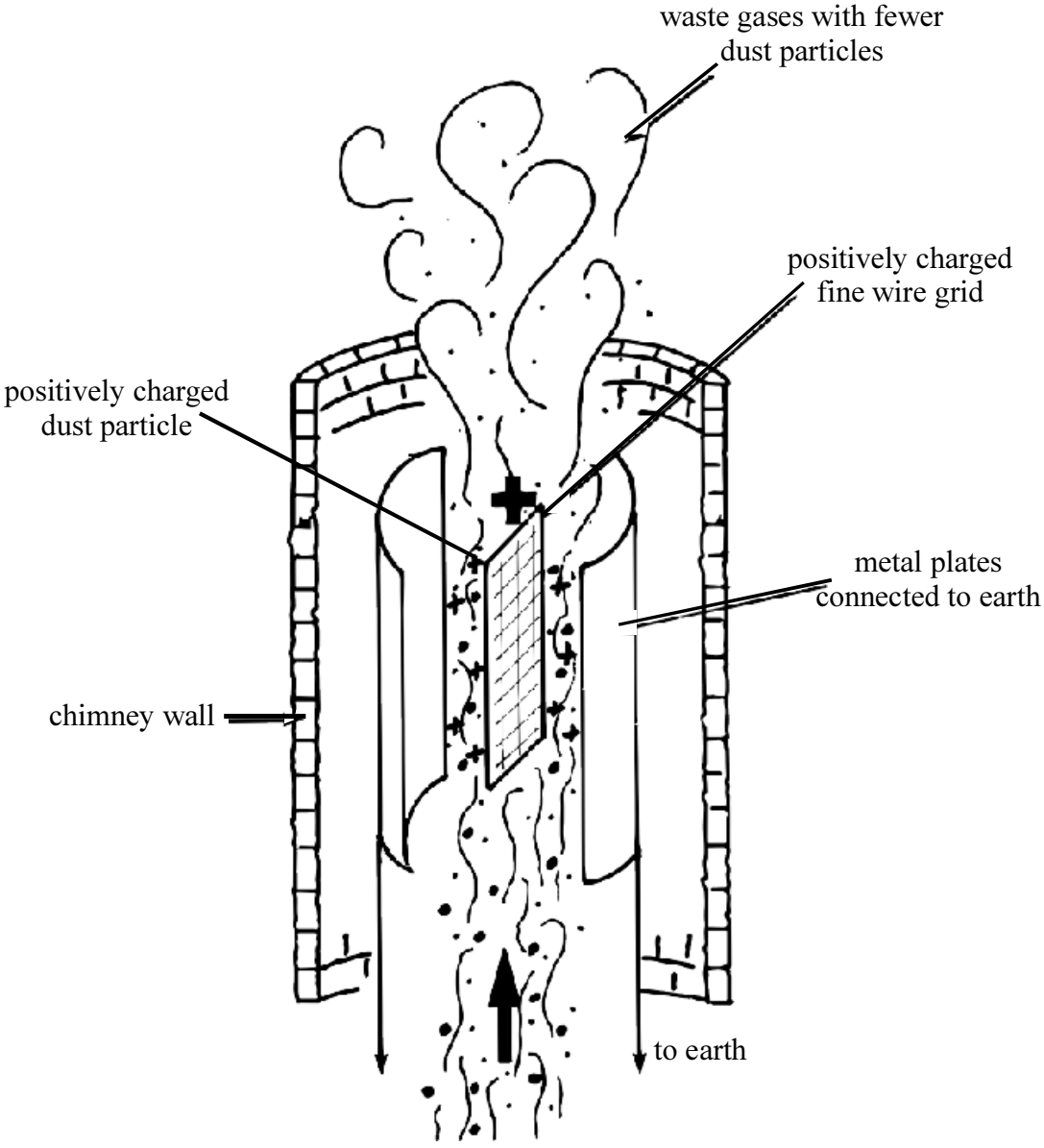
When Jacquie takes off her woollen jumper she hears a crackling sound and sees small flashes of light. It is thought that the …… between her jumper and blouse is producing …… charges. The jumper becomes positively charged because …… are being removed from it. Because the jumper and blouse have opposite charges they …… each other and this makes it difficult for the jumper to be removed.

(4)

QUESTION 4 CONTINUES ON NEXT PAGE

Leave blank

(b) The diagram shows the inside of a simple electrostatic precipitator. This is a device for removing dust from the waste gases in chimneys of factories and power stations. As the dust particles move up past the fine wire grid they gain a positive charge.



(i) Show, with an arrow, the direction of movement of the positively charged particles between the grid and the earth plate.

(1)

Leave blank

(ii) Explain why the positively charged particles move in the direction you have shown.

.....

.....

.....

.....

(2)

(iii) From time to time the earthed metal plates are hit with a hammer.

Suggest a reason for this.

.....

.....

(1)

(Total 8 marks)

TURN OVER FOR QUESTION 5

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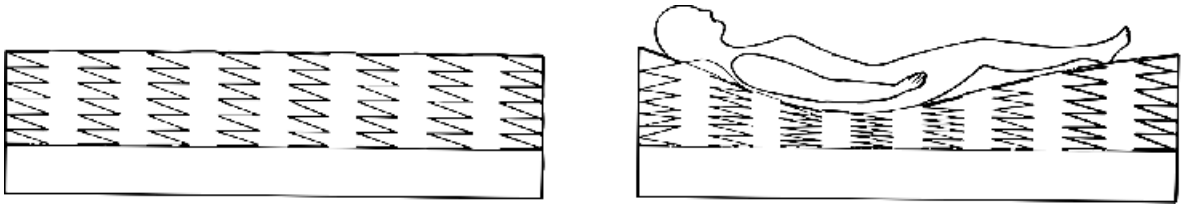
5. The mattress of a bed contains springs. The diagrams show the change that takes place when a person lies on the bed.



(a) (i) How do the springs change when a person lies on the bed?

.....

(1)

(ii) Circle the spring that has the greatest force on it.

(1)

(iii) How can you tell that this spring has the greatest force acting on it?

.....

(1)

(b) A manufacturer makes a mattress that sags less in the middle when a person lies on it.

Suggest **two** ways of doing this.

1 .....

.....

2 .....

.....

(2)

Leave blank

(c) One force acting on the person is the upward push of the springs.

(i) Another force acts on the person.

Draw an arrow on the diagram to show the direction of this force.

(1)

(ii) Use words from the box to complete the sentence.

downward	**Earth**	**mattress**	**upward**

The other force on the person is the .....……. pull of the

.....……. .

(2)

(Total 8 marks)

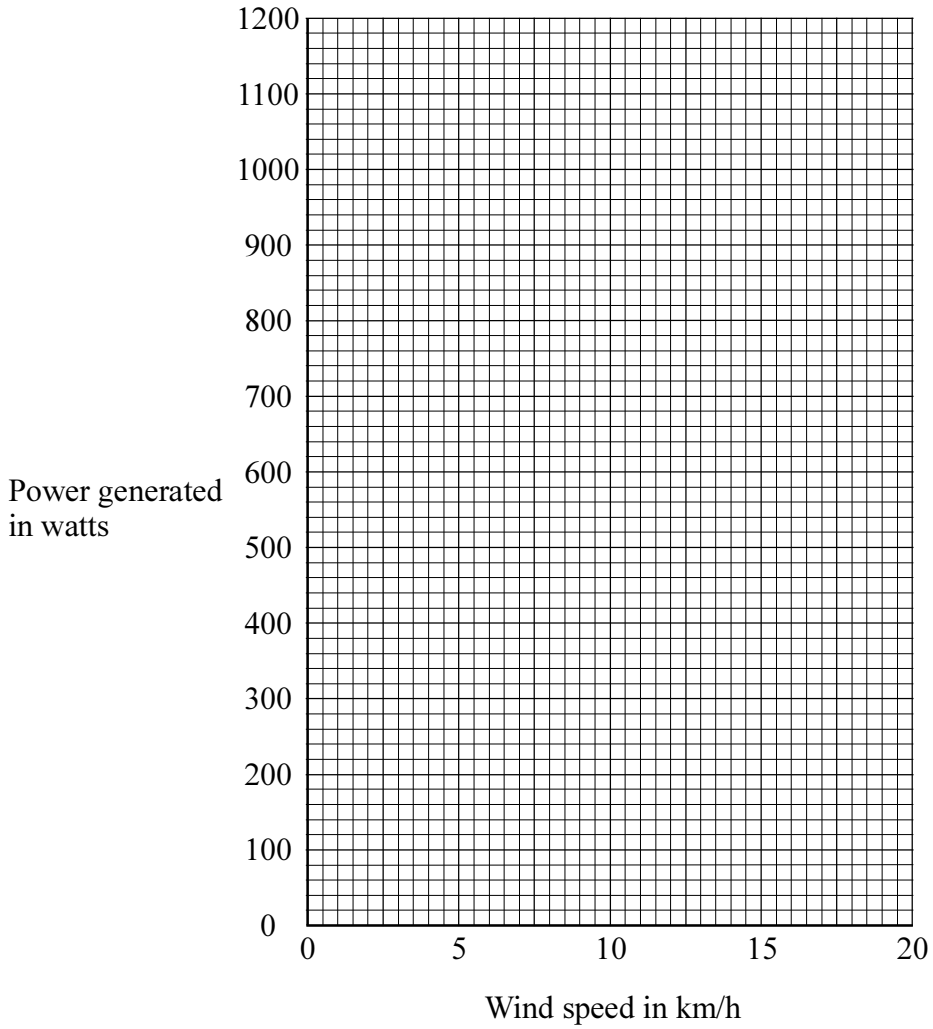
TURN OVER FOR QUESTION 6

Leave blank

6. (a) A wind powered generator is used to produce electrical power when the wind is blowing. The table shows the electrical power generated by the wind for different wind speeds.

Power generated (watts)	0	0	140	900	1100	1160	1160
Wind speed (km/h)	0	2	5	10	12	15	20

(i) On the axes below draw a graph to show how the power generated changes with wind speed.



(3)

Leave blank

(ii) What is the lowest wind speed needed to generate power?

.....

(1)

(iii) What is the maximum power generated by the wind?

.....

(1)

(iv) Explain **one** disadvantage of using only a wind generator as the source of electrical power.

.....

.....

(1)

(b) Complete the sentence to show the energy transfer taking place in the wind powered generator.

…… energy is transferred to …… energy.

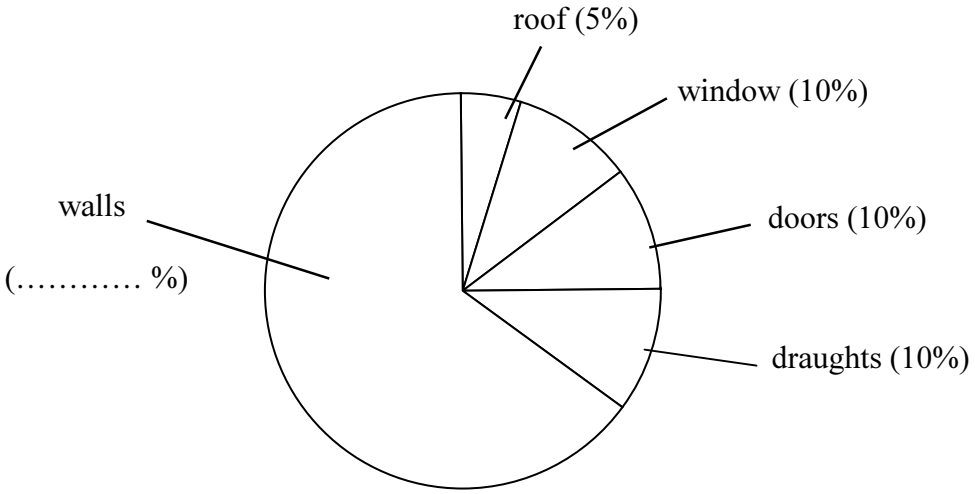
(2)

(Total 8 marks)

TURN OVER FOR QUESTION 7

Leave blank

7. (a) The main heat energy losses from a house are shown in the diagram.



(i) Complete the diagram to show the percentage heat energy loss through the walls.

(1)

(ii) Complete the table below to show how the heat energy loss from each part of the house can be reduced. The first one has been done for you.

Part of the house	**Method used for reducing heat energy loss**
roof	glass-fibre insulation in the loft
walls	…….. ……..
floor	…….. ……..

(2)

Leave blank

(b) Double glazing is used to reduce the heat energy loss from houses through the windows. The table compares the heat loss for ordinary windows and for double glazed windows.

Type of window	**Heat energy passing through (joules per second)**
ordinary window	224
double-glazed window	116

The size of the windows and the temperature inside and outside the house are the same in each case.

(i) How many joules per second does using double glazing save?

.....

(1)

(ii) How much energy would pass through an ordinary window in one hour?

.....

.....

..... joules

(3)

(c) A double glazing salesman claims that by replacing ordinary windows with double glazed windows, the heating bills of a house will be halved.

Use the information given earlier to show whether this claim is true or not.

.....

.....

.....

.....

.....

.....

(3)

(Total 10 marks)

TURN OVER FOR QUESTION 8

Leave blank

8. Radon is a radioactive gas. It escapes from underground rocks and causes a large part of the natural background radiation in the United Kingdom.

(a) Radon-220 ($^{220}_{86}\mathrm{Rn}$) is an isotope of radon.

(i) How many protons are there in a nucleus of radon-220?

.....

(1)

(ii) How many neutrons are there in a nucleus of radon-220?

.....

(1)

(iii) Explain what is meant by the statement: "This element has three isotopes".

.....

.....

.....

.....

(2)

Leave blank

(b)
- Radon-220 has a short half-life and emits α-particles.
- Alpha particles are easily stopped by material and only travel a short distance in air.
- Radon gas is thought to produce harmful effects.

When home owners, in areas where radon gas is produced, were told of the risks, very few took notice.

(i) Explain why the presence of radon gas in buildings is a health hazard.

.....

.....

.....

.....

.....

.....

(3)

(ii) Discuss why, you think, so few people took any action to reduce the risks due to radon gas.

.....

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.....

.....

.....

.....

.....

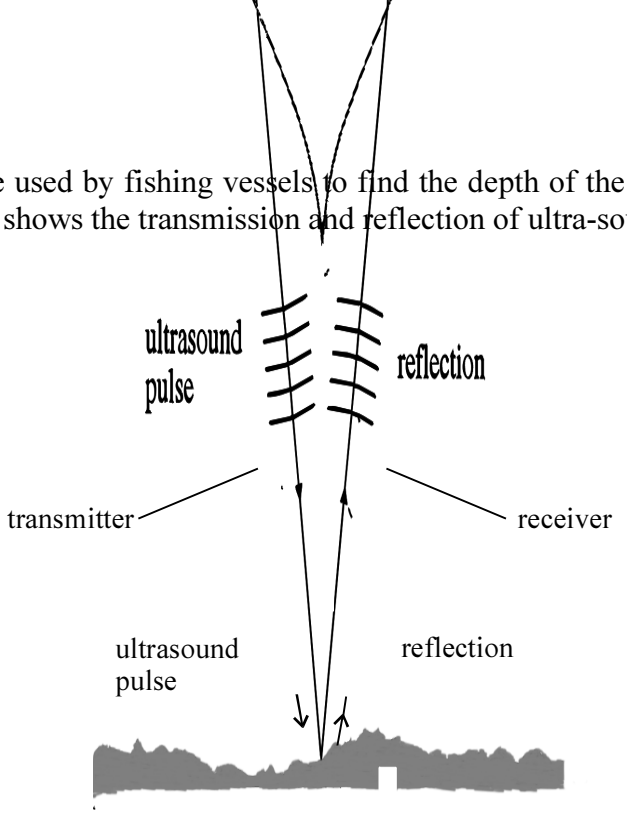
(4)

(Total 11 marks)

TURN OVER FOR QUESTION 9

Leave blank

9. Ultrasound can be used by fishing vessels to find the depth of the sea or to locate shoals of fish. The diagram shows the transmission and reflection of ultra-sound from a fishing vessel.



(a) What is ultrasound?

.....

.....

.....

.....

(2)

Leave blank

(b) The speed of ultrasound in water is 1500 m/s.

(i) The frequency of the ultrasound used for depth finding is 50 000 Hz.

Calculate the wavelength of the ultrasound.

.....

.....

.....

(4)

(ii) On the diagram the depth of the sea is 1200 m.

Calculate the time it would take for the ultrasound wave to travel from the transmitter to the sea-bed and back to the receiver.

.....

.....

.....

(4)

(c) Waves with small wavelengths spread out (diffract) less than those with long wavelengths. Use this information to suggest why ultrasound is much better than ordinary sound for finding the depth of the sea.

.....

.....

.....

.....

.....

.....

