Paper Reference(s)

1535/04 1536/04 1529/04 1539/04 1549/04

Edexcel GCSE

GCSE Science B

Specimen Paper

Materials required for examination
None

Items included with question papers
None

Instructions to Candidates

In the boxes on each of the answer books, write your centre number, candidate number, surname and initials, the paper reference and your signature. If more than one paper reference is shown, you should write the one for which you have been entered.
Answer all questions in the spaces provided in the answer books.

Information for Candidates

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

Candidates entered for 1535 Science: Single Award B have three answer books to complete, for Paper 4B, Paper 4C and Paper 4P. They each should be completed in 30 minutes, giving a total examination time of 1 hour 30 minutes.

Candidates entered for 1536 Science: Double Award B have three answer books to complete, for Paper 4B, Paper 4C and Paper 4P. They each should be completed in 30 minutes, giving a total examination time of 1 hour 30 minutes.

Candidates entered for 1529 Biology B have one answer book to complete, Paper 4B. It should be completed in 30 minutes.
Candidates entered for 1539 Chemistry B have one answer book to complete, Paper 4C. It should be completed in 30 minutes.
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Thus candidates entered for a single separate science will have 30 minutes of examining time, for two separate sciences, 1 hour, and for all three separate sciences, 1 hour 30 minutes.

Turn over

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Centre Number						Paper Reference	Surname	Initials
Candidate Number							Signature	

1535/4B 1536/4B 1529/4B

Edexcel GCSE

Science: Single Award B
[1535]
Paper 4B

Science: Double Award B
[1536]
Paper 4B

Biology B
[1529]
Paper 4B

HIGHER TIER
Specimen Paper

Time: 30 minutes **N230900**

Materials required for the examination
None

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For Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
Total	

Turn over

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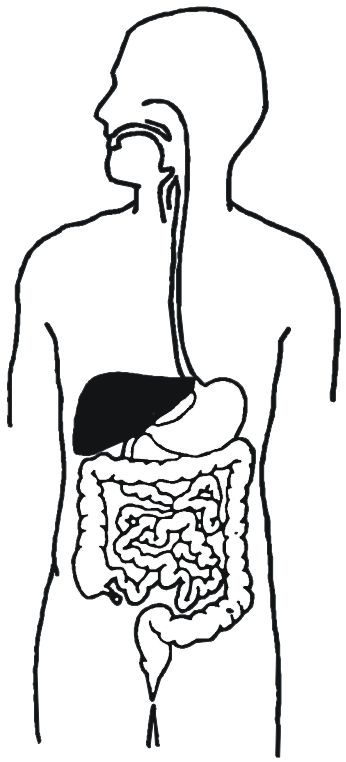
Leave blank

1. The diagram shows the human digestive system.



(a) (i) The digestion of starch begins in the mouth.
Name the enzyme that digests starch.

.....

(1)

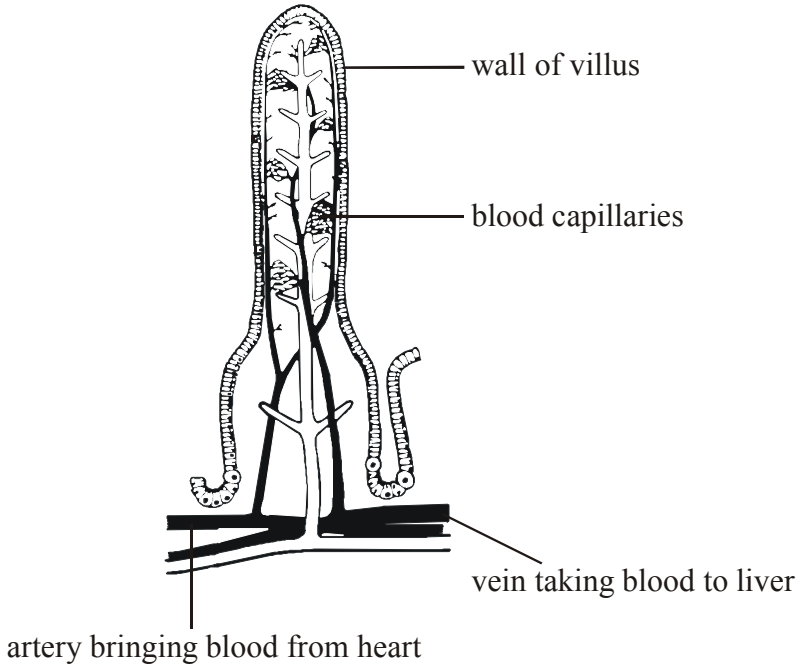
(ii) In which organ does the digestion of protein begin?

.....

(1)

(b) Digested food is absorbed into the blood through the villi. The diagram shows a section through a villus.

Leave blank



Describe TWO features of villi that help the absorption of digested food.

1 .....

2 .....

(2)

(c) People can get food poisoning from eating food containing harmful bacteria. One effect of food poisoning is diarrhoea. This means that only a little water is absorbed from the digestive system into the blood.

(i) On the diagram of **the digestive system opposite**, shade in the organ where most water is usually absorbed into the blood.

(1)

(ii) Explain why body temperature may rise if diarrhoea lasts for a few days.

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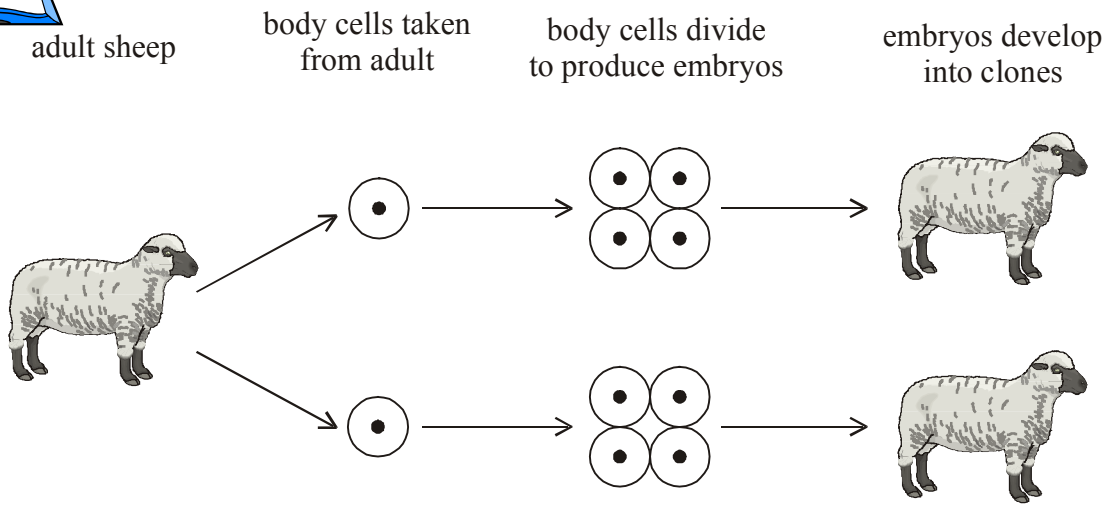
(2)

(Total 7 marks)

Leave blank

2. Scientists can now use body cells from an adult sheep to produce genetically identical copies of the adult. The copies are called clones.
The diagram shows some stages in this process.



(a) What type of reproduction produces clones?

.....

(1)

(b) Why must the body cells be protected from ultraviolet light and X-rays?

.....

.....

(1)

(c) In early experiments, many of the embryos died.

Suggest why this happened.

.....

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(1)

(d) The scientists did not publish the details of their early experiments.

Suggest why.

.....

.....

(1)

(e) After the successful production of clones, the scientists published the details of their methods. Scientists in other laboratories could then repeat the work.

Explain why it is important that scientists in other laboratories could repeat the cloning experiments.

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(3)

(Total 7 marks)

Leave blank

3. Dan measured the volume of urine he produced during the morning on two different days. His water intake was the same on both days. He did the same amount of exercise on both days. One day was hot, the other was cold.

His results are shown in the table.

	Conditions	
	Hot day	**Cold day**
Average volume of urine produced per hour (cm^3/h)	20	60

Explain how the volume of urine produced is affected by the hormone ADH.

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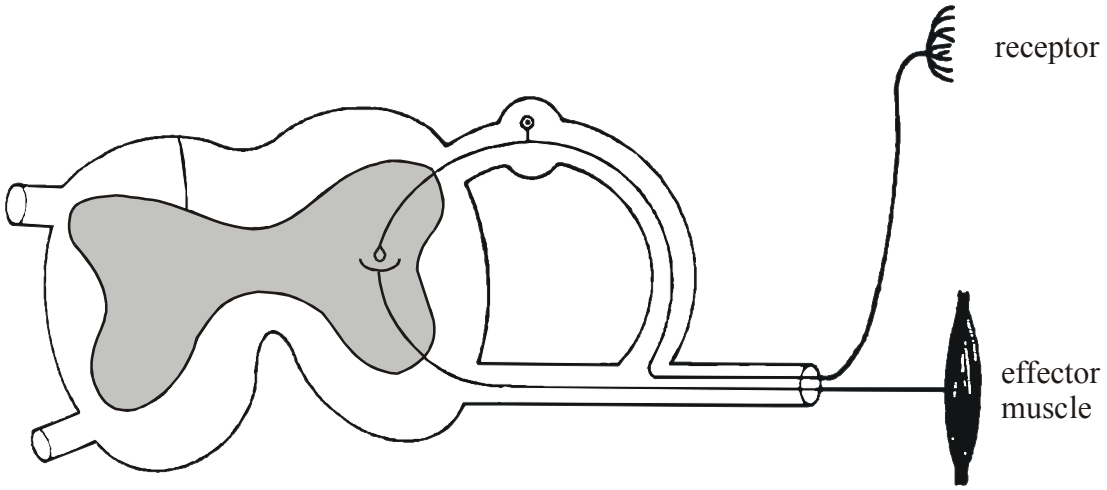
(Total 3 marks)

Leave blank

4. (a) The diagram shows part of a reflex arc.



Describe the sequence of events that takes place following stimulation of the receptor.

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(3)

(b) Heroin is an addictive drug.
Explain what is meant by addiction.

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(2)

(Total 5 marks)

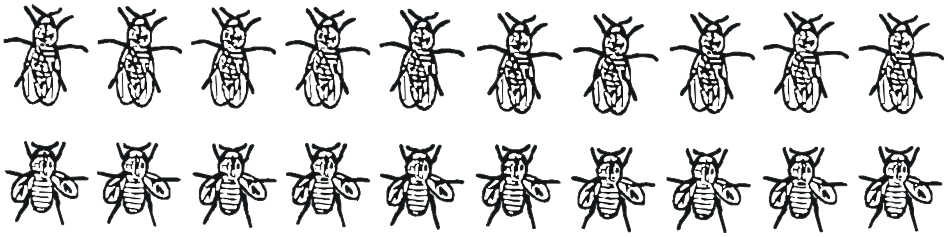
5. The diagram shows two fruit flies (*Drosophila*). One has normal wings, the other has short wings.

Leave blank

normal wings

short wings

A normal-winged fruit fly was crossed with a short-winged fruit fly. The offspring they produced are shown.



Wing length is inherited. The allele for normal wings (N) is dominant to the allele for short wings (n).
Fill in the spaces to show how a fruit fly with normal wings and a fruit fly with short wings can be crossed to produce the offspring shown.

(a) Phenotype of parents:

(b) Genotype of parents: ☐ ☐

(c) Gametes: ○ ○ ○ ○

(d) Possible genotypes of offspring: ☐ ☐

(Total 4 marks)

Leave blank

6. Vehicle exhaust gases contain harmful substances.
Air pollution produced by vehicles is a problem in towns.

Suggest what could be done to reduce air pollution produced by vehicles in towns.
You should make clear the scientific principles involved.

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(Total 4 marks)

TOTAL 30 MARKS

END

Centre Number						Paper Reference	Surname	Initials
Candidate Number							Signature	

1535/4C 1536/4C 1539/4C

Edexcel GCSE

Science: Single Award B
[1535]
Paper 4C

Science: Double Award B
[1536]
Paper 4C

Chemistry B
[1539]
Paper 4C

HIGHER TIER
Specimen Paper

Time: 30 minutes **N230900**

Materials required for the examination
None

Items included with these question papers
None

Instructions to Candidates

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Question Number	Leave Blank
1	
2	
3	
4	
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Total	

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THE PERIODIC TABLE

	1	2	Group									3	4	5	6	7	0
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

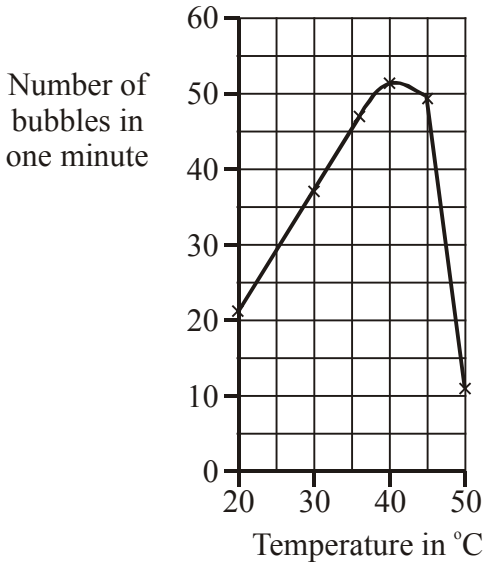
Relative atomic mass
Symbol
Name
Atomic number

1. Alan and Mo investigated fermentation. The word equation for fermentation is:

Leave blank

$$\text{sugar} \xrightarrow{\text{yeast}} \text{ethanol} + \text{carbon dioxide}$$

They carried out the experiment at different temperatures using the same amounts of sugar and yeast. They used their results to draw this graph.



(a) At first, readings were taken at 20 °C, 30 °C, 40 °C and 50 °C. Alan and Mo then took two extra readings at 36 °C and 45 °C.
Suggest why it was important to take these extra readings.

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.....

(1)

(b) Why did the reaction slow down at temperatures above 40 °C?

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(2)

(Total 3 marks)

2. (a) Natural gas is used as a fuel for heating and cooking. Natural gas contains the hydrocarbon methane.

Leave blank

(i) Write the balanced equation for the burning of methane in air.

.....

(3)

(ii) What is a hydrocarbon?

.....

.....

(2)

(b) In the early 1700's, scientists used the phlogiston theory to explain what happened when a substance burned.

This theory states that every substance is made of ash and phlogiston.
When a substance burns, the phlogiston escapes and the ash is left behind.

Lavoisier was a French scientist. He found that some substances became heavier when they burned.

(i) Explain how the work of Lavoisier showed that the phlogiston theory was wrong.

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(2)

(ii) Use your knowledge of burning to explain the results of Lavoisier's experiments.

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(2)

(Total 9 marks)

3. Cracking is an important chemical process.
An example of a cracking reaction is shown in the equation below.

Leave blank

$$\underset{\text{decane}}{C_{10}H_{22}} \longrightarrow \underset{\text{ethene}}{2C_2H_4} + \underset{\text{hexane}}{C_6H_{14}}$$

(a) Explain what is meant by cracking.

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.....

(2)

(b) Ethene is an unsaturated hydrocarbon.
What is meant by **unsaturated**?

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(1)

(c) Explain how plastics are formed from unsaturated hydrocarbons.

