GCSE

Rewarding Learning

CCEA GCSE Specimen Assessment Materials for

Double Award Science

For first teaching from September 2017
For first assessment in November 2017
For first award in Summer 2019
Subject Code: 1370

Foreword

CCEA has developed new specifications which comply with criteria for GCSE qualifications. The specimen assessment materials accompanying new specifications are provided to give centres guidance on the structure and character of the planned assessments in advance of the first assessment. It is intended that the specimen assessment materials contained in this booklet will help teachers and students to understand, as fully as possible, the markers' expectations of candidates' responses to the types of tasks and questions set at GCSE level. These specimen assessment materials should be used in conjunction with CCEA's GCSE Double Award Science specification.

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GCSE Double Award Science
Specimen Assessment Materials

Contents

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Subject Code	1370
QAN	603/1374/2

SPECIMEN PAPERS

Centre Number

Candidate Number

General Certificate of Secondary Education
2018

Double Award Science
Biology

Unit B1

Foundation Tier

[CODE]

SPECIMEN PAPER

TIME

1 hour

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

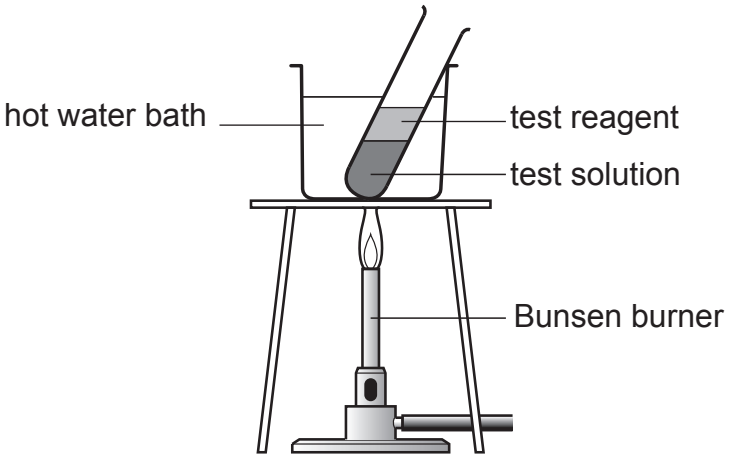
INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **8(c)**.

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

Examiner Only	
Marks	Re-mark

1 A student carried out a test for glucose (sugar) as shown in the diagram below.



(a) Name the test reagent used.

_____ [1]

(b) If the test solution contained glucose (sugar) describe the colour change in the test reagent.

Initial colour _____

Final colour _____ [2]

(c) What are the roles in the body of

(i) carbohydrates?

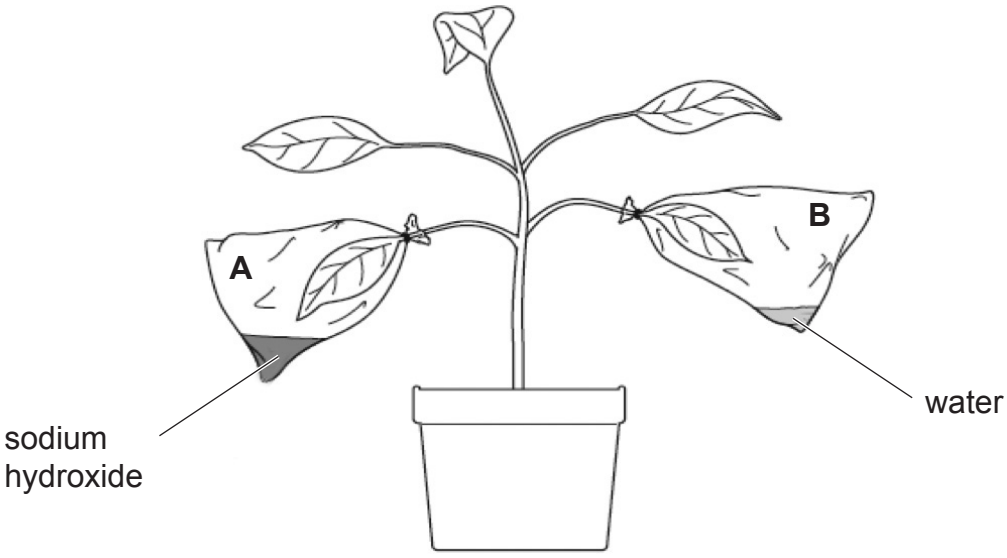
_____ [1]

(ii) proteins?

_____ [1]

Examiner Only	
Marks	Re-mark

2 The diagram below shows a plant used in a photosynthesis experiment.



(a) Describe how all the starch in the plant leaves could be removed before the start of the experiment.

_____ [1]

(b) Name the gas used in photosynthesis that is absorbed by the sodium hydroxide.

_____ [1]

(c) After the plant was left in the light for 24 hours, leaves A and B were tested for starch.

(i) What substance is used to test for starch?

_____ [1]

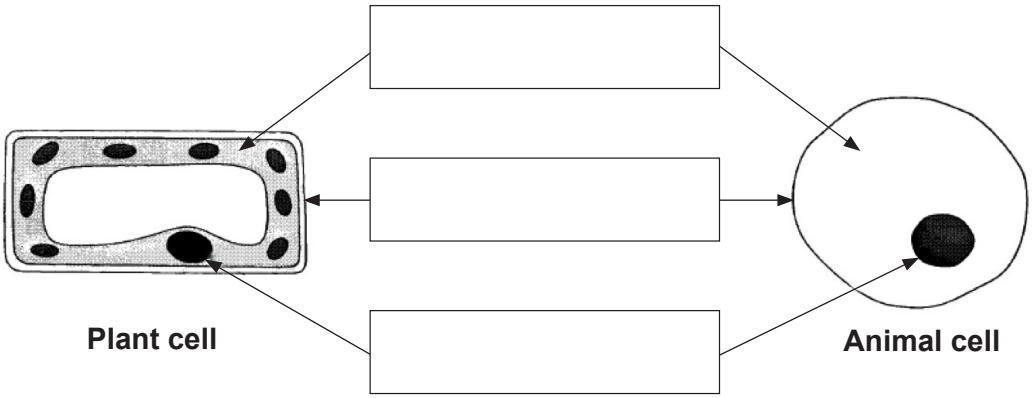
(ii) Complete the table below to give the colour of leaf A and leaf B at the end of the experiment, after they have been tested for starch.

Leaf	Colour after starch test
A	
B	

[2]

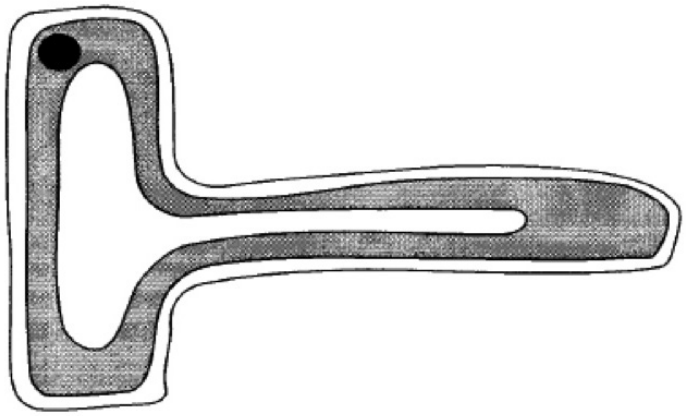
Examiner Only	
Marks	Re-mark

3 The diagrams below show a plant cell and an animal cell.



(a) Name the three labelled parts in the boxes provided above. [3]

(b) The diagram below shows a root hair cell.



Describe and explain how this root hair cell is adapted for its function.

_____

_____

_____

_____ [2]

4 Gaseous exchange takes place in the lungs.

(a) State **two** ways in which inhaled air is different from exhaled air.

1. _____

2. _____ [2]

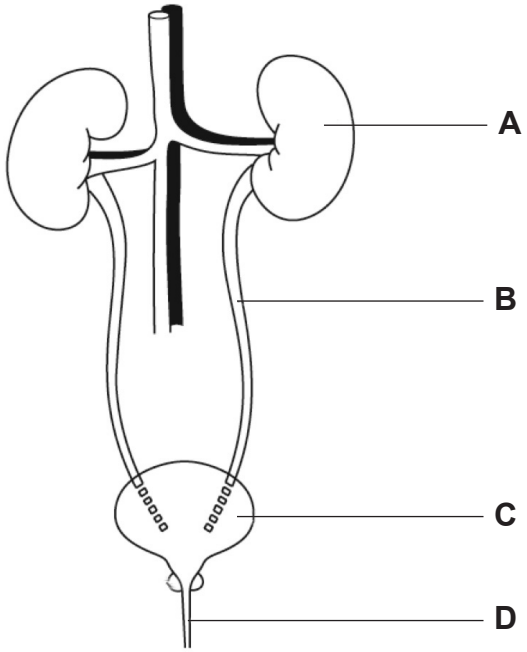
(b) List **two** effects exercise has on breathing.

1. _____

2. _____ [2]

Examiner Only	
Marks	Re-mark

5 The diagram below shows the human excretory system.



(a) Which part, (**A**, **B**, **C** or **D**), is the ureter?

_____ [1]

(b) What term is used to describe the control of water balance?

_____ [1]

(c) State **two** functions of the kidney.

1. _____

_____

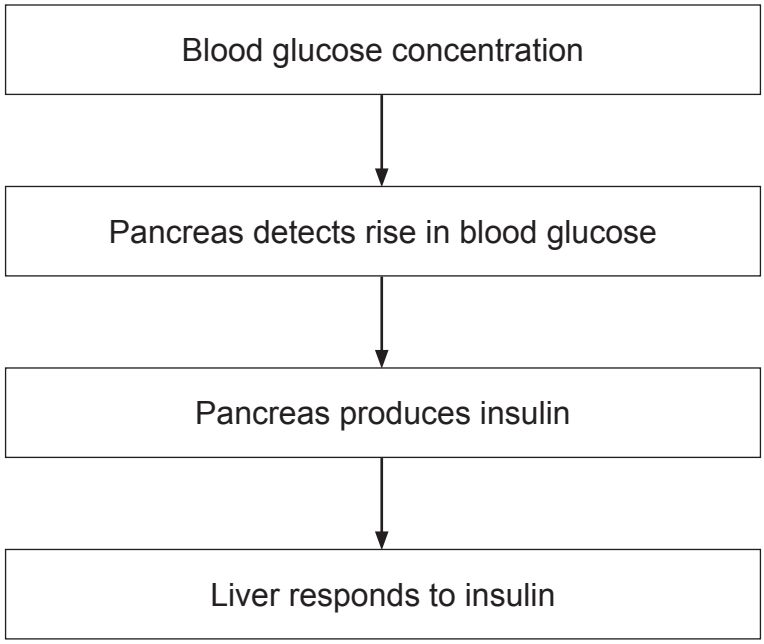
2. _____

_____ [2]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

6 **(a)** The diagram below shows some of the stages involved in the control of blood glucose concentration.



(i) How does insulin travel from the pancreas to the liver?

_____

_____ [1]

(ii) How does insulin affect blood glucose concentration?

_____

_____ [1]

(iii) Describe **two** ways in which the liver responds to insulin.

1. _____

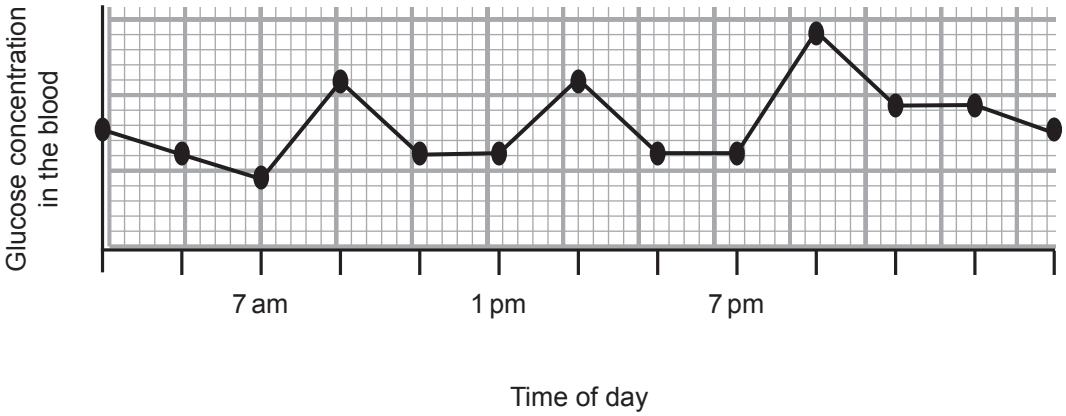
_____

2. _____

_____ [2]

Examiner Only	
Marks	Re-mark

(b) The graph below shows typical blood glucose concentration found in a person without diabetes over the period of a day.



(i) Use the graph above and your knowledge to suggest why there are peaks in blood glucose concentration during the day.

_____ [1]

(ii) People with Type 1 diabetes may need to inject themselves with insulin several times a day.

Use the graph above and your knowledge to suggest why they need to do this.

_____

_____ [1]

(c) One symptom of diabetes is the presence of glucose in the urine.

(i) Give **two other** symptoms of diabetes.

1. _____

2. _____ [2]

(ii) Give **one** possible long-term effect of diabetes.

_____ [1]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

7 It is thought that the barn owl, once a common bird in Northern Ireland, is now reduced to fewer than 50 breeding pairs.

© Andreas_Krone/iStock/Thinkstock

The following passage is from a news article written by a reporter who visited a farm where barn owls were nesting in an old barn.

'Soon the bird appeared, and what a bird! With its silent flight we never heard it arrive. The owl turns its head so that its sensitive ears can find the faint sounds we make. This is one way the owl finds its prey but also explains why it has difficulty hunting in snow or heavy rain. Grasping old beams with its large talons, it turns its very large eyes on us, eyes that are perfect for night time hunting of rodents, e.g. mice.'

Use the information given and your knowledge to answer the following questions.

(a) Apart from having very large eyes, describe and explain **two** ways in which the barn owl is adapted for hunting.

1. _____

_____

2. _____

_____ [4]

(b) Suggest why the barn owl has difficulty hunting in snow or heavy rain.

_____ [1]

Many farmers use poisons to limit rodent numbers. The owls eat these poisoned rodents and then die themselves. To give owls a chance of increasing their numbers there are now schemes run by the government to encourage farmers to:

1. leave old barns standing;
2. use cage traps to limit the number of rodents; and
3. plant crops such as canola near the edges of woodland. This encourages the rodents that eat the canola to come out into areas where they are clearly visible.

(c) Suggest how **each** of the three measures described above could help increase the barn owl population.

1. _____

_____

2. _____

_____

3. _____

_____ [3]

(d) **(i)** Use the above information to draw a food chain that includes the barn owl.

[2]

(ii) Identify a producer and a consumer in this food chain.

Producer _____

Consumer _____

[2]

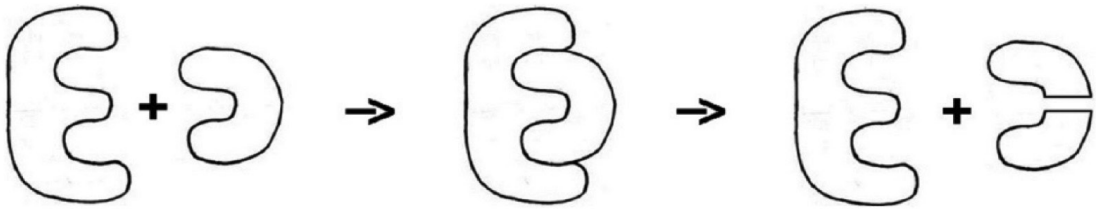
Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

8 **(a)** Enzymes speed up chemical reactions in the body.
The diagram below shows how an enzyme works.

(i) Label the diagram below with the letter:

- **E** for the enzyme molecule
- **S** for the substrate molecule
- **P** for a product molecule



[3]

(ii) Name the model of enzyme action shown by the diagram above.

_____ [1]

(iii) Use the information in the diagram above to describe what happens to the substrate molecule during the reaction.