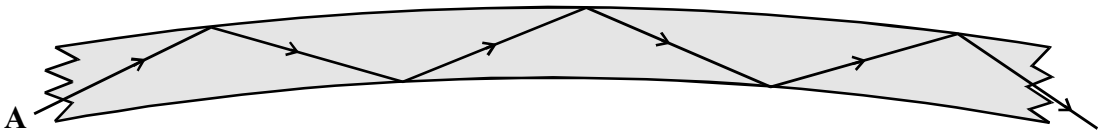
(3)

(Total 13 marks)

TURN OVER FOR QUESTION 10

Leave blank

10. (a) The diagram shows the passage of light beam **A** travelling down an optical fibre.



(i) State the name of the process that takes place as the light **A** beam travels down the optical fibre.

.....

(1)

(ii) Complete the diagram to show the passage of the light beam **B** down the same optical fibre.

(1)

(iii) Suggest why beam **B** will take slightly longer to travel down the fibre than beam **A**.

.....

.....

.....

.....

(2)

Leave blank

(b) Optical fibres are used to carry information. The information is carried by the light beam in the form of a digital signal.

(i) Draw a diagram to show what is meant by a digital signal.

(1)

(ii) The signal from a microphone is an analogue signal. How does an analogue signal differ from a digital signal?

.....

.....

(1)

(c) When signals are sent through optical fibres they lose energy.

(i) State what happens to the brightness of the light beam as it loses energy.

.....

(1)

(ii) State **one** disadvantage of losing energy as the light beam travels through the optical fibre.

.....

.....

(1)

(Total 8 marks)

TOTAL MARK 90

END

Centre Number						Paper Reference **1522/4H**		Surname	Other Names
Candidate Number						Paper Reference **1520/3H**		Signature	

For Examiner's use only

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1522/4H 1520/3H

Edexcel GCSE

Science: Double Award A **[1522]**

Paper 4H

Biology A **[1520]**

Paper 3H

HIGHER TIER

Specimen Paper

Time: 1 hour 30 minutes **N0000**

Question Number	Leave Blank
1	
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11	
12	
13	
Total	

Materials required for the examination
None

Items included with these question papers
None

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your signature, your surname and other names, then tick the box to show the correct paper reference for your examination.

The paper reference is shown below the boxes. If more than one paper reference is shown, you should tick the one for which you have been entered.

Answer ALL questions in the spaces provided in this book.

Show all stages in any calculations and state the units. Calculators may be used.

Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for the various parts of questions are shown in round brackets: e.g. (**2**).

This paper has 13 questions. There is one blank page.

Advice to Candidates

This symbol shows where the quality of your written answer will also be assessed.

Additional Answer Sheets may be used.

Turn over

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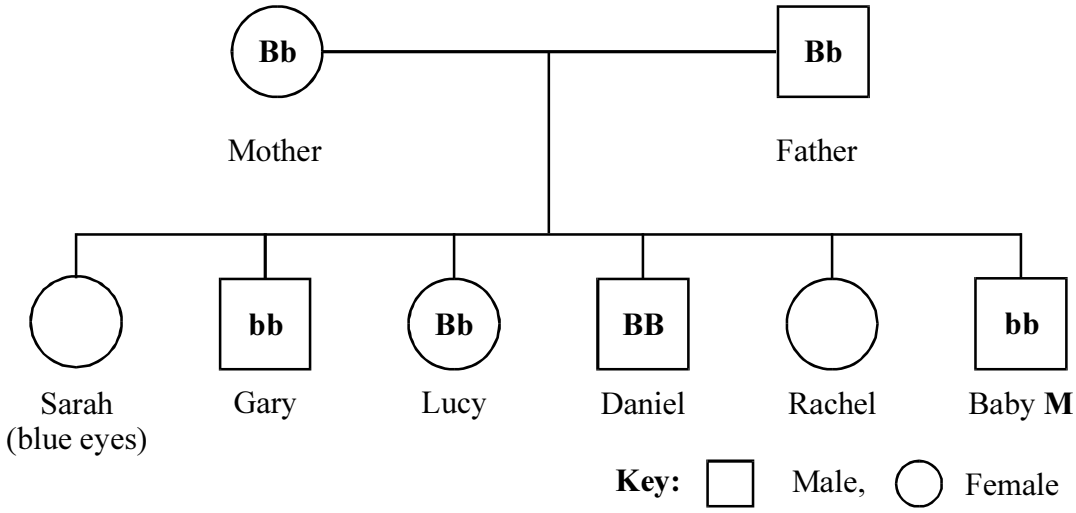
Leave blank

1. The diagram below shows the inheritance of eye colour in a family The allele for brown eyes is dominant (**B**) and the allele for blue eyes is recessive (**b**).



(a) Which of the following statements is true?

A Lucy and Daniel both have blue eyes

B Lucy and Daniel have different coloured eyes

C Lucy and Daniel have the same coloured eyes

D All the males in the family have brown eyes

Write the correct answer (**A**, **B**, **C** or **D**) in the box.

(1)

(b) (i) What is the sex and eye colour of baby **M**?

.....

(2)

(ii) How was the sex of baby **M** determined at fertilisation?

.....

.....

.....

(2)

(c) Daniel's genotype is BB.

What is Sarah's genotype?

.....

(1)

(d) In the family shown, Rachel has an identical twin. Rachel has brown eyes.

Leave blank

(i) Who is Rachel's identical twin? .....

(1)

(ii) Explain how you decided on your answer.

.....

.....

.....

(2)

(Total 9 marks)

TURN OVER FOR QUESTION 2

Leave blank

2. The passage below is about Charles Darwin.

Who Inspired Darwin?

Thomas Malthus lived in the early 19th century. He wrote 'An Essay on the Principle of Population.' In this essay he pointed out that human beings produce far more offspring than ever survive. However, the adult population tends to remain stable from generation to generation.

Darwin realised that this idea applies to other animals. For example, one fish, which lays thousands of eggs in a year, would over-populate an area with its offspring if they all survived.

The work of Malthus helped Darwin to develop his own ideas of how a species changes. He produced his theory of natural selection. Darwin realised that there must be a reason why some offspring survived but others did not. He suggested that small variations between individuals of a species might give certain individuals a better chance of survival. For example, those organisms with characteristics that made them better at escaping from predators or finding food would have a better chance of survival.

(a) (i) What is meant by the phrase "the adult population tends to remain stable from generation to generation"?

.....

.....

.....

.....

(2)

(ii) Suggest why fish lay thousands of eggs rather than just a few.

.....

.....

.....

.....

(2)

(iii) What can cause "small variations between individuals of a species"?

.....

.....

(1)

Leave blank

(iv) What is meant by the phrase **natural selection**?

.....

.....

.....

.....

.....

.....

.....

.....

(4)

(b) Here are four statements about evolution. Tick the box beside the statement that is false.

The theory of evolution was developed by Darwin	☐
DNA is the genetic material that transfers information from generation to generation	☐
Acquired characteristics **cannot** be passed on from parent to offspring	☐
Nature plays an important part in artificial selection	☐

(1)

(c) Suggest **two** ways that scientists can let other groups of scientists know about their ideas.

1 .....

2 .....

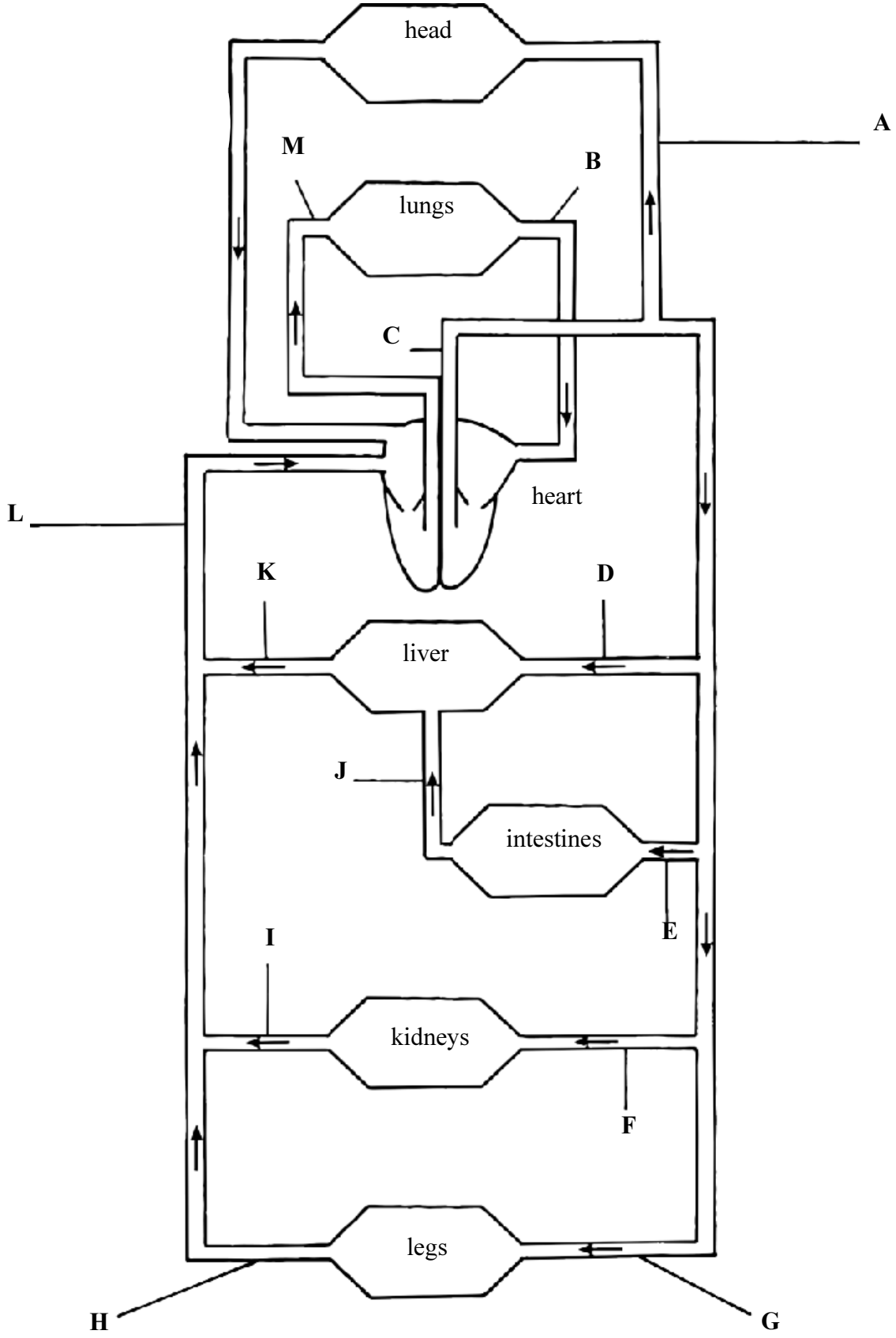
(2)

(Total 12 marks)

TURN OVER FOR QUESTION 3

Leave blank

3. The diagram shows a plan of the circulatory system. The blood vessels are labelled with letters.



Use the letters on the diagram to complete the sentences in the table.

Leave blank

The first one has been done for you.

Sentence	Letter
The blood vessel named the aorta is	**C**
The blood vessel containing blood pumped from the right ventricle is	
The blood vessel carrying blood with **least** carbon dioxide is	
The blood vessel carrying blood with **most** amino acids after a meal is	
The blood vessel containing blood at **lowest** pressure is	
The **first** blood vessel to transport inhaled solvents is	

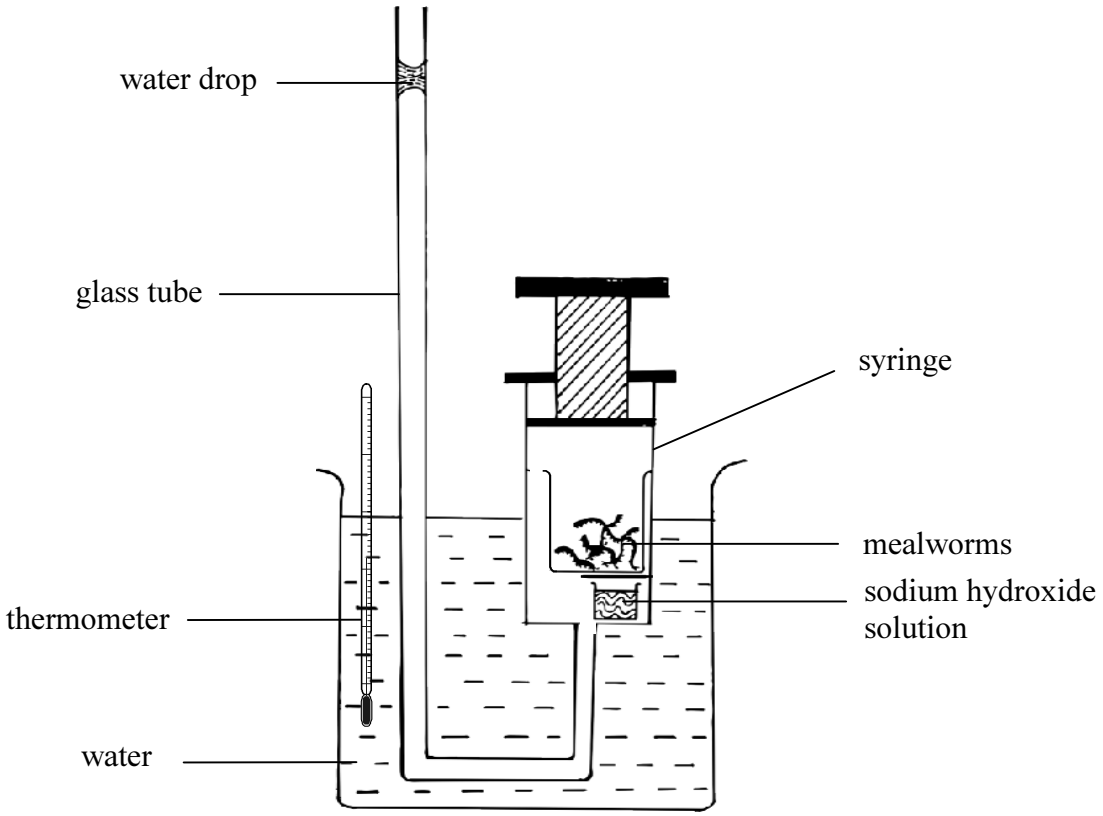
(5)

(Total 5 marks)

TURN OVER FOR QUESTION 4

Leave blank

4. This apparatus was used to measure the effect of temperature on the respiration rate of mealworms.



(a) (i) Name the gas absorbed by sodium hydroxide solution.

.....

(1)

(ii) Show on the diagram the direction of movement of the water drop.

(1)

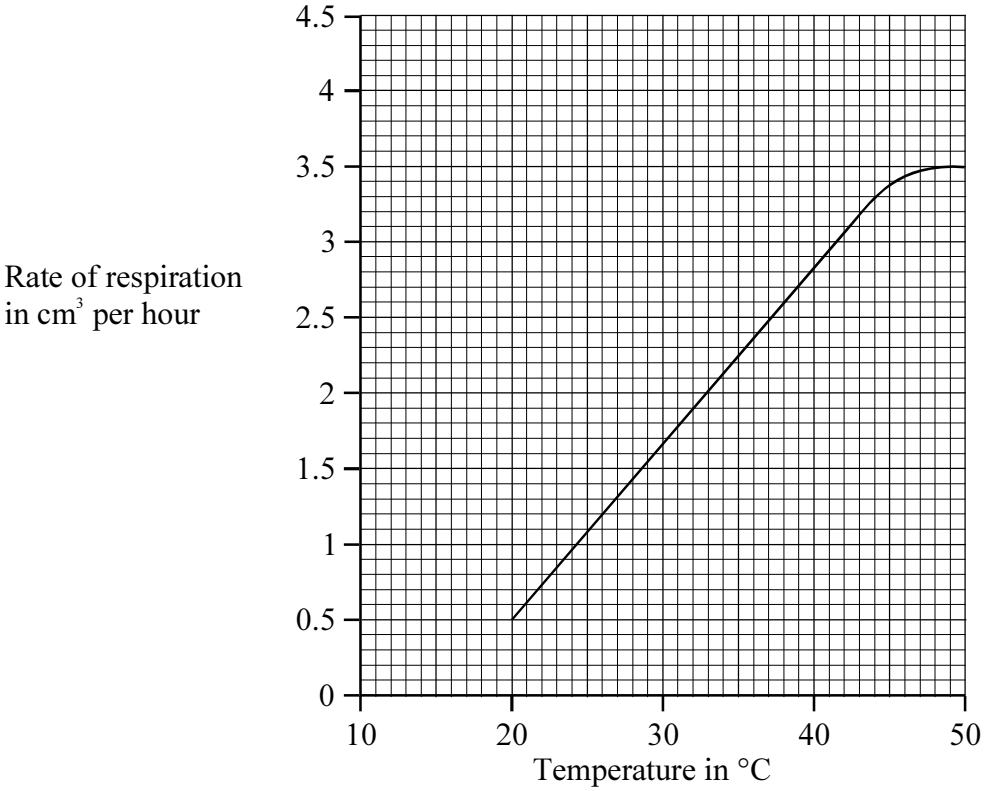
(iii) Give **one** difference between the apparatus shown and a suitable control apparatus.