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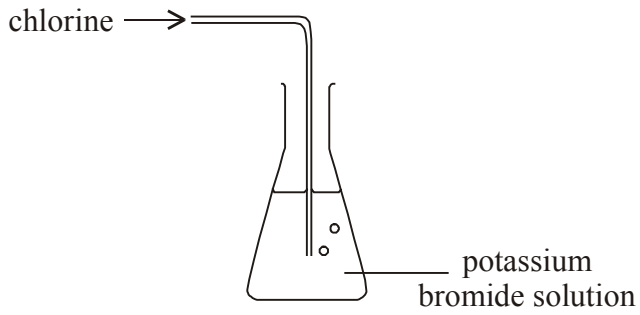
(2)

(Total 5 marks)

4. (a) When chlorine is bubbled into potassium bromide solution, the solution turns red-brown.

Leave blank



Explain this observation and give the reason why this reaction takes place.

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(3)

(b) When moist universal indicator paper is placed in chlorine, the paper turns white.
Why does the paper turn white?

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(1)

(c) The halogens have similar chemical properties.
Explain this by reference to their electronic structures.

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.....

(2)

(d) Chlorine reacts with iron.
Write the balanced equation for this reaction.

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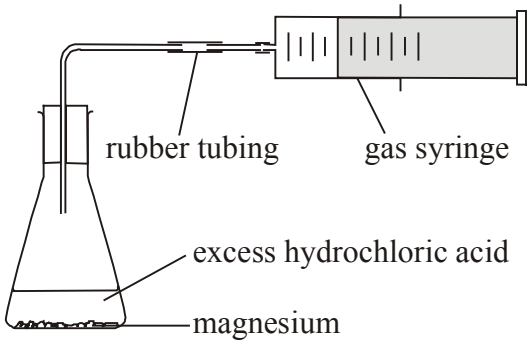
(3)

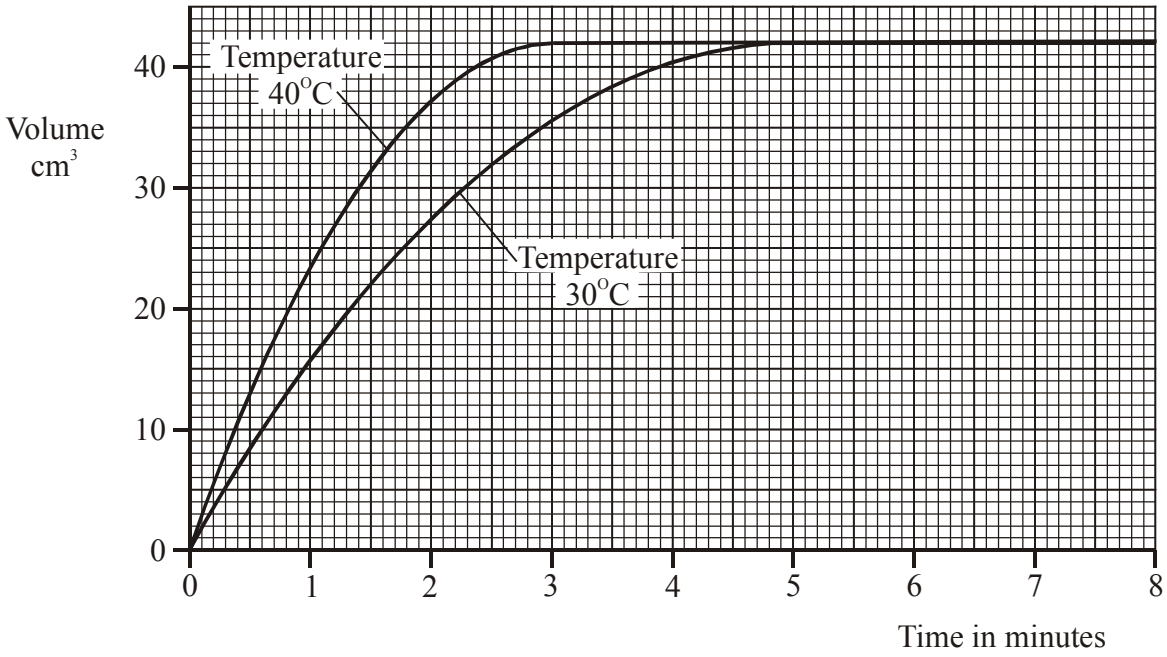
(Total 9 marks)

4. When magnesium ribbon reacts with hydrochloric acid, it produces hydrogen. John used this apparatus to investigate the reaction.

Leave blank



He carried out his experiment at two different temperatures. His results are shown on the graph.



State what the graphs show about the rates of reaction and explain your answer in terms of the behaviour of the particles.

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(Total 4 marks)

TOTAL 30 MARKS

END

Centre Number						Paper Reference	Surname	Initials
Candidate Number							Signature	

1535/4P 1536/4P 1549/4P

Edexcel GCSE

Science: Single Award B
[1535]
Paper 4P

Science: Double Award B
[1536]
Paper 4P

Physics B
[1549]
Paper 4P

HIGHER TIER
Specimen Paper

Time: 30 minutes **N230900**

Materials required for the examination
None

Items included with these question papers
None

Instructions to Candidates

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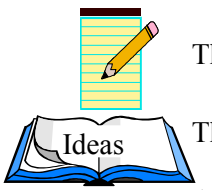

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Question Number	Leave Blank
1	
2	
3	
4	
5	
Total	

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Edexcel
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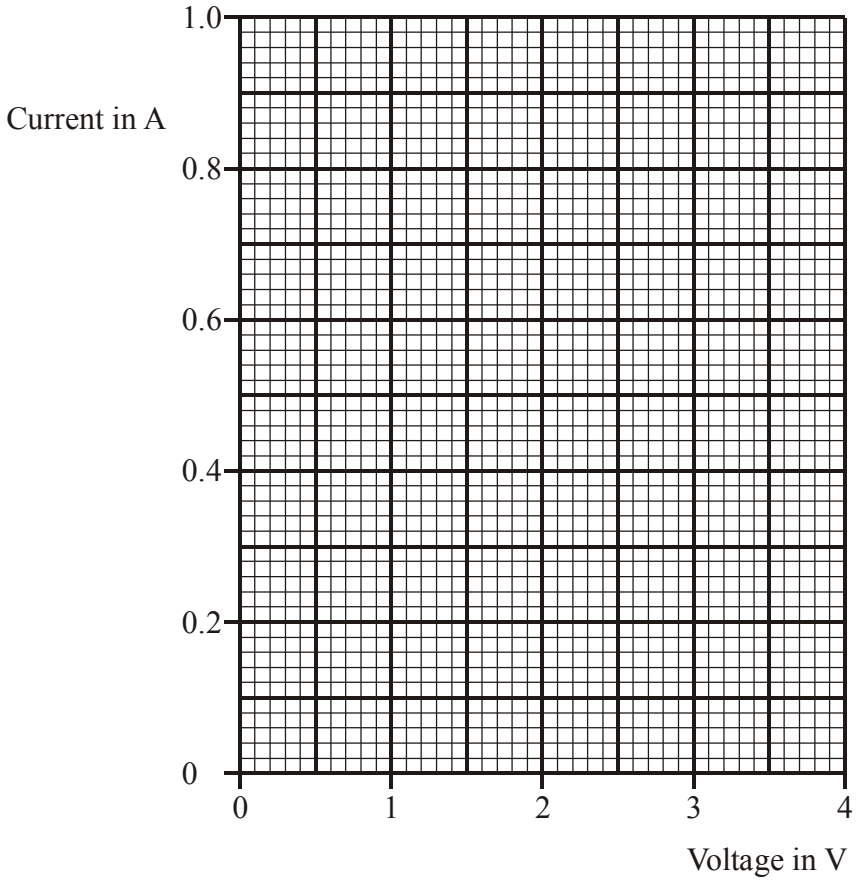
Leave blank

1. The current in a wire was measured at different voltages.
The table shows the results.

Current in amperes (A)	0.20	0.35	0.55	0.70	0.85
Voltage in volts (V)	0.8	1.4	2.2	2.8	3.4

(a) Use the data to draw a graph of current against voltage.



(3)

(b) Describe how the current in the wire changes when the voltage is increased.

Leave blank

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(2)

(c) Calculate the resistance of the wire when the current is 0.6 A.

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(3)

(Total 8 marks)

Leave blank

2 (a) Carbon-14 ($^{14}_{6}C$) is a radioactive isotope of carbon.

Describe the difference between an atom of carbon-14 and an atom of carbon-12 ($^{12}_{6}C$) in terms of the particles involved.

.....

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.....

(2)

(b) Radon gas is emitted from granite and can collect in buildings.
It decays by emitting alpha particles.
Explain whether the presence of radon gas in buildings is a health hazard.

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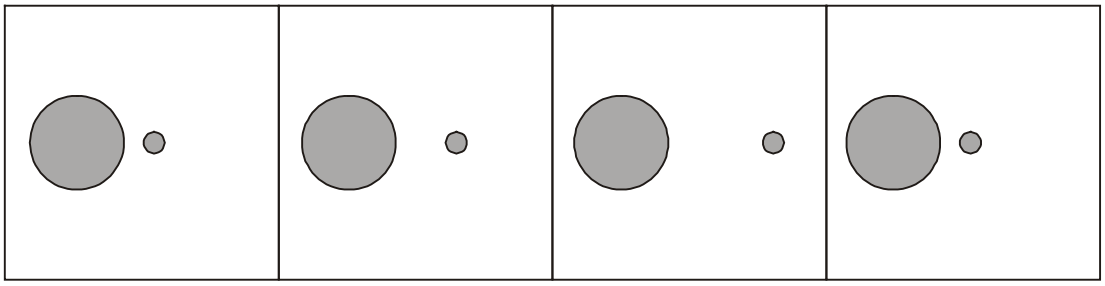
(3)

(Total 5 marks)

3. In 1609 Galileo was one of the first scientists to use a telescope. He used it to look at the planet Jupiter. The diagrams show what he observed.

Leave blank



The small object close to Jupiter had not been seen before. It was later named Io.

(a) Suggest a conclusion that Galileo could draw from his observations.

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(1)

(b) Explain how Galileo's observations went against the belief that all heavenly bodies revolve around the Earth.

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(3)

(c) Galileo published his findings in a book called *The Starry Messenger*.
Why did Galileo publish his findings?

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.....

(1)

(Total 5 marks)

Leave blank

4. (a) Infra-red and radio waves are two of the waves that make up the electromagnetic spectrum.
Describe **one** similarity and **one** difference between infra-red and radio waves.

Similarity .....

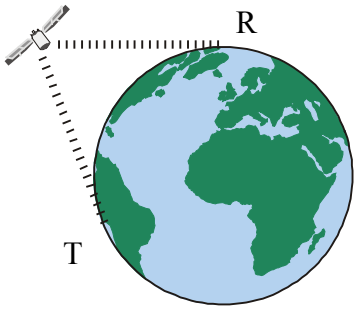
.....

Difference .....

.....

(2)

(b) The diagram shows how a satellite is used in the transmission of radio waves to different parts of the world.



(i) Explain why a satellite is needed to transmit the waves from T to R.

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(2)

(ii) Modern satellite transmissions use digital signals rather than analogue signals.
Describe the difference between a digital signal and an analogue signal.
A diagram could help to make your answer clear.

Leave blank

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(2)

(Total 6 marks)

Leave blank

5. (a) Electricity is transmitted by the national grid using a combination of overhead and underground cables. Explain ONE advantage of each method of transmission.

Overhead transmission

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.....

.....

Underground transmission

.....

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.....

(2)

(b) Most of the electricity in the United Kingdom is generated from non-renewable sources. Some electricity is generated from moving water. Wind turbines also contribute to the electricity supply.

Explain why these renewable sources can not provide all of the electricity needed in the United Kingdom.

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(4)

(Total 6 marks)

TOTAL 30 MARKS

Paper Reference(s)

1536/05 1529/05 1539/05 1549/05

Edexcel GCSE

Science B

GCSE

Specimen paper

Materials required for examination
None

Items included with question papers
None

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Centre Number						Paper Reference	Surname	Initials
Candidate Number							Signature	

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1536/5B 1529/5B

Edexcel GCSE

Science: Double Award B

[1536]

Paper 5B

Biology B

[1529]

Paper 5B

HIGHER TIER

Specimen Paper

Time: 30 minutes **N230900**

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
Total	

Materials required for the examination
None

Items included with these question papers
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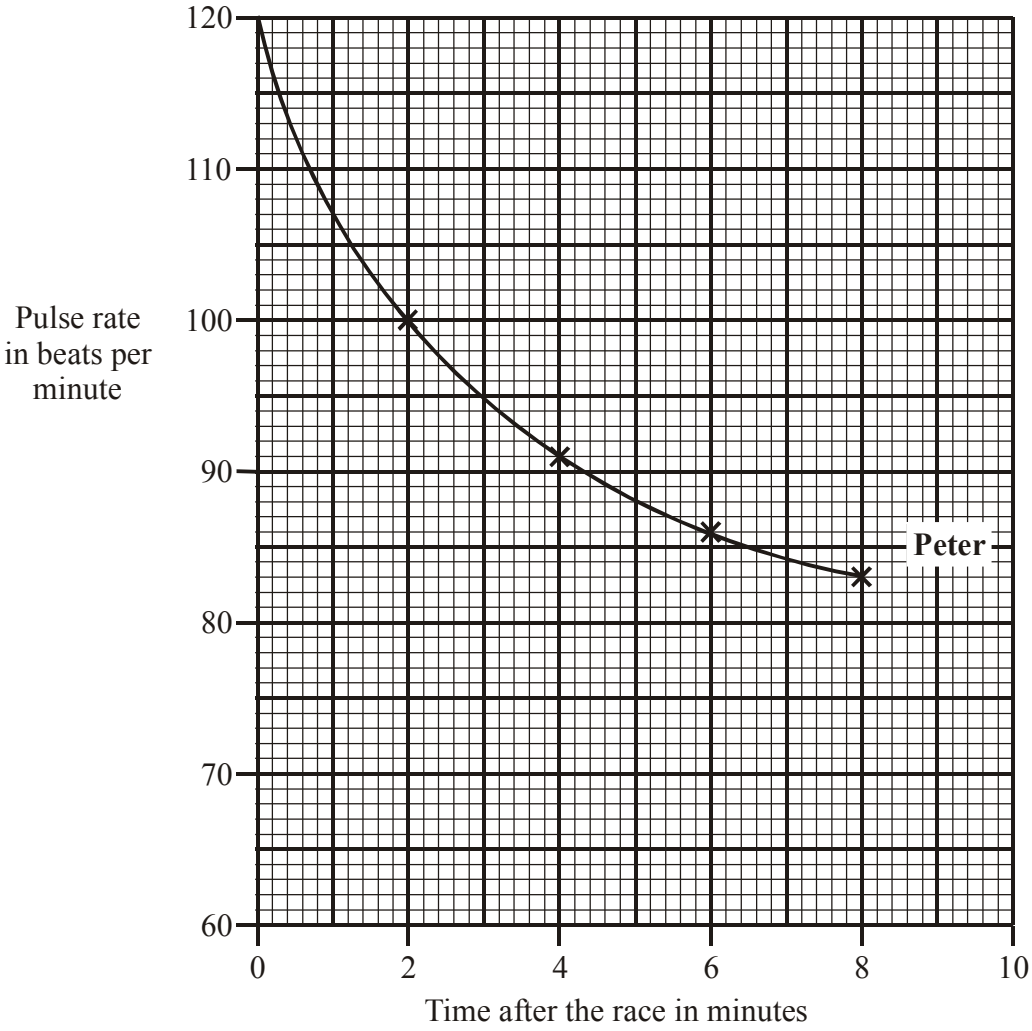
1. Two students, Peter and Kelly, ran an 800 metres race.
Before the race, when they were resting, Peter's pulse rate was 82 beats per minute and Kelly's was 70 beats per minute.
Just after the race, their teacher measured their pulse rates (beats per minute).
The teacher measured them again at 2 minute intervals.