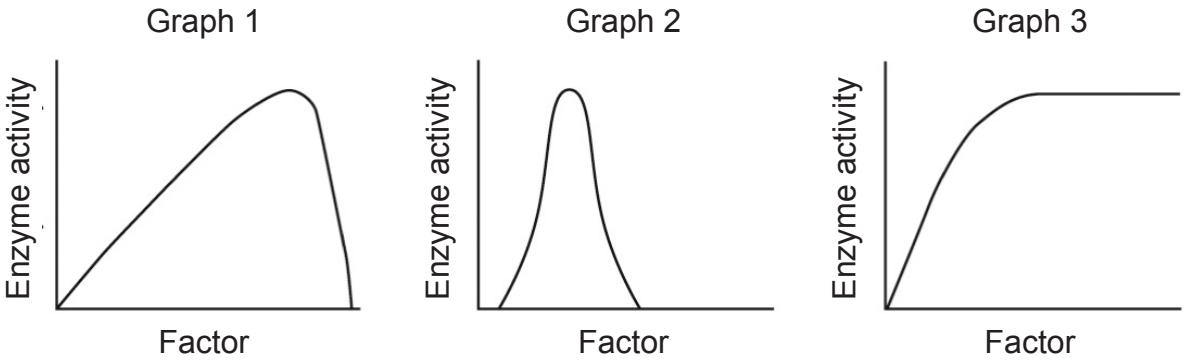
_____ [1]

(iv) How would this enzyme differ from one with a different specificity?

_____ [1]

Examiner Only	
Marks	Re-mark

(b) The graphs below show how enzyme activity in stomach protease varies with three different factors.



(i) Match each graph to the correct factor from the list below.

pH **enzyme concentration** **temperature**

Graph 1 _____

Graph 2 _____

Graph 3 _____ [2]

(ii) Name the substrate that protease acts on.

_____ [1]

(iii) Apart from the stomach, where else in the digestive system would protease be found?

_____ [1]

(c) Describe how the respiratory system in humans is adapted for gaseous exchange.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

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Centre Number

Candidate Number

General Certificate of Secondary Education
2018

Double Award Science
Biology

Unit B1

Higher Tier

[CODE]

SPECIMEN PAPER

TIME

1 hour

INSTRUCTIONS TO CANDIDATES

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Write your answers in the spaces provided in this question paper.
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INFORMATION FOR CANDIDATES

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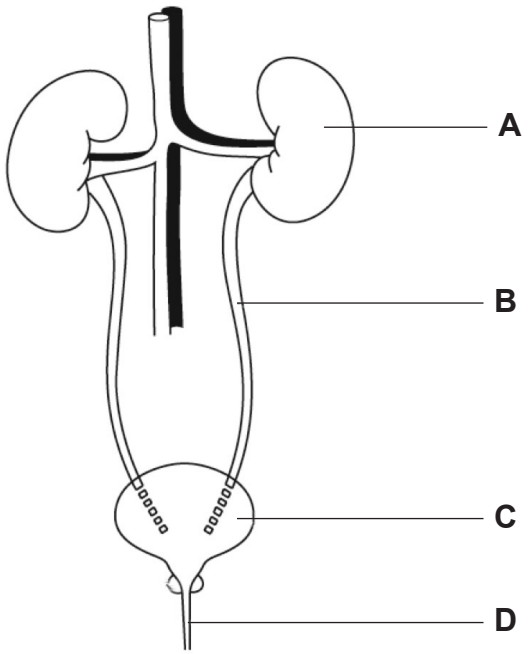
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **4(c)**.

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

Examiner Only	
Marks	Re-mark

1 The diagram below shows the human excretory system.



(a) Which part, (**A**, **B**, **C** or **D**), is the ureter?

_____ [1]

(b) What name is used to describe the control of water balance?

_____ [1]

(c) State **two** functions of the kidney.

1 _____

_____

2 _____

_____ [2]

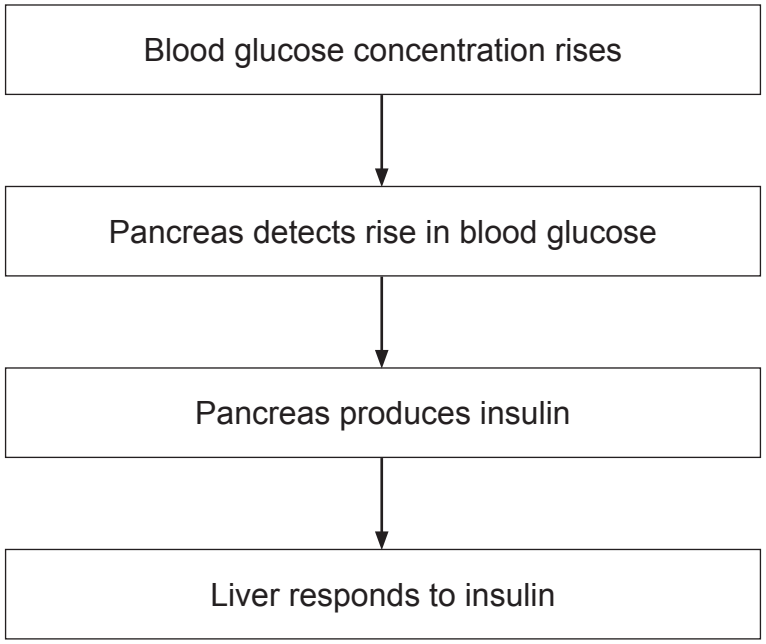
(d) Explain the role of ADH on the kidney.

_____

_____ [2]

Examiner Only	
Marks	Re-mark

2 **(a)** The diagram below shows some of the stages involved in the control of blood glucose concentration.



(i) How does insulin travel from the pancreas to the liver?

_____ [1]

(ii) How does insulin affect blood glucose concentration?

_____ [1]

(iii) Describe **two** ways in which the liver responds to insulin.

1 _____

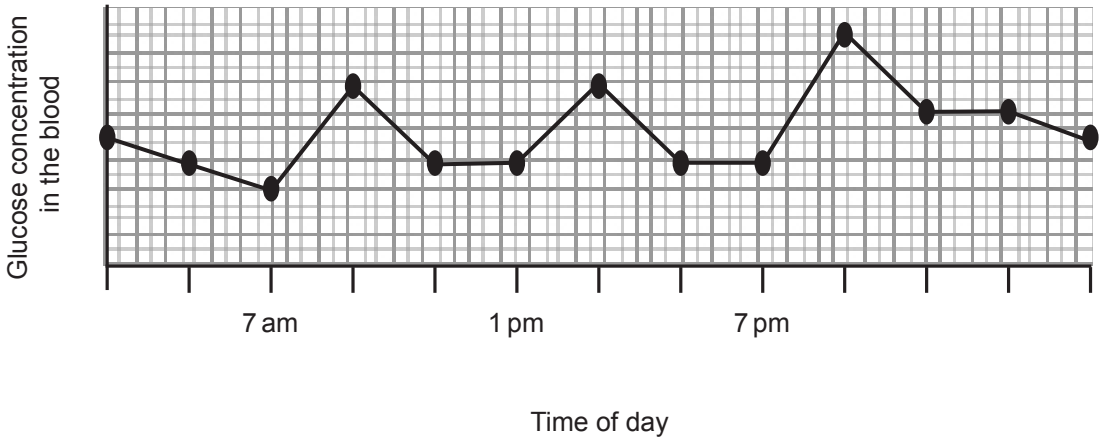
_____

2 _____

_____ [2]

Examiner Only	
Marks	Re-mark

(b) The graph below shows typical blood glucose concentration found in a person without diabetes over the period of a day.



(i) Use the graph above and your knowledge to suggest why there are peaks in blood glucose concentration during the day.

_____ [1]

(ii) People with Type 1 diabetes may need to inject themselves with insulin several times a day.

Use the graph above and your knowledge to explain why they need to do this.

_____

_____ [1]

(c) One symptom of diabetes is the presence of glucose in the urine.

The table below gives results of glucose tests carried out on urine samples from two patients A and B.

Patient	Initial colour	Final colour
A	Blue	Brick red
B	Blue	Blue

(i) Explain how these results suggest that Patient A has diabetes.

_____ [1]

(ii) Give **two other** symptoms of diabetes.

1. _____

2. _____ [2]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

3 It is thought that the barn owl, once a common bird in Northern Ireland, is now reduced to fewer than 50 breeding pairs.

© Andreas_Krone/iStock/Thinkstock

The following passage is from a news article written by a reporter who visited a farm where barn owls were nesting in an old barn.

'Soon the bird appeared, and what a bird! With its silent flight we never heard it arrive. The owl turns its head so that its sensitive ears can find the faint sounds we make. This is one way the owl finds its prey but also explains why it has difficulty hunting in snow or heavy rain. Grasping old beams with its large talons, it turns its very large eyes on us, eyes that are perfect for night time hunting of rodents, e.g. mice.'

Use the information given and your knowledge to answer the following questions.

(a) Apart from having very large eyes, describe and explain **two** ways in which the barn owl is adapted for hunting.

1. _____

_____

2. _____

_____ [4]

(b) Suggest why the barn owl has difficulty hunting in snow or heavy rain.

_____ [1]

Many farmers use poisons to limit rodent numbers. The owls eat these poisoned rodents and then die themselves. To give owls a chance of increasing their numbers there are now schemes run by the government to encourage farmers to:

1. leave old barns standing;
2. use cage traps to limit the number of rodents; and
3. plant crops such as canola near the edges of woodland. This encourages the rodents that eat the canola to come out into areas where they are clearly visible.

(c) Suggest how **each** of the three measures described above could help increase the barn owl population.

1. _____

_____

2. _____

_____

3. _____

_____ [3]

(d) **(i)** Use the above information to draw a food chain that includes the barn owl.

[2]

(ii) Identify a producer and a consumer in this food chain.

Producer _____

Consumer _____ [2]

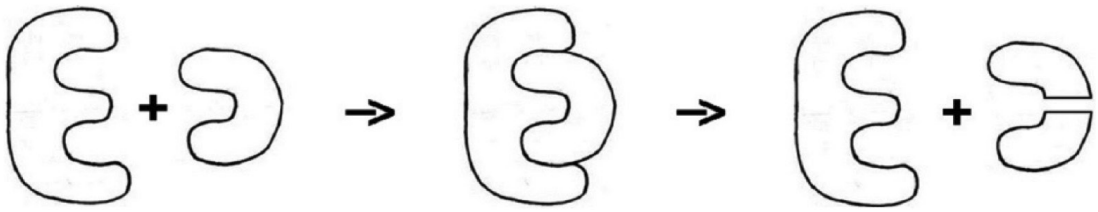
Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

4 **(a)** Enzymes speed up chemical reactions in the body.
The diagram below shows how an enzyme works.

(i) Label the diagram below with the letter:

- **E** for the enzyme molecule
- **S** for the substrate molecule
- **P** for a product molecule



[3]

(ii) Name the model of enzyme action shown by the diagram above.

_____ [1]

(iii) Use the information in the diagram above, describe what happens to the substrate molecule during the reaction.

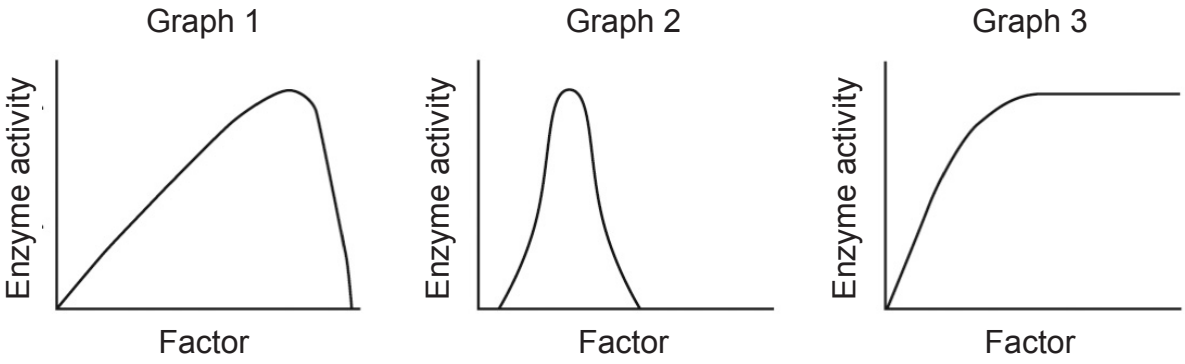
_____ [1]

(iv) How would this enzyme differ from one with a different specificity?

_____ [1]

Examiner Only	
Marks	Re-mark

(b) The graphs below show how enzyme activity in stomach protease varies with three different factors.



(i) Match each graph to the correct factor from the list below.

pH **enzyme concentration** **temperature**

Graph 1 _____

Graph 2 _____

Graph 3 _____ [2]

(ii) Name the substrate that protease acts on.

_____ [1]

(iii) Apart from the stomach, where else in the digestive system would protease be found?

_____ [1]

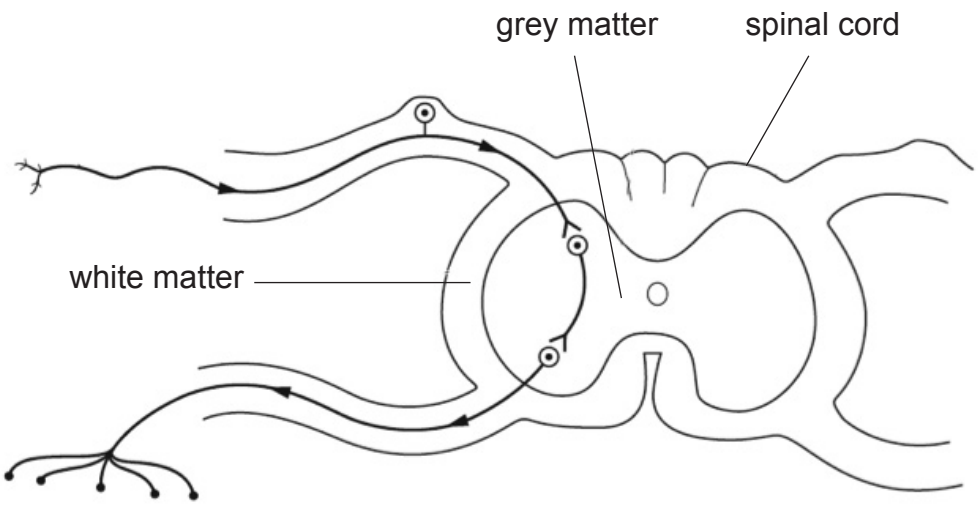
(c) Describe how the respiratory system in humans is adapted for gaseous exchange.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Re-mark

5 The diagram below shows a reflex arc.



(a) **On the diagram above**, **draw** the effector in the correct position. [1]

(b) How are sensory, association and motor neurones connected?

_____ [1]

(c) If you touch a very hot object you pull your hand away rapidly.

Why is this an example of a reflex action?

_____

_____ [1]

(d) Give **two** other examples of a reflex action.

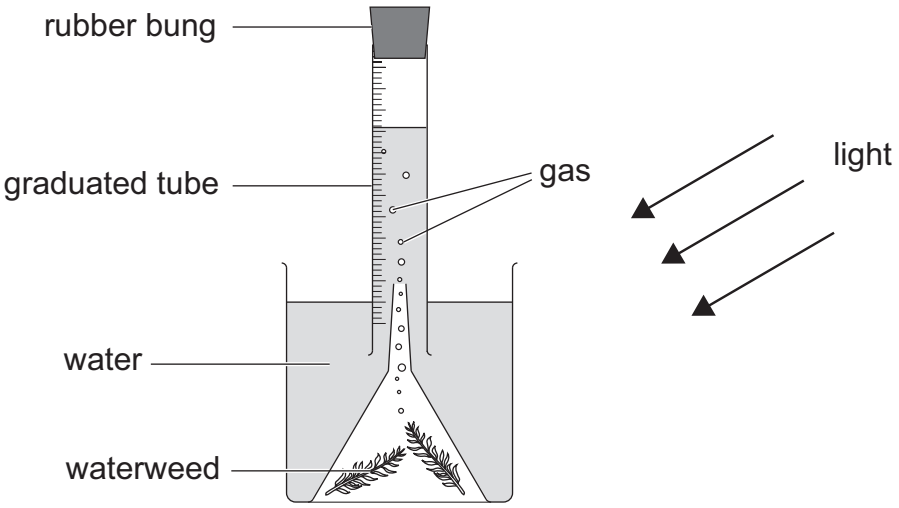
_____

_____ [2]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

6 The diagram below shows the apparatus used for investigating photosynthesis by measuring the volume of oxygen given off by a waterweed.



The table below shows the results from this experiment at different light intensities.