.....

(1)

Leave blank

(b) The rate of respiration was measured at intervals from 20 °C to 50 °C. The graph shows the results of the investigation.



(i) Explain the results shown on the graph.

.....

.....

.....

.....

(2)

(ii) Suggest what would happen if temperatures above 50 °C were used.

Give a reason for your answer.

.....

.....

.....

.....

(2)

(Total 7 marks)

TURN OVER FOR QUESTION 5

Leave blank

5. Algae are microscopic plants often found in water. They produce food by photosynthesis.

Researchers plan to grow large numbers of algae to help solve the world's energy crisis.

(a) Write a letter suggesting what the researchers could do in order to grow large numbers of the algae.

Dear Researchers,

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(5)

(b) The algae can be used to make petrol. This would reduce the need to obtain fuel by destroying the world's forests.

Suggest **three** advantages of reducing the destruction of the world's forests.

1 .....

.....

2 .....

.....

3 .....

.....

(3)

(Total 8 marks)

Leave blank

6. Read the passage and answer the questions that follow.

Young people who go clubbing lose a lot of water as sweat while they dance. This makes them very thirsty, so they drink a lot of water. Some of them also take tablets called *Ecstasy.* *Ecstasy* stimulates release of the hormone ADH. Young people who dance a lot and take *Ecstasy* have very dilute blood plasma. When blood passes through the brain, the brain cells swell and press against the inside of the skull. The pressure on the brain cells causes damage, which can be fatal.

(a) Explain why it is important that young people sweat when dancing.

.....

.....

.....

(2)

(b) (i) Name the organ that releases ADH.

.....

(1)

(ii) Which organ does ADH target?

.....

(1)

(iii) How does ADH travel from where it is released to the organ it targets?

.....

(1)

(c) Explain why young people who dance a lot and take *Ecstasy* have very dilute blood plasma.

.....

.....

.....

(2)

(d) Explain why brain cells swell when the blood plasma is very dilute.

.....

.....

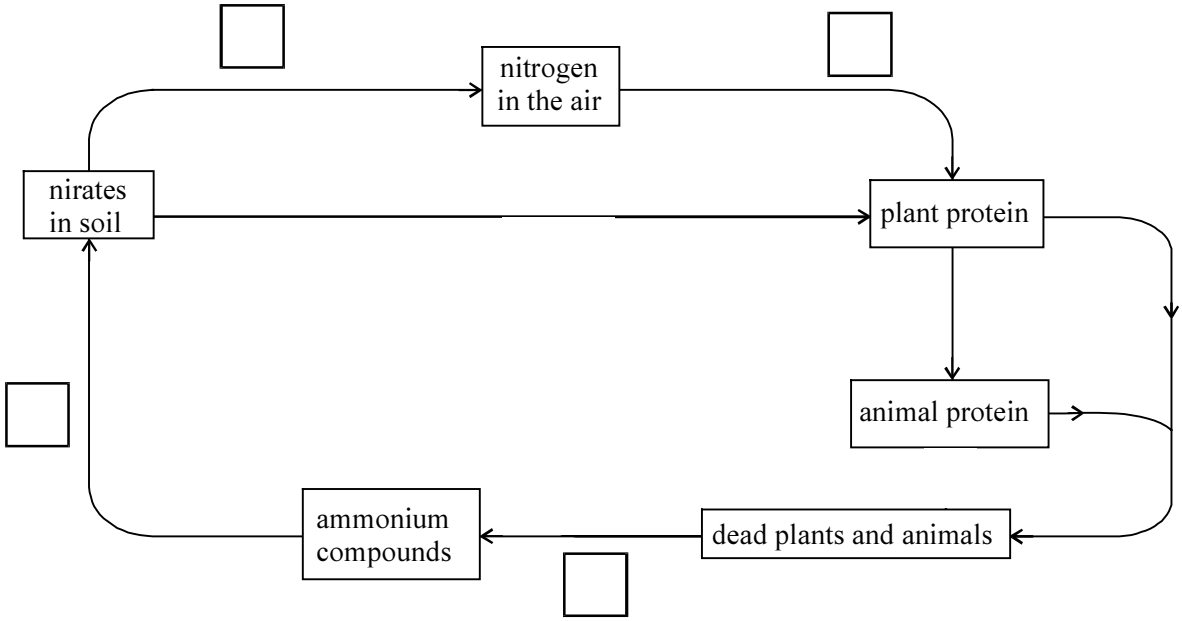
.....

(2)

(Total 9 marks)

Leave blank

7. The diagram shows the nitrogen cycle.



Four types of bacteria take part in the nitrogen cycle.

A – decomposing
B – denitrifying
C – nitrogen fixing
D – nitrifying

(a) Write **one** letter in each empty box on the nitrogen cycle to show where these bacteria are involved.

(4)

(b) Complete the following passage.

When plants are eaten by animals, the large insoluble molecules of plant protein are ……. into small soluble molecules called ……. This process is catalyzed by ……. released from the ……. The small soluble molecules are ……. into the blood and used to make animal protein.

(5)

(Total 9 marks)

Leave blank

8. DNA is a double helix with each strand linked by a series of paired bases. There are four bases in DNA.

(a) The table shows the percentage of each base found in a sample of DNA taken from a rat.

Complete the table to give the names of the two missing bases.

Percentage of base	Name of base
28.6	Adenine
21.4	Guanine
28.6	
21.4	

(2)

(b) A DNA molecule contains 1000 base **pairs**. 30% of the bases are guanine.

How many adenine bases are contained in this DNA molecule? Show your working.

Answer .....

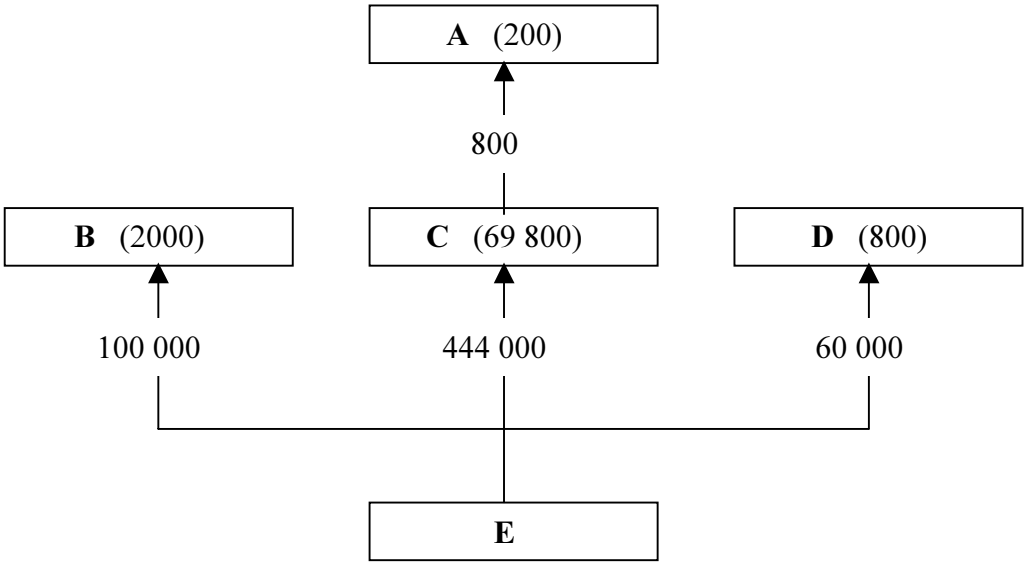
(3)

(Total 5 marks)

TURN OVER FOR QUESTION 9

Leave blank

9. The diagram shows a food web with organisms of types **A**, **B**, **C**, **D**, and **E**.
Numbers on arrows show the energy available to these organisms in kJ per m^2 per year.
Numbers in brackets show the energy that becomes part of the biomass of the organisms in kJ per m^2 per year.



The energy efficiency of an organism is a measure of how much of the energy available to the organism becomes part of its biomass.

The equation below shows how to calculate energy efficiency.

$$\text{Energy efficiency} = \frac{\text{energy that become part of biomass}}{\text{energy available}} \times 100\%$$

(a) Calculate the energy efficiency of organism **B**.

Put your answer in the table below.

Organism	Energy efficiency (%)
A	25.0
B	
C	15.7
D	1.3

(1)

Leave blank

(b) Suggest **two** reasons why organism **D** has a low energy efficiency.

1 .....

.....

2 .....

.....

(2)

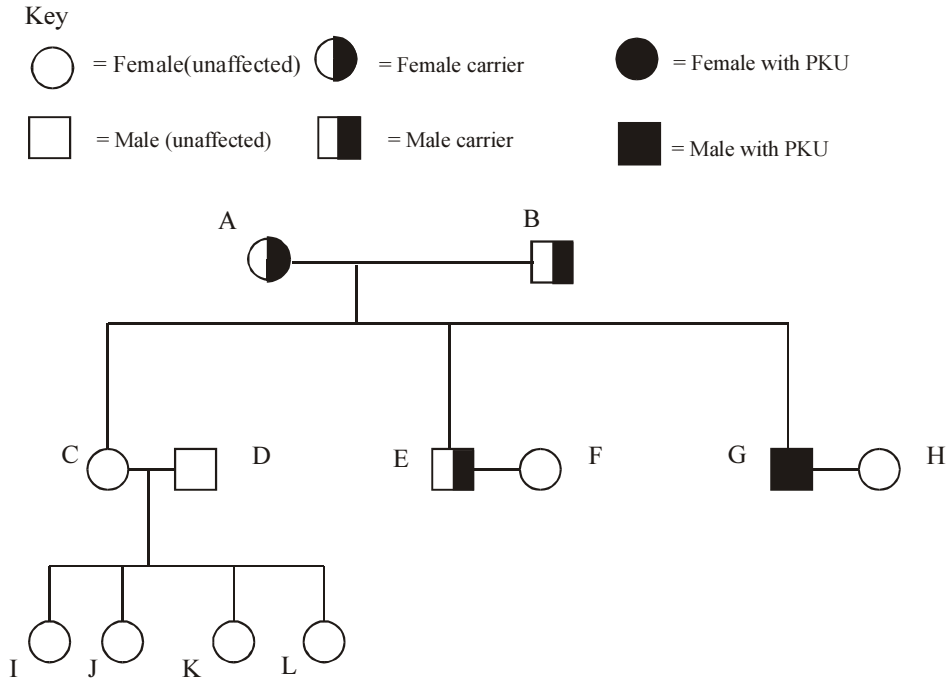
(Total 3 marks)

TURN OVER FOR QUESTION 10

Leave blank

10. PKU (phenylketonuria) is an inherited disease. The allele (n) for the disease is recessive to the normal allele (N).

The diagram shows how PKU was inherited in a family.



(a) Give the genotype of each individual in the table below.

Individual	Genotype
B	
J	

(2)

(b) How many of the children of **A** and **B** are homozygous?

.....

(1)

(c) If **G** and **H** have a child, what is the probability that it will have PKU?

.....

(1)

(d) **C** and **D** have four children, all of whom are female. What is the probability that their next child will be female?

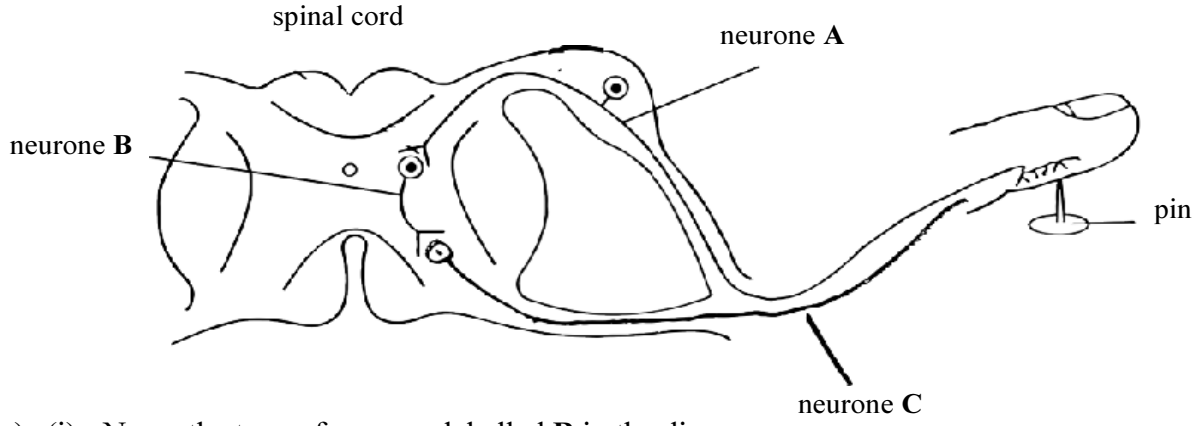
.....

(1)

(Total 5 marks)

Leave blank

11. The diagram shows part of a finger and a reflex arc.



(a) (i) Name the type of neurone labelled **B** in the diagram.

.....

(1)

(ii) Describe how nerve impulses are passed from neurone **A** to neurone **B**.

.....

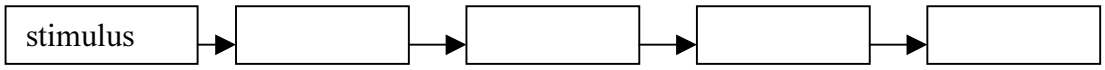
.....

(2)

(b) The words below are used to describe the pathway which involves nerve impulses during a reflex action.

effector	**neurones**	**receptor**	**response**	**stimulus**

Complete the pathway using these words.



(3)

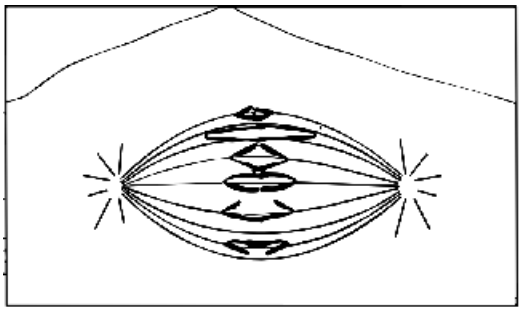
(Total 6 marks)

TURN OVER FOR QUESTION 12

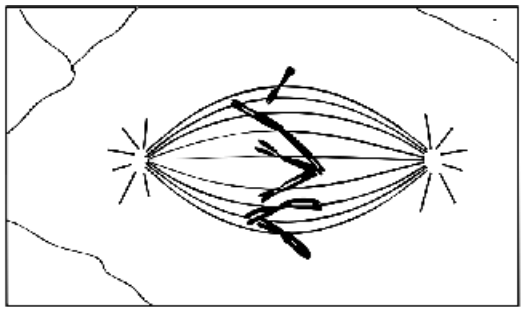
Leave blank

12. The diagrams **A**, **B**, **C**, **D**, **E** and **F** show an animal cell at different stages of mitosis.

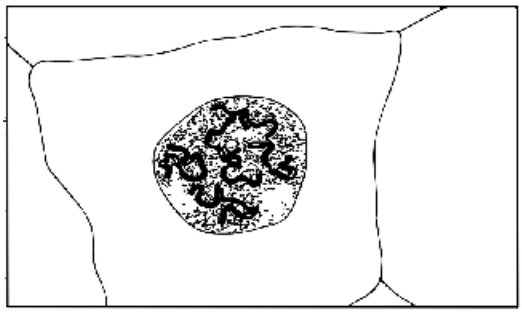
A



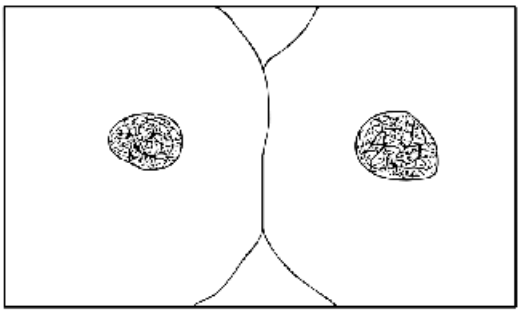
B



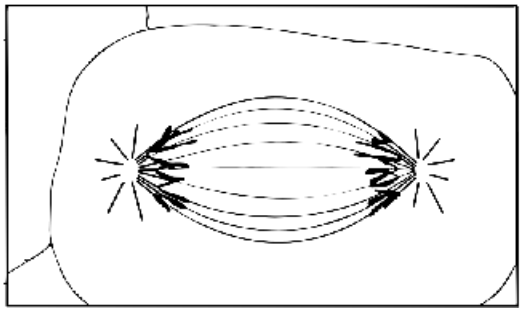
C



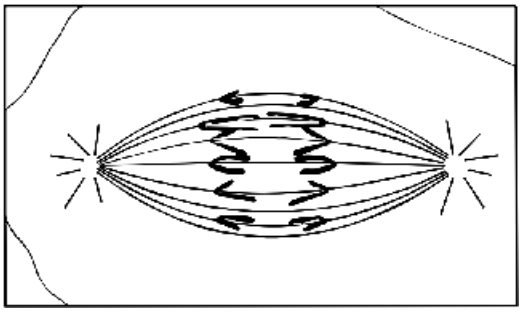
D



E



F



Leave blank

(a) Use the letter by each diagram to arrange these stages in the correct order. Write your answers in the table. The first and last stages have been done for you. Write **one** letter only in each box.