Leave blank

The results are shown in the table below.

	Time after race (minutes)				
	0	2	4	6	8
Peter's pulse rate (beats per minute)	120	100	91	86	83
Kelly's pulse rate (beats per minute)	100	82	73	70	70

Peter's results are shown on the grid.



(a) On the same grid, draw a graph of Kelly's results.

(3)

(b) Recovery rate is one measure of fitness.
Explain how the graphs show that Kelly is probably fitter than Peter.

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(4)

(Total 7 marks)

Leave blank

2. Read the newspaper article and then answer the questions.

Leave blank

Environmentally 'friendly herbicide' found

Biologists working on The Great Barrier Reef off the coast of Australia have discovered herbicides that are harmless to humans, other animals and crops.

Greenhouse trials show that some substances in reef organisms stop photosynthesis in weeds.

If field trials show the same results as the greenhouse trials, these substances could be a new class of herbicide which kill weeds without damaging the environment or crops.

The biologists got the idea for their work because they noticed that parts of the reef had no plants. They found about 5000 separate substances in the reef organisms. The biologists tested each substance for its effect until they found the substances they were looking for.

(a) Explain how the herbicides from reef organisms kill weeds.

.....

.....

.....

(2)

(b) Farmers already use herbicides to kill weeds.
Suggest why herbicides from reef organisms are described as a new class.

.....

(1)

(c) Suggest why the first trials were carried out in a greenhouse rather than in a field.

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.....

.....

(2)

(d) What observation gave the biologists the idea to do the research?

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(1)

(e) Explain why it was important to test each of the 5000 substances separately.

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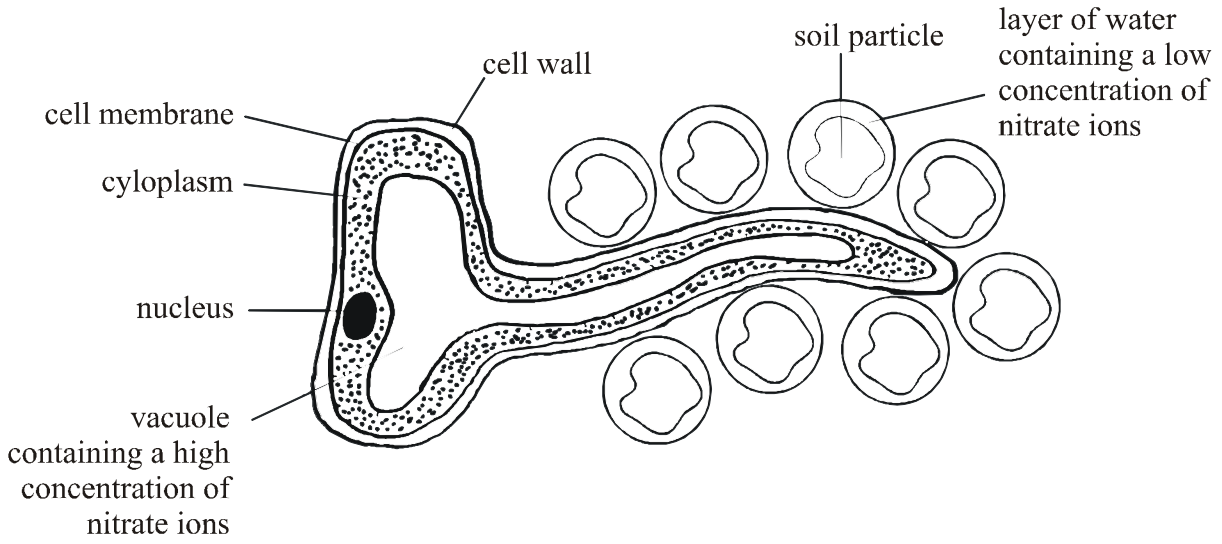
(1)

(Total 7 marks)

3. The diagram shows a root hair cell in the soil.

Leave blank



(a) Explain how the root hair cell takes up nitrate ions from the soil.

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(2)

(b) Gardeners dig soil to let more air into it. This increases the uptake of nitrate ions. Explain why.

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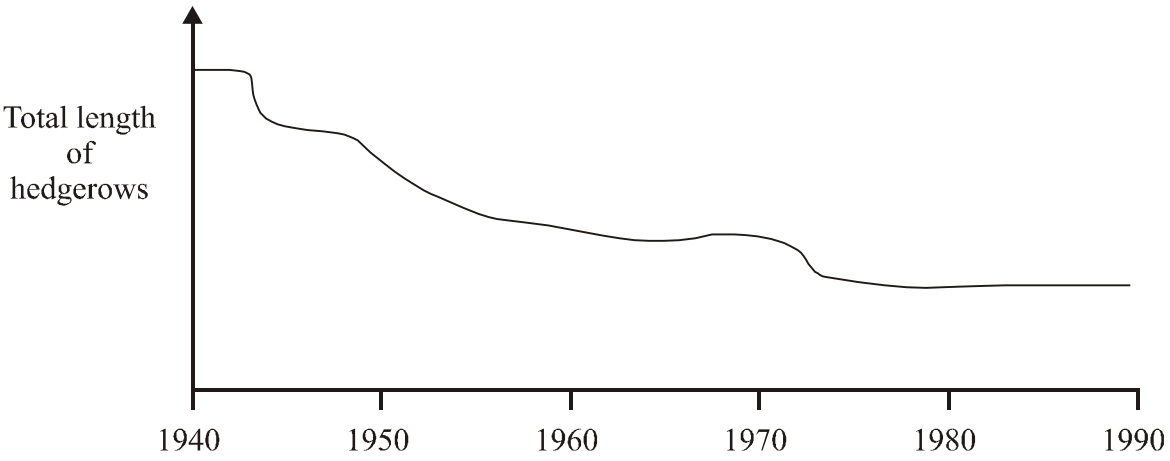
(2)

(Total 4 marks)

4. The graph shows the change in the total length of hedgerows in this country between 1940 and 1990.

Leave blank



Biodiversity refers to the number of different types of living organisms in a habitat.
Explain how the change in the total length of hedgerows affects the biodiversity of this habitat.

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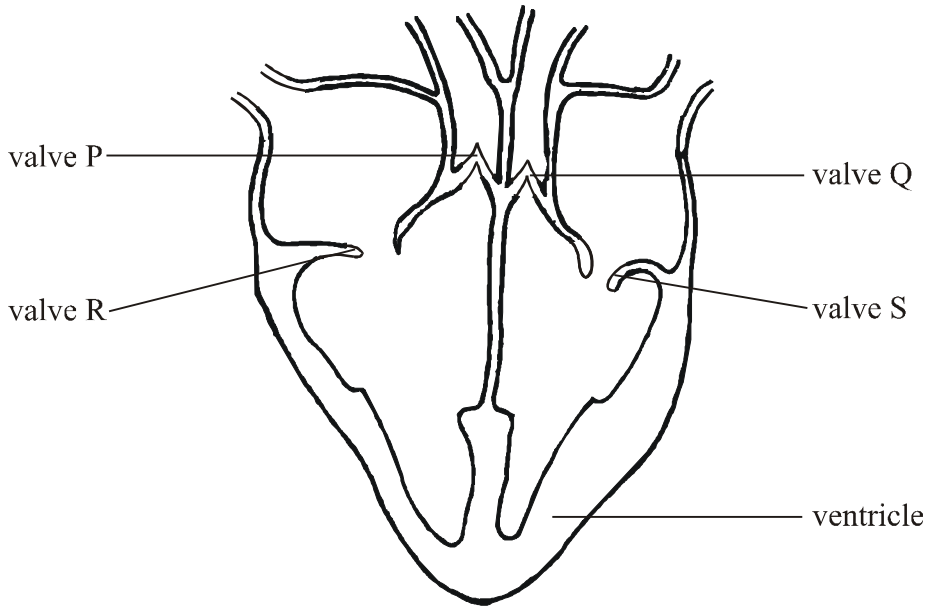
(Total 4 marks)

5. The diagram shows a section through the heart during contraction of the atria.

Leave blank



Describe the changes that occur in the heart which cause blood to enter the arteries.
Refer to the action of the ventricles and the valves.

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(Total 4 marks)

6. Cystic fibrosis is an inherited disease.

Leave blank

(a) Explain how it is possible to inherit cystic fibrosis even though neither parent suffers from the disease.

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(2)

(b) One symptom of cystic fibrosis is the production of too much mucus in the lungs.

Explain why people suffering from cystic fibrosis are more vulnerable to lung infections than non-sufferers.

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.....

(2)

(Total 4 marks)

TOTAL 30 MARKS

END

Centre Number						Paper Reference	Surname	Initials
Candidate Number							Signature	

1536/5C 1539/5C

Edexcel GCSE

Science: Double Award B
[1536]
Paper 5C
Chemistry B
[1539]
Paper 5C
HIGHER TIER
Specimen Paper

Time: 30 minutes **N230900**

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Question Number	Leave Blank
1	
2	
3	
4	
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.

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Include diagrams in your answers where these are helpful.

Information for Candidates

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This paper has 4 questions. There are no blank pages.

Advice to Candidates

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

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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) Water is a covalent compound formed when hydrogen burns.
Write the balanced equation for the burning of hydrogen.

.....

(3)

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

(i) Describe **three** things you would see.

.....

.....

.....

.....

.....

.....

(3)

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

.....

(1)

(iii) Use the periodic table provided to help you predict how the reaction of caesium with water would be different to the reaction of sodium with water.

.....

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(1)

Leave blank

(c) Sodium chloride is an ionic compound which dissolves in water.

(i) Explain why sodium chloride solution conducts electricity.

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(2)

(ii) Explain why solid sodium chloride does not conduct electricity.

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(2)

(Total 12 marks)

2. The ancient Greeks first thought of the idea of atoms. They had no experimental evidence of atoms but they liked the idea. Between 1803 and 1808, John Dalton worked out his atomic theory. He used the results of his own experiments and those of the French scientist Antoine Lavoisier.

Leave blank

Dalton stated:

- every chemical element is made up of atoms.
- the atoms of one element are different to those of all other elements.
- all atoms of a particular element are identical and have the same mass.
- chemical compounds are formed when atoms of different elements join together to form molecules.
- atoms cannot be split.

(a) Why was John Dalton's theory more scientific than that of the ancient Greeks?

.....

.....

(1)

(b) In 1811, Avogadro suggested that hydrogen gas contained molecules made from two hydrogen atoms joined together. Dalton would not accept this idea. He asked "If two hydrogen atoms in a container filled with this gas can cling together, why do not all cling together and condense to a liquid?"

(i) What was Dalton suggesting?

.....

.....

(1)

(ii) Explain, using a dot and cross diagram, why a hydrogen molecule contains only two hydrogen atoms.

(4)

(iii) In 1908, the scientists Wilhelm Ostwald and Ernst Mach still opposed the atomic theory of matter. They were unwilling to accept purely indirect evidence. Explain why the evidence for the existence of atoms was indirect.

.....

.....

(1)

(Total 7 marks)

3. Ammonia is made using the Haber process.

Leave blank

(a) The equation for the reversible reaction is:

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

When nitrogen and hydrogen form ammonia, heat is evolved.

(i) How is the yield of ammonia affected by **increasing the temperature**?

.....

(1)

(ii) How is the yield of ammonia affected by **increasing the pressure**?

.....

(1)

(b) When the Haber process was first used, the hydrogen was obtained by the electrolysis of water. It is now cheaper to obtain hydrogen by heating methane with steam rather than by electrolysis.
Suggest why.

.....

.....

(1)

(c) Most of the ammonia produced is reacted with acids to form fertilisers.
Write a balanced equation for the reaction of ammonia with sulfuric acid.

.....

(3)

(Total 6 marks)

4. Two samples of rock from different parts of a volcanic island have the same chemical composition but different crystal sizes.

Leave blank

(a) Explain why the rocks have different crystal sizes.

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(2)

(b) Analysis of another rock showed that it contains an oxide of tin in which 3.57 g of tin is combined with 0.96 g of oxygen.
Show that the empirical formula of the tin oxide present in the rock is SnO_2.
(Relative atomic masses: O = 16, Sn = 119)

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(3)

(Total 5 marks)

TOTAL 30 MARKS

END

Centre Number						Paper Reference	Surname	Initials
Candidate Number							Signature	

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1536/5P 1549/5P

Edexcel GCSE

Science: Double Award B

[1536]

Paper 5P

Physics B

[1549]

Paper 5P

HIGHER TIER

Specimen Paper

Time: 30 minutes

N230900

Question Number	Leave Blank
1	
2	
3	
4	
5	
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 initials, then write 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 write 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.

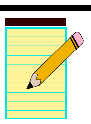
Include diagrams in your answers where these are helpful.

Information for Candidates

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

This paper has 5 questions. There are no blank pages.

Advice to Candidates



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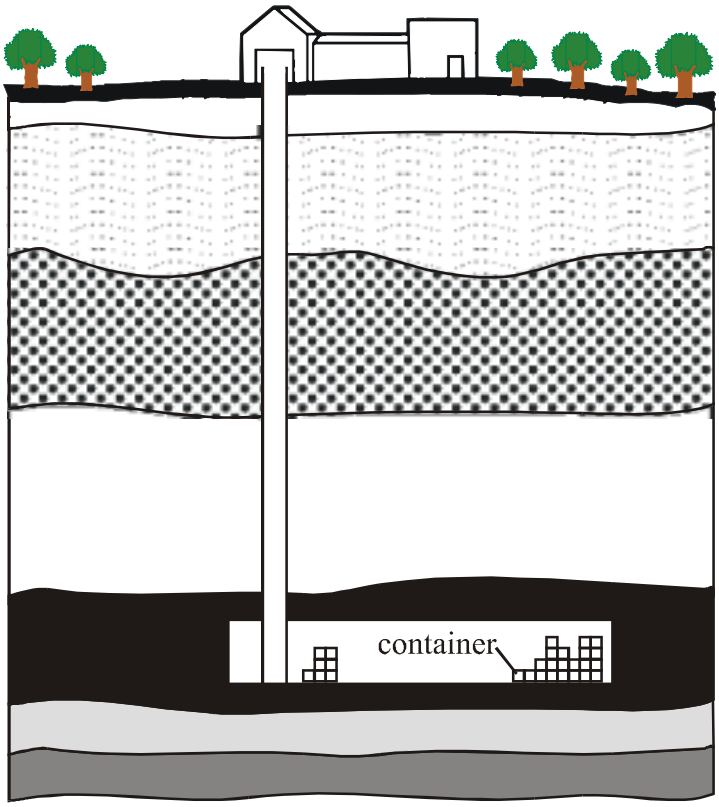
Additional Answer Sheets may be used.

Turn over

N230900

1. Nuclear power stations produce waste materials that are radioactive.
Rubber gloves and other items of protective clothing used in nuclear power stations are low level waste.
To dispose of them, they are sealed in glass inside corrosion-resistant metal containers.

Leave blank



The containers are then buried deep underground. This is shown in the diagram.

(a) Scientists think that the waste material is safe if there are three barriers separating it from people. The glass and the metal containers are two barriers.

What is the third barrier?

.....

(1)

(b) After 100 years, the waste material is thought to present no danger to people.
How does the activity of the waste change over a time span of 100 years?

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(1)

(c) How certain can scientists be that this method of disposal of radioactive waste materials is safe? Give full reasons for your answer.