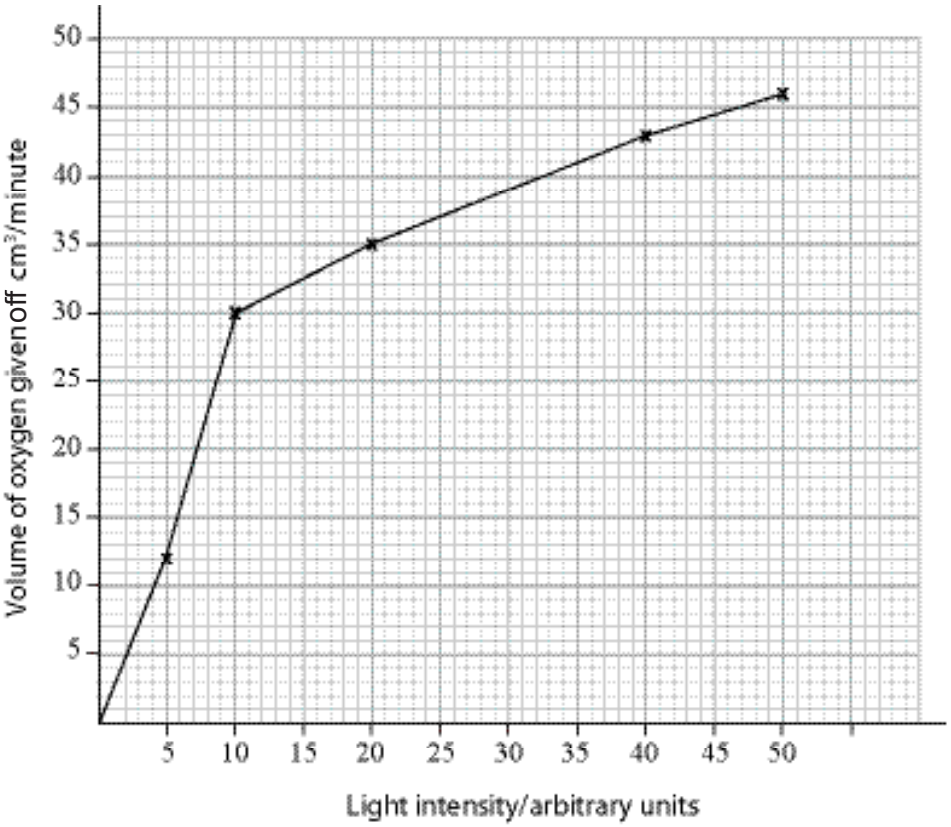
Units of light intensity/ arbitrary Units	Volume of oxygen given off cm^3/minute
5	12
10	30
20	35
30	40
40	43
50	46

(a) Describe how the light intensity in this investigation is changed.

_____

_____ [1]

The results from the investigation are plotted in the graph below.



(b) (i) Use the graph above to describe the relationship between light intensity and oxygen given off by the waterweed.

_____

_____ [1]

(ii) Explain the relationship you have described in **(b)(i)** above.

_____

_____ [1]

(iii) How could you change the experiment to show that the oxygen is coming from the plant and not from the water?

_____ [1]

(iv) Suggest **one other** factor which could affect the rate of photosynthesis in the waterweed.

_____ [1]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

7 Plants take up nitrates from the soil using root hair cells.

(a) Give **one** use of nitrates in plants.

_____ [1]

(b) Describe and explain how the structure of a root hair cell is adapted for the uptake of nitrates.

_____

_____

_____

_____ [2]

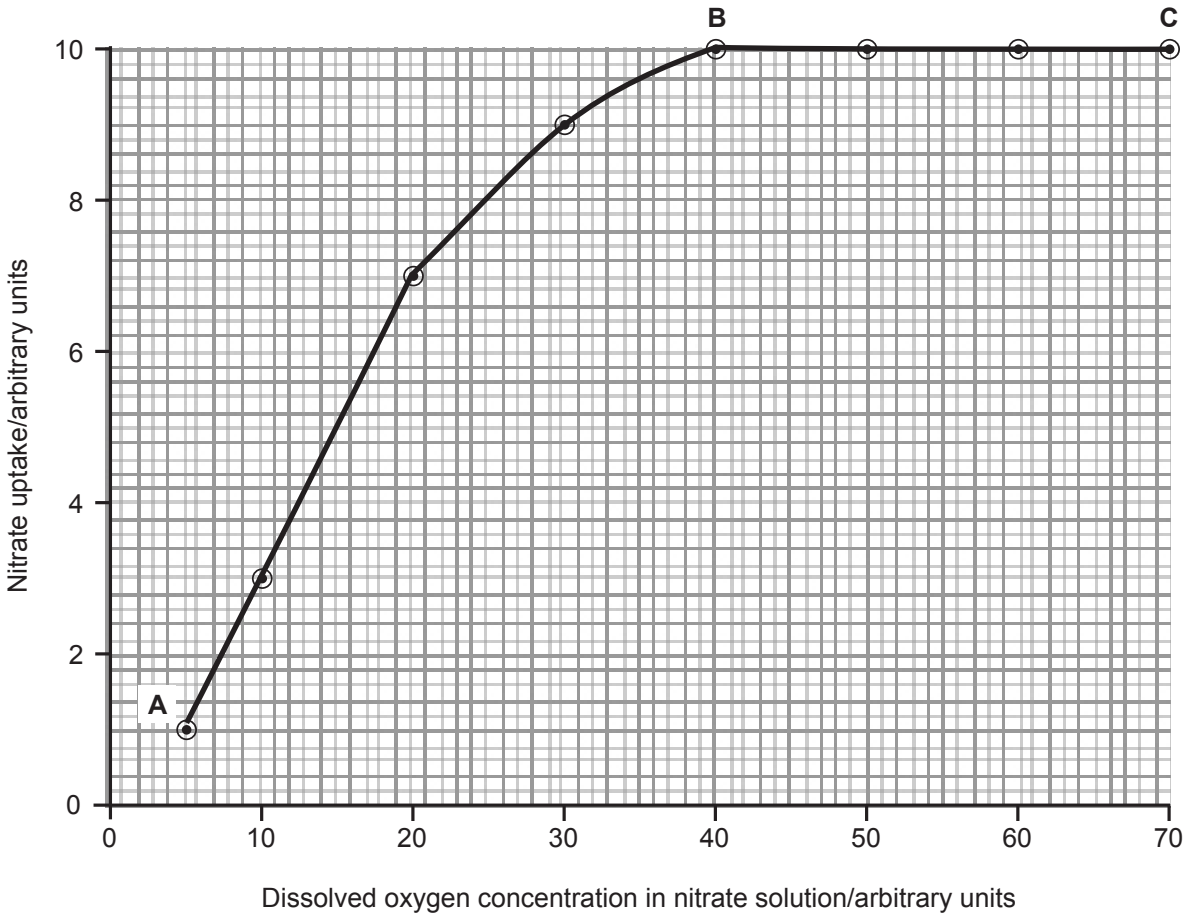
(c) Barley seedlings were grown in test tubes containing nitrate solution.

An experiment was set up to investigate the effect of dissolved oxygen on the uptake of nitrates by these seedlings.

Oxygen was bubbled through the nitrate solution.

The amount of nitrate taken up by the barley seedlings was measured.

The results of the investigation are shown in the graph below.



(i) State **two** variables that should be controlled in this experiment.

1. _____

2. _____ [2]

(ii) Describe and explain the change in nitrate uptake between points **A** and **B**.

_____

_____

_____

_____

_____

_____

_____ [4]

(iii) Explain why the nitrate uptake levels off between points **B** and **C**.

_____

_____ [1]

(iv) Name the process which occurs when excess nitrates enter waterways.

_____ [1]

Examiner Only	
Marks	Re-mark

8 **(a)** State **two** differences between photosynthesis and respiration.

1. _____

_____

_____

2. _____

_____

_____ [2]

Examiner Only	
Marks	Re-mark

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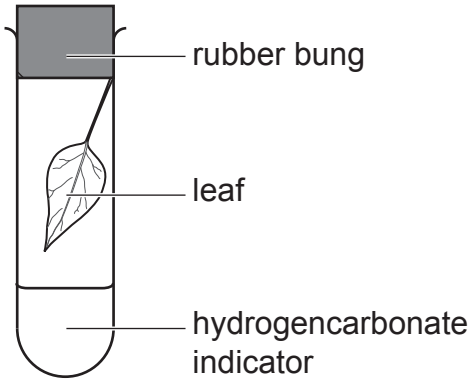
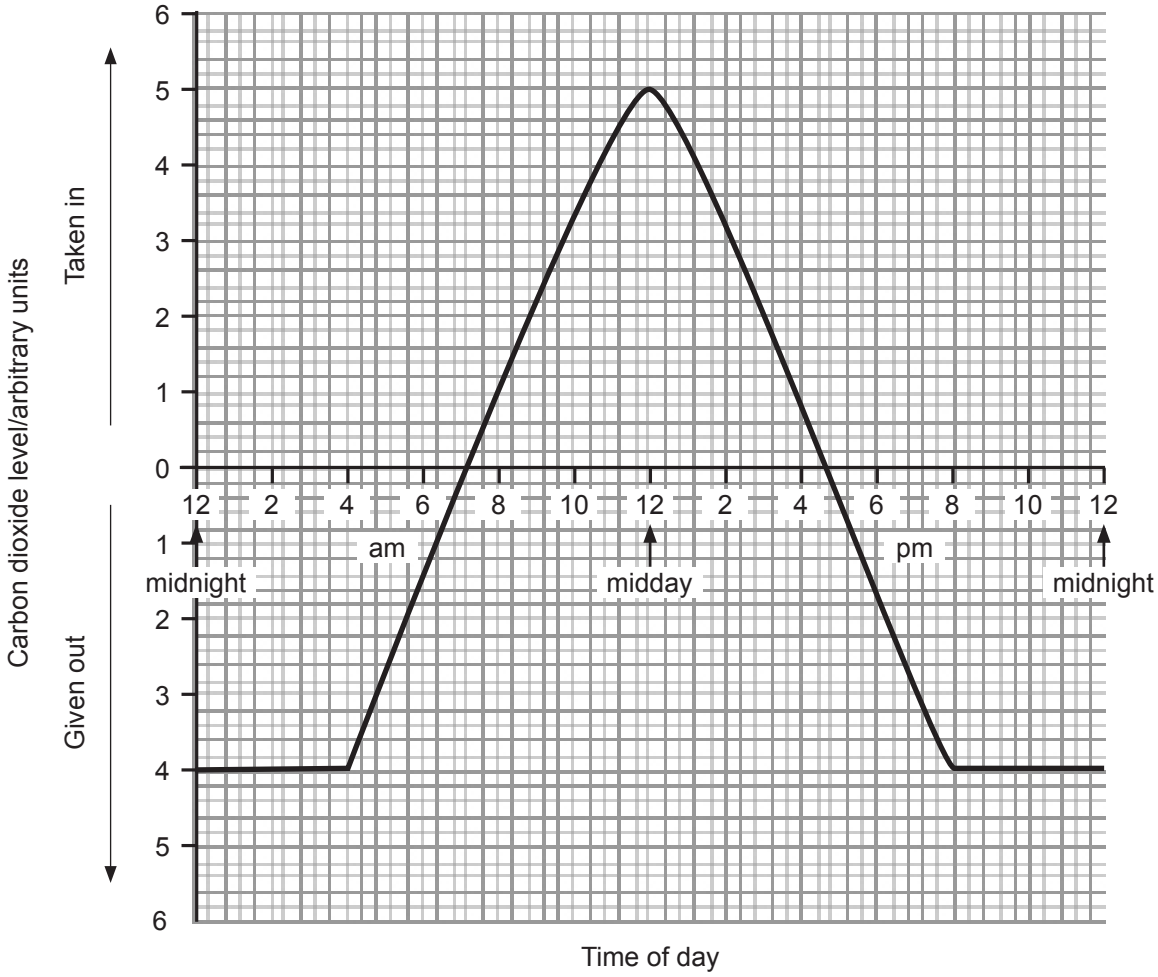
(Questions continue overleaf)

Examiner Only	
Marks	Re-mark

(b) The diagram below shows a leaf placed in a sealed test tube containing hydrogencarbonate indicator.



The graph below shows the carbon dioxide taken in and given out by this leaf during a summer's day.



Use your knowledge of photosynthesis and respiration to complete the table below.

- Give the colour of the hydrogencarbonate indicator at midday
- Give a reason to explain the colour of the indicator at each time.

Time	Colour of hydrogen carbonate indicator	Reason to explain colour of hydrogencarbonate indicator
2 am	Yellow	
12 midday		
5 pm	Red	

[4]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Biology

Unit B2

Foundation Tier

[CODE]

SPECIMEN PAPER

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

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Answer **all** questions.

INFORMATION FOR CANDIDATES

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Quality of written communication will be assessed in Question **8**.

For Examiner's use only	
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1	
2	
3	
4	
5	
6	
7	
8	
9	
Total Marks	

1 The photograph shows a field of sunflowers.

© 751/iStock/Thinkstock

A group of students measured the heights of the sunflowers.
The table below shows the number of sunflowers in each height range.

Height range/cm	Number of sunflowers
160–169	100
170–179	120
180–189	200
190–199	120
200–209	80

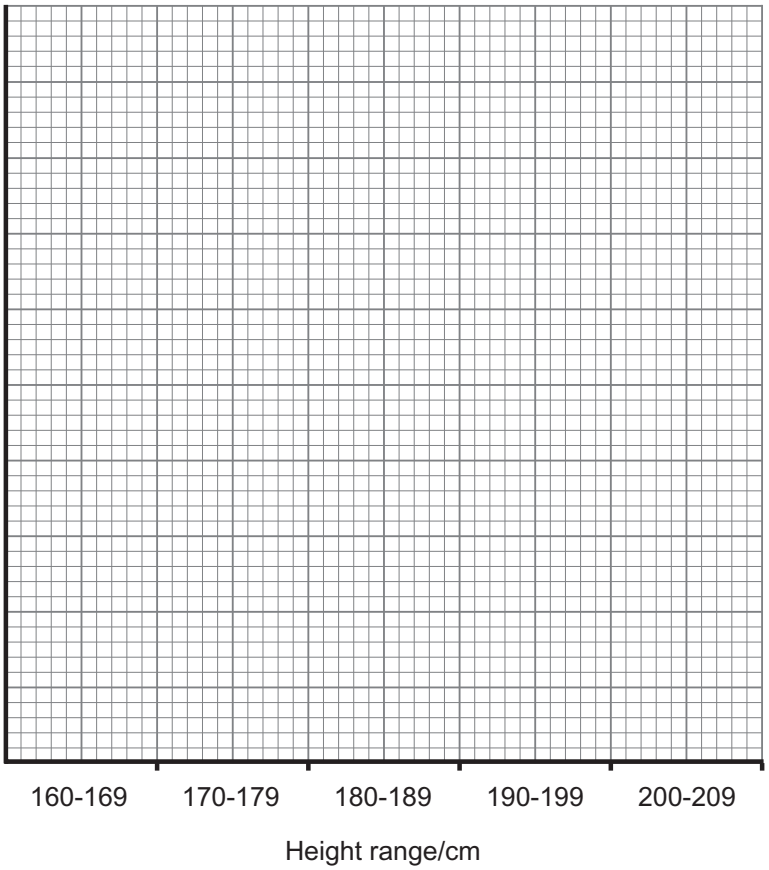
Examiner Only

Marks	Re-mark

(a) Use the information in the table on the previous page to plot a histogram on the grid.

Label the y axis.

Add a suitable scale to the y axis.



[3]

(b) What type of variation is shown by the heights of the sunflowers?