Stage in mitosis	**Label letter**
First stage	C
Second stage	
Third stage	
Fourth stage	
Fifth stage	
Sixth stage	D

(3)

(b) What is the diploid chromosome number of this cell?

.....

(1)

(c) Give **two** ways in which meiosis differs from mitosis.

1 .....

.....

2 .....

.....

(2)

(Total 6 marks)

TURN OVER FOR QUESTION 13

Leave blank

13. How does air pollution affect the environment?

.....

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.....

.....

(6)

(Total 6 marks)

TOTAL MARK 90

END

Centre Number						Paper Reference **1522/5H**		Surname	Other Names
Candidate Number						Paper Reference **1530/3H**		Signature	

For Examiner's use only

For Team Leader's use only

1522/5H 1530/3H

Edexcel GCSE

Science: Double Award A **[1522]**
Paper 5H

Chemistry A **[1530]**
Paper 3H

HIGHER TIER
Specimen Paper

Time: 1 hour 30 minutes **N0000**

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total	

Materials required for the examination
None

Items included with these question papers
None

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your signature, your surname and other names, then tick the box to show the correct paper reference for your examination.

The paper reference is shown below the boxes. If more than one paper reference is shown, you should tick the one for which you have been entered.

Answer ALL questions in the spaces provided in this book.

Show all stages in any calculations and state the units. Calculators may be used.

Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for the various parts of questions are shown in round brackets: e.g. (**2**).

This paper has 9 questions. There are no blank pages.

Advice to Candidates

This symbol shows where the quality of your written answer will also be assessed.

Additional Answer Sheets may be used.

Turn over

Edexcel
Success through qualifications

THE PERIODIC TABLE

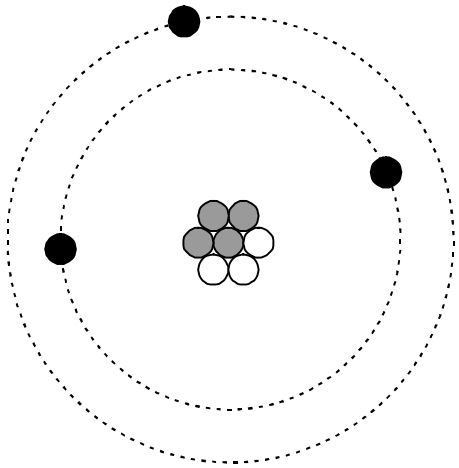
Period	1	2	Group										3	4	5	6	7	8
1	1 H Hydrogen 1																	4 He Helium 2
2	7 Li Lithium 3	9 Be Berylium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
3	23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
4	39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	63.5 Cu Copper 29	65.4 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
5	85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	99 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
6	133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86
7	223 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89															

Key

Relative atomic mass
Symbol
Name
Atomic number

Leave blank

1. (a) The diagram shows the arrangement of particles in an atom of the element lithium.



(i) Identify the particles **A**, **B** and **C**.

Particle **A** .....

Particle **B** .....

Particle **C** .....

(3)

(ii) What is the mass number of the atom in the diagram?

.....

(1)

(iii) Use the diagram to explain why this element is in group 1 of the periodic table.

.....

.....

(1)

(b) Another element in group 1 is sodium.
Sodium reacts with chlorine (Cl_2) to form sodium chloride (NaCl).
Write a balanced equation for this reaction.

.....

(2)

(Total 7 marks)

TURN OVER FOR QUESTION 2

Leave blank

2. (a) Use the periodic table provided to give the electronic structure of a chlorine atom and a chloride ion.

chlorine atom	chloride ion

(4)

(b) Sodium chloride is an ionic compound containing sodium ions and chloride ions.

Explain why ionic compounds have high melting points.

.....

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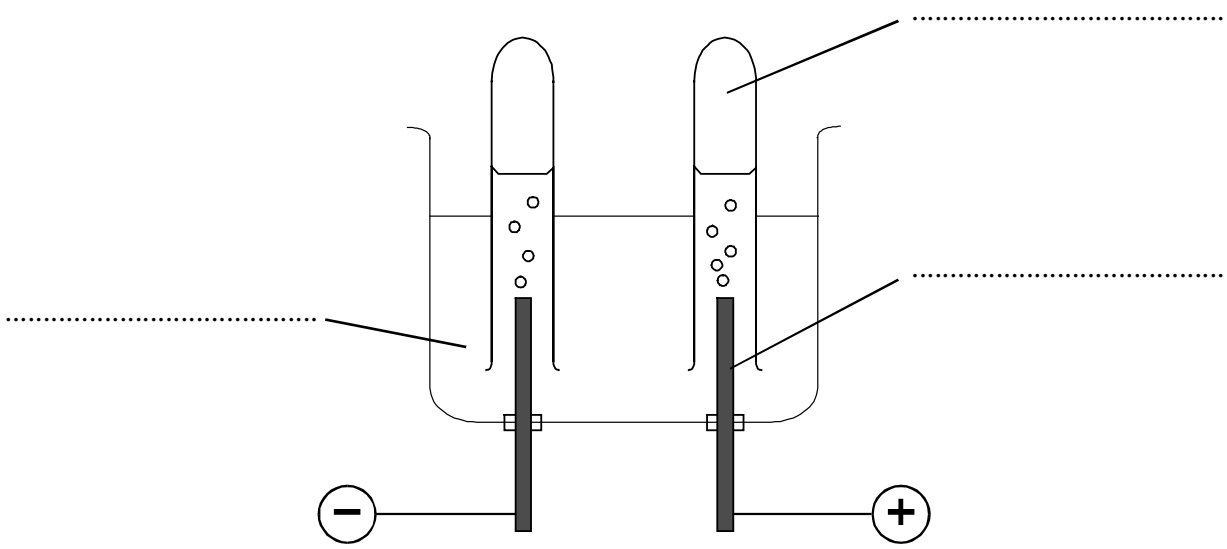
(2)

Leave blank

(c) When aqueous sodium chloride is electrolysed, hydrogen and chlorine gases are produced.
Label this diagram which shows the apparatus used to electrolyse aqueous sodium chloride.



(3)

(d) Describe a test for each of the gases formed.

Test for hydrogen .....

.....

.....

.....

Test for chlorine.....

.....

.....

.....

(4)

(e) In the industrial electrolysis of concentrated sodium chloride solution, three products are formed. Hydrogen and chlorine are two of the products.

Name the other product.

.....

(1)

(Total 14 marks)

Leave blank

3. The passage below is about the extraction of aluminium.

> Aluminium is the most common metallic element in the Earth's crust. In 1886, an inexpensive process for obtaining aluminium from its ores was invented by Charles Hall in the USA.
>
> As a 22 year old college student, Hall had become interested in the problem of producing aluminium. At that time, despite the abundance of aluminium compounds in nature, metallic aluminium was selling for about the same price as silver.
>
> Hall reasoned that aluminium oxide would be a good starting material from which to make aluminium. Some years later he said, 'The idea formed itself in my mind that if I could get a solution of aluminium oxide in something which contained no water, this would probably give a liquid from which aluminium could be obtained by electrolysis'.
>
> Working with home-made equipment, Hall made his first tiny globules of aluminium in a woodshed behind his parents' house. Within five years, the price of the metal had dropped to about a tenth of its former price.

(a) Suggest why silver is still expensive.

.....

(1)

(b) Hall's first reaction in February 1886 was done on a very small scale.

Give **one** piece of evidence from the passage to support this.

.....

(1)

(c) Large amounts of heat energy are taken in during the production of aluminium.

What word is used to describe this energy transfer?

A decomposition

B electrolysis

C endothermic

D exothermic

Write the correct answer (**A**, **B**, **C** or **D**) in the space provided.

.....

(1)

Leave blank

(d) Explain, using the passage and your knowledge of the reactivity series, why aluminium has only been used on a large scale since about 1890.

.....

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.....

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.....

.....

.....

(4)

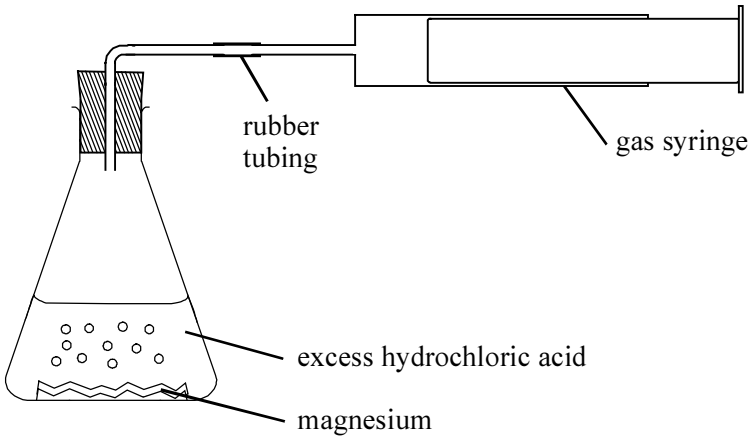
(Total 7 marks)

TURN OVER FOR QUESTION 4

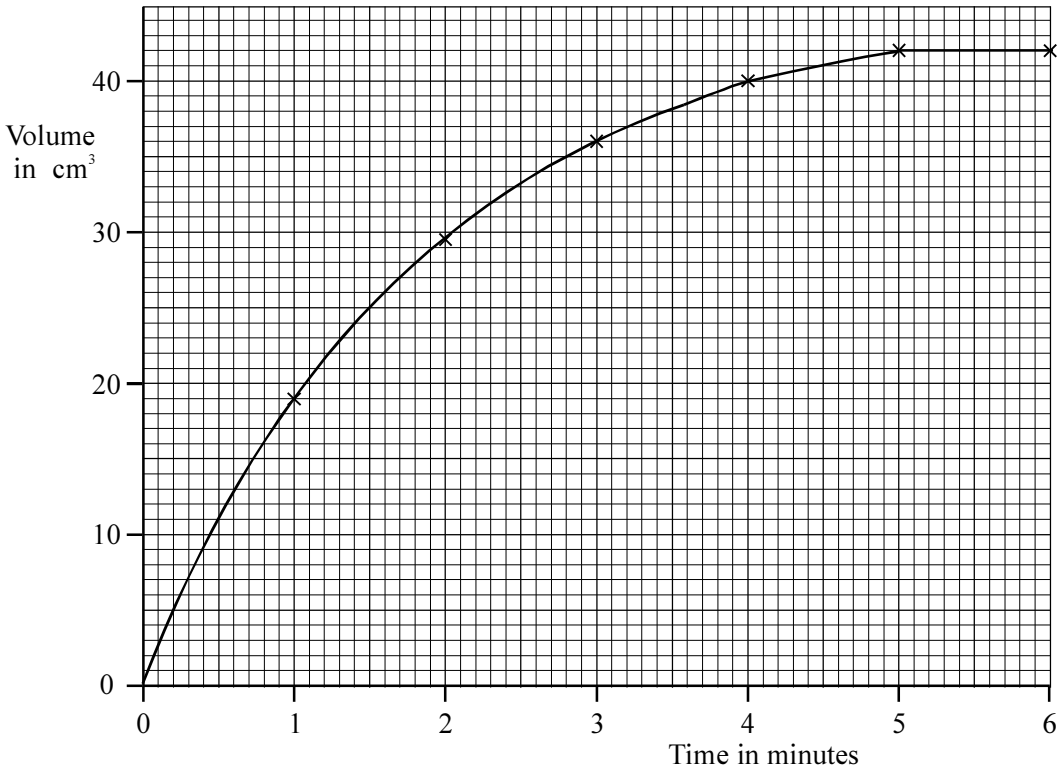
Leave blank

4. Magnesium ribbon reacts with hydrochloric acid to produce hydrogen.

A student used an excess of hydrochloric acid in the apparatus below to investigate this reaction.



His results are shown on the graph.



(a) What volume of gas was in the syringe at the end of the reaction?

.....

(1)

Leave blank

(b) State how the rate of reaction changes during the first **four** minutes and explain the change.

.....

.....

.....

.....

(2)

(c) The experiment was repeated using the same quantities of reagents but with the acid at a higher temperature.

Draw on the graph the line that should be obtained at this temperature.

(2)

(d) Some power stations burn coal in the production of electricity. The coal is ground to a fine powder before being burned in the furnace.

Use your knowledge of rates of reaction to suggest why the coal is ground to a fine powder rather than used in large lumps.

.....

.....

.....

.....

(2)

(Total 7 marks)

TURN OVER FOR QUESTION 5

Leave blank

5. Ammonia is made using the Haber process.

(a) The equation for the reversible reaction is:

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

What is the source of the nitrogen used in the Haber process?

.....

(1)

(b) The hydrogen used in the Haber process is obtained by heating methane with steam:

$$CH_4(g) + H_2O(g) \longrightarrow 3H_2(g) + CO(g)$$

What is the source of the methane gas for this reaction?

.....

(1)

(c) (i) Most of the ammonia produced is reacted with acids to form fertilisers.

Write a balanced equation for the reaction of ammonia with nitric acid.

.....

(3)

(ii) Why do most farmers add fertilisers to their crops?

.....

(1)

(iii) Excess fertiliser is washed off fields into rivers.

State **two** consequences of this.

1 .....

.....

2 .....

.....

(2)

(Total 8 marks)

Leave blank

6. Methanol is manufactured from carbon monoxide and hydrogen using similar conditions to those used in the manufacture of ammonia by the Haber process.

The equation for the manufacture of methanol is

$$CO(g) + 2H_2(g) \rightleftharpoons CH_3OH(g)$$

This reaction is exothermic.
The reaction conditions are a pressure of 200 atm and a temperature of 400 °C.

(a) State **two** advantages of using a pressure higher than 200 atm.

1 .....

2 .....

(2)

(b) (i) State **one** advantage of using a temperature lower than 400 °C.

Explain your answer.

.....

.....

.....

.....

.....

.....

(4)

(ii) State **one** disadvantage of using a temperature lower than 400 °C.

Explain your answer.

.....

.....

.....

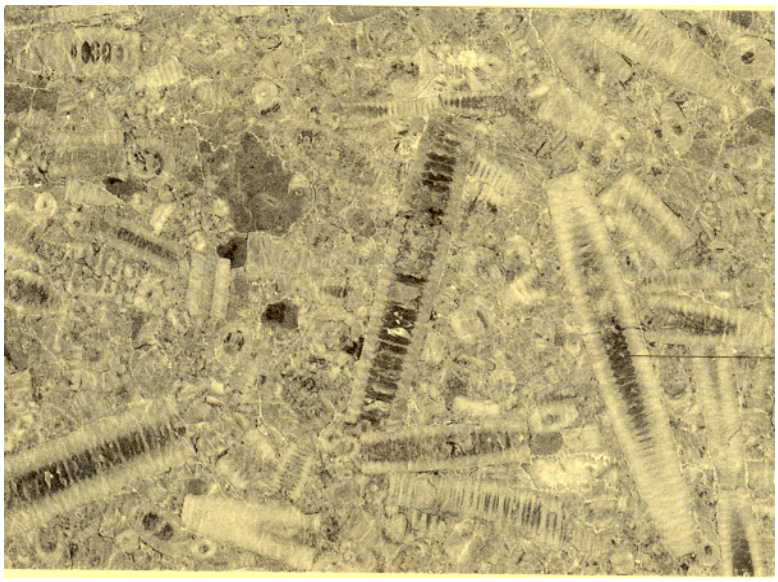
(2)

(Total 8 marks)

TURN OVER FOR QUESTION 7

Leave blank

7. Calcium carbonate occurs as the rock limestone. Limestone is often found in layers that contain fossils.



(a) Use the information above to explain how limestone was formed.

.....

.....

.....

.....

.....

.....

(4)

(b) Calcium carbonate also occurs as marble. Marble has been formed by subjecting limestone to heat and pressure.

What type of rock is marble?

.....

(1)

Leave blank

(c) When calcium carbonate is heated it decomposes.

$$CaCO_3 \longrightarrow CaO + CO_2$$

Calculate the mass of calcium oxide formed from 25 g of calcium carbonate.
(Relative atomic masses: Ca = 40; C = 12; O = 16)

.....

.....

.....

.....