Leave blank

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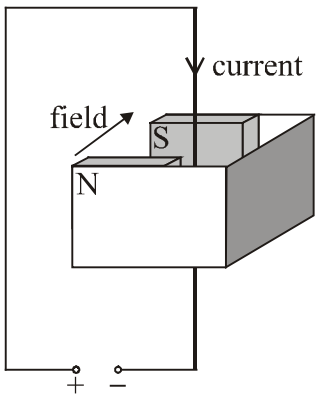
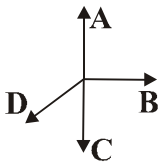
(3)

(Total 5 marks)

2. The diagram shows a metal wire placed in a magnetic field.

Leave blank





(a) Which arrow shows the direction of the magnetic force on the wire?

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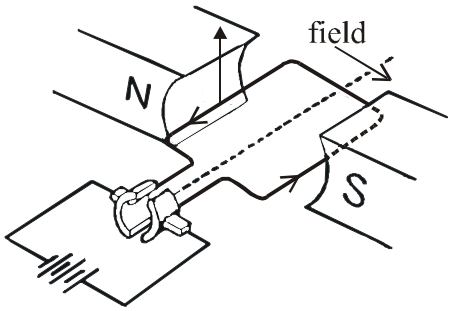
(1)

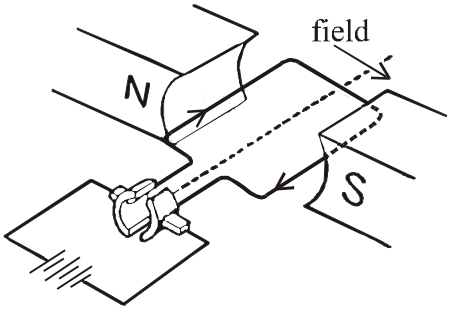
(b) In a d.c. motor, the forces on a coil of wire make it rotate.
The diagram shows a simple motor and the force acting on one side of the coil of wire.



Draw an arrow on the diagram to show the force acting on the right-hand side of the coil of wire.

(1)

(c) The current in the coil is reversed. Draw arrows on the diagram below to show the forces now acting on the sides of the coil of wire.

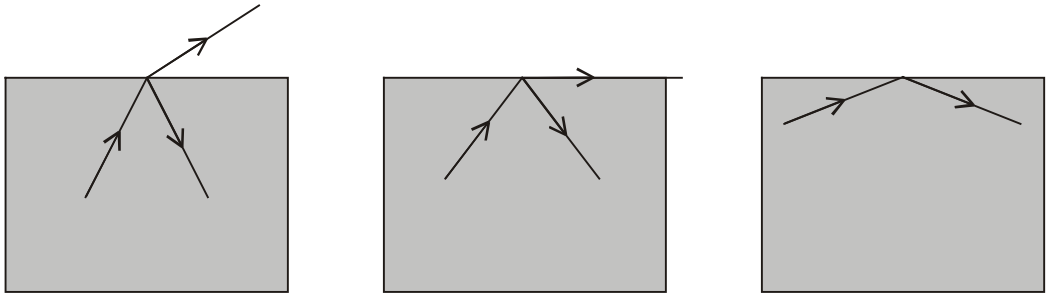


(2)

(Total 4 marks)

3. The diagrams show what happens when light meets a glass-air boundary at different angles of incidence.

Leave blank



A **B** **C**

(a) Describe what is happening to light in diagrams **A** and **C**.

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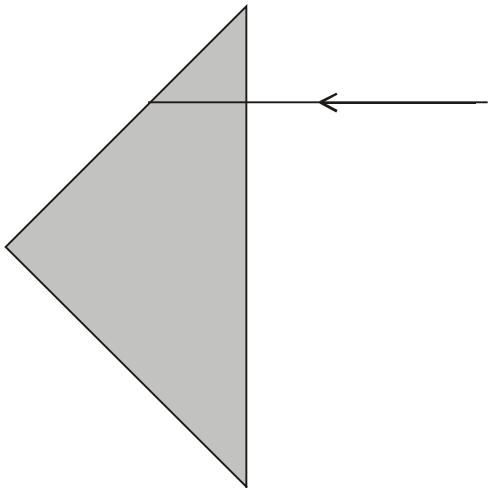
(3)

(b) Complete the diagram to show how light passes through a prism in a cycle reflector.



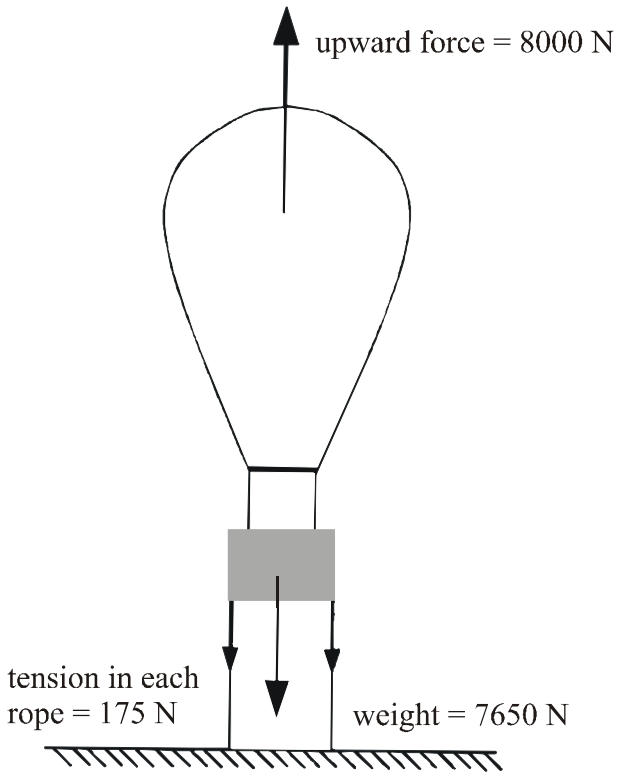
(2)

(Total 5 marks)

4. A hot air balloon is tied to the ground by two ropes.

Leave blank

The diagram shows the forces acting on the balloon.



The ropes are untied and the balloon starts to move upwards.

(a) Calculate the size of the unbalanced force acting on the balloon.
State the direction of this force.

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(2)

(b) The mass of the balloon is 765 kg. Calculate the initial acceleration of the balloon.

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(3)

(c) Explain how the acceleration of the balloon changes during the first ten seconds of its flight.

Leave blank

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(4)

(d) When the balloon is still accelerating, the balloonist throws some bags of sand over the side. Explain how this affects the acceleration of the balloon.

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(2)

(Total 11 marks)

5. (a) An aircraft in flight becomes charged.
The aircraft tyres are made of rubber that conducts electricity.
Suggest what happens to the charge on the aircraft when it lands.

Leave blank

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(2)

(b) The charge on an aircraft is 2.0×10^{-4} C.
It passes through the tyres in 0.5 s.
Calculate the current in the tyres when the charge is passing through them.

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(3)

(Total 5 marks)

TOTAL 30 MARKS

END

Paper Reference(s)

1529/06 1539/06 1549/06

Edexcel GCSE

GCSE Science B

Specimen paper

Materials required for examination
None

Items included with question papers
None

Instructions to Candidates

In the boxes on each of the answer books, write your centre number, candidate number, surname and initials, the paper reference and your signature. If more than one paper reference is shown, you should write the one for which you have been entered.
Answer all questions in the spaces provided in the answer books.

Information for Candidates

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

Candidates entered for 1529 Biology B have one answer book to complete, Paper 6B. It should be completed in 30 minutes.
Candidates entered for 1539 Chemistry B have one answer book to complete, Paper 6C. It should be completed in 30 minutes.
Candidates entered for 1549 Physics B have one answer book to complete, Paper 6P. It should be completed in 30 minutes

Thus candidates entered for a single separate science will have 30 minutes of examining time, for two separate sciences, 1 hour, and for all three separate sciences, 1 hour 30 minutes.

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Centre Number						Paper Reference	Surname	Initials
Candidate Number						**1529/6B**	Signature	

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1529/6B

Edexcel GCSE

Biology B **[1529]**
Paper 6B

HIGHER TIER
Specimen Paper

Time: 30 minutes **N230900**

Question Number	Leave Blank
1	
2	
3	
4	
Total	

Materials required for the examination
None

Items included with these question papers
None

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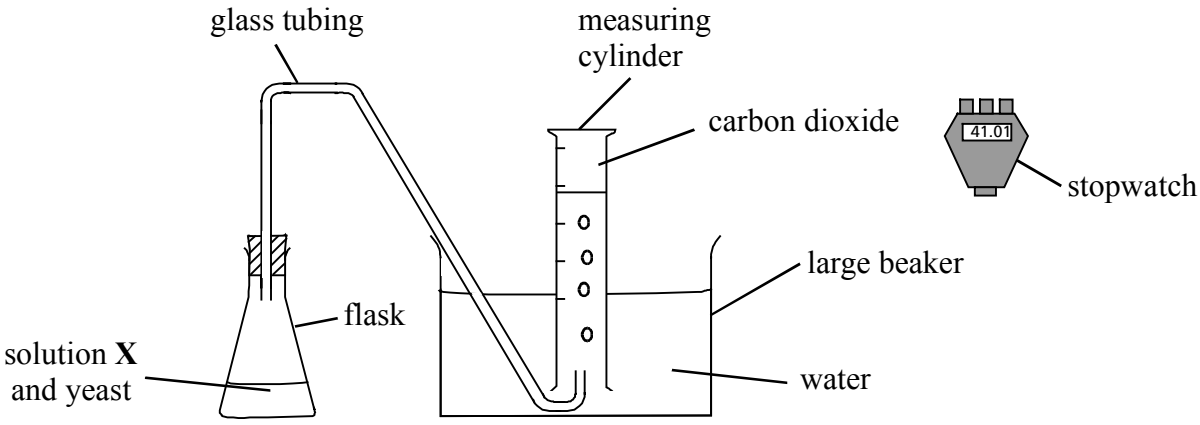
Leave blank

1. Eric investigated the fermentation of solution **X** by yeast at different temperatures over a 24-hour period.
He used the apparatus shown below.



His results are shown on the table.

Temperature (±C)	**Volume of carbon dioxide collected in 24 hrs (cm^3)**			**Average volume of carbon dioxide collected in 24 hrs(cm^3)**
10	25	28	28	27
20	58	65	66	63
30	99	108	102	……..

(a) Calculate the average volume of carbon dioxide produced over 24 hours at 30±C. Show your working.

Answer ……..……cm^3

(2)

(b) What is the advantage of calculating an average volume of carbon dioxide for each temperature?

Leave blank

.....

(1)

(c) What do Eric's results show about the relationship between temperature and the rate of fermentation?

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(1)

(d) What would be the effect of a temperature of 0 ±C on the rate of fermentation? Give a reason for your answer.

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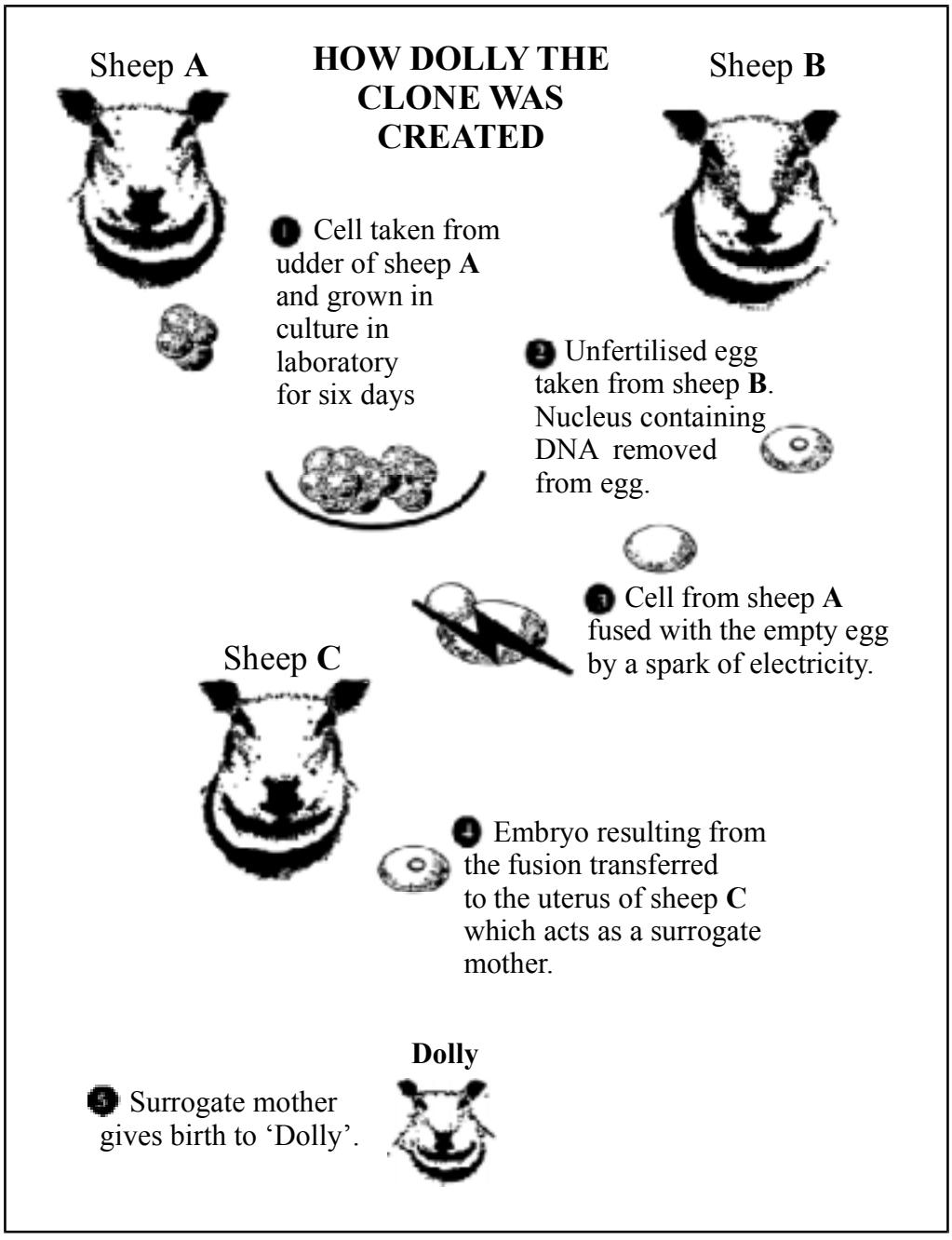
(2)

(Total 6 marks)

2. The diagram shows how scientists produced Dolly the sheep.

Leave blank



(a) (i) Dolly was produced with the help of an unfertilised egg.
Where did the scientists get the DNA to put into this egg?

Leave blank

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(1)

(ii) Suggest why it was important to remove the DNA from the unfertilised egg.

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(2)

(iii) Dolly is genetically identical to another sheep in the diagram. Which one?

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(1)

(b) Give **one** way in which this method is different from the normal method of sheep reproduction.

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(1)

(c) The production of Dolly was a significant advance in scientific work. The work may result in animal clones being produced in large numbers.

Suggest why it is important that people are informed of new scientific advances.

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(2)

(d) Suggest **one** advantage of producing animal clones.