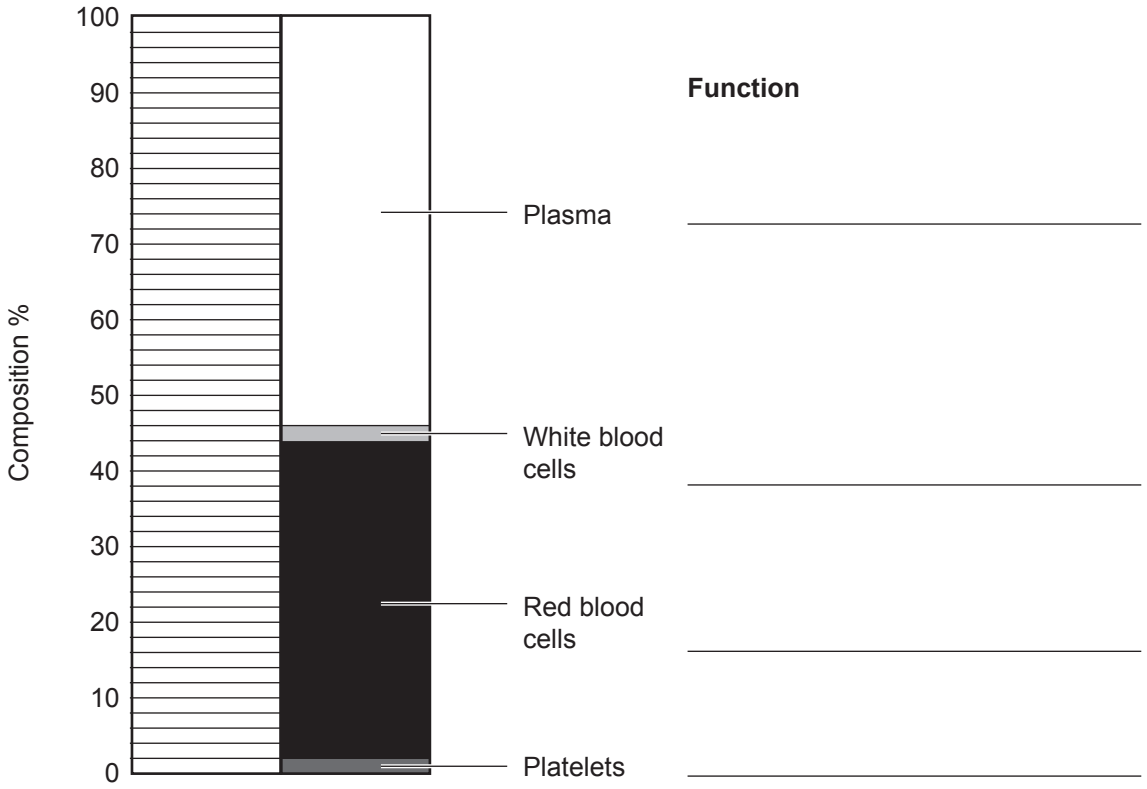
_____ [1]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

2 **(a)** The graph below shows the composition of blood.

(i) Give **one function** of each part labelled.



[4]

(ii) Use the information in the graph above to complete the table below.

Blood part	% composition
White blood cells	
	2
Plasma	
	42

[4]

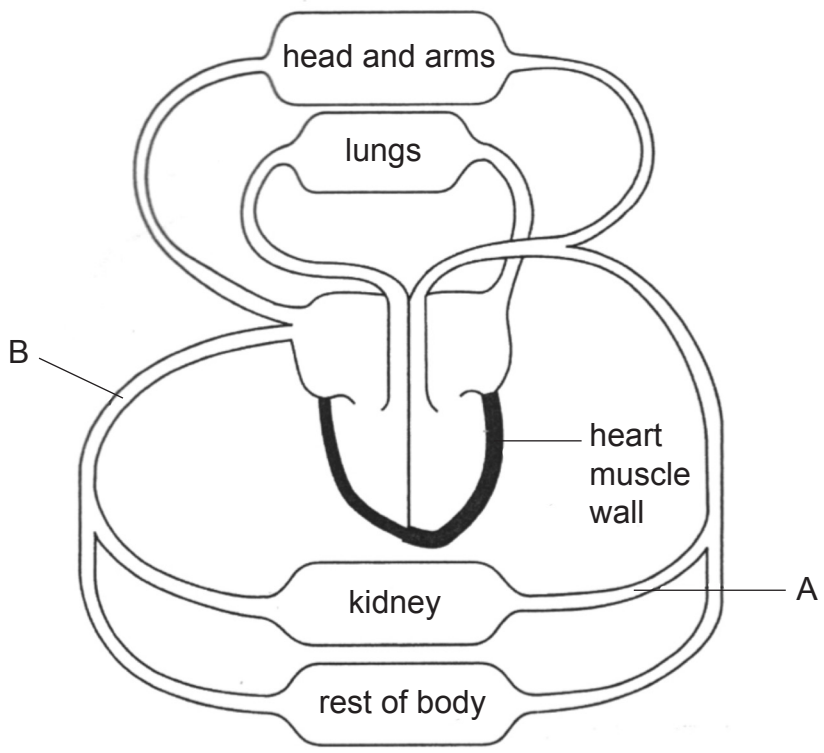
Examiner Only	
Marks	Re-mark

(b) Give **one** way in which red blood cells are adapted for their function.

_____

_____ [1]

(c) The diagram below shows part of the human circulatory system.



(i) **On the diagram above**, **draw** arrows to show the passage of blood from the lungs through the heart and to the kidney. [2]

(ii) **On the diagram above**, **label** with the letter **X**, the chamber of the heart that contracts with the greatest force. [1]

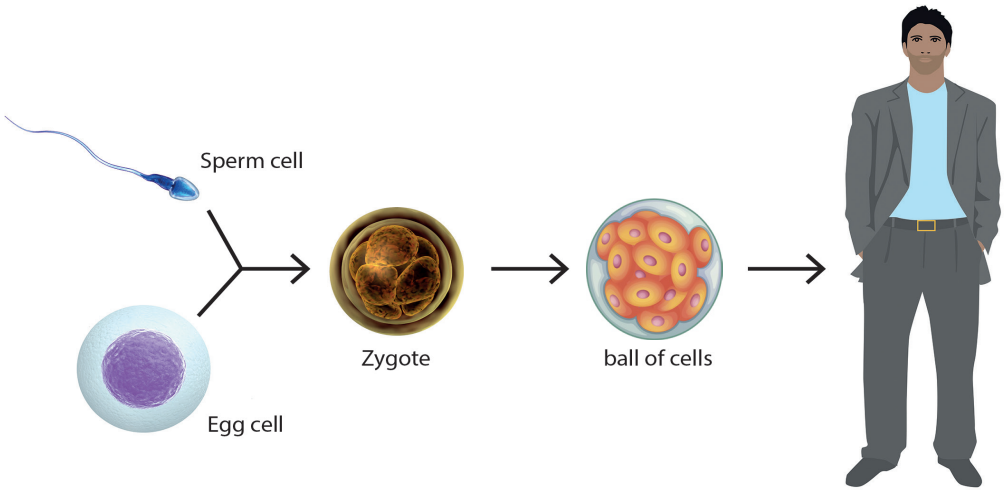
(iii) Name blood vessels A and B.

A _____

B _____ [2]

Examiner Only	
Marks	Re-mark

3 The diagram below shows the role of a sperm cell in human reproduction.



Zygote - © knorre/iStock/Thinkstock
Sperm cell - © ubrx/iStock/Thinkstock
Image of man - © Dorling Kindersley/iStock/Thinkstock
Egg cell - © Jezperklauzen/iStock/Thinkstock
ball of cells - © blueringmedia/iStock/Thinkstock

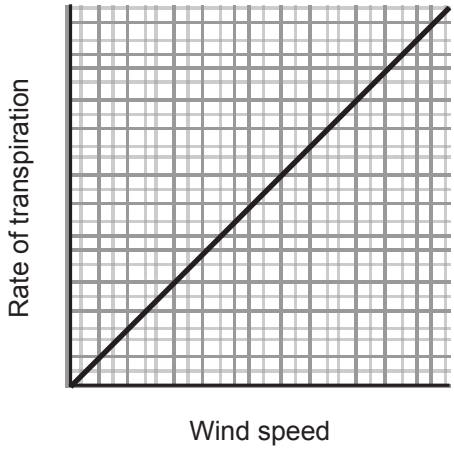
Complete the passage below about reproduction, using the most appropriate terms from the following list.

mitosis	**placenta**	**foetus**	**vagina**	**amniotic fluid**
haploid	**uterus**	**female**	**oviduct**	**meiosis**

Fertilisation takes place in the _____. In this process a sperm and egg fuse to form a zygote. The zygote divides by _____ and grows into a ball of cells as it travels to the _____ where it implants and develops into a _____. As this grows, it is cushioned by the _____ and receives dissolved nutrients across the _____. [6]

Examiner Only	
Marks	Re-mark

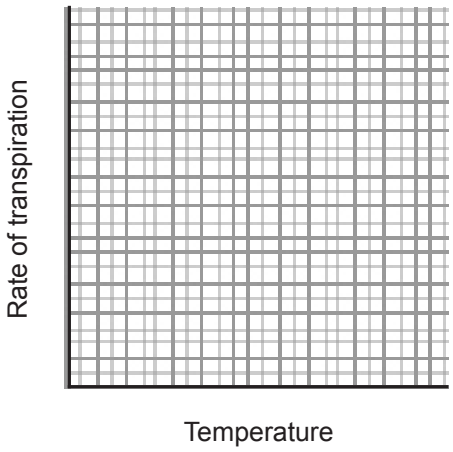
4 The graph below shows the effect of increasing wind speed on the rate of transpiration in plants.

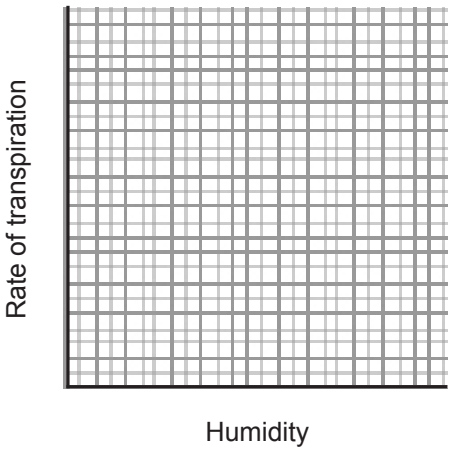


Temperature and humidity are two other factors that have an effect on rate of transpiration in plants.

(a) On the first axes below, draw a line to show the effect of increasing temperature on the rate of transpiration.

On the second axes below, draw a line to show the effect of increasing humidity on the rate of transpiration.

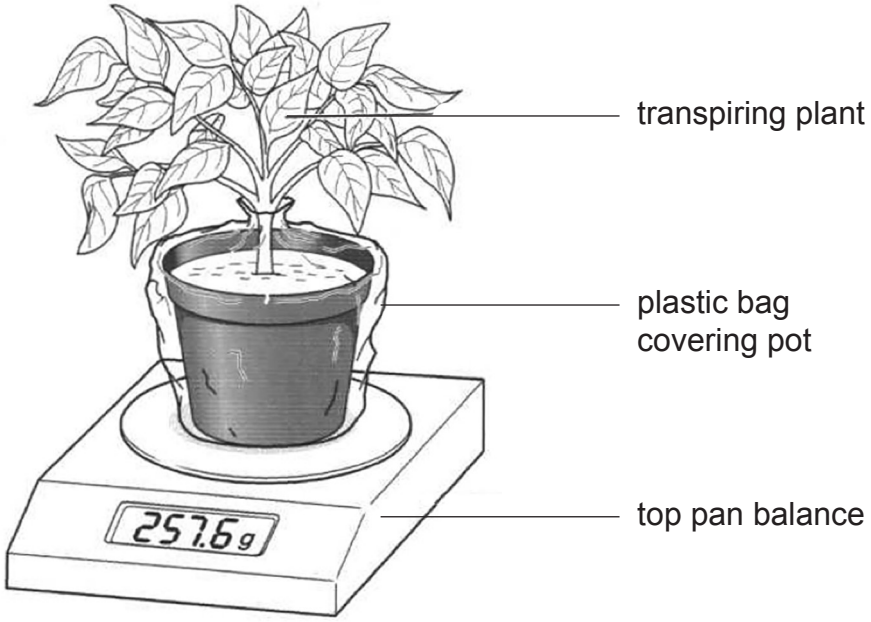




[2]

Examiner Only	
Marks	Re-mark

(b) The diagram below shows apparatus used to investigate the effect of surface area of leaves on the rate of water loss from a plant.



(i) Suggest why the pot was covered with a plastic bag.

_____

_____ [1]

The plant was weighed, left for **24 hours** and then reweighed.
The **rate** of water loss was calculated as 3.8 g per hour.
Some leaves were removed from the plant and the experiment was repeated.

The table below shows the result for the second experiment.

Mass of plant at start/g	Mass of plant after 24 hours/g
257.6	185.6

(ii) Use the data in the table above to calculate the rate of water loss (in g per hour) in the second experiment.
Show your working.

_____ g per hour [2]

(iii) Explain why the rate of water loss is lower when some leaves were removed.

_____

_____

_____

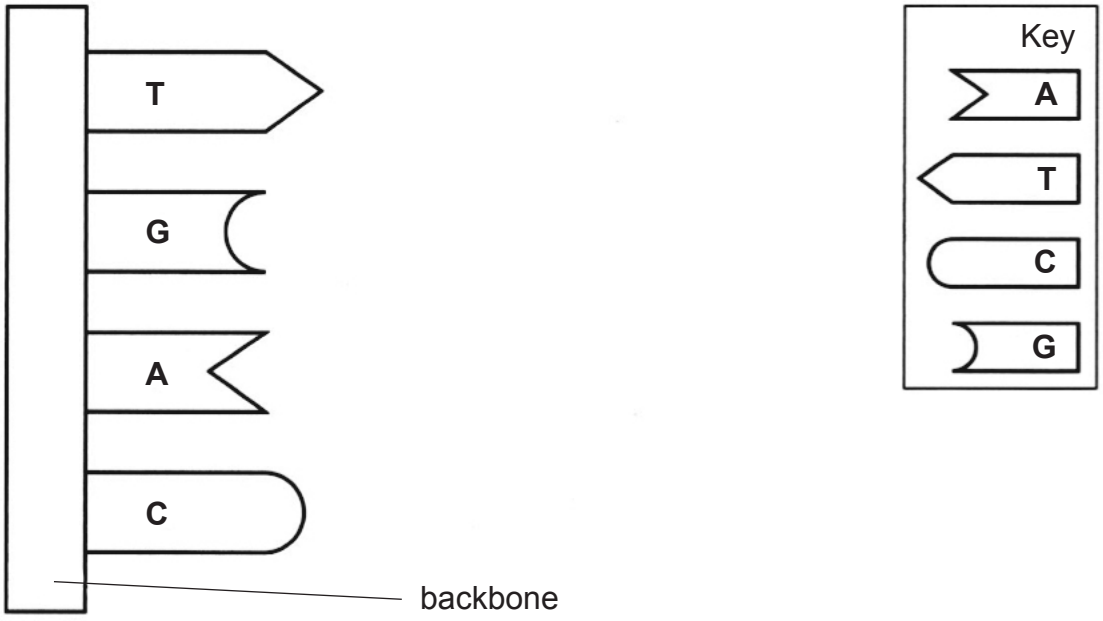
_____ [2]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

5 The diagram below shows part of a DNA molecule.

(a) Add the correct bases and a backbone to the diagram below to complete the molecule of DNA.



[3]

(b) Name the **two** substances that make up the backbone of the DNA molecule.

_____ and _____ [2]

(c) Name the term used to describe the shape of a DNA molecule.

_____ [1]

(d) Where would you find DNA in a cell?

_____ [1]

Examiner Only	
Marks	Re-mark

6 African lions usually have a gold-coloured coat but a few lions with a white-coloured coat exist.

© GlobalP/iStock/Thinkstock

The allele for gold coat colour is dominant to the allele for white coat colour.

Let G represent the allele for gold coat colour.
Let g represent the allele for white coat colour.

(a) Give the possible genotypes for a lion with a gold colour coat.

_____ and _____ [2]

(b) Use a Punnett square to show how two gold-coloured lions could produce a lion cub with a white coat.