(3)

(d) Bromine is reduced when it reacts with iodide ions.

$$Br_2(aq) + 2I^-(aq) \longrightarrow 2Br^-(aq) + I_2(aq)$$

(i) Name one compound containing I^- ions, which would be suitable for this reaction.

.....

(1)

(ii) State **one** change you would **see** as this reaction takes place.

.....

(1)

(iii) Explain why bromine is said to be reduced in this reaction.

.....

.....

(1)

(iv) Complete the half equation to show the iodide ions being oxidised.

$$\text{.....}I^- \longrightarrow I_2 + \text{.....}$$

(2)

(Total 13 marks)

TURN OVER FOR QUESTION 8

Leave blank

8. The table below gives information about the main fractions obtained from crude oil.

Fraction	Boiling range (°C)	Number of carbon atoms in each molecule
gas	-40 to 40	1 to 4
petrol	40 to 100	4 to 8
naphtha	100 to 160	6 to 10
kerosene	160 to 250	10 to 16
diesel oil	250 to 300	16 to 20
fuel oil	300 to 350	20 to 25

(a) State and explain the pattern shown between the boiling range of the fractions and the number of carbon atoms in each molecule.

.....

.....

.....

.....

(2)

(b) Fuel oil is cracked to form more useful products such as petrol and naphtha. Cracking produces a mixture of saturated and unsaturated hydrocarbons.

(i) Describe how cracking is carried out.

.....

.....

.....

.....

(2)

(ii) Describe a test for an unsaturated hydrocarbon.

.....

.....

.....

.....

(2)

Leave blank

(c) Propene (C_3H_6) can be obtained by cracking alkanes.

(i) Draw the structure of a molecule of propene showing **all** the bonds.

(2)

(ii) One molecule of the alkane decane ($C_{10}H_{22}$) was cracked to give two molecules of propene and one molecule of an alkane.

Write the balanced equation for this reaction.

.....

(2)

(d) Propene is used to make poly(propene).

(i) What feature of a propene molecule enables it to form poly(propene)?

.....

(1)

(ii) Draw the structure of the repeating unit in poly(propene).

(2)

(iii) Poly(ethene) is used to make many types of bottle.

Suggest why the more expensive poly(propene) is used to make bottles for fizzy drinks.

.....

.....

(1)

(Total 14 marks)

Leave blank

9. The table below shows some information about the isotopes of chlorine.

(a) Use information from the periodic table to help you complete the table.

Isotope	Mass Number	Abundance	Number of protons in one atom	Number of electrons in one atom	Number of neutrons in one atom
chlorine-35	35	75%	…….	……	……
chlorine-37	37	25%	…….	……	……

(3)

(b) (i) Show why the relative atomic mass of chlorine is given as 35.5.

.....

.....

.....

.....

(2)

(ii) What is the relative molecular mass of a chlorine molecule?

.....

(1)

(c) Draw a dot and cross diagram for a molecule of chlorine, showing outer electrons only.

(2)

Leave blank

(d) 18.39g of oxygen and 81.61g of chlorine are combined in 100g of a compound.

Calculate the empirical formula of the compound.

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(4)

(Total 12 marks)

TOTAL MARK 90

END

Centre Number						Paper Reference **1522/6H**		Surname	Other Names
Candidate Number						Paper Reference **1540/3H**		Signature	

For Examiner's use only

For Team Leader's use only

1522/6H 1540/3H

Edexcel GCSE

Science: Double Award A **[1522]**

Paper 6H

Physics A **[1540]**

Paper 3H

HIGHER TIER

Specimen Paper

Time: 1 hour 30 minutes **N0000**

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
Total	

Materials required for the examination
None

Items included with these question papers
None

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your signature, your surname and other names, then tick the box to show the correct paper reference for your examination.

The paper reference is shown below the boxes. If more than one paper reference is shown, you should tick the one for which you have been entered.

Answer ALL questions in the spaces provided in this book.

Show all stages in any calculations and state the units. Calculators may be used.

Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for the various parts of questions are shown in round brackets: e.g. (**2**).

This paper has 8 questions. There are no blank pages.

Advice to Candidates

This symbol shows where the quality of your written answer will also be assessed.

Additional Answer Sheets may be used.

Turn over

Edexcel
Success through qualifications

FORMULAE

You may find the following formulae useful.

energy transferred = current × voltage × time $E = I \times V \times t$

pressure × volume = constant $P_1 \times V_1 = P_2 \times V_2$

$$\text{frequency} = \frac{1}{\text{time period}} \qquad f = \frac{1}{T}$$

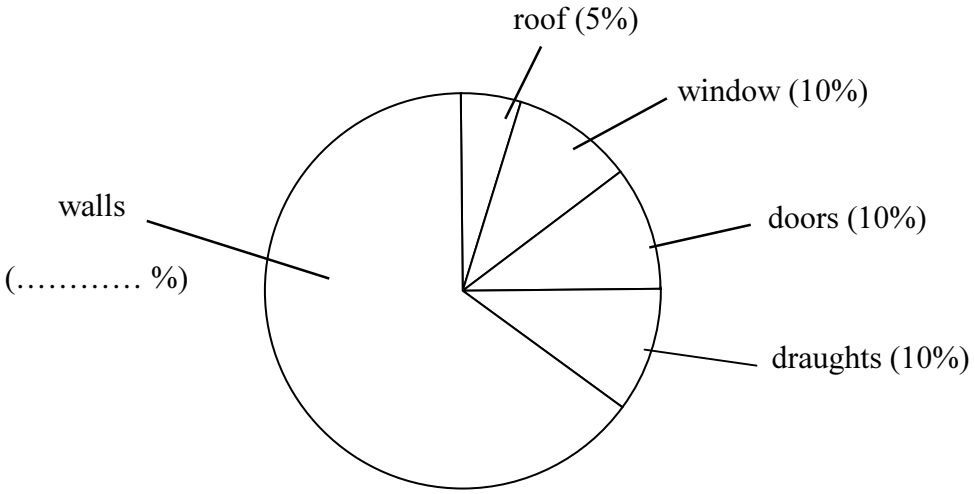
$$\text{power} = \frac{\text{work done}}{\text{time taken}} \qquad P = \frac{W}{t}$$

Leave blank

TURN OVER FOR QUESTION 1

Leave blank

1. (a) The main heat energy losses from a house are shown in the diagram.



(i) Complete the diagram to show the percentage heat energy loss through the walls.

(1)

(ii) Complete the table below to show how the heat energy loss from each part of the house can be reduced. The first one has been done for you.

Part of the house	**Method used for reducing heat energy loss**
roof	glass-fibre insulation in the loft
walls	…….. ……..
floor	…….. ……..

(2)

Leave blank

(b) Double glazing is used to reduce the heat energy loss from houses through the windows. The table compares the heat loss for ordinary windows and for double glazed windows.

Type of window	**Heat energy passing through (joules per second)**
ordinary window	224
double-glazed window	116

The size of the windows and the temperature inside and outside the house are the same in each case.

(i) How many joules per second does using double glazing save?

.....

(1)

(ii) How much energy would pass through an ordinary window in one hour?

.....

.....

.....joules

(3)

(c) A double glazing salesman claims that by replacing ordinary windows with double glazed windows, the heating bills of a house will be halved.

Use the information given earlier to show whether this claim is true or not.

.....

.....

.....

.....

.....

.....

(3)

(Total 10 marks)

TURN OVER FOR QUESTION 2

Leave blank

2. Radon is a radioactive gas. It escapes from underground rocks and causes a large part of the natural background radiation in the United Kingdom.

(a) Radon-220 ($^{220}_{86}Rn$) is an isotope of radon.

(i) How many protons are there in a nucleus of radon-220?

.....

(1)

(ii) How many neutrons are there in a nucleus of radon-220?

.....

(1)

(iii) Explain what is meant by the statement: "This element has three isotopes".

.....

.....

.....

.....

(2)

Leave blank

(b)
- Radon-220 has a short half-life and emits α-particles.
- Alpha particles are easily stopped by material and only travel a short distance in air.
- Radon gas is thought to produce harmful effects.

When home owners, in areas where radon gas is produced, were told of the risks, very few took notice.

(i) Explain why the presence of radon gas in buildings is a health hazard.

.....

.....

.....

.....

.....

.....

(3)

(ii) Discuss why, you think, so few people took any action to reduce the risks due to radon gas.

.....

.....

.....

.....

.....

.....

.....

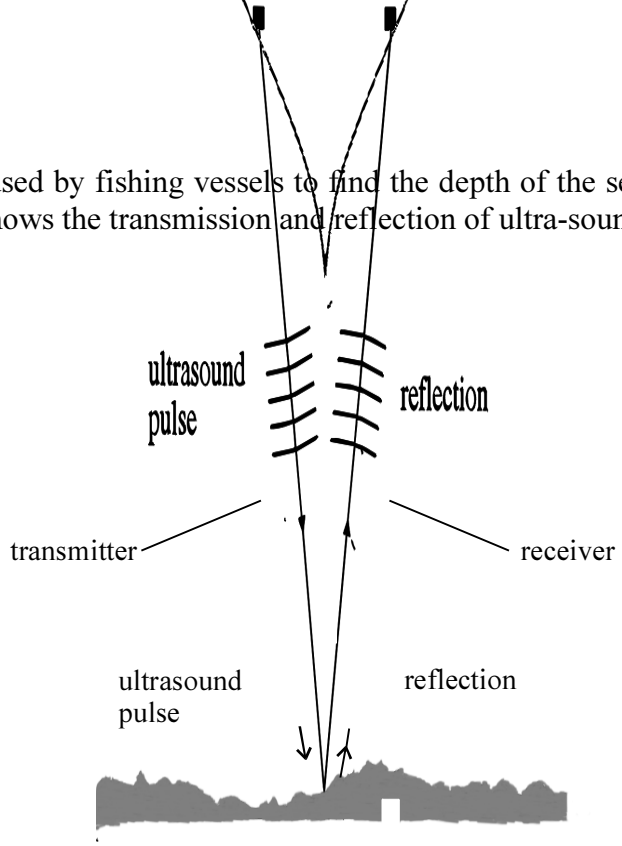
(4)

(Total 11 marks)

TURN OVER FOR QUESTION 3

Leave blank

3. Ultrasound can be used by fishing vessels to find the depth of the sea or to locate shoals of fish. The diagram shows the transmission and reflection of ultra-sound from a fishing vessel.



(a) What is ultrasound?

.....

.....

.....

.....

(2)

Leave blank

(b) The speed of ultrasound in water is 1500 m/s.

(i) The frequency of the ultrasound used for depth finding is 50 000 Hz.

Calculate the wavelength of the ultrasound.

.....

.....

.....

(4)

(ii) On the diagram the depth of the sea is 1200 m.

Calculate the time it would take for the ultrasound wave to travel from the transmitter to the sea-bed and back to the receiver.

.....

.....

.....

(4)

(c) Waves with small wavelengths spread out (diffract) less than those with long wavelengths. Use this information to suggest why ultrasound is much better than ordinary sound for finding the depth of the sea.

.....

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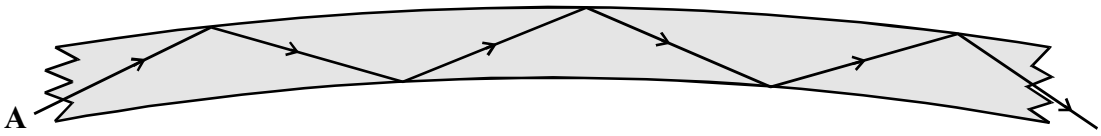
(3)

(Total 13 marks)

TURN OVER FOR QUESTION 4

Leave blank

4. (a) The diagram shows the passage of light beam **A** travelling down an optical fibre.



(i) State the name of the process that takes place as the light **A** beam travels down the optical fibre.

.....

(1)

(ii) Complete the diagram to show the passage of the light beam **B** down the same optical fibre.

(1)

(iii) Suggest why beam **B** will take slightly longer to travel down the fibre than beam **A**.

.....

.....

.....

.....

(2)

Leave blank

(b) Optical fibres are used to carry information. The information is carried by the light beam in the form of a digital signal.

(i) Draw a diagram to show what is meant by a digital signal.

(1)

(ii) The signal from a microphone is an analogue signal. How does an analogue signal differ from a digital signal?

.....

.....

(1)

(c) When signals are sent through optical fibres they lose energy.

(i) State what happens to the brightness of the light beam as it loses energy.

.....

(1)

(ii) State **one** disadvantage of losing energy as the light beam travels through the optical fibre.

.....

.....

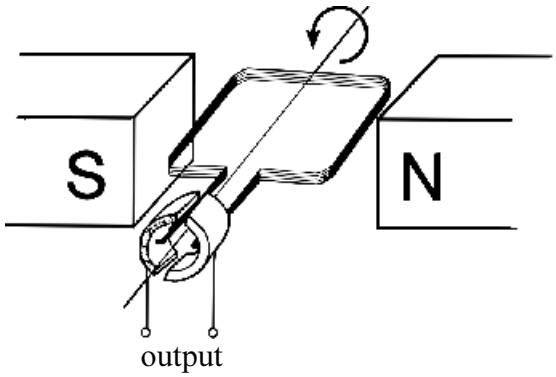
(1)

(Total 8 marks)

TURN OVER FOR QUESTION 5

Leave blank

5. (a) The diagram shows the construction of a simple electrical generator. When the coil is rotated, an alternating voltage is produced at the output.



(i) Explain what is meant by an alternating voltage.

.....

.....

(1)

(ii) State **two** ways in which the voltage output could be increased.

1 .....

2 .....

(2)

Leave blank

(b) The generators at a power plant produce a voltage of 25 000 V. For long distance transmission, on overhead power lines, this is stepped up to 400 000 V. It is later stepped down to 240 V for domestic use.

(i) Explain why the voltage is stepped up to 400 000 V.

.....

.....

.....

.....

(2)

(ii) A transformer is used to step up the voltage. Calculate the ratio of primary turns to secondary turns needed for this transformer.

.....

.....

.....

(3)

(c) Give **one** advantage and **one** disadvantage of increasing the thickness of overhead power lines.

Advantage.....

.....

Disadvantage .....

.....

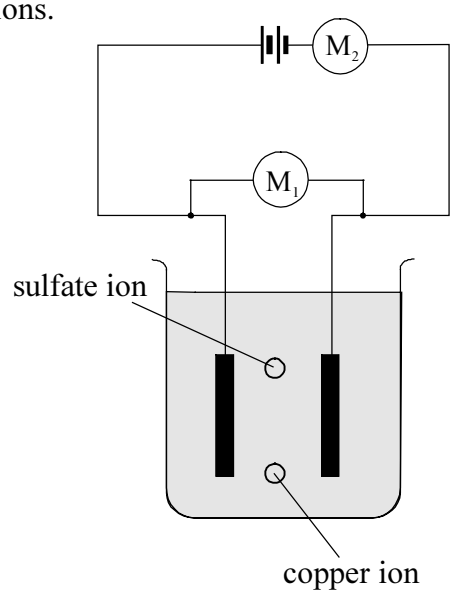
(2)

(Total 10 marks)

TURN OVER FOR QUESTION 6

Leave blank

6. The diagram shows the arrangement used for copper-plating an object. The electrolyte used is copper sulfate which when dissolved in water produces positive copper (Cu^{2+}) ions and negative sulfate (SO_4^{2-}) ions.



(a) (i) On the diagram, add arrows to show which way the ions move.

(1)

(ii) Which meter reading shows that the ions are moving through the electrolyte? Explain your answer.

.....

.....

.....

(2)

Leave blank

(b) In an electrolysis experiment, a voltage of 6 V produced a current of 0.5 A. The current passed for 5 minutes.

(i) Calculate the charge passing through the electrolyte during this time.

.....

.....

.....

.....

(4)

(ii) The charge on a copper ion (Cu^{2+}) is 3.2×10^{-19} coulombs. Calculate the total number of copper ions moving through the electrolyte in 5 minutes.

.....

.....

.....

(2)

(iii) How much energy is used in moving each copper ion through the electrolyte?

.....

.....

.....

.....