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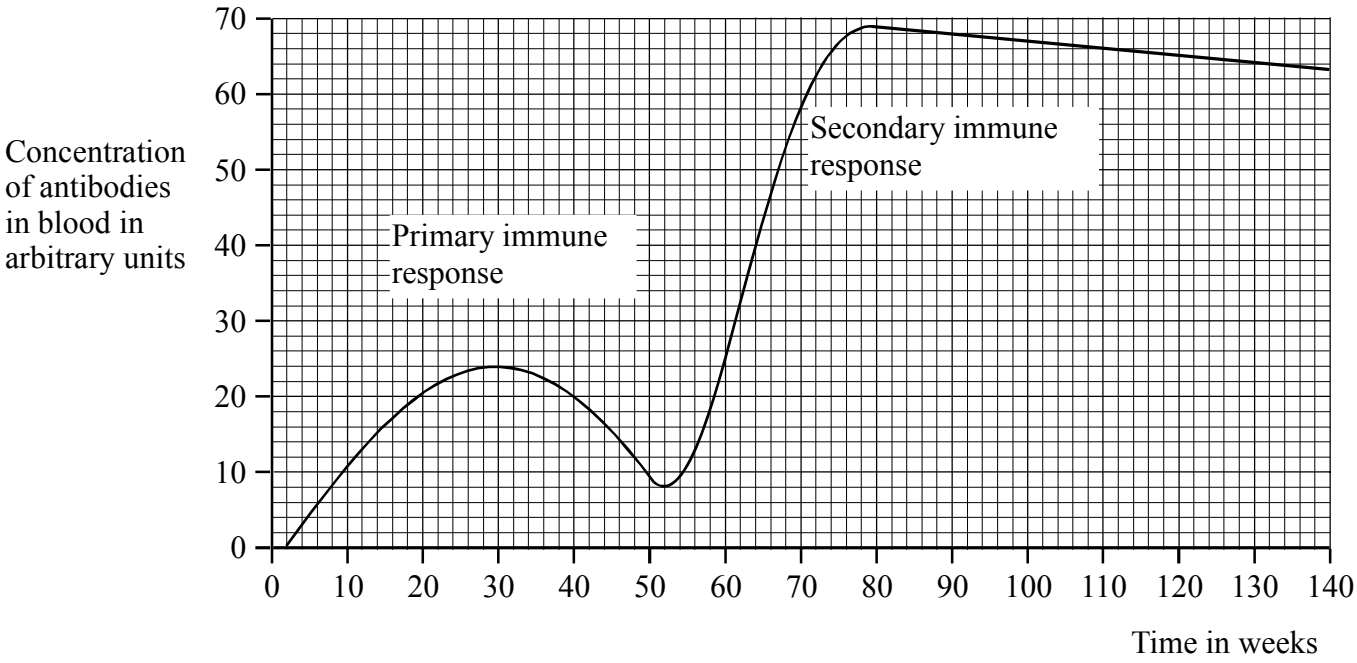
(1)

(Total 8 marks)

3. A person was given two vaccinations of an inactivated virus. The graph shows the person's primary and secondary immune responses.

Leave blank



(a) Draw an arrow on the graph to show when the second vaccination was given.

(1)

(b) Describe how proteins on the outside of inactivated viruses result in the production of antibodies.

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(4)

Leave blank

(c) Give **three** ways in which the primary immune response is different from the secondary immune response.

1 .....

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2 .....

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3. .....

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(3)

(d) Why is it important to use an inactivated virus?

.....

(1)

(Total 9 marks)

4. Read the newspaper article about soya bean plants.

Leave blank

GM SOYA BEANS

Traditional soya bean plants are killed by selective weedkillers. Genetic engineers have transferred a gene into a soya bean plant to create a genetically modified variety. This new variety of soya bean plant is resistant to selective weedkiller. Farmers in the USA grow this variety and use selective weedkiller to improve crop yield.

Some people are concerned that there are dangers in growing genetically modified soya beans.

(a) What is meant by the term **genetically modified**?

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(2)

(b) The new variety of soya bean plant is resistant to selective weedkiller.
Explain how this can increase crop yield when the new variety is grown.

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(4)

(c) Suggest **two** ways in which growing the new variety of soya bean plants may be harmful.

1 .....

2 .....

(2)

(Total 8 marks)

TOTAL 30 MARKS

END

Centre Number		Paper Reference	Surname	Initials
Candidate Number		1539/6C	Signature	

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1539/6C

Edexcel GCSE

Chemistry B **[1539]**
Paper 6C

HIGHER TIER
Specimen Paper

Time: 30 minutes **N230900**

Question Number	Leave Blank
1	
2	
3	
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 initials.

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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

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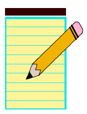
This paper has 3 questions. There are no blank pages.

Advice to Candidates



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Additional Answer Sheets may be used.

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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) Complete the table which shows the tests for some ions in solution.

Name of ion in solution	Reagent added to the solution	Positive result
copper (II)	…… ……	light blue precipitate
……	dilute nitric acid + silver nitrate solution	white precipitate
sulfate	……+ ……	…… ……

(5)

(b) Describe a test to show the presence of ammonium ions in ammonium chloride.

……

……

……

……

……

……

……

……

……

(5)

(Total 10 marks)

TURN OVER FOR QUESTION 2

2. Outline a method for manufacturing ethanol.

Include raw materials and necessary reaction conditions.

Leave blank

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4)

(Total 4 marks)

Leave blank

3. Much of the sulfur dioxide required for the manufacture of sulfuric acid is obtained from roasting metal sulfide ores such as zinc sulfide in air. The equation for this reaction is

$$2ZnS + 3O_2 \longrightarrow 2ZnO + 2SO_2$$

(a) Calculate the maximum volume of sulfur dioxide, measured at room temperature and atmospheric pressure, which would be released when 48.5 kg of zinc sulfide is roasted.

(Relative atomic masses: Zn = 65, S = 32)
(1 mol of a gas occupies 24.0 dm^3 at room temperature and atmospheric pressure.)

.....

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.....

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.....

.....

.....

.....

(4)

(b) In the next stage of the process, the sulfur dioxide is converted into sulfur trioxide.

$$2SO_2 + O_2 \longrightarrow 2SO_3$$

The conversion is carried out at atmospheric pressure and a temperature of 450 ±C. The use of higher pressures and lower temperatures would give a greater yield of sulfur trioxide.

Explain why such conditions are not normally used.

Higher pressures

.....

.....

Lower temperatures

.....

.....

(2)

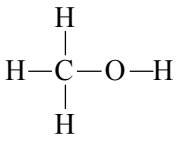
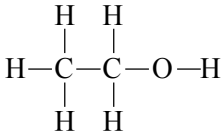
(Total 6 marks)

Leave blank

4. The alcohols are an example of an homologous series.

(a) (i) The structures of the first two alcohols in the series are shown.

Complete the table to show the names and the structures of all the alcohols.

Name	Structure
.....	
ethanol	
propanol	
butanol	

(3)

(ii) Why are these alcohols members of the same homologous series?

.....

.....

(1)

(iii) Describe a trend in a physical property of these alcohols.

.....

.....

.....

.....

(2)

(b) Compounds in the same homologous series undergo similar chemical reactions.

Leave blank

Describe one such reaction of the alcohols.
Write a balanced equation to show this reaction for one of the alcohols.

.....

.....

.....

.....

.....

.....

(4)

(Total 10 marks)

TOTAL 30 MARKS

END

Centre Number						Paper Reference	Surname	Initials
Candidate Number						**1549/6P**	Signature	

For Examiner's use only

For Team Leader's use only

1549/6P

Edexcel GCSE

Physics B **[1549]**
Paper 6P

HIGHER TIER
Specimen Paper

Time: 30 minutes **N230900**

Question Number	Leave Blank
1	
2	
3	
4	
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.

The paper reference is shown below the boxes.

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 4 questions. There are no blank pages.

Advice to Candidates

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

This symbol shows where ideas and evidence are being assessed.

Additional Answer Sheets may be used.

Turn over

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1. (a) Most telephone signals are sent through cables in the form of electrical signals. One disadvantage of this is that they can only travel a limited distance before they need to be amplified. A second disadvantage is that stray signals can affect the original signal.

Leave blank

(i) Explain why the electrical signals lose energy as they travel through the cable.

.....

.....

.....

.....

(2)

(ii) What is the function of the amplifier?

.....

(1)

(iii) When the stray signals are amplified, a 'hissing' is heard. What term is used to describe this type of signal distortion?

.....

(1)

(b) A signal can be sent through the cable in either digital or analogue form.

(i) Which method is used to avoid interference due to stray signals?

.....

(1)

(ii) Digital signals have an advantage over analogue signals since more information can be sent along the cable.
Explain this.

.....

.....

.....

.....

(2)

(c) Name the transducer used in the earpiece of the telephone used for converting the electrical signals received to sound.

.....

(1)

(Total 8 marks)

2. When air is pumped into a bicycle tyre the pressure inside the tyre increases. As more air is pumped in, it becomes increasingly difficult to push down the piston in the pump.

Leave blank

(a) Explain, in terms of air particles, how pressure is produced inside the tyre.

.....

.....

.....

.....

.....

.....

(4)

(b) Explain why the pressure in the tyre increases as more air is put in it.

.....

.....

.....

(2)

(Total 6 marks)

TURN OVER FOR QUESTION 3

3. A geostationary satellite is at a height of 36 000 km above the Earth's surface and is used to receive and transmit television signals from the Earth.

Leave blank

(a) The satellite is described as being an active satellite rather than a passive satellite.

Explain the difference between these two types of satellite.

.....

.....

.....

.....

(2)

(b) Explain how the satellite is able to keep in orbit around the Earth without having its motors running or using energy.

.....

.....

.....

.....

(2)

(c) The transmitter on the satellite beams 100 W of radiation to the Earth.

Explain how the size of the transmitting dish affects the power per square metre that arrives at the Earth's surface from the satellite.

.....

.....

.....

.....

.....

.....

(3)

(Total 7 marks)

4. At the end of the nineteenth century, physicists considered that the atom consisted of evenly distributed electrons and protons.

Leave blank

(a) Give an outline of what the β-particle scattering experiment involved and how the results led to this the nuclear model of the atom.

.....

.....

.....

.....

.....

(3)

(b) Protons and electrons were initially considered to be **fundamental particles**. Explain what this term means and state which of the two particles named is still considered to be a fundamental particle.

.....

.....

.....

(2)

(c) The neutron was detected much later than either the electron or the proton although it was known to exist.

(i) Suggest why neutrons were much more difficult to detect than protons or electrons.

.....

.....

.....

(2)

(ii) Quarks are fundamental particles. What is the connection between quarks, protons and neutrons?

.....

.....

.....

(2)

(Total 9 marks)

TOTAL 30 MARKS

END

Syllabus 1535
Science: Single Award B

Syllabus 1536
Science: Double Award B

Syllabus 1529
Biology B

Syllabus 1539
Chemistry B

Syllabus 1549
Physics B

Specimen Paper 1

MARK SCHEME

First Examination Summer 2003

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USING THE MARK SCHEME

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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.

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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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÷ use a suitable structure and style of writing.

Paper 1B

1 retina – creates nerve impulses;
pupil – allows light to enter the eye;
iris – allows light to enter the eye; **(3 marks)**

2 (a) zygote; 1

(b) An explanation to include:
male = XY / has different chromosomes / eq;
female = XX / has same chromosomes / eq; 2

(c) Any two from:
hair growth – under arm / pubic / body / face;
voice deepens;
shoulders widen;
growth spurt; 2

(5 marks)

3 (a) sulfur dioxide / carbon monoxide; 1

(b) (i) less pollution at lower speeds (or reverse argument); 1

(ii) discourage journey; 1

(3 marks)

4 (a) reduces surface area; 1

(b) muscles contract / work;
generating heat; 2

(c) An explanation to include two from:
sweat glands secrete water;
water / sweat evaporates;
evaporation requires energy / heat from body;
energy / heat loss leads to cooling; 2

(5 marks)

5 (a) (i) carbohydrase / amylase; 1

(ii) stomach; 1

(b) A description of two from:
large surface area;
thin (tissue);
<u>wall</u> supplied with blood <u>capillaries</u>; 2

(c) (i) colon shaded 1

(ii) An explanation to include two from:
less water in blood;
less sweat produced;
less evaporation;
less heat lost; 2

(7 marks)

6 (a) asexual / mitosis; 1

(b) to prevent mutation; 1

(c) technique not fully developed / OWTTE 1

(d) Any one idea from:
to prevent others from accessing the information;
to avoid publicity on failed work;
to avoid controversy / animal rights; 1

(e) An explanation to include two from:
to demonstrate / prove the technique works;
to spread knowledge / educate;
to allow further research / developments;
plus 1 communication mark for ensuring that spelling, punctuation and grammar are accurate, so that meaning is clear; 3

(7 marks)

TOTAL 30 MARKS

Paper 1C

1 (a) (i) S; 1

(ii) silicon / germanium / tin / lead;
[Accept correct symbol] 1

(iii) any metallic element from the periodic table; 1

(iv) one; 1

(v) oxygen / sulfur / selenium / tellurium / polonium;
[Accept correct symbol] 1

(vi) lithium / beryllium / boron / carbon / nitrogen / oxygen / fluorine / neon; 1
[Accept correct symbol]

(b) bromine;
chlorine;
fluorine; 3

(9 marks)

2 (a) bumper: does not rust / less damage to people in accidents / crumples easily;

carrier bag: stronger / does not rip when wet;

bottle: does not break easily / less dangerous; 3

(b) An explanation to include three from:
marine deposits / small sea creatures;
sank to sea bed;
covered in silt;
did not rot;
long term / millions of years;
effects of temperature and pressure; 3

(6 marks)

3

Change	Tick	
adding more of the acid to the test tube		
adding water to the test tube		
grinding up the marble chips before adding the acid	✓	;
using a beaker rather than a test tube		
using more concentrated acid	✓	;
warming the test tube and contents	✓	; 3

(3 marks)

4 (a) A suggestion to include one from:
to work out exactly where maximum was;
to establish shape at top of curve; 1

(b) A suggestion to include two from:
enzymes involved;
denatured above 40 °C / shape changes above 40 °C;
no longer fit in lock and key; 2

(3 marks)

5 (a) (i) $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$ correct reactants;
correct products;
fully correct and balanced; 3

(ii) A definition to include:
a compound of carbon and hydrogen;
only; 2

(b) (i) An explanation to include:
if phlogiston lost, substances would weigh less;
actually got an increase in weight; 2

(ii) An explanation to include:
substance had combined with something in the air;
oxygen; 2

(9 marks)

TOTAL 30 MARKS

Paper 1P

1 (a) television remote control to infra-red;
loudspeaker to sound;
sunbed to ultraviolet; 3

(b) sound; 1

(c) ultraviolet; 1

(5 marks)

2 8 (kW) x 0.5 (h) x 7 (p/kW h);
= 28;
pence / p; 3

(3 marks)

3 (a) the inside of the house is warmer than the outside; 1

(b) through the walls; 1

(c) Any three from:
loft insulation;
cavity wall insulation;
double glazing;
draught excluder; 3

(d) An explanation to include:
reduces energy use / burning of fossils fuels / greenhouse effect;
saves the householder money; 2

(7 marks)

4 (a) (i) alpha; 1

(ii) alpha and beta; 1

(iii) gamma; 1

(b) A description to include:
C-14 has more (particles);
the extra particles are neutrons; 2

(5 marks)

5 (a) 5 points plotted correctly;;
[Allow 1 mark for 3 points plotted correctly]
best straight line drawn; 3

(b) A description to include:
the current increases;
in a linear / uniform way; 2

(5 marks)

6 (a) Io goes round / Io orbits Jupiter / Jupiter has a moon; 1

(b) An explanation to include:
(at least) one object orbits Jupiter;
so all "heavenly bodies" cannot orbit the Earth;
plus 1 communication mark for presenting relevant information in a form that suits its purpose; 3

(c) to make others aware of his findings; 1

(5 marks)

TOTAL 30 MARKS

Syllabus 1536
Science: Double Award B

Syllabus 1529
Biology B

Syllabus 1539
Chemistry B

Syllabus 1549
Physics B

Specimen Paper 2

MARK SCHEME

First Examination Summer 2003

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USING THE MARK SCHEME

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AMPLIFICATION

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÷ use a suitable structure and style of writing.