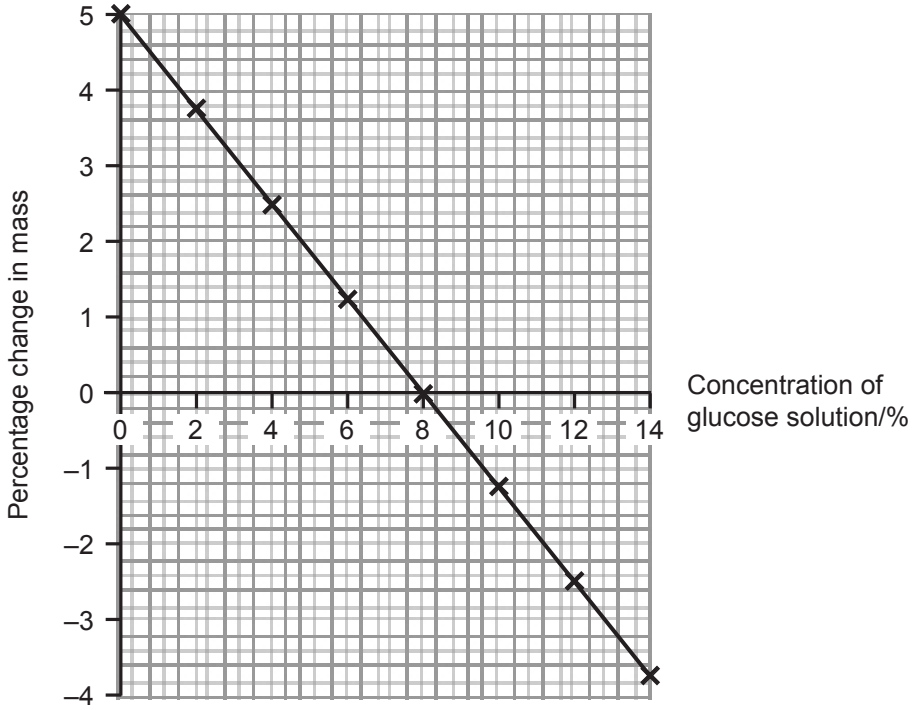
Circle the genotype for the lion cub with a white coat.

[4]

Examiner Only	
Marks	Re-mark

7 A student weighed and recorded the mass of eight potato cylinders.
One cylinder was placed in each of eight concentrations of glucose solution and left for two hours.
The cylinders were then reweighed and the percentage change in mass was calculated.

The graph below shows the results.



(a) (i) Use the graph above to find the percentage concentration of glucose solution which gives zero percentage change in the mass of the potato cylinder.

_____ % [1]

(ii) Explain your answer.

_____

_____

_____

_____ [1]

Examiner Only	
Marks	Re-mark

(b) Draw a plant cell in each box below as it would appear after it had been left for two hours in:

(i) water (0% glucose solution).

(ii) 12% glucose solution.

Label the cell wall and cell membrane.

(i) cell in water

(ii) cell in 12% glucose solution **(Label the cell membrane and cell wall.)**

[4]

(c) What is the function of the plant cell wall in osmosis?

_____

_____ [1]

8 Pregnancy can be prevented by a variety of contraceptive methods.

Name **three** contraceptive methods (apart from the rhythm method).

Explain how each of these contraceptive methods acts to prevent pregnancy.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Re-mark

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Examiner Only	
Marks	Re-mark

9 A high cholesterol level in the blood increases the risk of a heart attack.

(a) Explain how a high cholesterol level in the blood can lead to a heart attack.

_____

_____

_____

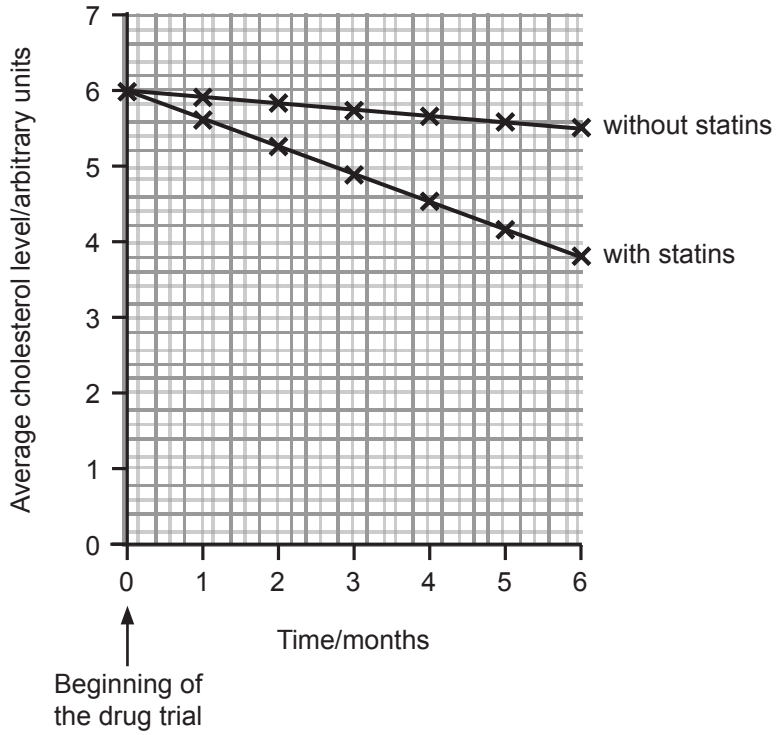
_____

_____

_____ [4]

(b) A six month drug trial involved 14 000 patients with high cholesterol levels.
It is claimed that drugs called statins reduce cholesterol levels.
Half of the patients were given statins and half were not.
All patients were told to eat a balanced diet over the period of the trial.

The graph below shows the average cholesterol levels of the patients over the six months of the trial.



(i) What conclusions can be drawn from this drug trial?
Use **data** from the graph to support your answer.

_____

_____

_____

_____ [3]

(ii) Why was the group of patients who were **not** given statins included as part of the trial?

_____

_____ [1]

Of the 14 000 patients who took part in the drug trial six out of seven were men.
This is because men make up a greater proportion of heart disease patients.

(iii) How many **women** took part in the drug trial?
Show your working.

_____ women [2]

Examiner Only	
Marks	Re-mark

(iv) Some of these women found that statins did not reduce their cholesterol level. This meant that they were still at risk of having a heart attack.

Other than a balanced diet suggest **two** lifestyle changes that these women could make which would help to reduce their risk of having a heart attack.

1. _____

2. _____ [2]

Aspirin is given to some people who might be at risk from a heart attack.

(c) How does aspirin reduce the risk of a heart attack?

_____

_____

_____ [1]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

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Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Biology

Unit B2

Higher Tier

[CODE]

SPECIMEN PAPER

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 80.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **2**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

Examiner Only	
Marks	Re-mark

1 A student weighed and recorded the mass of eight potato cylinders.
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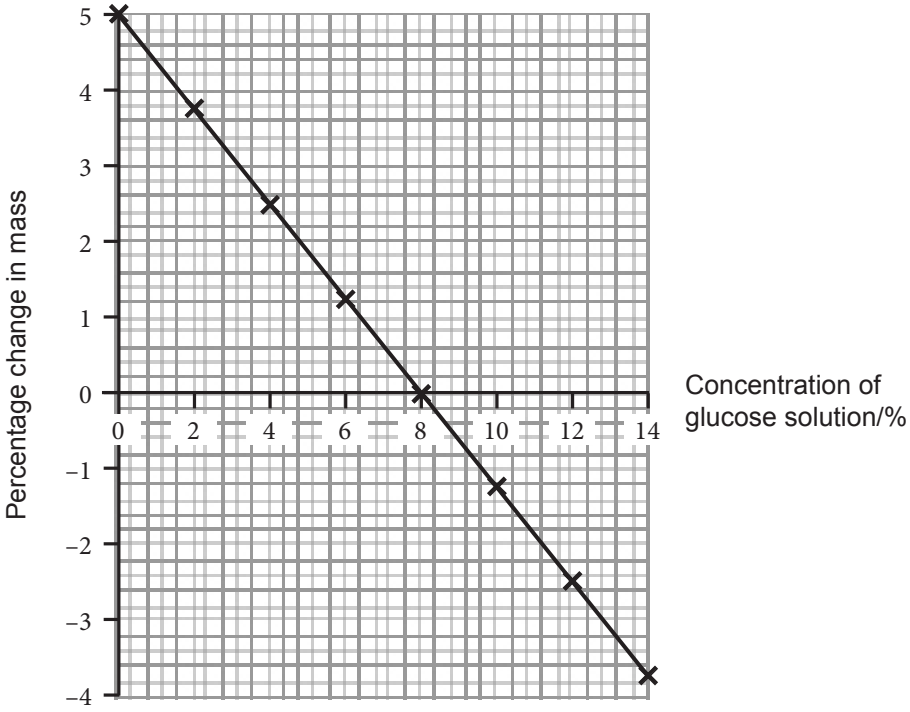

(a) (i) Use the graph above to find the percentage concentration of glucose solution which gives zero percentage change in the mass of the potato cylinder.

_____ % [1]

(ii) Explain your answer.

_____

_____

_____

_____ [1]

Examiner Only	
Marks	Re-mark

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(ii) 12% glucose solution.

Label the cell wall and cell membrane.

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[4]

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[6]

Examiner Only	
Marks	Re-mark

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(Questions continue overleaf)

Examiner Only	
Marks	Re-mark

3 A high cholesterol level in the blood increases the risk of a heart attack.

(a) Explain how a high cholesterol level in the blood can lead to a heart attack.

_____

_____

_____

_____

_____

_____ [4]

(b) A six month drug trial involved 14 000 patients with high cholesterol levels.
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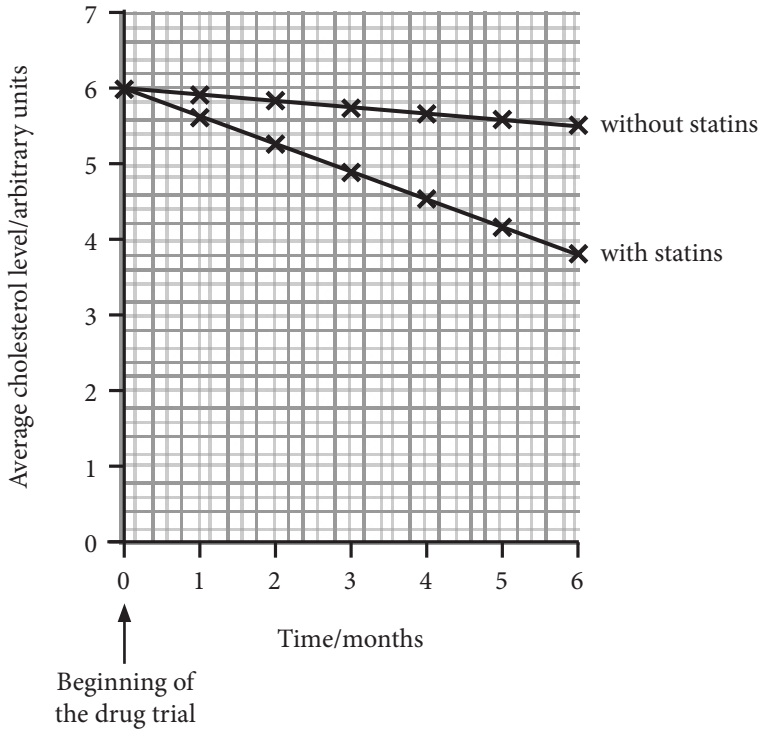
The graph below shows the average cholesterol levels of the patients over the six months of the trial.



(i) What conclusions can be drawn from this drug trial?
Use **data** from the graph to support your answer.

_____

_____

_____

_____

_____

_____

_____

_____

_____ [3]

(ii) Why was the group of patients who were **not** given statins included as part of the trial?

_____

_____ [1]

Of the 14 000 patients who took part in the drug trial six out of seven were men.
This is because men make up a greater proportion of heart disease patients.

(iii) How many **women** took part in the drug trial?
Show your working.

_____ women [2]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

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1. _____

2. _____ [2]

Aspirin is given to some people who might be at risk from a heart attack.

(c) How does aspirin reduce the risk of a heart attack?

_____

_____

_____ [1]

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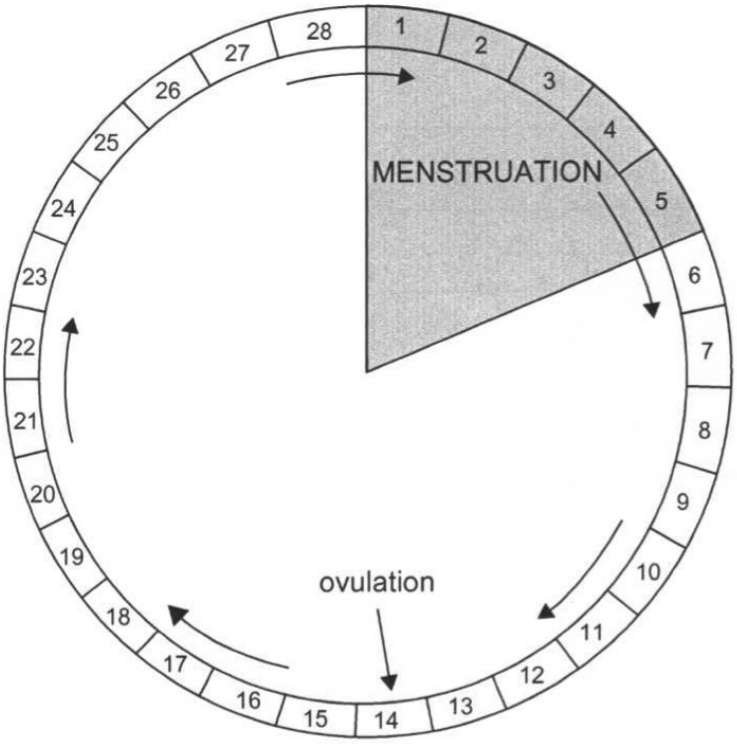
Examiner Only	
Marks	Re-mark

4 **(a)** The diagram below shows a 28 day menstrual cycle.



(i) Describe what happens to the lining of the uterus from day 1 to day 5.

_____ [1]

(ii) Suggest what happens to the lining of the uterus between day 6 and day 13.

_____ [1]

(iii) Name the hormone that brings about the changes that occur during the second half of the menstrual cycle.

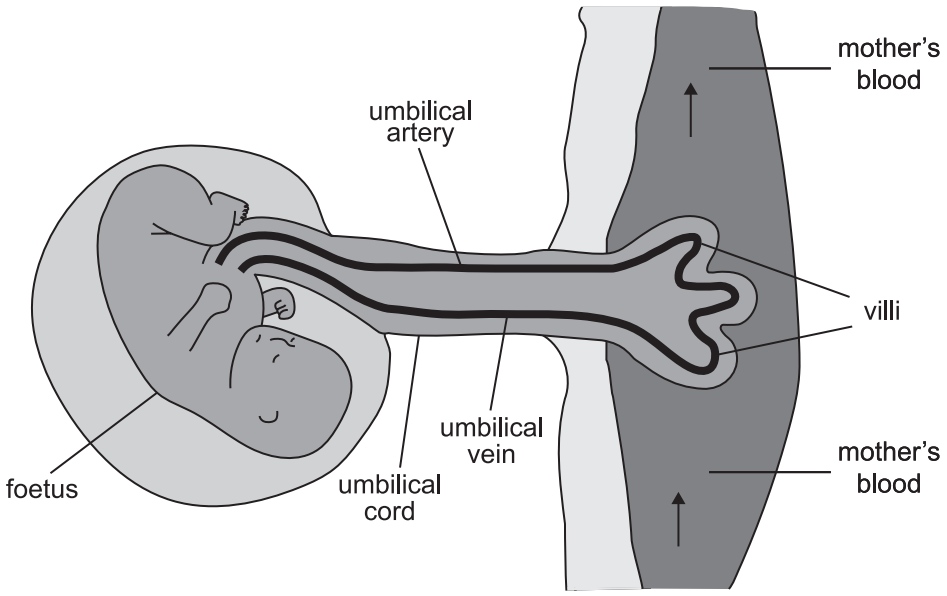
_____ [1]

One form of contraception is to avoid intercourse during the days when an egg and sperm could meet.
In a 28 day cycle ovulation usually occurs on day 14.
Sperm can live for up to five days in the female body.
The egg lives for one day.

(b) **On the diagram above, shade in** the days when sexual intercourse should be avoided to prevent pregnancy. [2]

Examiner Only	
Marks	Re-mark

(c) The diagram below shows a human foetus and the blood supply in both the umbilical cord and the placenta.



(i) The umbilical vein carries oxygenated blood.

On the diagram above, **draw** an arrow to show the direction of blood flow in the umbilical vein. [1]

(ii) Name **one** useful substance, other than oxygen, that can pass from the mother's blood to the blood of the foetus.

_____ [1]

(iii) Name **one** waste substance that passes from the blood of the foetus to the mother's blood.

_____ [1]

(iv) Suggest how the villi, shown in the diagram, increase the rate of exchange of substances between the mother's blood and the blood of the foetus.