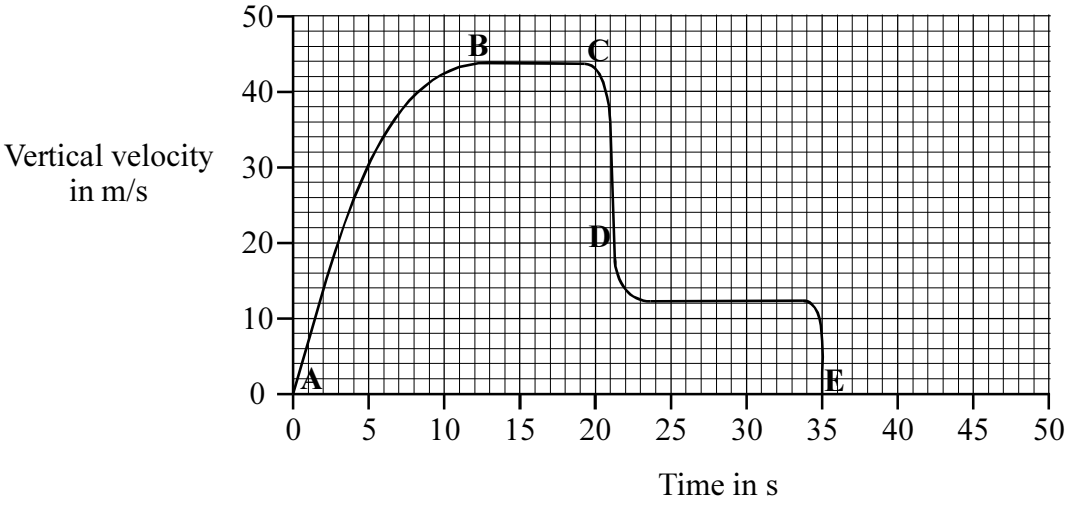
(3)

(Total 12 marks)

TURN OVER FOR QUESTION 7

Leave blank

7. A sky-diver of mass 70 kg jumps from a plane. The graph shows how the vertical velocity of the sky-diver varies with time. Parts of the graph have been labelled **A**, **B**, **C**, **D** and **E**.



(a) At **A**, the sky-diver has an acceleration equal to the acceleration due to gravity of l0 m/s^2. Calculate the resultant force acting on the sky-diver at this instant.

.....

.....

.....

(3)

(b) How can you tell from the graph that in the time period from **B** to **C** the resultant force acting on the sky-diver is zero?

.....

.....

.....

.....

(2)

Leave blank

(c) Describe and explain the motion of the sky-diver from **C** until he lands at **E**.

.....

.....

.....

.....

.....

.....

.....

(4)

(d) A sky-diver, of the same mass, falls from the same height but uses a parachute with a larger surface area. On the grid, sketch a graph to show his motion.

(2)

(Total 11 marks)

TURN OVER FOR QUESTION 8

Leave blank

8. (a) The nearest star to the Earth is the Sun. Heat and light from the Sun arrive at the Earth's surface after travelling many millions of kilometres through space.

(i) How does this confirm that heat and light are electromagnetic radiation?

.....

.....

(1)

(ii) Which part of the electromagnetic spectrum is associated with heat radiation?

.....

(1)

(iii) The Sun also emits ultraviolet radiation.

What are the health hazards of this type of radiation?

.....

.....

.....

.....

(2)

(b) Stars are formed from very large clouds of gases, mainly hydrogen and helium, and some dust. These clouds collapse under the action of gravity.

(i) Describe the energy changes taking place as clouds of gas and dust particles collapse under the action of gravity.

.....

.....

.....

.....

(2)

(ii) Explain why nuclear reactions take place if a sufficiently large cloud of material collapses under the action of gravity.

.....

.....

.....

.....

(2)

(c) The fusion of hydrogen takes place in the core of the Sun to produce helium. This process releases considerable amounts of energy.

Describe the sequence of events which may occur as a star uses up its supply of hydrogen.

Leave blank

.....

.....

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.....

.....

(4)

(d) One of the theories concerned with the origin of the universe is the 'Big Bang' theory. Describe this theory and state what evidence there is to support it.

.....

.....

.....

.....

.....

.....

(3)

(Total 15 marks)

TOTAL MARK 90

END

Syllabus 1522

Science: Double Award A

Specimen Paper 1F

MARK SCHEME

First Examination Summer 2003

Edexcel
Success through qualifications

USING THE MARK SCHEME

1. This mark scheme gives you;
   * an idea of the type of response expected
   * how individual marks are to be awarded
   * the total mark for each question
   * examples of responses that should not receive credit.
2. ; separates points for the award of each mark.
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MARKING

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AMPLIFICATION

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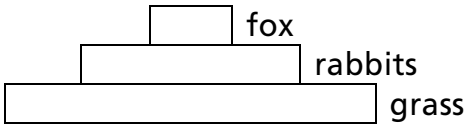
4. If candidates use chemical formulae instead of chemical names, credit can only be given if the formulae are correct..

QUALITY OF WRITTEN COMMUNICATION

This logo indicates where students will be assessed on their ability to:

- present relevant information in a form that suits its purpose
- ensure that spelling, punctuation and grammar are accurate, so that the meaning is clear
- use a suitable structure and style of writing.

1. (a)



1 mark for shape
1 mark for labels — 2

(b) (i) numbers decrease/eq; — 1

(ii) no food/grass for rabbits/eq;
no food/rabbits for foxes; — 2

Total 5 marks

2. decreases;
decreases;
increases;
stays the same; — 4

Total 4 marks

3. (a) keep (sulfur dioxide) gas in/keep water vapour in/eq; — 1

(b) control/see what effect water had/comparison; — 1

(c) Any two from:
- temperature;
- dampness of cotton wool/humidity;
- size of bag;
- transparency/thickness of bag;
- number of seeds; — 2

(d) diffusion ☑ ; — 1

(e) (i) 75; — 1

(ii) no germination happened/eq; — 1

Total 7 marks

4. (a) (i) 37.1; — 1

(ii) 14/15; — 1

(iii) thermometer; — 1

(b) (i) oestrogen; 1

(ii) (in the) blood; 1

(iii) Any two from:
- enlarged breasts;
- body shape eg hips widen;
- lack of facial hair;
- high voice; 2

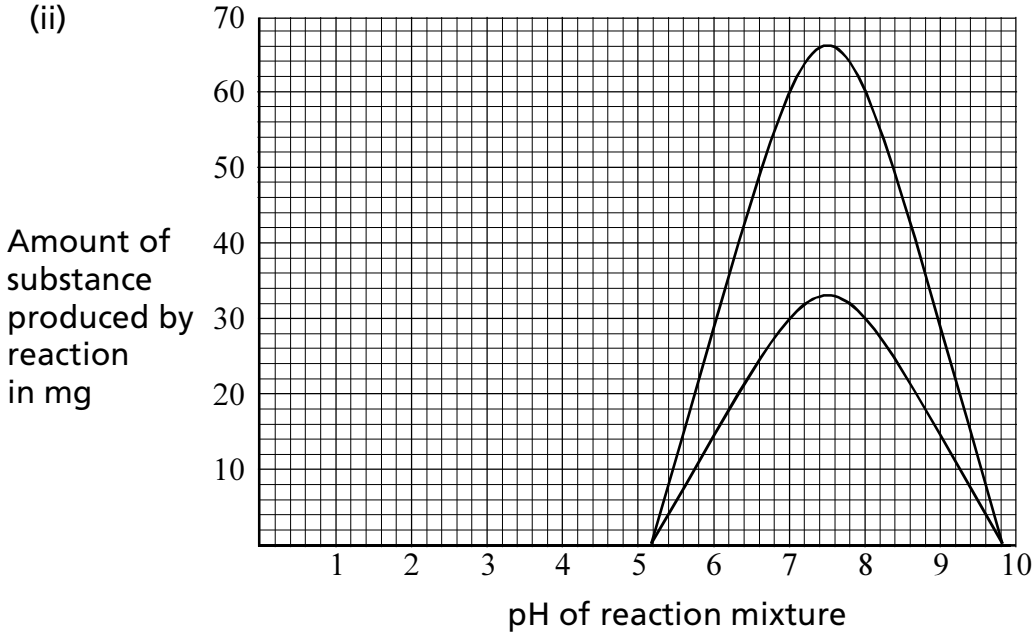
(iv) for embryo to implant/placenta to establish/
to allow fetus to develop/obtain enough nutrients; 1

Total 8 marks

5. (a) 50 (mg); 1

(b) (i) 2.5; 1

(ii)



same max and min pH values;
peak height about half original; 2

(c) (i) amino acid/polypeptide; 1

(ii) glucose; 1

Total 6 marks

6. (a) X – intercostal/muscle;
Y – diaphragm; 2

(b) bronchioles; 1

(c) 250; 1

(d) (i) 3; 1

(ii) higher;
less daily variation/eq; 2

(iii) (yes) normal never drops to 230/230 is a low reading/eq; 1

(e) A suggestion to include:
- widen/eq;
- bronchioles/bronchi/small tubes; 2

Total 10 marks

7. (a) (i) seven; 1

(ii) 1; 1

(iii) pupil size decreases;
as light intensity increases; 2

(b) retina;
brain;
optic;
muscle;
iris; 5

Total 9 marks

8. (a) C/Lucy and Daniel have same coloured eyes; 1

(b) (i) male;
blue; 2

(ii) X from ovum/mother;
Y from sperm/father; 2

(c) (i) Lucy; 1

(ii) Rachel's twin must:
- be a girl/Lucy or Sarah;
- have brown eyes/can't have blue eyes; 2

Total 8 marks

9. (a) (i) numbers remain constant/eq;
over a long period of time; 2

(ii) A suggestion to include two from:
- predation;
- some survive;
- to continue the species/eq; 2

(iii) mutation/environmental factor/eq; 1

(iv) A description to include three from:
- environmental pressure/eq;
- competition;
- individuals with beneficial characteristics;
- survive;
- reproduce;
- pass on characteristic to offspring;

plus one communication mark for ensuring that spelling, punctuation and grammar are accurate, so that the meaning is clear; 4

(b) nature plays an important part in artificial section; 1

(c) lecture;
publish (in journal); 2

Total 12 marks

10. M;
B;
J;
L;
B; 5

Total 5 marks

11. (a) (i) carbon dioxide; 1

(ii) direction of arrow downwards; 1

(iii) **Either** control has no mealworms;
or has water/no sodium hydroxide solution; 1

(b) (i) An explanation to include two from:
- increase in activity/enzyme reaction/ metabolism/eq;
- more oxygen used as temperature rises;
- levels off at higher temperature; 2

(ii) 2.5; 1

(iii) A suggestion to include two from:
- correct reference to the (fall of) rate of respiration;
- denature enzymes;
- mealworms killed/die;
- no results obtainable/rate falls/eq; 2

Total 8 marks

12. (a) A letter to include four from:
- in water;
- light;
- reference to suitable temperature;
- minerals/named mineral;
- add carbon dioxide;
- keep herbivores out;
- remove dead algae;

plus one communication mark for using a suitable structure and style of writing; 5

(b) Three suggestions from:
- less greenhouse effect/global warning;
- more photosynthesis;
- absorbs carbon dioxide;
- habitats remain;
- less disruption to food chains/webs;
- less risk of species extinction;
- less risk of soil erosion/floods; 3

Total 8 marks

TOTAL MARK 90

Syllabus 1522

Science: Double Award A

Specimen Paper 2F

MARK SCHEME

First Examination Summer 2003

Edexcel
Success through qualifications

1522.2F/1530.1F

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- use of a suitable structure and style of writing.

1. (a) (i) S; 1

(ii) lithium/potassium/rubidium/caesium/francium; 1

(iii) beryllium/magnesium/calcium/strontium/barium/radium; 1

(iv) oxygen/sulfur/selenium/tellurium/polonium; 1

(v) 10; 1

(vi) lithium/beryllium/boron/carbon/nitrogen/oxygen/fluorine/neon; 1

(b) Any two non-metallic elements;; 2

Total 8 marks

2. (a) H_2O;
N_2;
CO; 3

(b) (i) volcanoes / volcanic activity; 1

(ii) Two from:
- carbon monoxide;
- water vapour;
- carbon dioxide;

hydrogen; 2

(iii) oxygen; 1

(c) A description to include:
- (bubble gas through) limewater;
- which turns milky/cloudy; 2

(d) (i) increases; 1

(ii) decreases; 1

Total 11 marks

3. (a) A description to include three from:
- fizzes/bubbles;
- moves about;
- floats on water;
- white smoke;
- burns with **yellow** flame;
- dissolves/gets smaller;

plus 1 communication mark for presenting relevant information in a form that suits its purpose; 4

	(b)		hydrogen;	1
	(c)		alkaline;	1
	(d)		increases;	1
				Total 7 marks
4.	(a)	(i)	55%;	1
		(ii)	good electrical conductor/ductile;	1
		(iii)	not corroded/malleable/not toxic;	1
	(b)	(i)	carbon;	1
		(ii)	CO_2; (g);	2
		(iii)	D;	1
				Total 7 marks
5.	(a)	(i)	hydrogen;	1
		(ii)	ethane;	1
		(iii)	hexane;	1
		(iv)	propane;	1
	(b)	(i)	points plotted correctly;; smooth curve;	3
		(ii)	value in range 32 to 38 °C;	1
	(c)	(i)	fractional; distillation;	2
		(ii)	Any two from: • petrol; • naphtha; • kerosine; • diesel (oil); • fuel oil;	2
	(d)		oxygen; water/steam/hydrogen oxide;	2
				Total 14 marks

6. (a) (i) Particle A - electron;
Particle B - neutron;
Particle C - proton; 3

(ii) 7; 1

(iii) one electron in outer shell; 1

(b) $2Na + Cl_2 \longrightarrow 2NaCl$
formulae correct;
balanced; 2

Total 7 marks

7. (a) atom: 2:8:7/equivalent diagram;;
ion: 2:8:8/equivalent diagram;;
in each case allow 1 mark for correct outer shell; 4

(b) An explanation to include:
- large amount of energy needed;
- to overcome strong forces/bonds between ions; 2

(c) 1. left - electrolyte/sodium chloride (solution);
2. top right - chlorine;
3. bottom right - anode/**positive** electrode; 3

(d) Test for hydrogen:
- lighted splint;
- gives 'pop';

Test for chlorine:
- (damp) litmus (paper);

bleached; 4

(e) sodium hydroxide (solution); 1

Total 14 marks

8. (a) it is rare; 1

(b) home-made equipment/tiny globules/made in a woodshed; 1

(c) endothermic/C; 1

(d) An explanation to include three from:
- process not discovered until 1886;
- electricity needed/electrolysis uses electricity;
- electricity unavailable before this time;
- aluminium compounds are stable;

plus 1 communication mark for using a suitable structure and style of writing; 4

Total 7 marks

9. (a) 42 (cm^3); 1

(b) rate of reaction decreases;
as acid concentration falls/reactants or acid used up/
fewer collisions; 2

(c) line steeper than original;
but reaching same maximum volume; 2

(d) A suggestion to include:
- powder burns faster than lumps;
- because of greater surface area; 2

Total 7 marks

10. (a) air; 1

(b) natural/North Sea gas; 1

(c) (i) $NH_3 + HNO_3 \longrightarrow NH_4NO_3$
LHS formulae;
RHS formulae;
balanced; 3

(ii) to grow bigger/better crops; 1

(iii) increased plant life in rivers;
chokes rivers/eventually uses up oxygen in rivers; 2

Total 8 marks

TOTAL MARK 90

Syllabus 1522

Science: Double Award A

Specimen Paper 3F

MARK SCHEME

First Examination Summer 2003

Edexcel
Success through qualifications

USING THE MARK SCHEME

1. This mark scheme gives you;
   * an idea of the type of response expected
   * how individual marks are to be awarded
   * the total mark for each question
   * examples of responses that should not receive credit.
2. ; separates points for the award of each mark.
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4. ( ) means that a phrase/word is not essential for the award of the mark but helps the examiner to get the sense of the expected answer.
5. Phrases/words in **bold** indicate that the meaning of the phrase/word is **essential** to the answer.
6. OWTTE (or words to that effect) and eq (equivalent) indicate that valid alternative answers (which have not been specified) are acceptable.
7. 'Ignore' means that this answer is not worth a mark but does not negate an additional correct response.
8. 'Reject' means that the answer is wrong and negates any additional correct response for that specific mark.
9. ORA (or reverse argument) indicates that the complete reverse is also valid for the award of marks.
10. ecf (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

MARKING

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2. The sub-total marks for a question should be added together and the total mark written and ringed at the end of the question then transferred to the front of the script.
3. Suggestion/explanation questions should be marked correct even when the suggestion is contained within the explanation.
4. **Do not** award marks for repetition of the stem of the question.
5. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct scientific context.

AMPLIFICATION

1. In calculations, full credit must be given for a bald, correct answer. If a numerical answer is incorrect, look at the working and award marks according to the mark scheme.
2. Consequential marking should be used in calculations. This is where a candidate's working is correct but is based upon a previous error. When consequential marks have been awarded write "ecf" next to the ticks.
3. If candidates use the mole in calculations they must be awarded full marks for a correct answer even though the term may not be on the syllabus at their level.
4. If candidates use chemical formulae instead of chemical names, credit can only be given if the formulae are correct.

QUALITY OF WRITTEN COMMUNICATION

This logo indicates where students will be assessed on their ability to:

- present relevant information in a form that suits its purpose
- ensure that spelling, punctuation and grammar are accurate, so that the meaning is clear
- use a suitable structure and style of writing.