Paper 2B

1 heart pumps blood to the lungs;
alveolus where gas exchange takes place;
cartilage keeps the air passage open; 3

(3 marks)

2 (a) Any two from:
membrane;
cytoplasm;
nucleus;
correctly labelled – each for 1 mark 2

(b) cellulose; 1

(c) (i) longer roots;
more spread out / more branched; 2

(ii) **Either** better water / mineral / ion / nutrient absorption;
or firmer anchorage; 1

(8 marks)

3 (a) oxygen;
carbon dioxide; 2

(b) (i) absorbs energy / withstands pressure; 1

(ii) allows outward / inward movement / diffusion; 1

(c) prevent backflow; 1

(5 marks)

4 (a) 5 accurate plots *for 2 marks*
3 or 4 accurate plots *for 1 mark*
curve drawn accurately; 3

(b)

Kelly has:	**OR**	Peter has:
less of a rise;		more of a rise
more rapid fall;		slower fall;
reaches resting rate;		fails to reach resting point;

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

(7 marks)

5 (a) stops photosynthesis / food / sugar production;
so cannot respire / produce protein / grow; 2

(b) less damage to environment / animals / harmless to humans; 1

(c) better control over variables / isolated from the environment;
so more reliable results; 2

(d) parts of the reef had no plants; 1

(e) to establish which one was effective /
find the effect of each chemical /
analysis with a view to synthesis; 1

(7 marks)

TOTAL 30 MARKS

Paper 2C

1 (a) fossil; 1

(b) crystal; 1

(2 marks)

2 (a) An explanation to include three from:
volcanoes gave out gases;
including water vapour / steam;
(as) Earth cooled;
water (vapour) condensed;
water became a liquid; 3

(b) An explanation to include:
photosynthesis / plants produce oxygen plus
respiration / animals use oxygen;
at the same rate; 2

(c) (i) the mouse died / it was cruel; 1

(ii) one fifth of air used by both / same amount of air used; 1

(iii) put both in together /
put mouse in air left by candle /
put candle in air left by mouse; 1

(8 marks)

3 (a) atom;
compound;
property;
formula; 4

(b) Diagram to include 4 of:
atom with nucleus;
atom with 3 protons and 4 neutrons;
protons and neutrons in nucleus;
atom with orbiting electrons;
arranged 2 in first shell and 1 in second shell; 4

(8 marks)

4 (a) $2H_2 + O_2 \longrightarrow 2H_2O$ correct reactants;
correct products;
fully correct and balanced; 3

(b) (i) A description to include any three from:
moves;
floats on surface;
sodium disappears (do not accept sodium dissolves);
bubbles of gas;
sometimes catches fire; 3

(ii) hydrogen; 1

(iii) more reactive; 1

(c) (i) An explanation to include:
contains ions / charged particles;
these move in solution; 2

(ii) An explanation to include:
ions held by strong forces;
cannot move; 2

(12 marks)

TOTAL 30 MARKS

Paper 2P

1 (a) (i) they become compressed / smaller; 1

(ii) smallest spring circled; 1

(iii) it is the smallest / been compressed most; 1

(b) use stiffer springs;
use more springs; 2

(c) arrows drawn vertically upwards; 1

(6 marks)

2 (a) (i) Des; 1

(ii) graph for Des is the steepest line /
Des competed the race in the shortest time; 1

(b) (i) 20 s; 1

(ii) $\text{speed} > \frac{\text{distance}}{\text{time}}$ / reference to gradient / slope of graph; 1

(iii) $\frac{100\,\text{m}}{20\,\text{s}} = 5;$ (m/s); 2

(6 marks)

3 (a) the Earth / ground; 1

(b) it decreases; 1

(c) mark according to quality of answer:
an argument either way with at least two supporting reasons for 3 marks
an argument with one supporting reason for 2 marks
no argument but a simple point made for 1 mark 3

(5 marks)

4 (a) **S** at mid-ocean ridge; 1

(b) plate is moving;
towards South America / away from mid-ocean ridge;
plus a communication mark for presenting relevant information in a form that suits its purpose; 3

(4 marks)

5	(a)	B;	1
	(b)	arrow pointing down on the right;	1
	(c)	arrows pointing in opposite directions; down on the left and up on the right;	2
			(4 marks)
6	(a)	A description to include: in A, some light reflected; some light refracted; in C, all light reflected / total internal refraction;	3
	(b)	correct reflection at the first face; correct reflection at the second face and correct passage out of the prism;	2
			(5 marks)
			TOTAL 30 MARKS

Syllabus 1529
Biology B

Syllabus 1539
Chemistry B

Syllabus 1549
Physics B

Specimen Paper 3

MARK SCHEME

First Examination Summer 2003

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Paper 3B

1 in water;
malaria;
virus; running] 4

Total 4 marks

2 (a) A description to include two from:
buds / **X** grow on the cell / eq;
they drop away/become independent / eq;
is asexual/replicates the yeast / eq;
plus a communication mark for ensuring that text is legible and that spelling, punctuation and grammar are accurate, so that the meaning is clear; 3

(b) *Penicillium* is branched / has hyphae / is part of a mycelium/ reproduces by spores /
yeast is unicellular / has vacuoles / eq; 1

(c) (i) continue the species/spread to new areas / eq; 1

(ii) can travel further/move in the air / eq; 1

Total 6 marks

3 (a) can be used to inseminate more cows/eq; 1
.

(b) in a freezer/using liquid nitrogen/eq; 1

(c) An explanation to include:
thaws out the frozen semen/eq;
so the sperms can swim/eq; 2

(d) press the plunger (and cut the seal)/eq; 1

(e) so that the semen enters the uterus/
can reach the fallopian tubes/can reach an egg/eq; 1
[Ignore so that semen goes to the right place /
semen does not go to the wrong place]

Total 6 marks

4 (a) $99 + 108 + 102 = 309$;
$\frac{309}{3} = 103$; [Allow ecf] 2

(b) more likely to represent the true value / eq; 1

(c) as temperature rises then so does the rate of fermentation /
rate of fermentation is proportional to temperature / eq; 1

(d) decrease in rate / zero rate / eq;
enzymes below optimum / inactive / reference to collision theory / eq; 2

Total 6 marks

5 (a) (i) sheep **A**/udder cell/eq; 1

(ii) A suggestion to include two from:
cell would die with two nuclei/eq;
otherwise it would have the genes of sheep **B**/eq;
so that the correct DNA would be accepted/eq; 2

(iii) sheep **A**; 1

(b) does not need sperm/
uses instruments/surrogate mother/eq; 1

(c) A suggestion to include two from:
there may be dangers/eq;
may be unethical/eq;
educates opinion/eq; 2

(d) can be used to produce useful chemicals/products/
large groups of animals with desired characteristics/eq; 1

Total 8 marks

TOTAL 30 MARKS

Paper 3C

1 (a) **Either** use safety glasses / wear apron / tie back hair;
or avoid contact with lead compounds / acid 1

(b) (i) C / sulfuric acid; 1

(ii) diagram of measuring cylinder / pipette / burette;
label; 2
[Allow 1 mark for beaker]

Total 4 marks

2 (a) protective layer;
can be coloured; 2

(b) aluminium oxide; 1

(c) aluminium / graphite / (named) unreactive metal; 1

(d) (dilute) sulfuric acid; 1

Total 5 marks

3 (a) sulfur;
air;
sulfur dioxide;
sulfur dioxide;
sulfur trioxide; 5

(b) Any two from:
making fertilisers;
detergents;
paints;
plastics; 2

Total 7 marks

4 (a) sodium hydroxide (solution);
chloride;
barium chloride/nitrate (solution);
+ (dilute) hydrochloric/nitric acid;
white ppt; 5

(b) A description to include:

- ÷ add sodium hydroxide (solution);
- ÷ warm mixture;
- ÷ ammonia gas evolved;
- ÷ turns red litmus blue/
  forms white smoke with hydrogen chloride/
  has pungent smell;

plus 1 communication mark for ensuring that spelling, punctuation and grammar are accurate, so that the meaning is clear; 5

Total 10 marks

5 An outline to include:

Either fermentation;
glucose/sugar;
yeast/warm temperature/absence of air;
distill mixture to concentrate ethanol;

or hydration of ethene;
ethene/steam;
high temperature;
catalyst; 4

Total 4 marks

TOTAL MARK 60

Paper 3P

1 (a) increases; 1

(b) (i) 24 hrs; 1

(ii) 36;
million m; 2
[Allow ecf from part (b)(I)]

(iii) television / radio / telephone; 1

(c) A description to include three of:
as it slows, drawn inwards/radius of orbit decreases;
by pull of Earth;
enters atmosphere;
burns up; 4

Total 8 marks

2 (a) (i) electrons; 1

(ii) filament;
hot;
negative;
repelled; 4

(b) (i) B; 1

(ii) light; 1

(iii) brighter; 1

Total 8 marks

3 (a) (i) An explanation to include:
cable has electrical resistance;
energy lost as heat; 2

(ii) to replace lost energy/boost the signal/increase amplitude; 1

(iii) noise; 1

(b) (i) digital; 1

(ii) An explanation to include:
very short time interval between pulses;
lots can be placed close together; 2

(c) loudspeaker; 1

Total 8 marks

4 (a) An explanation to include:
particles moving;
collisions with walls/hitting walls;
force produced;
plus 1 communication mark for ensuring that spelling, punctuation and grammar are accurate, so that the meaning is clear; 4

(b) An explanation to include:
more collisions;
more particles present; 2

Total 10 marks

TOTAL 30 MARKS

Syllabus 1535
Science: Single Award B

Syllabus 1536
Science: Double Award B

Syllabus 1529
Biology B

Syllabus 1539
Chemistry B

Syllabus 1549
Physics B

Specimen Paper 4

MARK SCHEME

First Examination Summer 2003

Edexcel
Success through qualifications

USING THE MARK SCHEME

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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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2. The sub-total marks for a question should be added together and the total 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.

Paper 4B

1 (a) (i) carbohydrase / amylase; 1

(ii) stomach; 1

(b) A description of two from:
large surface area;
thin (tissue);
wall supplied with blood capillaries; 2

(c) (i) colon shaded 1

(ii) An explanation to include two from:
less water in blood;
less sweat produced;
less heat lost; 2

(7 marks)

2 (a) asexual / mitosis; 1

(b) prevent mutation; 1

(c) technique not fully developed / OWTTE 1

(d) Any one idea from:
to prevent others from accessing the information;
to avoid publicity on failed work;
to avoid controversy / animal rights; 1

(e) An explanation to include two from:
to demonstrate / prove the technique works;
to spread knowledge / educate;
to allow further research / developments;
plus 1 communication mark for ensuring that spelling, punctuation and grammar are accurate, so that the meaning is clear; 3

(7 marks)

3 An explanation to include:
less water in plasma/blood;
increased ADH / more ADH produced;
more water reabsorbed into blood;
urine volume decreases, 3

(3 marks)

4 (a) An explanation to include three references from:
impulses / electrical signals;
neurones;
spinal cords / central nervous system;
stimulation of muscle / effector; 3

(b) An explanation to include two from:

craving (must have more);
withdrawal symptoms (eg headache / depression);
tolerance / need increased dose for same effect; 2

(5 marks)

5 (a) normal short 1

(b) Nn nn; 1

(c) N n n n;
combinations of genotypes, correctly derived;
if parental genotypes are incorrect, two marks max for Punn square/diagram 1

(d) Nn nn 1

(4 marks)

6 cause plus effect to a max of 3 eg
introduce speed limits, because less pollution at lower speeds;
fit catalytic converters to reduce production of harmful gases;
tune engines to make them more efficient;
plus 1 communication mark for using a suitable structure and style of writing; 4

(4 marks)

TOTAL 30 MARKS

Paper 4C

1 (a) A suggestion to include one from:
to work out exactly where maximum was;
to establish shape at top of curve; 1

(b) An explanation to include two from:
enzymes involved;
denatured above 40 °C / shape changes above 40 °C;
no longer fit in lock and key; 2

(3 marks)

2 (a) (i) $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$ correct reactants;
correct products;
fully correct and balanced; 3

(ii) An explanation to include two of:
a compound of carbon and hydrogen;
only; 2

(b) (i) An explanation to include two of:
if phlogiston lost would weigh less;
actually got an increase in weight; 2

(ii) had combined with something in the air;
oxygen; 2

(9 marks)

3 (a) breaking of large hydrocarbon molecules;
into smaller ones; 2

(b) containing (carbon – carbon) double bond; 1

(c) double bond breaks open;
joins other carbon atoms / forms long chains; 2

(5 marks)

4 (a) bromine displaced;
by chlorine;
chlorine more reactive; 3

(b) chlorine is a bleach; 1

(c) same number of outer electrons;
7 outer electrons/1 short of noble gas configuration; 2

(d) $2Fe + 3\ Cl_2 \longrightarrow 2FeCl_3$ correct reactants;
correct product;
fully correct and balanced; 3

(9 marks)

5 An explanation to include three from:

rate faster at a higher temperature;
higher temperature particles moving faster / have more energy;
increased number / frequency of collisions;
increased energy of collisions;
more successful collisions;

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

4

(4 marks)

TOTAL 30 MARKS

Paper 4P

1 (a) 5 points plotted correctly;;
[Allow 1 mark for 3 points plotted correctly]
best straight line drawn; 3

(b) A description to include:
the current increases;
in a linear / uniform way; 2

(c) $resistance > \frac{voltage}{current}$ *or* $R > \frac{V}{I}$;
voltage = 2.4 (V) or correct reading from graph;
$R > \frac{2.4}{0.6}$; = 4.0 Ω; 3

(8 marks)

2 (a) A description to include:
C-14 has more (particles);
the extra particles are neutrons; 2

(b) An explanation to include:
alpha particles cannot penetrate skin;
they are absorbed in breathing;
and can cause cell damage; 3

(5 marks)

3 (a) Io goes round / Io orbits Jupiter / Jupiter has a moon; 1

(b) An explanation to include:
(at least) one object orbits Jupiter;
so all "heavenly bodies" cannot orbit the Earth;
plus 1 communication mark for presenting relevant information in a form that suits its purpose; 3

(c) to make others aware of his findings; 1

(5 marks)

4 (a) similarity: both transverse /
travel at the same speed in a vacuum or air;
difference: frequency / wavelength; 2

(b) (i) A description to include:
the waves travel in straight lines;
earth is curved / blocks the waves; 2

(ii) An explanation to include:
digital – only certain values allowed (or from diagram);
analogue – continuously variable /
signal can have any value (or from diagram); 2

(6 marks)

5 (a) Overhead – cheaper installation / lower running costs / easy to detect OR repair faults;
Underground – less unsightly / more appropriate in cities where less space / less prone to whether damage; 2

(b) An explanation to include three from:
water flow too slow / tide not high enough / small waves;
wind reliable;
large area needed for wind farm / lot of turbines needed;
few suitable sites / rivers;
plus 1 communication mark if the text is legible and that spelling, 4

punctuation and grammar are accurate, so that the meaning is clear; **(6 marks)**

TOTAL 30 MARKS

Syllabus 1536
Science: Double Award B

Syllabus 1529
Biology B

Syllabus 1539
Chemistry B

Syllabus 1549
Physics B

Specimen Paper 5

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
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9. ORA (or reverse argument) indicates that the complete reverse is also valid for the award of marks.
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MARKING

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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

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÷ use a suitable structure and style of writing.