_____ [1]

Examiner Only	
Marks	Re-mark

5 The human body has a number of mechanisms to deal with disease-causing microorganisms.

The first line of defence is to prevent the microorganisms from entering the body.

(a) Describe **two** ways microorganisms are prevented from entering the body.

1. _____

_____

2. _____

_____ [2]

(b) If microorganisms such as bacteria do get into the body, the body responds by producing antibodies.

Describe how the presence of a specific microorganism results in the production of antibodies.

_____

_____

_____

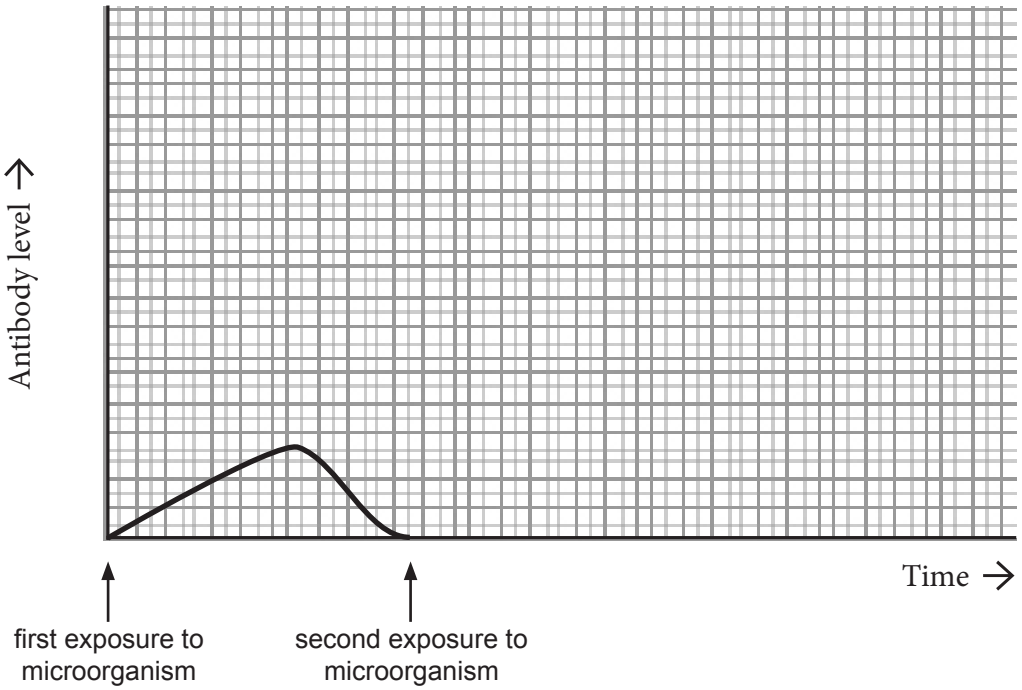
_____

_____

_____ [2]

A person was exposed to the same type of microorganism on a second occasion.

(c) On the graph below, draw a line for the time period given to show the antibody level that you would expect.



[3]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

6 **(a)** MRSA is a 'superbug'. It is resistant to antibiotics and can spread quickly, particularly in hospitals.

(i) What type of microorganism is MRSA?

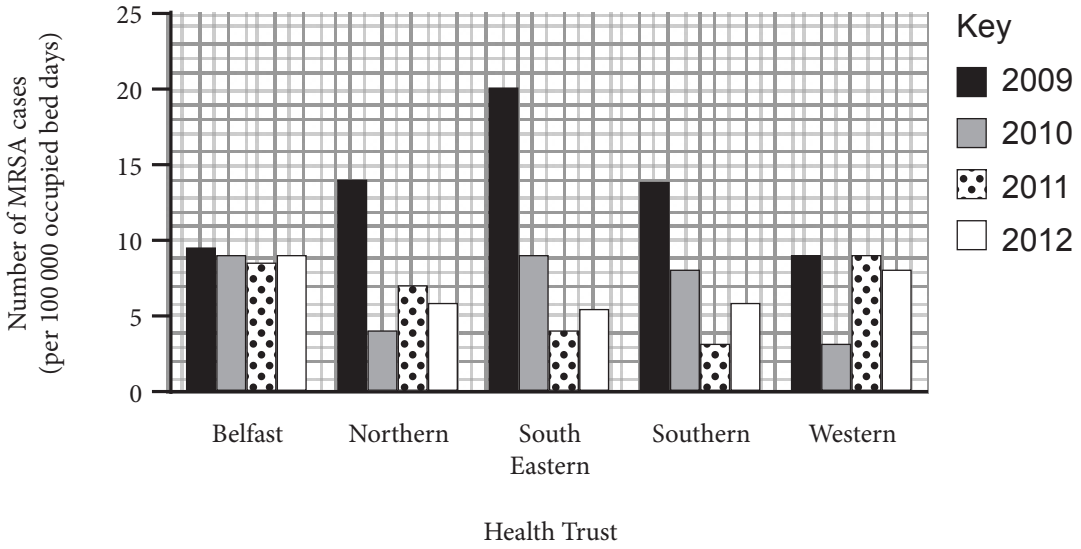
_____ [1]

(ii) Explain what is meant by the term 'resistant to antibiotics'.

_____

_____ [1]

(b) The graph below compares the number of MRSA cases in hospitals for the first three months of each year from 2009–2012 for each of the five Health Trusts in Northern Ireland.



Data adapted from http://www.publichealth.hscni.net/sites/default/files/C.difficile%20Surveillance%20Report%20quarter%20ending%20March%202012.pdf

Examiner Only	
Marks	Re-mark

(i) The table below compares the number of MRSA cases in the first three months of 2010 to 2012 compared to the same period the previous year for different Health Trusts.

Use the information in the graph on the previous page to complete the table below or the Western Trust.

	Number of MRSA cases in the first three months of each year compared to the previous year		
Health Trust	**2010**	**2011**	**2012**
Belfast	decreased	decreased	increased
Northern	decreased	increased	decreased
South Eastern	decreased	decreased	increased
Southern	decreased	decreased	increased
Western			

[1]

(ii) Use the information in the table above to give the Health Trust that shows the same trend as the Western Trust.

_____ [1]

(iii) Use the information in the graph on the previous page to calculate the percentage decrease in MRSA cases between **2009 and 2011** for the **South Eastern Trust**.
Show your working.

_____ % [2]

(iv) Suggest **two** ways that staff in the hospitals in this Health Trust could have brought about this decrease in MRSA cases.

1. _____

_____

2. _____

_____ [2]

Examiner Only	
Marks	Re-mark

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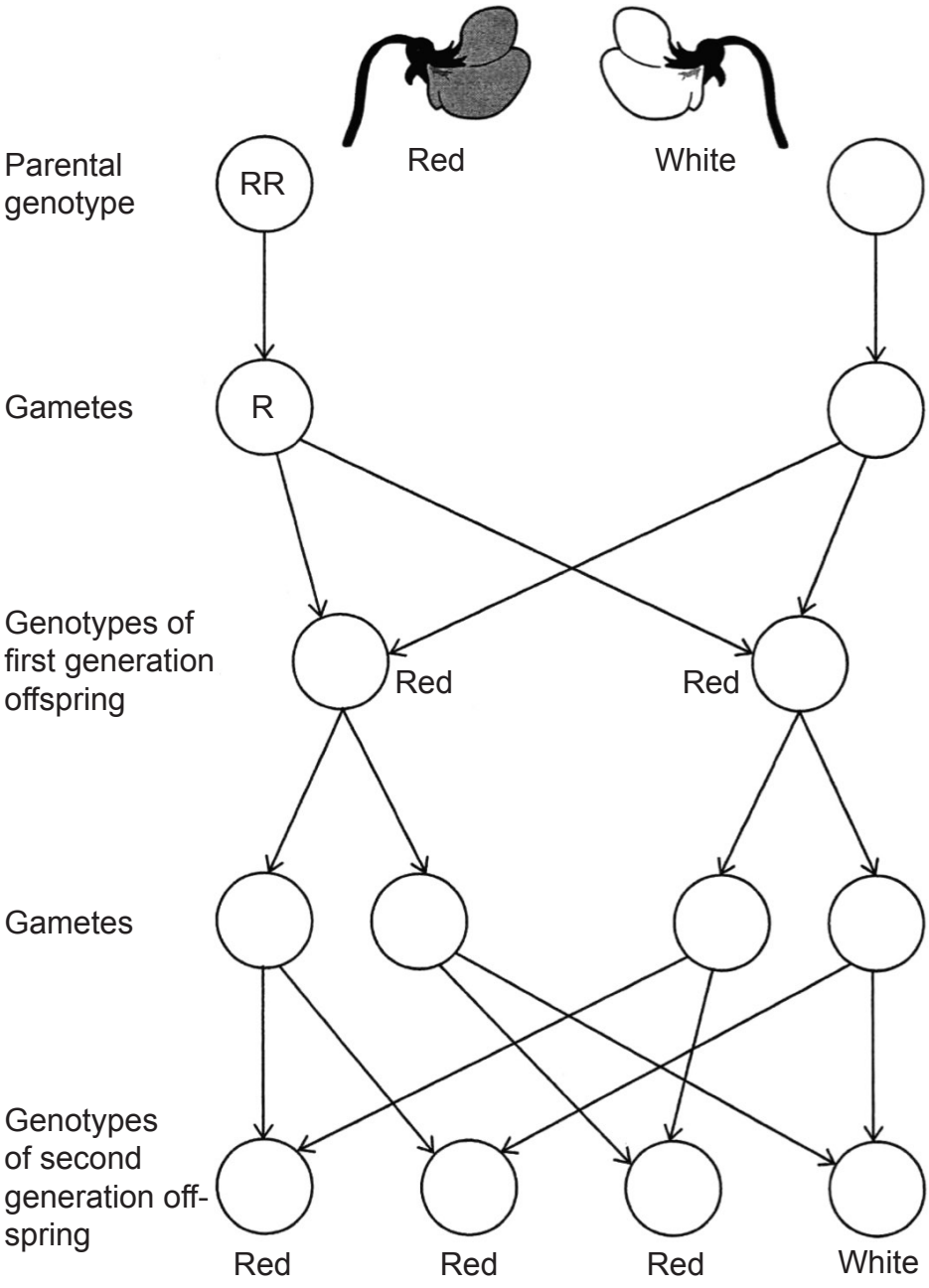
(Questions continue overleaf)

Examiner Only	
Marks	Re-mark

7 In the sweet pea plant when a red-flowered plant is crossed with a white-flowered plant, the offspring are red-flowered plants in the first generation.

Let R represent the allele (gene) for red flowers.
Let r represent the allele (gene) for white flowers.

(a) Complete the diagram below by writing the correct letter or letters in each circle. Two circles have been completed for you.



[4]

Examiner Only	
Marks	Re-mark

(b) Seeds were collected from another sweet pea plant. The following spring the seeds were planted and when they produced flowers the colours were recorded.

The table below shows the number of plants obtained with each flower colour.

	Flower colour	
	Red	White
Number of plants	60	60

(i) What is the ratio of red-flowered plants to white-flowered plants?

_____ [1]

(ii) Draw a Punnett square to show how two plants produced the red and white offspring in this ratio.

[4]

Sweet pea plants are plants with tall stems that need supported.
Their flowers have a pleasant smell and come in many different colours.

(c) Suggest **one other** characteristic that plant breeders might try to introduce into sweet pea plants.

_____

_____ [1]

Examiner Only	
Marks	Re-mark

8 Some human conditions can be caused by the inheritance of certain genes.

(a) Give **one** example of a human genetic condition caused by:

1. a sex-linked allele.

_____

2. a recessive allele.

_____

3. a dominant allele.

_____ [3]

(b) (i) Some people carry genes that predispose them to cancer.

Other cancers can develop as a result of infection by a virus, for example, human papilloma virus (HPV).

Name the type of cancer that infection with this type of virus can lead to.

_____ [1]

(ii) Cancer cells produce two types of tumours, benign and malignant.

Give **one** difference between a benign and malignant tumour.

_____ [1]

Examiner Only	
Marks	Re-mark

9 Peppered moths have two forms, dark and pale.

The photograph below shows the two forms of peppered moth and how they look against a tree that has been blackened by soot produced by pollution in an industrialised area.

The percentage of dark to pale moths in a population can change over a period of time with changes in the environment.

Peppered moths are food for birds.

© Michael W. Tweedie / Science Photo Library

(a) With reference to **natural selection**, explain why there was an increase in the percentage of dark moths in the industrialised area.

_____

_____

_____

_____

_____

_____

_____ [4]

(b) If the industrialised area becomes less polluted over time, how would you expect the percentage of **light** moths in the population to change?

_____ [1]

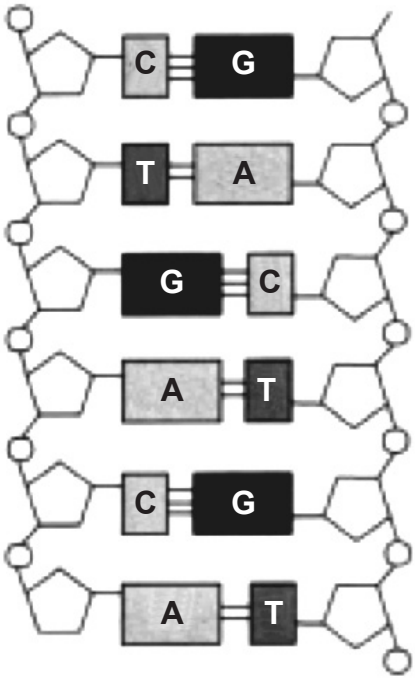
(c) If the population of an organism does **not** adapt to a change in its environment, suggest what could happen.

_____ [1]

Examiner Only	
Marks	Re-mark

10 (a) The structure of DNA consists of a phosphate and sugar (deoxyribose) backbone linked to a base.

The diagram below shows part of a molecule of DNA.



(i) **On the diagram above**, **draw** a circle around **one** deoxyribose unit. [1]

(ii) The two strands of DNA need to be the same distance from one another to ensure the DNA molecule is stable.

In the diagram, the relative sizes of the different bases are represented by the sizes of the rectangles.

Use this information and the diagram above to explain why **G** cannot link with **A**.

_____

_____ [1]

Examiner Only	
Marks	Re-mark

(b) The twisted DNA molecule is shown below.

(i) What term is given to the shape of the DNA molecule?

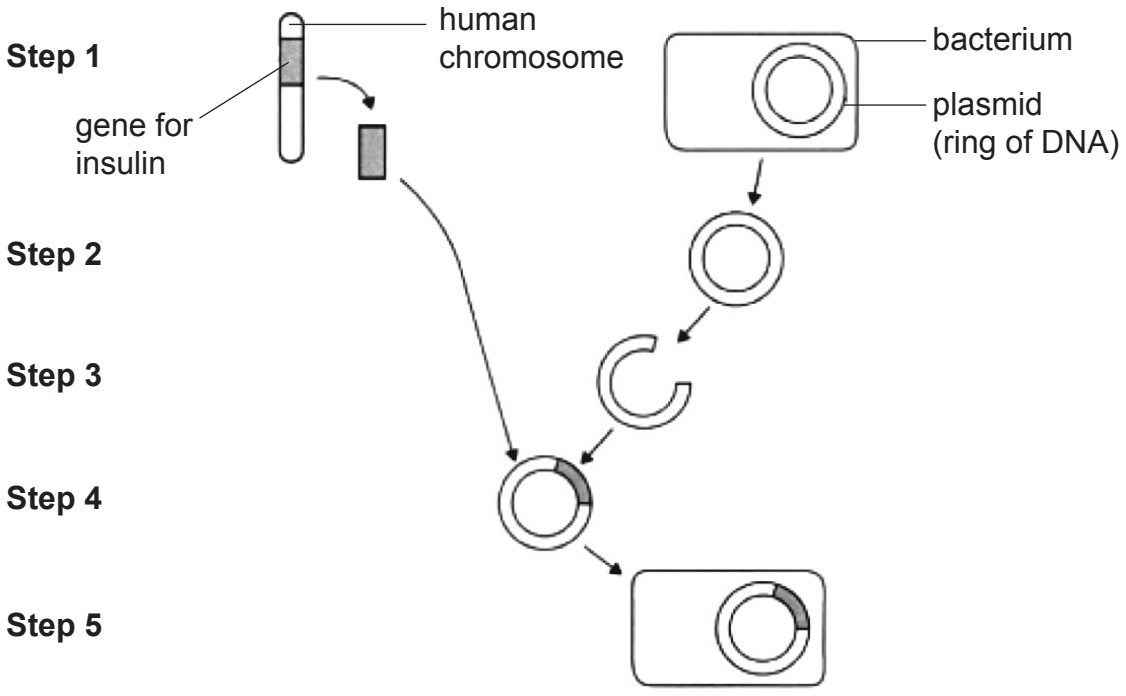
_____ [1]

(ii) The table below shows the percentage of bases **A** and **G** in a DNA molecule.