1.	(a)		Pluto;	1
	(b)		Pluto; heat; icreases;	3
	(c)		low density;	1
	(d)	(i)	largest value of surface gravity;	1
		(ii)	Pluto;	1

Total 7 marks

2.	(a)	(i)	cooker; highest power/most current;	2
		(ii)	biggest current for same voltage/needs high current/ high power; largest current with lowest resistance;	2
		(iii)	thick cables have a lower resistance; thick cables produce less heat;	2
	(b)		each lamp has its own circuit/ each lamp can be switched separately; each lamp has the same voltage/ each can operate at own power;	2

Total 8 marks

3.	(a)		friction for grip/so tyre can push back on ground; car moves forward/forward push of ground;	2
			friction between hands; produces heat energy/keeps hands warm;	2
			plus 1 communication mark for using a suitable structure and style of writing;	1
	(b)		upward arrow; labelled reaction/push of table; downward arrow; labelled weight/pull of Earth;	4

Total 9 marks

4. (a) friction;
electrostatic;
electrons;
attract; 4

(b) (i) correct direction of movement shown (towards metal plates); 1

(ii) An explanation to include:
- repelled from positive grid;
- attracted to negative plates; 2

[Allow like charges repel/unlike charges attract for 1 mark]

(iii) to make dust particles fall off/
in order to collect dust particles/to clean the plates; 1

Total 8 marks

5. (a) (i) become compressed/compacted/smaller/squashed/
decrease in size/go down/pushed together; 1

(ii) smallest spring circled; 1

(iii) most compressed/smallest spring/OWTTE;
[a comparative statement is needed] 1

(b) Two suggestions from:
- use more springs (in the middle);
- use stiffer/stronger springs (in the middle);
- sensible use of material;
- more coils in the spring; 2

(c) (i) arrow pointing down; 1
[Ignore point of action]

(ii) downward;
Earth; 2

Total 8 marks

6. (a) (i) points plotted correctly;;
smooth curve drawn; 3

(ii) about 3 km/h; 1

(iii) 1160 watts; 1

(iv) not always windy/variable output/too much land needed; 1

(b) kinetic/movement;
electrical; 2

Total 8 marks

7. (a) (i) 65%; 1

(ii) walls - draught excluder/curtains/cavity wall insulation;
floor - carpets/wooden floors; 2
[Accept damp proofing for 1 mark]

(b) (i) 108 W; 1

(ii) 224×3600;;
8.06×10^5 (J); 3
[Allow 2 marks where 3600 sec has been missed/224×60]

(c) An explanation to include two of:
- approx 50% of heat lost through window saved;
- windows only account of 10% of energy lost;
- only approx 5% saving on heating bills;
- makes connection between energy and cost;

plus 1 communication mark for presenting relevant information in a form that suits its purpose; 3

Total 10 marks

8. (a) (i) 86; 1

(ii) 134; 1

(iii) An explanation to include particles with:
- same number of protons;
- different numbers of neutrons; 2

(b) (i) An explanation to include:
- gas breathed in;
- α - particles cannot pass through living tissue;
- named health risk; 3

(ii) A discussion to include three of:
- lack of understanding of dangers;
- evidence;
- cost;
- information not widely known;
- complacency;
- information did not spell out dangers clearly;
- regional variation;

plus 1 communication mark for ensuring that spelling, punctuation and grammar are accurate, so that the meaning is clear; 4

Total 11 marks

9. (a) (very) high frequency sound;
beyond human hearing/humans cannot hear this frequency; 2

(b) (i) $v = f\lambda$;
$\lambda = \frac{v}{f}$;
$\frac{1500}{50000}$/0.03;
m; 4

(ii) Total distance = 2400 m;
$t = \frac{2400}{1500}$;
= 1.65;
s; 4
[Allow 3 marks max, if total distance taken as 1200 m]

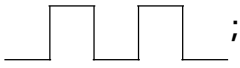
(c) A suggestion to include:
- ordinary sound spreads more;
- concentration less/less intense/ amplitude decreases rapidly;
- range limited/cannot travel far; 3

Total 13 marks

10. (a) (i) total internal reflection; 1

(ii) should show more reflections; 1

(iii) An explanation to include:
- more reflections/hits side more often; 2
- greater distance to travel;

(b) (i)  ; 1
(sharp on/off pulses)

(ii) continuously variable (or diag)/voltage changing all the time/ can have any value (allow mark if shown on diagram); 1

(c) (i) decreases/dims/less intense; 1

(ii) limits range/travels less/ cannot go as far/amplitude less; 1

Total 8 marks

TOTAL MARKS 90

Syllabus 1522

Science: Double Award A

Specimen Paper 4H

MARK SCHEME

First Examination Summer 2003

Edexcel
Success through qualifications

USING THE MARK SCHEME

1. This mark scheme gives you;
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8. 'Reject' means that the answer is wrong and negates any additional correct response for that specific mark.
9. ORA (or reverse argument) indicates that the complete reverse is also valid for the award of marks.
10. ecf (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

MARKING

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4. **Do not** award marks for repetition of the stem of the question.
5. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct scientific context.

AMPLIFICATION

1. In calculations, full credit must be given for a bald, correct answer. If a numerical answer is incorrect, look at the working and award marks according to the mark scheme.
2. Consequential marking should be used in calculations. This is where a candidate's working is correct but is based upon a previous error. When consequential marks have been awarded write "ecf" next to the ticks.
3. If candidates use the mole in calculations they must be awarded full marks for a correct answer even though the term may not be on the syllabus at their level.
4. If candidates use chemical formulae instead of chemical names, credit can only be given if the formulae are correct..

QUALITY OF WRITTEN COMMUNICATION

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- present relevant information in a form that suits its purpose
- ensure that spelling, punctuation and grammar are accurate, so that the meaning is clear
- use a suitable structure and style of writing.

1. (a) C/Lucy and Daniel have same coloured eyes; 1

(b) (i) male;
blue; 2

(ii) X from ovum/mother;
Y from sperm/father; 2

(c) bb; 1

(d) (i) Lucy; 1

(ii) Rachel's twin must:
- be a girl/Lucy or Sarah;
- have brown eyes/can't have blue eyes; 2

Total 9 marks

2. (a) (i) numbers remain constant/eq;
over a long period of time; 2

(ii) A suggestion to include two from:
- predation;
- some survive;
- to continue the species/eq; 2

(iii) mutation/environmental factor/eq; 1

(iv) A description to include three from:
- environmental pressure/eq;
- competition;
- individuals with beneficial characteristics;
- survive;
- reproduce;
- pass on characteristic to offspring;

plus one communication mark for ensuring that spelling, punctuation and grammar are accurate, so that the meaning is clear; 4

(b) nature plays an important part in artificial section; 1

(c) lecture;
publish (in journal); 2

Total 12 marks

3. M;
B;
J;
L;
B; 5

Total 5 marks

4. (a) (i) carbon dioxide; 1

(ii) direction of arrow downwards; 1

(iii) **Either** control has no mealworms;
or has water/no sodium hydroxide solution; 1

(b) (i) An explanation to include two from:
- increase in activity/enzyme reaction/ metabolism/eq;
- more oxygen used as temperature rises;
- levels off at high temperature; 2

(ii) A suggestion to include two from:
- correct reference to the (fall of) rate of respiration;
- denature enzymes;
- mealworms killed/die;
- no results obtainable/rate falls/eq; 2

Total 7 marks

5. (a) A letter to include four from:
- in water;
- light;
- reference to suitable temperature;
- minerals/named mineral;
- add carbon dioxide;
- keep herbivores out;
- remove dead algae;

plus one communication mark for using a suitable structure and style of writing; 5

(b) A suggestion to include three from:
- less greenhouse effect/global warning;
- more photosynthesis;
- absorbs carbon dioxide;
- habitats remain;
- less disruption to food chains/webs;
- less risk of species extinction;
- less risk of soil erosion/floods; 3

Total 8 marks

6. (a) An explanation to include two from:
- dancing generates heat;
- heat transferred out of body/cooling essential/eq;
- prevent enzyme denaturation/death; 2

(b) (i) brain; 1

(ii) kidney; 1

(iii) in the blood/plasma/bloodstream; 1

(c) An explanation to include two from:
- sweat contains salt;
- drinking water does not replace salt;
- water reabsorbed in kidney;
- because of ADH; 2

(d) An explanation to include two from:
- water absorbed;
- by osmosis;
- brain cells contain less water than plasma/eq; 2

Total 9 marks

7. (a) correct letters in boxes;;;; 4

(b) digested;
amino acids;
enzymes;
stomach/pancreas/small intestines;
absorbed; 5

Total 9 marks

8. (a) thymine;
cytosine; 2

(b) 2000 bases;
600 are G/600 are C/1200 are G or C;
800 are A and T/400 are A; 3

Total 5 marks

9. (a) (i) 2.0; 1

(ii) Two suggestions from:
- warm blooded/body temperature constant/eq;
- energy transferred as heat loss;
- respiration rate high;
- active/moves a lot;
- cannot digest food available; 2

Total 3 marks

10. (a) Nn;
NN; 2

(b) two; 1

(c) zero/eq; 1

(d) half/eq; 1

Total 5 marks

11. (a) (i) relay/intermediate; 1

(ii) A description to include two from:
1. synapse;
2. neurotransmitter;
3. diffusion; 2

(b) receptor → neurones → effector → response 3

All correct - 3 marks
3 correct - 2 marks
2 correct - 1 mark
1 correct - 0 marks

Total 6 marks

12. (a) B
A
F
E 3
All correct - 3 marks
3 correct - 2 marks
2 correct - 1 mark
1 correct - 0 marks

(b) 6; 1

(c) Two from:

- reduces/halves chromosome number/ produces haploid cells/eq;
- produces gametes/sex cells/sperms and eggs;
- results in cells which are genetically different;
- occurs in gonads/testes/ovary only;
- produces 4 cells; 2

Total 6 marks

13. An explanation to include five from:

- sulphur dioxide/carbon dioxide/nitrogen oxide;
- from factories/car exhaust/burning fossil fuel;
- acid rain;
- kills plants/deforestation;
- kills fish;
- carbon monoxide;
- less oxygen in blood;
- can kill;
- greenhouse effect/global warming;
- eg carbon dioxide/water vapour;
- flooding;
- loss of habitats;
- species extinction;
- disruption of food chains/webs;
- depletion of ozone layer;
- CFCs;
- danger from ultraviolet/UV radiation;

plus one communication mark for using a suitable structure and style of writing; 6

Total 6 marks

TOTAL MARK 90

Syllabus 1522

Science: Double Award A

Specimen Paper 5H

MARK SCHEME

First Examination Summer 2003

Edexcel
Success through qualifications

1522.5H/1530.3H

USING THE MARK SCHEME

1. This mark scheme gives you;
   * an idea of the type of response expected
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2. Consequential marking should be used in calculations. This is where a candidate's working is correct but is based upon a previous error. When consequential marks have been awarded write "ecf" next to the ticks.
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1. (a) (i) Particle A - electron;
Particle B - neutron;
Particle C - proton; 3

(ii) 7; 1

(iii) one electron in outer shell; 1

(b) $2Na + Cl_2 \longrightarrow 2NaCl$
formulae correct;
balanced; 2

Total 7 marks

2. (a) atom: 2:8:7/equivalent diagram;;
ion: 2:8:8/equivalent diagram;; 4
in each case allow 1 mark for correct outer shell;

(b) An explanation to include:
- large amount of energy needed;
- to overcome strong forces/bonds between ions; 2

(c) 1. left - electrolyte/sodium chloride (solution);
2. top right - chlorine;
3. bottom right - anode/**positive** electrode;
3

(d) Test for hydrogen:
- lighted splint;
- gives 'pop';

Test for chlorine:
- (damp) litmus (paper);
- bleached; 4

(e) sodium hydroxide (solution); 1

Total 14 marks

3. (a) it is rare; 1

(b) home-made equipment/tiny globules/made in a woodshed; 1

(c) endothermic/C; 1

(d) An explanation to include three from:
- process not discovered until 1886;
- electricity needed/electrolysis uses electricity;
- electricity unavailable before this time;
- aluminium compounds are stable;

plus 1 communication mark for using a suitable structure and style of writing; 4

Total 7 marks

4. (a) 42 (cm^3); 1

(b) rate of reaction decreases;
as acid concentration falls/reactants or acid used up;
fewer collisions; 2

(c) line steeper than original;
but reaching same maximum volume; 2

(d) A suggestion to include:
- powder burns faster than lumps;
- because of greater surface area; 2

Total 7 marks

5. (a) air; 1

(b) natural/North Sea gas; 1

(c) (i) $NH_3 + HNO_3 \longrightarrow NH_4NO_3$
LHS formulae;
RHS formulae;
balanced; 3

(ii) to grow bigger/better crops; 1

(iii) increased plant life in rivers;
chokes rivers/eventually uses up oxygen in rivers; 2

Total 8 marks

6. (a) greater yield of methanol;
faster reaction; 2

(b) (i) An explanation to include:
- greater yield of methanol;
- forward reaction/ formation of methanol is exothermic;
- lower temperature allows equilibrium to move in exothermic direction;

plus one communication mark for ensuring text is legible and that spelling, punctuation and grammar are accurate, so that the meaning is clear; 4

(ii) An explanation to include:
- molecules collide with less energy/less frequently;
- slower reaction; 2

Total 8 marks

7. (a) An explanation to include:
- marine organisms/crustaceans died;
- shells/skeletons built up in layers;
- compressed to form rock over time;

plus 1 communication mark for presenting relevant information in a form that suits its purpose; 4

(b) metamorphic; 1

(c) 100 g $CaCO_3$;
produces 40 g of CaO;
therefore 25 g $CaCO_3$ produces 10 g CaO; 3

(d) (i) any **soluble** metal iodide/hydrogen iodide; 1

(ii) red-brown colour produced; 1

(iii) gains electrons; 1

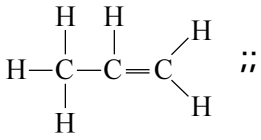
(iv) 2;
$2e^-$; 2

Total 13 marks

8. (a) An explanation to include:
- the more carbon atoms, the higher the boiling point;
- more energy needed to separate larger molecules; 2

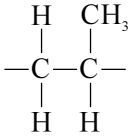
(b) (i) A description to include two from:
- high temperature;
- catalyst;
- absence of air; 2

(ii) A description to include:
- bromine (water);
- is decolourised; 2

(c) (i)  ;;
[Allow one mark for C=C] 2

(ii) $C_{10}H_{22} \longrightarrow 2C_3H_6 + C_4H_{10}$;; 2
[Allow one mark for $C_{10}H_{22} \longrightarrow C_3H_6 + C_7H_{16}$]

(d) (i) double bond; 1

(ii)  2

(iii) poly(propene) stronger; 1

Total 14 marks

9. (a)

17	17	18
17	17	20

each vertical pair; 3

(b) (i) $(0.75 \times 37) + (0.25 \times 35) = 35.5$;; 2

(ii) 71; 1

(c) correct diagram;; 2
[Allow one mark for one shared pair of electrons]

(d) O $\frac{18.39}{16} = 1.149$;
Cl $\frac{81.61}{35.5} = 2.299$;
ratio O:Cl 1:2;
empirical formula: OCl_2/Cl_2O; 4

Total 12 marks

TOTAL MARK 90

Syllabus 1522

Science: Double Award A

Specimen Paper 6H

MARK SCHEME

First Examination Summer 2003

Edexcel
Success through qualifications

1522.6H/1540.3H

USING THE MARK SCHEME

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AMPLIFICATION

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- ensure that spelling, punctuation and grammar are accurate, so that the meaning is clear
- use a suitable structure and style of writing.