Paper 5B

1 (a) 5 accurate plots *for 2 marks*
3 or 4 accurate plots *for 1 mark*
curve drawn accurately; 3

(b) Kelly has:
less of a rise;
more rapid fall;
reaches resting rate;
ORA each case for Peter
plus 1 communication mark; 4

(7 marks)

2 (a) stops photosynthesis / food / sugar production;
so cannot respire / produce protein / grow; 2

(b) less damage to environment / animals / harmless to humans; 1

(c) better control over variables / isolated from the environment;
so more reliable results; 2

(d) parts of the reef had no plants; 1

(e) to establish which one was effective /
find the effect of each chemical /
analysis with a view to synthesis; 1

(7 marks)

3 (a) An explanation to include two from:
active transport / uptake;
nitrate ions carried across (cell) membrane;
[Reject nitrate ions just pass through membrane]
against the concentration gradient;
using energy; 2

(b) An explanation to include two from:
more oxygen in soil;
rate of respiration increases;
to provide more energy;
[Ignore references to photosynthesis and oxygen] 2

(4 marks)

4 An explanation to include two from:
loss of home / habitat / protection / shelter /
overcrowding / increased predation;
fewer breeding sites;
less food / restricted diet / disrupts food chain / web;
no wildlife corridors to move along to other habitats;
isolation;
some species become endangered or extinct /
types or numbers of plants / animals decrease;
emigration to other areas; 4

[Ignore greenhouse effect and gas changes]

(4 marks)

5 An explanation to include four from:
muscle of ventricles (or heart muscle) contracts;
correct reference to labelled valve or: a/v close;
correct reference to labelled valve or: semi-lunar open;
valve R/S (or both R and S) close(s) first;
forcing blood into arteries;

4
(4 marks)

6 (a) An explanation to include:
cf is caused by recessive alleles / is a recession condition; 2
parents are carriers / heterozygous;

(b) An explanation to include two of:
bacteria / micro-organisms are trapped in mucus;
but not brought up / swallowed / killed in stomach acid;
too much mucus hinders action of cilia; 2

(4 marks)

TOTAL 30 MARKS

Paper 5C

1 (a) $2H_2 + O_2 \longrightarrow 2H_2O$
correct reactants;
correct products;
fully correct and balanced; 3

(b) (i) A description to include any three from:
moves;
floats on surface;
sodium disappears (do not accept sodium dissolves);
bubbles of gas;
sometimes catches fire; 3

(ii) hydrogen; 1

(iii) more reactive; 1

(c) (i) An explanation to include:
contains ions / charged particles;
these move in solution; 2

(ii) An explanation to include:
Either ions held by strong forces;
cannot move;
or not a metal;
therefore no free electrons; 2

(12 marks)

2 (a) was based on experimental results; 1

(b) (i) liquids have particles which are close together /
thought that atom of same element could not combine; 1

(ii) $H \overset{x}{\div} H$
one electron from each hydrogen atom;
shared between atoms;
each atom has access to two electrons;
noble gas / helium electron configuration; 4

(c) atoms cannot be seen; 1

(7 marks)

3 (a) (i) yield reduced; 1

(ii) yield increased; 1

(b) large amounts of energy needed for electrolysis /
electricity is expensive; 1

(c) $2NH_3 + H_2SO_4 \longrightarrow (NH_4)_2SO_4$ correct reactants;
correct product;
fully correct and balanced; 3

(6 marks)

4 (a) An explanation to include two from:
different rates of cooling;
fast cooling small crystals / slow cooling large crystals;
larger volume slower cooling;
below ground slower cooling; 2

(b) $\frac{3.57}{119} : \frac{0.96}{16}$;
0.03 : 0.06 ;
1 : 2 ;
hence empirical formula SnO_2 3

(5 marks)

TOTAL 30 MARKS

Paper 5P

1 (a) the earth / ground; 1

(b) it decreases; 1

(c) mark according to quality of answer:
an argument either way with at least two supporting reasons for 3 marks
an argument with one supporting reason for 2 marks
no argument but a simple point made for 1 mark;;; 3

(5 marks)

2 (a) B; 1

(b) arrow pointing down; 1

(c) arrow pointing in opposite directions;
down on the left and up on the right; 2

(4 marks)

3 (a) A description to include:
in A, some light reflected;
some light refracted;

in C. all light reflected / total internal refraction; 3

(b) correct reflection at the first face;
correct reflection at the second face and correct passage out of the prism; 2

(5 marks)

4 (a) force = 350 N;
direction is upwards; 2

(b) $\text{acceleration} > \frac{\text{force}}{\text{mass}}$;
$> \frac{350\ \text{N}}{765\ \text{kg}}$;
$= 0.46\ \text{m/s}^2$; 3

(c) An explanation to include:
acceleration decreases;
resistive force increases;
reducing the size of the unbalanced force;
plus 1 communication mark for ensuring that spelling, punctuation and grammar are accurate, so that the meaning is clear 4

(d) An explanation to include:
mass / downwards force decreases;
causing an increase in acceleration; 2

(11 marks)

5 (a) A suggestion to include:
electrons;
pass through tyres to earth; 2
[Allow aircraft is earthed for 1 mark]

(b) $Q = I \times t$ / $I > \frac{Q}{t}$;

$> \frac{2.0 \times 10^{-4}\ C}{0.5\ s}$;

$= 4 \times 10^{-4}$ A ; 4

(5 marks)

TOTAL 30 MARKS

Syllabus 1529
Biology B

Syllabus 1539
Chemistry B

Syllabus 1549
Physics B

Specimen Paper 6

MARK SCHEME

First Examination Summer 2003

Edexcel
Success through qualifications

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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.

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÷ use a suitable structure and style of writing.

Paper 6B

1 (a) $99 + 108 + 102 = 309$;
$\frac{309}{3} = 103$; [Allow ecf] 2

(b) more likely to represent the true value/eq; 1

(c) as temperature rises then so does the rate of fermentation/
rate of fermentation is proportional to temperature/eq; 1

(d) decrease in rate/zero rate/eq;
enzymes below optimum/inactive/
reference to collision theory/eq; 2

Total 6 marks

2 (a) (i) sheep **A**/udder cell/eq; 1

(ii) A suggestion to include two from:
cell would die with two nuclei/eq;
otherwise it would have the genes of sheep **B**/eq;
so that the correct DNA would be accepted/eq; 2

(iii) sheep **A**; 1

(b) does not need sperm / uses instruments / surrogate mother / eq; 1

(c) A suggestion to include two from:
there may be dangers/eq;
may be unethical/eq;
educates opinion/eq; 2

(d) can be used to produce useful chemicals / products /
large groups of animals with desired characteristics / eq; 1

Total 8 marks

3 (a) 50 – 55 weeks (accept within range); 1

(b) A description to include four from:
some proteins are antigens/eq;
B lymphocytes;
creation of plasma cells;
which secrete the antibodies/eq; 4

(c) primary has less antibodies/
secondary produces more antibodies/eq;
secondary response antibodies decrease
more slowly or last longer/eq;
primary response slower/secondary response faster/eq; 3

(d) otherwise it could cause disease/eq; 1

Total 8 marks

6 (a) gene is transferred/eq;
to different species/soya (bean) plant/eq; 2

(b) An explanation to include three from:
- ÷ plant is not killed when weedkiller used/eq;
- ÷ less competition from weeds/eq;
- ÷ more light for crop/eq;
- ÷ more water for crop/eq;
- ÷ more minerals for crop/eq;
- ÷ so more photosynthesis/eq;

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

(c) A suggestion to include:
- ÷ could pass on weedkiller to consumer/could be toxic/eq;
- ÷ could pass on resistance to weeds/eq; 2

Total 8 marks

TOTAL 30 MARKS

Paper 6C

1 (a) sodium hydroxide (solution);
chloride;
barium chloride/nitrate (solution);
+ (dilute) hydrochloric/nitric acid;
white ppt; 5

(b) A description to include:
add sodium hydroxide (solution);
warm mixture;
ammonia gas evolved;
turns red litmus blue / has pungent smell /;
forms white smoke with hydrogen chloride;
plus 1 communication mark for ensuring that spelling, punctuation and grammar are accurate, so that the meaning is clear;
5

Total 10 marks

2 An outline to include:
Either fermentation;
glucose/sugar;
yeast/warm temperature/absence of air;
distill mixture to concentrate ethanol;
or hydration of ethene;
ethene/steam;
high temperature;
catalyst; 4

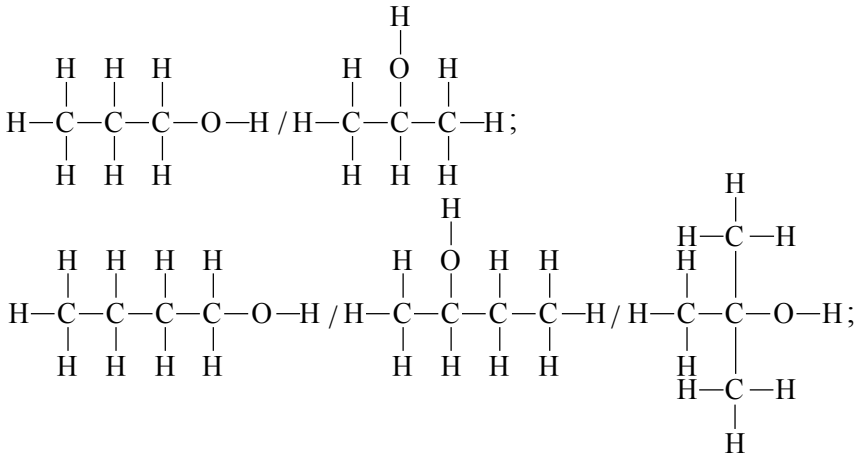
Total 4 marks

3 (a) I mol ZnS $\longrightarrow$ 1 mol SO_2;
ZnS = 97;
Mol ZnS = $\frac{48.5 \propto 10^3}{97}$ = 500;
Vol of SO_2 $500 \propto 24 = 12000$ dm^3; 4

(b) Higher Pressures - expensive to maintain/safety risks;
Lower temperatures - slow; 2

Total 6 marks

4 (a) (i) methanol;



3

(ii) they all contain an O—H group/eq; 1

(iii) eg boiling point increases as number of carbon atoms increases;; 2

(b) eg they all react when heated with ethanoic acid;
to form sweet smelling;
esters;
$C_2H_5OH + CH_3COOH \longrightarrow CH_3CO.OC_2H_5 + H_2O$;; max 4

Total 10 marks

TOTAL 30 MARKS

Paper 6P

1 (a) (i) An explanation to include:
cable has electrical resistance;
energy lost as heat; 2

(ii) to replace lost energy/boost the signal/increase amplitude; 1

(iii) noise; 1

(b) (i) digital; 1

(ii) An explanation to include:
very short time interval between pulses;
lots can be placed close together; 2

(c) loudspeaker; 1

Total 8 marks

2 (a) An explanation to include:
particles moving;
collisions with walls/hitting walls;
force produced;
plus 1 communication mark for ensuring that spelling, punctuation and grammar are accurate, so that the meaning is clear; 4

(b) An explanation to include:
more collisions;
more particles present; 2

Total 6 marks

3 (a) An explanation to include:
active – acts on received signal / produces a
passive – does not change it/just reflects 2

(b) An explanation to include two from:
gravitational pull;
keeps satellite in orbit;
responsible for its changing direction; 2

(c) (i) An explanation to include:
wave diffracted /spread out by dish;
wavelength to dish size ratio determines amount of diffraction/spreading;
less energy per m^2 if spread out; 3

Total 7 marks

4 (a) An outline to include:
β particles fired at gold foil;
angles of scatter measured;
a few scattered through large angles;
plus 1 communication mark for using a suitable structure and style of writing; 4

(b) An explanation to include:
cannot be divided/ broken down further;
electrons; 2

(c) (i) A suggestion to include:
neutrons have no charge/cannot be deflected by E/M fields; 2
(difficult to detect) travel though matter easily;

(ii) protons and neutrons contain 3 quarks;
different combinations of up and down quarks; 2

Total 11 marks

TOTAL 30 MARKS

SPECIFICATION GRID *Specimen Paper*

GCSE SCIENCE B

Syll. No. 1536 Paper No. 1B Foundation Tier

Maximum mark for Paper 90 Page 1 of 3 23 SEPTEMBER 2000

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equ^{n} & Calc^{n}.	Extended Prose		
		AO1		AO2	AO3		Low	Stand.				= 2	> 2	Comm.
		K & U												
		53 – 59												
		Recall	Other	Applic^{n}	Inv.Sc.		G-E	D-C						
		12-14	41-45	27-36	0-7	90	45-54	36-45	×	/ 42	SeeCQC	~18	~5	~3
Paper 1B														
1	1.09	1	2			3	3			3				
2 (a)	2.06	1					1		×	1				
(b)	2.09		2				2					2		
(c)	2.10		2			5	2			2				
3 (a)	2.44	1					1		×	1				
(b) (i)	2.45			1			1		×	1				
(ii)	2.45			1		3	1		×	1				
4 (a)	1.23		1				1			1				
(b)	1.27		2				2					2		
(c)	1.23	2				5	2					2		
5 (a) (i)	1.02	1						1		1				
(ii)	1.01		1					1		1				
(b)	1.03		2					2		2				
(c) (i)	1.01			1				1		1				
(ii)	1.23			2		7		2				2		
6 (a)	2.27	1						1		1				
(b)	2.26		1					1		1				
(c)	2.27		1					1		1				
(d)	2.27			1				1		1				
(e)	2.27				3	7		3				2		1
Totals		7	14	6	3	30	16	14		19		10		1

SPECIFICATION GRID *Specimen Paper*

GCSE SCIENCE B

Syll. No. 1536 Paper No. 1C Foundation Tier

Maximum mark for Paper 90 Page 2 of 3 23 SEPTEMBER 2000

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equ^{n} & Calc^{n}.	Extended Prose		
		AO1		AO2	AO3		Low	Stand.						
		K & U												
		53 – 59										= 2	> 2	Comm.
		Recall	Other	Applic^{n}	Inv.Sc.		G-E	D-C						
		12-14	41-45	27-36	0-7	90	45-54	36-45	×	/ 42	SeeCQC	~18	~5	~3
Paper 1C														
1 (a)	3.02/3/4/5		4	2			6			6				
(b)	3.11/13	2	1			9	3			3				
2 (a)	4.20			3			3		×	3				
(b)	4.01	1	2			6	3						3	
3	3.17		1	2		3	3			3				
4 (a)	3.21				1			1		1				
(b)	3.21	1	1			3		2				2		
5 (a) (i)	4.08			3				3			3			
(ii)	4.02	1	1					2				2		
(b) (i)	4.08			2				2				2		
(ii)	4.08		2			9		2				2		
Totals		5	12	12	1	30	18	12		16	3	8	3	

SPECIFICATION GRID *Specimen Paper*

GCSE SCIENCE B

Syll. No. 1536 Paper No. 1P Foundation Tier

Maximum mark for Paper 90 Page 3 of 3 23 SEPTEMBER 2000

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equ^{n} & Calc^{n}.	Extended Prose		
		AO1		AO2	AO3		Low	Stand.						
		K & U												
		53 – 59										= 2	> 2	Comm.
		Recall	Other	Applic^{n}	Inv.Sc.		G-E	D-C						
		12-14	41-45	27-36	0-7	90	45-54	36-45	×	/ 42	seeCQC	~18	~5	~3
						Pape								
1 (a)	6.08/13		3				3		×	3				
(b)	6.03		1				1			1				
(c)	6.04	1				5	1			1				
2	5.20			3		3	3		×		3			
3 (a)	5.26		1				1		×	1				
(b)	5.26			1			1		×	1				
(c)	5.27	3					3		×	3				
(d)	5.27		2			7	2		×			2		
4 (a)	6.30/31	1	2				3			3				
(b)	6.28/27		2			5		2				2		
5(a)	5.05			3		3		3		3				
(b)	5.05		2			2		2			2			
6 (a)	6.16			1				1		1				
(b)	6.16		2	1				3				2		1
(c)	6.16		1			5		1		1				
Totals		5	16	9	0	30	18	12		15	6	8	0	1
Totals – Paper 1		17	42	27	4	90	52	38		50	9	24	3	2