Base	**A**	**C**	**G**	**T**
Percentage %	20		30	

Complete the table above to show the percentage of bases **C** and **T** in this DNA molecule. [2]

The diagram below shows the first stages in the genetic engineering of insulin using bacteria.



(c) Use the information in the diagram above and your knowledge to describe how human insulin is produced by genetic engineering.

[4]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

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Centre Number

Candidate Number

General Certificate of Secondary Education
2018

Double Award Science
Chemistry

Unit C1

Foundation Tier

[CODE]

SPECIMEN PAPER

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet including a Periodic Table of the elements is provided.
Quality of written communication will be assessed in Question **7(b)**.

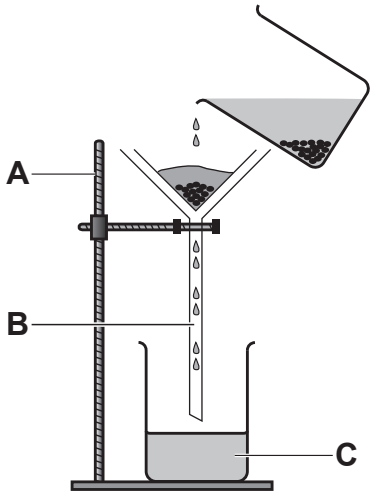
For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

Examiner Only	
Marks	Re-mark

1 A mixture of salt and sand may be easily separated using the following method:

1. Add water to the mixture and stir.

2. Filter the resulting mixture using the apparatus below.



(a) What happens to the salt and the sand when the water is added and the mixture stirred?

The salt _____

The sand _____ [2]

(b) Name the pieces of apparatus **A** and **B**.

A _____

B _____ [2]

(c) Which **two** of the terms in the list below best describe substance C? Circle the **two** correct answers.

residue	**distillate**	**solution**
filtrate	**insoluble**	**solvent**

[2]

(d) Explain how you would obtain a dry sample of pure salt from substance **C**.

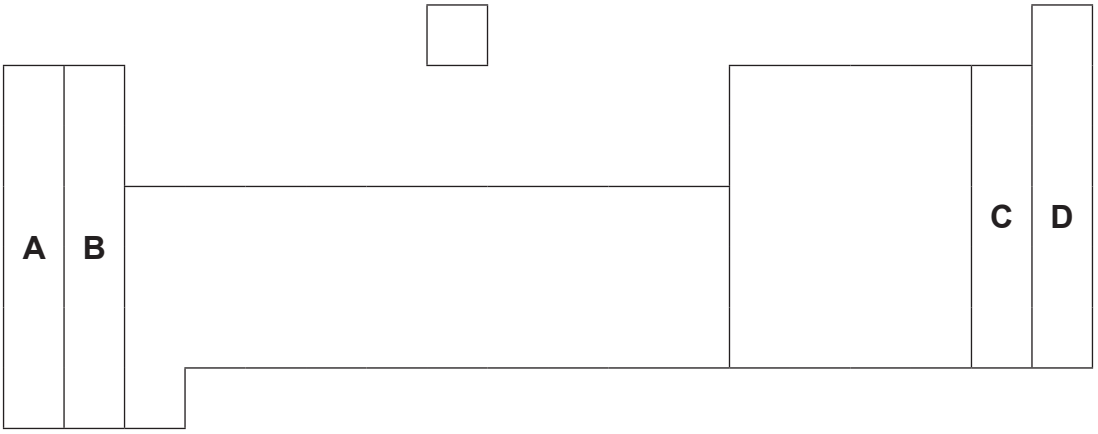
_____

_____ [1]

Examiner Only	
Marks	Re-mark

2 The Periodic Table is a list of all known elements. Vertical columns called groups contain elements which react in a similar way.

The outline of the Periodic Table shown below shows four groups, labelled **A, B, C** and **D**.



(a) Which of the groups, **A, B, C** or **D**,

(i) is a group of coloured non-metals? _____ [1]

(ii) contains the alkali metals? _____ [1]

The noble gases are a group of unreactive gases.

(b) Explain why the noble gases are unreactive.

_____

_____

_____

_____ [2]

The alkali metals are very reactive.

(c) How are the alkali metals stored?

_____ [1]

(d) Copper is a transition metal.

(i) Shade the area in the Periodic Table above where copper is placed. [1]

(ii) Copper forms many coloured compounds.

Complete the sentences below about copper by circling the correct word.

Copper(II) carbonate is a | blue / black / green | solid. When it is heated it decomposes to form copper(II) oxide which is a | blue / black / green | solid. Copper(II) oxide is a base and reacts with acids to form salts. When it reacts with sulfuric acid a salt called | copper(II) sulfate / copper(II) chloride / copper(II) nitrate | is formed. This salt is | colourless / white / blue | in solution and as a solid. When the water is fully evaporated the solid turns white and is described as | hydrated / unreactive / anhydrous |

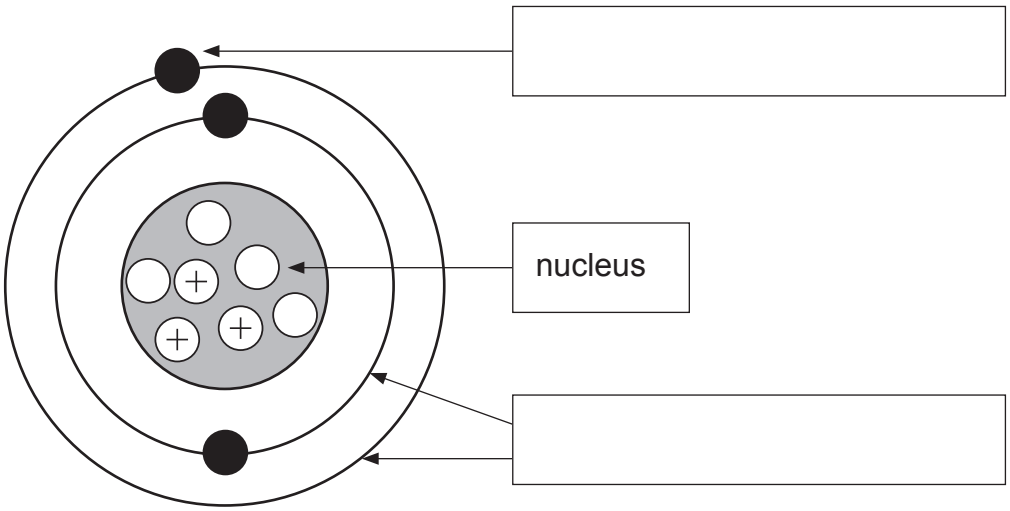
[5]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

3 The diagram below represents an atom.

(a) Fill in the missing labels to complete the diagram.



[2]

(b) The nucleus contains two different types of particles.

(i) Name the type of particle in the nucleus which has a positive charge.

_____ [1]

(ii) What is the atomic number of this atom?

_____ [1]

(c) To which group of the Periodic Table does this element belong? Explain your answer in terms of its electronic structure.

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Re-mark

4 Nanoparticles can be used in tennis balls and golf balls. This makes tennis balls bounce higher and golf balls fly straighter. Nanoparticles are also used in the making of trousers and socks so they will last longer and are cooler in summer.

Scientists think that nanoparticles have the potential to change the way we live if used in healthcare and construction materials. However they suggest that much more work and time are needed to establish the dangers of nanoparticles before they are widely used in everyday life.

(a) What is the value of one **nanometre**? Tick (✓) the correct answer in the table below.

Value	**Tick**
1000 m	
1 m	
0.001 m	
0.000000001 m	

[1]

(b) From the information provided, give the advantage of using nanoparticles in golf balls.

_____

_____ [1]

(c) Give **one** use of nanoparticles in healthcare.

_____ [1]

Examiner Only	
Marks	Re-mark

5 **(a)** Complete the table below to show the colour of universal indicator and the pH of three solutions.

Solution	Colour of universal indicator	pH
lemon juice	orange	
baking soda solution		9
cleaning fluid	purple	

[3]

(b) From the table above choose a solution which is:

(i) a weak acid _____ [1]

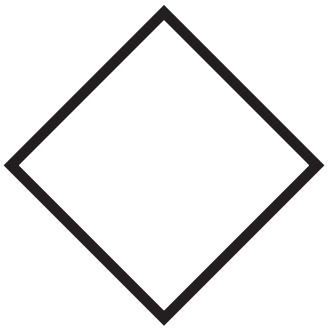
(ii) a weak alkali _____ [1]

(c) Balance the symbol equation below which describes the reaction between sodium oxide and hydrochloric acid.

$$Na_2O + HCl \rightarrow NaCl + H_2O$$ [2]

(d) Acids and alkalis need to be handled with caution.

In the diamond below draw the general hazard symbol you would expect to see on a bottle of acid which needs to be handled with caution.



[1]

Examiner Only	
Marks	Re-mark

6 Graphene is an allotrope of carbon. It consists of a single layer of carbon atoms joined together by covalent bonds. It is 200 times stronger than steel. It conducts electricity as efficiently as copper and is a good conductor of heat. It is almost completely transparent with possibly the highest melting point known.

(a) What are **allotropes**? Tick (✓) the correct answer.

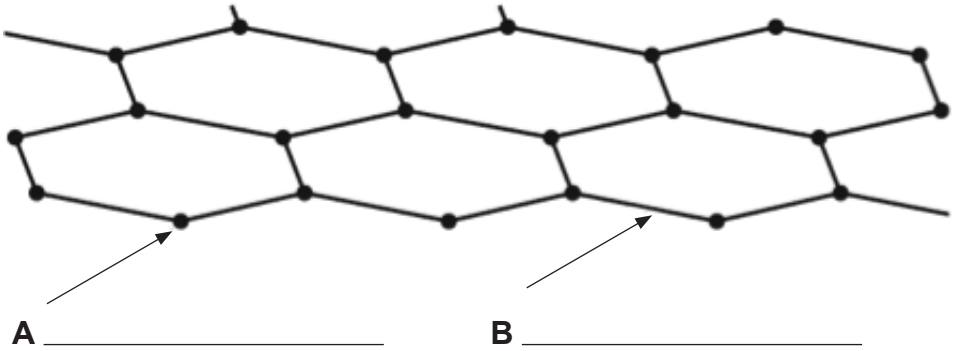
Atoms of the same element with a different mass number. ☐

Different forms of the same element in the same physical state. ☐

Two or more atoms held tightly by a covalent bond. ☐

[1]

(b) Using the information in the passage above, label **A** and **B** in the diagram of graphene below.



A _____ **B** _____

[2]

(c) Graphene was discovered in 2004. It has many outstanding properties.

Choose one property of graphene from the passage above and **suggest** a use based on the property.

property	
use	

[1]

(d) Explain, using the information in the passage, why graphene could be considered to be both a metal and a non-metal.

_____

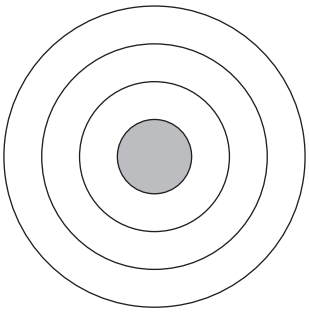
_____

_____ [2]

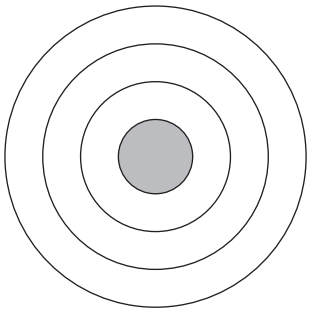
Examiner Only	
Marks	Re-mark

7 Hot magnesium metal will burn in chlorine gas to form magnesium chloride.

(a) **Complete the diagrams below** to show **all** the electrons in a magnesium atom and a chlorine atom.



magnesium atom



chlorine atom

[2]

In part (b) you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

(b) Explain fully, **in terms of electrons**, how the atoms of magnesium and chlorine react together to form magnesium chloride. Include in your answer the charges on the ions and an explanation of how the ions are held together in the compound.

[6]

(c) Using a **dot and cross** diagram, draw a molecule of hydrogen.

[2]

(d) Name the following:

(i) the bond between hydrogen atoms in a molecule of hydrogen.

_____ [1]

(ii) the force between neighbouring hydrogen molecules.

_____ [1]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

8 This question is about relative atomic mass, relative formula masses and using mole calculations.

(a) What do you understand by the **relative atomic mass** of an element?

_____

_____

_____

_____

_____

_____ [3]

(b) Calculate the relative formula mass of each of the following substances.
(Relative atomic masses: H = 1, O = 16, Na = 23, Al = 27, S = 32)

(i) Sodium sulfate Na_2SO_4

_____ [1]

(ii) Aluminium hydroxide $Al(OH)_3$

_____ [1]

(c) Silver nitrate, $AgNO_3$, has a relative formula mass of 170.

(i) How many moles of silver nitrate are there in 340 g of the substance?

_____ moles [1]

(ii) What is the mass of 0.3 moles of silver nitrate?

_____ g [1]

THIS IS THE END OF THE QUESTION PAPER

Rewarding Learning

General Certificate of Secondary Education
2018

Centre Number

Candidate Number

Double Award Science
Chemistry

Unit C1

Higher Tier

[CODE]

SPECIMEN PAPER

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet including a Periodic Table of the elements is provided.
Quality of written communication will be assessed in Question **3(b)**.

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

Examiner Only	
Marks	Re-mark

1 **(a)** Complete the table below to show the colour of universal indicator and the pH of three solutions.

Solution	Colour of universal indicator	pH
lemon juice	orange	
baking soda solution		9
cleaning fluid	purple	

[3]

(b) From the table above choose a solution which is:

(i) a weak acid _____ [1]

(ii) a weak alkali _____ [1]

(c) Copper(II) oxide reacts with sulfuric acid in a neutralisation reaction to form copper(II) sulfate and water.

(i) Write a balanced symbol equation for the reaction between copper(II) oxide and sulfuric acid.

_____ [2]

(ii) Describe what you observe happening during this reaction.

_____

_____

_____

_____

_____

_____ [3]

Copper(II) sulfate can also be produced by the reaction of copper(II) carbonate with sulfuric acid.

(iii) Describe two ways in which the reaction of copper(II) carbonate with sulfuric acid is different to the reaction of copper(II) oxide with sulfuric acid.

1. _____

_____

2. _____

_____ [2]

(iv) Sulfuric acid is described as a **strong** acid. Explain this term.

_____

_____ [1]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

2 Graphene is an allotrope of carbon. It consists of a single layer of carbon atoms joined together by covalent bonds. It is 200 times stronger than steel. It conducts electricity as efficiently as copper and is a good conductor of heat. It is almost completely transparent with possibly the highest melting point known.

(a) Explain what is meant by the term **allotrope**.

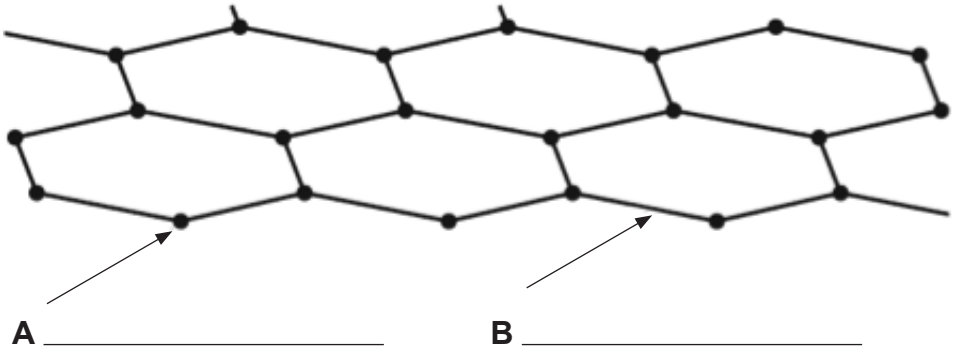
_____

_____

_____

_____ [2]

(b) Using the information in the passage, label A and B in the diagram of graphene below.