1. (a) (i) 65%; 1

(ii) walls - draught excluder/curtains/cavity wall insulation;
floor - carpets/wooden floors; 2
[Accept damp proofing for 1 mark]

(b) (i) 108 W; 1

(ii) 224×3600;;
8.06×10^5 (J); 3
[Allow 2 marks where 3600 sec has been missed/224×60]

(c) An explanation to include two of:
- approx 50% of heat lost through window saved;
- windows only account of 10% of energy lost;
- only approx 5% saving on heating bills;
- makes connection between energy and cost;

plus 1 communication mark for presenting relevant information in a form that suits its purpose; 3

Total 10 marks

2. (a) (i) 86; 1

(ii) 134; 1

(iii) An explanation to include particles with:
- same number of protons;
- different numbers of neutrons; 2

(b) (i) An explanation to include:
- gas breathed in;
- α - particles cannot pass through living tissue;
- named health risk; 3

(ii) A discussion to include three of:
- lack of understanding of dangers;
- evidence;
- cost;
- information not widely known;
- complacency;
- information did not spell out dangers clearly;
- regional variation;

plus 1 communication mark for ensuring that spelling, punctuation and grammar are accurate, so that the meaning is clear; 4

Total 11 marks

3. (a) (very) high frequency sound;
beyond human hearing/humans cannot hear this frequency; 2

(b) (i) $v = f\lambda$;
$\lambda = \frac{v}{f}$;
$\frac{1500}{50\,000}$/0.03;
m; 4

(ii) Total distance = 2400 m;
$t = \frac{2400}{1500}$;
= 1.65;
s; 4
[Allow 3 marks max, if total distance taken as 1200 m]

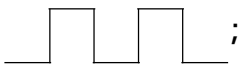
(c) A suggestion to include:
- ordinary sound spreads more;
- concentration less/less intense/ amplitude decreases rapidly;
- range limited/cannot travel far; 3

Total 13 marks

4. (a) (i) total internal reflection; 1

(ii) should show more reflections; 1

(iii) An explanation to include:
- more reflections/hits side more often; 2
- greater distance to travel;

(b) (i)  ; 1

(sharp on/off pulses)

(ii) continuously variable (or diag)/voltage changing all the time/ can have any value (allow mark if shown on diagram); 1

(c) (i) decreases/dims/less intense; 1

(ii) limits range/travels less/ cannot go as far/amplitude less; 1

Total 8 marks

5. (a) (i) changing polarity, 1

(ii) Any two from:
- stronger magnet;
- more turns;
- increase speed rotation;
- placing coil on soft iron core; 2

(b) (i) An explanation to include:
- higher V, less I;
- less I, lower heating effect; 2

(ii) $\frac{N_p}{N_s} = \frac{V_p}{V_s}; = \frac{25000}{400\,000} = \frac{1}{16}\left(\text{or } \frac{16}{1} \text{ if secondary to primary}\right);;$ 3

(c) Advantage: less resistance;
Disadvantage: heavier; 2

Total 10 marks

6. (a) (i) copper ions towards negative plate ie to right
sulfate ions towards positive plate ie to left; 1

(ii) An explanation to include:
- ammeter/M_2;
- moving charges make a current; 2

(b) (i) $Q = It$;
$= 0.5 \times 5 \times 60$;
$= 150$;
C;
[Max 3 marks where 60 sec has been omitted] 4

(ii) $150/3.2 \times 10^{-19}$;
4.688×10^{20};
[Allow ecf from part (b)(i)] 2

(iii) 6 J/C;
$6 \times (3.2 \times 10^{-19}) = 1.92 \times 10^{-18}$;
J; 3

Total 12 marks

7. (a) $F = m \times a$ / $W = m \times g$;
$= 70 \times 10$;
= 700 N; 3

(b) speed constant;
upward force = downward force/
forces balanced/from F = ma if a = 0; 2

(c) A description and an explanation to include:
- opens parachute at C;
- drag force increased/upward force increased;
- lower terminal velocity;

plus 1 communication mark for using a suitable structure and style of writing; 4

(d) shows lower terminal velocity at D;
shows longer time to land; 2

Total 11 marks

8. (a) (i) only electromagnetic waves can travel through space/vacuum; 1

(ii) infra-red; 1

(iii) cancer (skin);
one other identified danger eg damage to eyes; 2

(b) (i) A description to include:
- potential energy at distance/ KE increases as particles move in;
- heat energy increases; 2

(ii) An explanation to include:
- KE increasing therefore temperature increasing/ total energy more;
- at high temperature nuclei can undergo fusion; 2

(c) A description of events to include three from:
- hydrogen gone $\rightarrow$ centre cools;
- star pulled in, collapses;
- KE increased again, temp rises;
- fusion of heavier elements;
- Red giant;
- explosion;

plus 1 communication mark for presenting relevant information in a form that suits its purpose 4

(d) A description to include three from:
- hot "super atom" erupted in a burst of energy;
- Universe is expanding/ galaxies appear to be moving apart;
- background microwave radiation from every direction in space;
- red shift of emission spectrum;
- started with explosion; 3

Total 15 marks

TOTAL MARK 90

SPECIFICATION GRID Specimen Paper

GCSE SCIENCE: DOUBLE AWARD A

Syll. No. 1522 Paper No. 1F Foundation Tier

Maximum mark for Paper 90 Page 1 of 1 **Date 7 November 2000**

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of Demand		SocEET aspects	Short ans./ Object.	Equⁿ & Calcⁿ.	Extended Prose		
		AO1		AO2	AO3		Low	Stand.						
		K & U												
		51 – 62										= 2	> 2	Comm.
		Recall	Other	Applicⁿ	Inv.Sc.		G-E	D-C						
		17-21	34-41	28-39	0-5	90	45-54	36-45	✔	≤60	seeCQC	~18	~5	~3
1	4.03/05		3	2		5	5		✔	3		2		
2	1.11/40/41	2	2			4	4		✔	4				
3	4.02	1		4	2	7	7		✔	6	1			
4	1.25/27/28	4	2	2		8	8		✔	8				
5	1.08/09	2		4		6	6		✔	6				
6	1.16	2	3	5		10	10		✔	8		2		
7	1.20/21/23	2	3	4		9	9			7		2		
8	3.14	2	2	4		8		8		4		4		
9	3.04/12	3	7	2		12		12	✔	4		4	3	1
10	1.07/15		5			5		5	✔	5				
11	1.09/18	1	4	2	1	8		8	✔	4		4		
12	2.06/4.04	2	3	2	1	8		8		3			4	1
	Total	21	34	31	4	90	49	41		62	1	18	7	2

SPECIFICATION GRID Specimen Paper

GCSE SCIENCE: DOUBLE AWARD A

Syll. No. 1522 Paper No. 2F Foundation Tier

Maximum mark for Paper 90 Page 1 of 2

YEAR of EXAM 2003

Date 7 November 2000

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equⁿ & Calcⁿ.	Extended Prose		
		AO1		AO2	AO3		Low	Stand.				= 2	> 2	Comm.
		K & U												
		51 – 62												
		Recall	Other	Applicⁿ	Inv.Sc.		G-E	D-C						
		17-21	34-41	28-39	0-5	90	45-54	36-45	✔	≤60	seeCQC	~18	~5	~3
1(a)	1.03/2.02/3.02		6				6			6				
(b)	3.01			2		8	2			2				
2(a)	2.02	2	1				3			3				
(b)	6.08/09/10	2	2				4			4				
(c)	4.16	2					2					2		
(d)	6.13		2			11	2			2				
3(a)	3.11	1	2	1			4						3	1
(b)	3.11	1					1			1				
(c)	3.12			1			1			1				
(d)	5.10		1			7	1			1				
4(a)	3.22		2	1			3		✔	2	1			
(b)	2.01/02/05/ 4.01	1	3			7	4			4				
5(a)	4.11/13/22		2	2			4			4				
(b)	4.13		3	1			3	1			4			
(c)	4.12/14	4					4		✔	4				
(d)	4.15		2			14	2			2				
6(a)	1.01/03/3.05		1	4				5		5				
(b)	2.04			2		7		2			2			
7(a)	1.04/09		4					4		4				
(b)	1.10	1	1					2				2		
(c)	3.13			3				3		3				
(d)	3.13	4						4	✔			4		
(e)	3.13		1			14		1		1				

SPECIFICATION GRID Specimen Paper

GCSE SCIENCE: DOUBLE AWARD A

Syll. No. 1522 Paper No. 2F Foundation Tier

Maximum mark for Paper 90 Page 2 of 2

YEAR of EXAM 2003

Date 7 November 2000

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equⁿ & Calcⁿ.	Extended Prose		
		AO1		AO2	AO3		Low	Stand.						
		K & U										= 2	> 2	Comm.
		51 – 62												
		Recall	Other	Applicⁿ	Inv.Sc.		G-E	D-C						
		17-21	34-41	28-39	0-5	90	45-54	36-45	✔	≤60	seeCQC	~18	~5	~3
8(a)	4.03			1				1	✔	1				
(b)	4.06			1				1	✔	1				
(c)	5.11		1					1	✔	1				
(d)	4.04/05			4		7		4	✔				3	1
9(a)	5.03			1				1		1				
(b)	5.03/04		2					2				2		
(c)	5.04			2				2		2				
(d)	5.04/05			2		7		2	✔			2		
10(a)	6.01	1						1		1				
(b)	4.21	1						1		1	6			
(c)	6.04/05/06		3	3		8		6	✔	3	3			
	Total	20	39	31		90	46	44		58	10	14	6	2

SPECIFICATION GRID Specimen Paper

GCSE SCIENCE: DOUBLE AWARD A

Syll. No. 1522 Paper No. 3F Foundation Tier

Maximum mark for Paper 90 Page 1 of 2 **Date 7 November 2000**

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equⁿ & Calcⁿ.	Extended Prose		
		AO1		AO2	AO3									
		K & U					Low	Stand.						
		51 – 62										= 2	> 2	Comm.
		Recall	Other	Applicⁿ	Inv.Sc.		G-E	D-C						
		17-21	34-41	28-39	0-5	90	45-54	36-45	✔	≤60	seeCQC	~18	~5	~3
1(a)	P4.01			1			1			1				
(b)	P4.01		3				3			3				
(c)	P4.01		1				1			1				
(d)	P4.01		1	1		7	2			2				
2(a)	P1.08/1.14	2	2	2			6			4		2		
(b)	P1.11	1	1			8	2			2				
3(a)	P2.09/10	2	1	2			5					4		1
(b)	P2.08		4			9	4			4				
4(a)	P1.23/24/25		4				4			4				
(b)	P1.26	1	1	2		8	4			2		2		
5(a)	P2.18		2	1			3			3				
(b)	P2.18		2				2			2				
(c)	P2.07/08		2	1		8	3			3				
6(a)	P5.14		4	2			6			3	3			
(b)	P5.02		1	1		8	2					2		
7(a)	P5.06	2	1					3		2	1			
(b)	P5.06			4				4			4			
(c)	P5.06		2	1		10		3				2		1
8(a)	P6.02/03		2	2				4		2		2		
(b)	P6.05/13	1	4	2		11		7					6	1

SPECIFICATION GRID Specimen Paper

GCSE SCIENCE: DOUBLE AWARD A

Syll. No. 1522 Paper No. 3F Foundation Tier

Maximum mark for Paper 90 Page 2 of 2 **Date 7 November 2000**

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equⁿ & Calcⁿ.	Extended Prose		
		AO1		AO2	AO3		Low	Stand.				= 2	> 2	Comm.
		K & U												
		51 – 62												
		Recall	Other	Applicⁿ	Inv.Sc.		G-E	D-C						
		17-21	34-41	28-39	0-5	90	45-54	36-45	✔	≤60	seeCQC	~18	~5	~3
9(a)	P3.22	2						2				2		
(b)	P3.05	4		4				8			8			
(c)	P3.08/20/22		3			13		3					3	
10(a)	P3.17	1	2	1				4		2		2		
(b)	P3.18		1	1				2		2				
(c)	P5.02	2				8		2		2				
	Total	18	44	28		90	48	42		44	16	18	9	3

SPECIFICATION GRID Specimen Paper

GCSE SCIENCE: DOUBLE AWARD A

Syll. No. 1522 Paper No. 4H Higher Tier

Maximum mark for Paper 90 Page 1 of 1 **Date 7 November 2000**

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equⁿ & Calcⁿ.	Extended Prose		
		AO1		AO2	AO3		Stand.	High				= 2	> 2	Comm.
		K & U												
		51 – 62												
		Recall	Other	Applicⁿ	Inv.Sc.		D-C	B-A*						
		17-21	34-41	28-39	0-5	90	36-45	45-54	✔	≤ 60	seeCQC	~14	~9	~3
1	3.14	2	3	4		9	9			5		4		
2	3.04/12	3	7	2		12	12		✔	4		4	3	1
3	1.07/15		5			5	5		✔	5				
4	1.09/18	1	4	1	1	7	7			3		4		
5	2.06/4.04	2	3	2	1	8	8		✔	3			4	1
6	1.02/31/37	2	5	2		9		9	✔	3		6		
7	1.07/08/4.10	2	3	4		9		9		9				
8	3.03	2		3		5		5	✔	2	3			
9	4.06		2	1		3		3	✔	2	1			
10	3.16/17			5		5		5		5				
11	1.22	1	2	3		6		6		4		2		
12	3.07/08	2		4		6		6		6				
13	4.02	3	3			6		6					5	1
	Total	20	37	31	2	90	41	49		51	4	20	12	3

SPECIFICATION GRID Specimen Paper

GCSE SCIENCE: DOUBLE AWARD A

Syll. No. 1522 Paper No. 5H Higher Tier

Maximum mark for Paper 90 Page 1 of 2 **Date 7 November 2000**

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equⁿ & Calcⁿ.	Extended Prose		
		AO1		AO2	AO3		Stand.	High						
		K & U										= 2	> 2	Comm.
		51 – 62												
		Recall	Other	Applicⁿ	Inv.Sc.		D-C	B-A*						
		17-21	34-41	28-39	0-5	90	36-45	45-54	✔	≤ 60	seeCQC	~14	~9	~3
1(a)	1.01/03/3.05		1	4			5			5				
(b)	2.04			2		7	2				2			
2(a)	1.04/09		4				4			4				
(b)	1.10	1	1				2					2		
(c)	3.13			3			3			3				
(d)	3.13	4					4		✔			4		
(e)	3.13		1			14	1			1				
3(a)	4.03			1			1		✔	1				
(b)	4.06			1			1		✔	1				
(c)	5.11		1				1			1				
(d)	4.04/05			4		7	4						3	1
4(a)	5.03			1			1			1				
(b)	5.03/04		2				2					2		
(c)	5.04			2			2			2				
(d)	5.04/05			2		7	2		✔			2		
5(a)	6.01	1					1			1				
(b)	4.21	1					1			1				
(c)	6.04/05/06		3	3		8	6		✔	3	3			
6(a)	6.02/03		2					2	✔	2				
(b)	6.02/03	2	1	3		8		6	✔			2	3	1
7(a)	6.16		3	1				4					3	1
(b)	6.18	1					1			1				
(c)	2.08			3				3			3			
(d)	2.06/3.18/4.02	1	2	2		13		5		3	2			

SPECIFICATION GRID Specimen Paper

GCSE SCIENCE: DOUBLE AWARD A

Syll. No. 1522 Paper No. 5H Higher Tier

Maximum mark for Paper 90 Page 2 of 2 **Date 7 November 2000**

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equⁿ & Calcⁿ.	Extended Prose		
		AO1		AO2	AO3		Stand.	High						
		K & U										= 2	> 2	Comm.
		51 – 62												
		Recall	Other	Applicⁿ	Inv.Sc.		D-C	B-A*						
		17-21	34-41	28-39	0-5	90	36-45	45-54	✔	≤ 60	seeCQC	~14	~9	~3
8(a)	4.13		1	1				2				2		
(b)	4.18/24	4						4	✔			4		
(c)	4.17/23	1	3					4		2	2			
(d)	4.26/27		3	1		14		4		4				
9(a)	1.01/03		2	1				3			3			
(b)	1.03/06/2.03		2	1				3			3			
(c)	1.12	2						2		2				
(d)	2.07		2	2		12		4			4			
	Total	18	34	38		90	44	46		38	22	18	9	3

SPECIFICATION GRID Specimen Paper

GCSE SCIENCE: DOUBLE AWARD A

Syll. No. 1522 Paper No. 6H Higher Tier

Maximum mark for Paper 90 Page 1 of 1

Date 7 November 2000

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equⁿ & Calcⁿ.	Extended Prose		
		AO1		AO2	AO3		Stand.	High				= 2	> 2	Comm.
		K & U												
		51 – 62												
		Recall	Other	Applicⁿ	Inv.Sc.		D-C	B-A*						
		17-21	34-41	28-39	0-5	90	36-45	45-54	✔	≤ 60	seeCQC	~14	~9	~3
1(a)	P5.06	2	1				3			2	1			
(b)	P5.06			4			4				4			
(c)	P5.06		2	1		10	3					2		1
2(a)	P6.02/03		2	2			4			2		2		
(b)	P6.05/13	1	4	2		11	7						6	1
3(a)	P3.22	2					2					2		
(b)	P3.05	4		4			8				8			
(c)	P3.08/20/22		3			13	3						3	
4(a)	P3.17	1	2	1			4			2		2		
(b)	P3.18		1	1			2			2				
(c)	P5.02	2				8	2			2				
5(a)	P1.10/31/32		3					3		3				
(b)	P1.32/34	1	2	2				5			3	2		
(c)	P1.32/5.15		2			10		2		2				
6(a)	P1.20		1	2				3		3				
(b)	P1.18/21	3		6		12		9			9			
7(a)	P2.11	1		2				3			3			
(b)	P2.09		1	1				2				2		
(c)	P2.14		2	2				4					3	1
(d)	P2.10			2		11		2		2				
8(a)	P3.12/13	3	1					4		2		2		
(b)	P4.06		4					4				4		
(c)	P4.07		4					4					3	1
(d)	P4.09		3			15		3				3		
	Total	20	38	32		90	42	48		22	28	21	15	4

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