SPECIFICATION GRID *Specimen Paper*

GCSE SCIENCE B

Syll. No. 1536 Paper No. 2B Foundation Tier

Maximum mark for Paper 90 Page 1 of 3 23 SEPTEMBER 2000

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equ^{n} & Calc^{n}.	Extended Prose		
		AO1		AO2	AO3		Low	Stand.						
		K & U										= 2	> 2	Comm.
		53 – 59												
		Recall	Other	Applic^{n}	Inv.Sc.		G-E	D-C						
		12-14	41-45	27-36	0-7	90	45-54	36-45	×	/ 42	seeCQC	~18	~5	~3
Paper 2B														
1	8.01/07		3			3	3			3				
2 (a)	7.01/02	2	2				4			4				
(b)	7.02	1					1			1				
(c) (i)	7.16		2				2		×			2		
(ii)	7.08/11			1		8	1			1				
3 (a)	8.20		2				2			2				
(b) (i)	8.12		1				1			1				
(ii)	8.13		1				1			1				
(c)	8.12		1			5	1			1				
4 (a)	8.20				3			3			3			
(b)	8.20			4		7		4	×				3	1
5 (a)	7.04			2				2	×			2		
(b)	7.30			1				1	×	1				
(c)	7.30			2				2	×			2		
(d)	7.30			1				1		1				
(e)	7.30			1		7		1	×	1				
Total		3	12	12	3	30	16	14		17	3	6	3	1

SPECIFICATION GRID *Specimen Paper*

GCSE SCIENCE B

Syll. No. 1536 Paper No. 2C Foundation Tier

Maximum mark for Paper 90 Page 2 of 3 23 SEPTEMBER 2000

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equ^{n} & Calc^{n}.	Extended Prose		
		AO1		AO2	AO3		Low	Stand.				= 2	> 2	Comm.
		K & U												
		53 – 59												
		Recall	Other	Applic^{n}	Inv.Sc.		G-E	D-C						
		12-14	41-45	27-36	0-7	90	45-54	36-45	×	/ 42	seeCQC	~18	~5	~3
Paper 2C														
1 (a)	9.24		1				1			1				
(b)	9.23		1			2	1			1				
2 (a)	9.31		2	1			3		×				3	
(b)	9.33		1	1			2		×			2		
(c)	9.33			3		8	3		×	3				
3 (a)	10.01/06/10	3	1				4			4				
(b)	10.03		2	2		8	4			4				
4 (a)	10.06		1	2				3			3			
(b)	9.18/19	2	2	1				5		2			3	
(c) (i)	10.12		2					2				2		
(ii)	10.12		2			12		2				2		
Total		5	15	10		30	18	12		15	3	6	6	0

SPECIFICATION GRID *Specimen Paper*

GCSE SCIENCE B

Syll. No. 1536 Paper No. 2P Foundation Tier

Maximum mark for Paper 90 Page 3 of 3 23 SEPTEMBER 2000

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET Aspects	Short Ans./ Object.	Equ^{n} & Calc^{n}.	Extended Prose		
		AO1		AO2	AO3		Low	Stand.						
		K & U										= 2	> 2	Comm
		53 – 59												
		Recall	Other	Applic^{n}	Inv.Sc.		G-E	D-C						
		12-14	41-45	27-36	0-7	90	45-54	36-45	×	/ 42	seeCQC	~18	~5	~3
Paper 2P														
1 (a) (i)	12.30			1		1	1			1				
(ii)	12.30		1			1	1			1				
(iii)	12.30		1			1	1			1				
(b)	12.30			2		2	2			2				
(c)	11.09	1				1	1			1				
2 (a)	11.02		1	1		2	2			2				
(b) (i)	11.02			1		1	1			1				
(ii)	11.02	1		2		3	3				3			
3 (a) (i)	11.29			1				1		1				
(b)	11.29	1						1		1				
(c)	11.29		3			5		3					3	
4 (a)	11.27		1				1		×	1				
(b)	11.26		3			4	3		×			2		1
5 (a)	12.16	1						1		1				
(b)	12.15		1					1		1				
(c)	12.15		2			4		2		2				
6 (a)	12.24		3					3					3	
(b)	12.24			2		5		2	×	2				
Total		4	16	10		30	16	14		18	3	2	6	1
Total Paper 2		13	40	34	3	90	50	40		50	9	14	15	2

SPECIFICATION GRID **Specimen Paper**

GCSE SCIENCE B

Syll. No. 1529/39/49 Paper 3 **Foundation Tier**

Maximum mark for Paper 90 **Page 1 of 1** **23 SEPTEMBER 2000**

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equ^{n} & Calc^{n}.	Extended Prose		
		AO1		AO2	AO3		Low	Stand.				= 2	> 2	Comm.
		K & U												
		53 – 59												
		Recall	Other	Applic^{n}	Inv.Sc.		G-E	D-C						
		12-14	41-45	27-36	0-7	90	45-54	36-45	×	/ 42	seeCQC	~18	~5	~3
Paper 3B														
1	13.14	4				4	4		×	4				
2	13.09/09	1	4	1		6	6			3		2		
3	14.15	1	5			6	6			4		2		
4	13.10/11		6			6		6		4	2			
5	14.14		3	3	2	8		8		4		4		
Total		6	18	4	2	30	16	14		19	2	8		1
Paper 3C														
1	15.03/04/06		2	2		4	4			4				
2	16.01		2	3		5	5			5				
3	16.09/11	2	5			7	7			7				
4	15.11	7		3		10		10		5			4	1
5	16.12	2	1	1		4		4					4	
Total		11	13	6		30	16	14		21			8	1
Paper 3P														
1	17.21/22/24	2	3	3		8	6	2		5			3	
2	18.28/29/32/33	1	2	5		8	8			4		4		
3	17.3/05/07/09/09	4	4			8		8		4	4			
4	18.05		3	3		6		6				2	3	1
Totals		7	12	11		30	14	16		13	4	6	6	1
Totals Paper 3		16	38	33	3	90	47	43		49	4	18	16	3

SPECIFICATION GRID *Specimen Paper*

GCSE SCIENCE B

SYLL. NO. 1536 PAPER NO. 4 B HIGHER TIER

23 SEPTEMBER 2000

Maximum mark for Paper 90 Page 1 of 3

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equ^{n} & Calc^{n}.	Extended Prose		
		AO1		AO2	AO3		Stand.	High.				= 2	> 2	Comm.
		K & U												
		53 – 59												
		Recall	Other	Applic^{n}	Inv.Sc.		C-D	B-A*						
		12-14	41-45	27-36	0-7	90	36-45	45-54	×	/ 42	seeCQC	~14	~9	~4
Paper 4B														
1 (a) (i)	1.02	1					1			1				
(ii)	1.01		1				1			1				
(b)	1.03		2				2			2				
(c) (i)	1.01			1			1			1				
(ii)	1.23			2		7	2					2		
2 (a) (i)	2.27	1					1			1				
(b)	2.26		1				1			1				
(c)	2.27		1				1			1				
(d)	2.27		1				1			1				
(e)	2.27				3	7	3					2		1
3 (a)	1.08	1	2					3					3	
(b)	1.15		2			5		2	×			2		
4	1.21	1	2			3		3					3	
5	2.22		4			4		4		4				
6	2.44/45			4		4		4					4	
Totals		4	16	7	3	30	14	16		13		6	10	1

SPECIFICATION GRID *Specimen Paper*

GCSE SCIENCE B

SYLL. NO. 1536 PAPER NO. 4 C HIGHER TIER

23 SEPTEMBER 2000

Maximum mark for Paper 90 Page 2 of 3

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equ^{n} & Calc^{n}.	Extended Prose		
		AO1		AO2	AO3		Stand.	High.				= 2	> 2	Comm.
		K & U												
		53 – 59												
		Recall	Other	Applic^{n}	Inv.Sc.		C-D	B-A*						
		12-14	41-45	27-36	0-7	90	36-45	45-54	×	/ 42	seeCQC	~14	~9	~4
Paper 4C														
1 (a)	9.21				1		1			1				
(b)	9.21	1	1			3	2					2		
2 (a) (i)	10.08		3				3				3			
(ii)	10.02	1	1				2					2		
(b) (i)	10.08			2			2					2		
(ii)	10.08		2			9	2					2		
3 (a)			2					2				2		
(b)		1						1		1				
(c)			2			5		2	×			2		
4 (a)			3				1	2					3	
(b)		1						1		1				
(c)			2					2				2		
(d)			1	2		9		3			3			
5			3	1		4	1	3					4	
Totals		4	20	5	1	30	14	16		3	6	14	7	

SPECIFICATION GRID *Specimen Paper*

GCSE SCIENCE B

SYLL. NO. 1536 PAPER NO. 4P HIGHER TIER

23 SEPTEMBER 2000

Maximum mark for Paper 90 Page 3 of 3

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equ^{n} & Calc^{n}.	Extended Prose		
		AO1		AO2	AO3		Stand.	High.				= 2	> 2	Co mm.
		K & U												
		53 – 59												
		Recall	Other	Applic^{n}	Inv.Sc.		C-D	B-A*						
		12-14	41-45	27-36	0-7	90	36-45	45-54	×	/ 42	seeCQC	~14	~9	~4
Paper 4P														
1 (a)	12.27/28		2				2					2		
(b)	12.32/33		2	1		5	3						3	
2 (a)	11.05			3			3				3			
(b)	11.05		2				2					2		
(c)	11.06	1		2		8		3			3			
3 (a)	12.16			1			1			1				
(b)	12.16		2	1			3					2		1
(c)	12.16		1			5	1			1				
4 (a)	11.22		2					2	×	2				
(b)	11.24		1	3		6		4	×				4	
5 (a)	12.03/04	2						2	×	2				
(b) (i)	12.08		2					2	×			2		
(ii)	12.07	1	1			6		2	×			2		
Total		5	15	11		30	15	15		6	6	10	7	1
Total Paper 4		12	46	28	4	90	40	50		22	12	29	27	4

SPECIFICATION GRID *Specimen Paper*

GCSE SCIENCE B

SYLL. NO. 1536 PAPER NO. 5 HIGHER TIER

23 SEPTEMBER 2000

Maximum mark for Paper 90 Page 1 of 3

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equ^{n} & Calc^{n}.	Extended Prose		
		AO1		AO2	AO3		Stand.	High.				= 2	> 2	Comm.
		K & U												
		53 – 59												
		Recall	Other	Applic^{n}	Inv.Sc.		C-D	B-A*						
		12-14	41-45	27-36	0-7	90	36-45	45-54	×	/ 42	seeCQC	~14	~9	~4
Paper 5B														
1 (a)	7.04			2			2		×			2		
(b)	7.30			1			1		×	1				
(c)	7.30			2			2		×			2		
(d)	7.30			1			1			1				
(e)	7.30			1		7	1		×	1				
2 (a)	8.20				3		3				3			
(b)	8.20			4		7	4		×				3	1
3 (a)	7.09	1	1					2				2		
(b)	7.09	1	1			4		2	×			2		
4	7.27	1	3			4		4	×				4	
5	8.09	1	3			4		4					4	
6 (a)	8.27		2					2	×			2		
(b)	8.03		2			4		2				2		
Total		4	12	11	3	30	14	16		3	3	12	11	1

SPECIFICATION GRID *Specimen Paper*

GCSE SCIENCE B

SYLL. NO. 1536 PAPER NO. 5 HIGHER TIER

23 SEPTEMBER 2000

Maximum mark for Paper 90 Page 1 of 3

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equ^{n} & Calc^{n}.	Extended Prose		
		AO1		AO2	AO3		Stand.	High.				= 2	> 2	Comm.
		K & U												
		53 – 59												
		Recall	Other	Applic^{n}	Inv.Sc.		C-D	B-A*						
		12-14	41-45	27-36	0-7	90	36-45	45-54	×	/ 42	seeCQC	~14	~9	~4
Paper 5C														
1 (a)	10.06		1	2			3				3			
(b)	9.18/19	2	2	1			5			2			3	
(c) (i)	10.12		2				2					2		
(ii)	10.12		2			12	2					2		
2 (a)	10.01			1				1		1				
(b) (i)	10.01		1					1		1				
(ii)	10.14	1	2	1				4		4				
(c)	10.01		1			7		1		1				
3 (a)	9.27		2					2	×	2				
(b)	9.9/9.10			1				1	×	1				
(c)	9.29		1	2		6		3			3			
								3						
4 (a)	9.41		2				2					2		
(b)	10.44			3		5		3			3			
Totals		3	16	11		30	14	16		12	9	6	3	

SPECIFICATION GRID *Specimen Paper*

GCSE SCIENCE B

SYLL. NO. 1536 PAPER NO. 5 HIGHER TIER

23 SEPTEMBER 2000

Maximum mark for Paper 90 Page 2 of 2

YEAR of EXAM 2003

Q	Spec.Ref.	Assessment Objective				Total Mark	Level of demand		SocEET aspects	Short ans./ Object.	Equ^{n} & Calc^{n}.	Extended Prose		
		AO1		AO2	AO3		Stand.	High.				= 2	> 2	Comm.
		K & U												
		53 – 59												
		Recall	Other	Applic^{n}	Inv.Sc.		C-D	B-A*						
		12-14	41-45	27-36	0-7	90	36-45	45-54	×	/ 42	seeCQC	~14	~9	~4
Paper 5P														
1 (a)	12.16	1					1			1				
(b)	12.15		1				1			1				
(c)	12.15		2			4	2			2				
2 (a)	11.29			1			1		×	1				
(b)	11.29	1					1		×	1				
(c)	11.29		3			5	3		×				3	
3 (a)	12.24		3			3	3						3	
(b)	12.24			2		2	2		×	2				
4 (a)	12.07		2					2				2		
(b)	12.09	1		3		6		4			4			
5 (a)	11.15			2				2			2			
(b)	11.16	1		2				3			3			
(c)	11.15	1	2					3					3	
(d)	11.15		2			10		2				2		
Total		5	15	10		30	14	16		8	9	4	9	
Total Paper 5		12	43	32	3	90	42	48		23	21	22	23	1

SPECIFICATION GRID **Specimen Paper**

GCSE SCIENCE B

Syll. No. 1529/39/49 **Paper 6** **Higher Tier**

Maximum mark for Paper 90 **Page 1 of 1** **23 SEPTEMBER 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												
		53 – 59												
		Recall	Other	Applicⁿ	Inv.Sc.		C-D	B-A*						
		12-14	41-45	27-36	0-7	90	36-45	45-54	×	/ 42	seeCQC	~14	~9	~4
Paper 6B														
1	13.10/11		6			6	6			4	2			
2	14.14		3	3	2	8	8			4		4		
3	14.11	3	3	2		8		8		2		2	3	1
4	13.28	2	2	4		8		8		5			3	
Paper 6C														
1	15.11	7		3		10	10			5			4	1
2	16.12	2	1	1		4	4						4	
3	15.13/15/16 16.10		3	3		6		6		2	4			
4	16.24/25/26/ 27	3	6	1		10		10		4	2	4		
Paper 6P														
1	17.03/5/7/8/ 9	4	4			8	8			4		4		
2	18.05		3	3		6	6					2	3	1
3	17.13/`9/24/ 25	1	4	2		7		7				4	3	
4	18.08/09/24/ 25/27	1	7	1		9		9				6	3	
Totals		23	42	23	2	90	42	48		30	8	26	23	3

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