A _____ **B** _____

[2]

(c) Graphene was discovered in 2004. It has many outstanding properties.

Choose one property of graphene from the passage above and **suggest** a use based on the property.

property	
use	

[1]

(d) Explain, using the information in the passage, why graphene could be considered to be both a metal and a non-metal.

_____

_____

_____

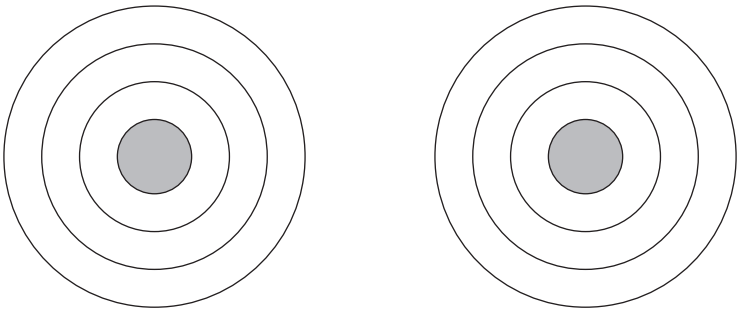
_____ [2]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

3 Hot magnesium metal will burn in chlorine gas to form magnesium chloride.

(a) **Complete the diagrams below** to show **all** the electrons in a magnesium atom and a chlorine atom.



magnesium atom chlorine atom

[2]

(b) Explain fully, **in terms of electrons**, how the atoms of magnesium and chlorine react together to form magnesium chloride. Include in your answer the charges on the ions and an explanation of how the ions are held together in the compound.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

[6]

(c) Using a **dot and cross** diagram, draw a molecule of hydrogen.

[2]

(d) Name the following:

(i) the bond between hydrogen atoms in a molecule of hydrogen.

_____ [1]

(ii) the force between neighbouring hydrogen molecules.

_____ [1]

(e) Ammonia is a compound which exhibits the same bonding type as hydrogen.

(i) Using a **dot and cross** diagram, draw a molecule of ammonia, showing the electrons in the outer shells only.

[2]

(ii) On the diagram in **(e)(i)**, label a lone pair of electrons. [1]

Examiner Only	
Marks	Re-mark

(iii) Explain why ammonia has a low boiling point.

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

4 This question is about relative atomic mass, relative formula masses and using mole calculations.

(a) Barium sulfate can be produced by reacting barium nitrate with excess sodium sulfate.

$$Ba(NO_3)_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaNO_3$$

(i) Calculate the relative formula mass of barium sulfate.
(Ba = 137; S = 32; O = 16)

_____ [1]

(ii) Calculate the relative formula mass of barium nitrate.
(Ba = 137; N = 14; O = 16)

_____ [1]

(iii) Calculate the number of moles of barium nitrate in 13.05 g of the compound.

_____ moles [1]

Examiner Only	
Marks	Re-mark

(iv) Use your answer to **(a)(i)** and **(a)(iii)** on the previous page and the equation below:

$$Ba(NO_3)_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaNO_3$$

to calculate the maximum mass of barium sulfate that can be obtained from 13.05 g of barium nitrate.

_____ g [1]

(b) (i) When the reaction in **(a)(iv)** was performed and completed, only 10.5 g of barium sulfate was obtained.

Calculate the percentage yield.

_____ % [1]

(ii) Give **one** reason why a yield of less than 100% was obtained.

_____ [1]

Examiner Only	
Marks	Re-mark

5 The element carbon has three naturally occurring isotopes, ^{12}C, ^{13}C and ^{14}C.

(a) Draw a labelled diagram of an atom of the ^{13}C isotope showing the number and position of the protons, neutrons and electrons.

[4]

(b) Explain why an atom of ^{13}C has no electrical charge.

_____

_____

_____

_____ [2]

(c) Chlorine is another element which has naturally occurring isotopes, ^{35}Cl and ^{37}Cl. These exist in a 3:1 ratio.

Show that the relative atomic mass of naturally occurring chlorine is 35.5

[2]

Examiner Only	
Marks	Re-mark

6 The modern Periodic Table of elements has been developed over many years. Mendeleev is credited as being the scientist who made the greatest contribution to the development of the Periodic Table.

(a) Outline three features of Mendeleev's Periodic Table.

_____

_____

_____

_____

_____ [3]

(b) Describe three ways in which the modern Periodic Table differs from the one proposed by Mendeleev.

_____

_____

_____

_____

_____ [3]

Examiner Only	
Marks	Re-mark

7 An experiment was set up to investigate the displacement reactions of the halogens.

Solutions of sodium halides were prepared and reacted with other halogens. The results table is shown below.

	sodium iodide (aq)	**sodium bromide (aq)**	**sodium chloride (aq)**
iodine solution		**X**	**X**
bromine solution	✓		
chlorine solution			

✓ means that a reaction took place
X means that no reaction took place

(a) Complete the **three** remaining places in the table above. [2]

(b) State the colour of each solid sodium halide.

_____ [1]

(c) Describe what is observed when chlorine solution is added to aqueous sodium bromide.

_____

_____

_____

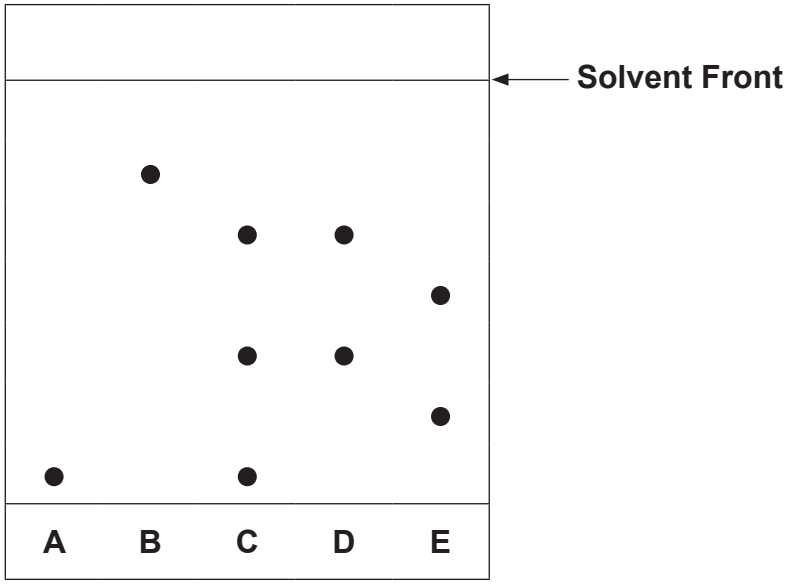
_____ [2]

(d) Write the ionic equation for the reaction between chlorine solution and aqueous sodium bromide. Include state symbols in your answer.

_____ [4]

Examiner Only	
Marks	Re-mark

8 A student investigated different coloured inks using chromatography.
The chromatogram is shown below.



(a) Which ink samples only have one colour in them?

_____ [1]

(b) Which inks are mixed to make C?

_____ [1]

(c) Calculate the R_f value of ink B.

[2]

THIS IS THE END OF THE QUESTION PAPER

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Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Chemistry

Unit C2

Foundation Tier

[CODE]

SPECIMEN PAPER

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet including a Periodic Table of the elements is provided.
Quality of written communication will be assessed in Question **3(c)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
Total Marks	

Examiner Only	
Marks	Re-mark

1 Gates and other metal structures containing iron are protected from the effects of rust by painting them.

(i) State the chemical name for rust.

_____ [2]

(ii) What are the **two** conditions necessary for rusting to occur?

1. _____

2. _____ [2]

(iii) Explain why painting gates can prevent rusting.

_____

_____ [1]

(iv) If a bicycle is left outdoors it can become rusty. For each part of the bicycle listed, choose the protection method which is most suitable from the list below.

Plastic coating **Galvanising** **Oiling**

1. The bicycle frame _____ [1]

2. The chain _____ [1]

3. The handlebars _____ [1]

(v) When a bicycle rusts, an oxidation reaction occurs.

Explain what is meant by the term **oxidation**.

_____

_____

_____ [1]

2 A student investigated displacement reactions and recorded some observations in the table below.

Reactants	Some Observations
copper + silver nitrate solution	Colourless solution turned blue, solid formed
iron + zinc nitrate solution	Nothing happened
silver + iron(II) nitrate solution	Nothing happened
zinc + copper(II) nitrate solution	Blue solution turned colourless, solid formed
iron + copper(II) nitrate solution	Blue solution turned colourless, solid formed

(a) A solid is formed when copper reacts with silver nitrate solution.

What colour would you expect the solid to be?

_____ [1]

(b) Why did the blue solution turn colourless when zinc powder reacted with copper(II) nitrate solution?

_____

_____ [1]

(c) Using the information from the student's investigation, list the metals copper, iron, silver and zinc, in order of reactivity from the most reactive to the least reactive.

	Most reactive ↓
	Least reactive

[2]

(d) Using these observations and your knowledge, suggest which combination of metal and metal nitrate would give the most exothermic reaction.

_____ [1]

Examiner Only

Marks	Re-mark

Examiner Only	
Marks	Re-mark

3 **(a)** **(i)** Explain what is meant by the term electrolysis.

_____

_____ [2]

(ii) State the names of the positive and negative electrodes:

Positive _____

Negative _____ [2]

(b) Ionic compounds, such as lithium chloride, conduct electricity when molten or dissolved in water.

(i) Explain why lithium chloride does not conduct when solid, but does conduct electricity when molten or dissolved in water.

_____

_____

_____

_____

_____

_____ [3]

(ii) Electrodes are made from graphite.

Give **one** reason why it is suitable for this use.

_____ [1]

(iii) Describe the product at the positive electrode.

_____

_____

_____

_____ [2]

(iv) Name the product at the negative electrode.

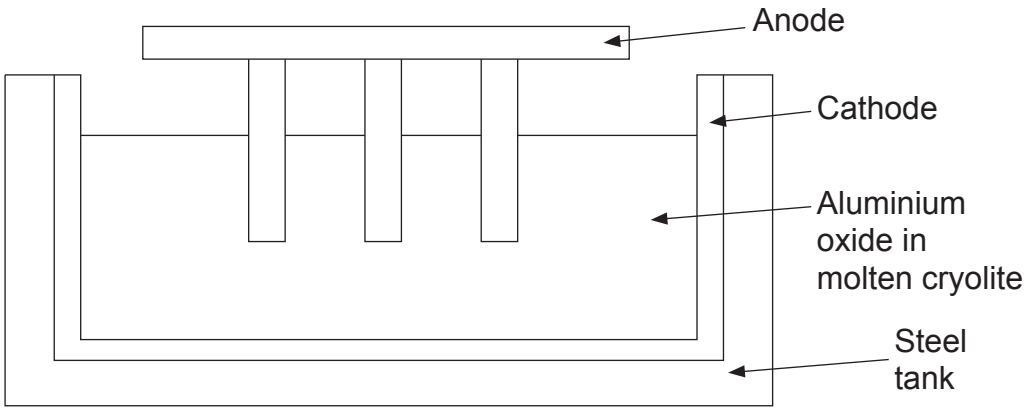
_____ [1]

(v) Give **one** reason why this electrolysis is carried out in a fume cupboard.

_____ [1]

(c) Aluminium metal is extracted from pure molten aluminium oxide by electrolysis using the cell shown below.

Describe the production of aluminium metal from pure aluminium oxide in an electrolytic cell.



Your answer should include the following information:

- A reason for using electrolysis as the extraction method.
- The name of the ore from which the aluminium oxide has been obtained.
- Why the anodes must be replaced from time to time.
- A full balanced equation for the production of aluminium and oxygen from aluminium oxide.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Examiner Only

Marks	Re-mark

_____

_____

_____ [6]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

4 **(a)** Organic chemistry is the study of carbon compounds. For ease of classification, organic compounds are split into different homologous series.

Give **two** features which are common to members of a homologous series.

1. _____

2. _____ [2]

(b) Crude oil is the world's main source of hydrocarbons. It is a mixture of many different hydrocarbons, and before they can be used they must be separated by a process called fractional distillation.

(i) What is meant by the term **hydrocarbon**?

_____

_____

_____

_____ [2]

(ii) What physical property of the hydrocarbons allows them to be separated by fractional distillation?

_____

_____ [1]

(c) Further processing of the separated hydrocarbons is needed to provide the actual molecules needed by the petrochemical industry. Butane and ethene are obtained by the cracking of hexane, C_6H_{14}.

(i) Suggest the homologous series to which hexane belongs.

_____ [1]

(ii) Write a balanced symbol equation to represent the cracking of hexane, C_6H_{14}, to form butane and ethene.

_____

_____ [2]

Examiner Only	
Marks	Re-mark

(iii) A student investigated the combustion of butane.
(The vapours produced were first cooled and passed over anhydrous copper(II) sulfate and then passes through limewater.)
The following observations were made.

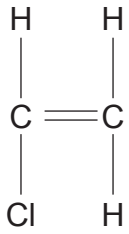
Reagent	Observation
Limewater	Colourless → Milky
Anhydrous copper(II) sulfate	White → Blue

Using the information in the table, identify the two products of combustion.

1. _____

2. _____ [2]

(d) Chloroethene (common name vinyl chloride) is a monomer with the structure shown below.



A large number of these monomers can join together in a long chain to form a widely used polymer, PVC.

What is this process known as?

_____ [2]

Examiner Only	
Marks	Re-mark

(e) The main constituent of vinegar is ethanoic acid.
An investigation into the reactions of ethanoic acid in salt formation was recorded in a lab book as follows:

'**Test 1**: Solid A was added to the ethanoic acid in a test tube. I saw bubbles and put a lighted splint into the test tube and heard a squeaky pop.'

(i) Identify the gas formed.

_____ [1]

(ii) Classify Solid A.

_____ [1]

'**Test 2**: I added Solid B to the ethanoic acid in the test tube and saw bubbles. When I put the lighted splint into the test tube, the bubbles made it go out.'

(iii) Identify the gas formed.

_____ [1]

(iv) Classify Solid B.

_____ [1]

'**Test 3**: Solid C was added to the ethanoic acid. No bubbles were seen.'

(v) Classify Solid C.

_____ [1]

Examiner Only	
Marks	Re-mark

5 Copper(II) sulfate crystals are described as containing water of crystallisation.

(a) What do you understand by the term water of crystallisation?

_____

_____

_____

_____ [2]

(b) A student weighs out 2.50 g of hydrated copper(II) sulfate, which has been on a shelf in the chemistry store. The label on the container states that the salt is $CuSO_4.5H_2O$, but as the lid has not been replaced properly, it was decided to check how much water of crystallisation is present.

(i) Calculate the relative formula mass of water, H_2O
(Relative atomic masses: H=1, O=16)

_____ [1]

(ii) Calculate the relative formula mass of the hydrated copper(II) sulfate, $CuSO_4.5H_2O$
(Relative atomic masses: Cu=64, S=32, O=16, H=1)

_____ [1]

The hydrated copper(II) sulfate is heated until it is a constant mass and the mass of anhydrous copper(II) sulfate obtained is recorded as shown below.

mass of evaporating basin	153.80 g
mass of evaporating basin and hydrated copper(II) sulfate	156.30 g
mass of hydrated copper(II) sulfate	2.50 g
mass of evaporating basin and anhydrous copper(II) sulfate	155.19 g
mass of anhydrous copper(II) sulfate	

(iii) How can the student ensure that the dish has reached a constant mass?

_____

_____

_____

_____ [2]

(iv) Complete the table on the previous page, by calculating the mass of anhydrous copper(II) sulfate. [1]

(v) What mass of water evaporated?

_____ [1]

(vi) The same experiment was conducted with a 2.50 g sample of hydrated copper(II) sulfate from an unopened container.
The mass of water which evaporated was calculated to be 0.9 g.

Identify which sample contained more water of crystallisation.

_____ [1]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

6 **(a)** Hydrogen peroxide decomposes slowly in sunlight to produce water and oxygen.

(i) Write a balanced chemical equation for this reaction.

_____ [3]

This reaction is very slow. It can be speeded up by adding a black powder, MnO_2, manganese(IV) oxide, which acts as a catalyst.

(ii) Explain what is meant by the term catalyst.

_____

_____

_____ [2]

(iii) Name a piece of equipment you would use to measure the volume of oxygen produced in the laboratory.

_____ [1]

(iv) Oxygen is very reactive and forms oxides with metals and non-metals.

Complete the table below with information about two oxides.

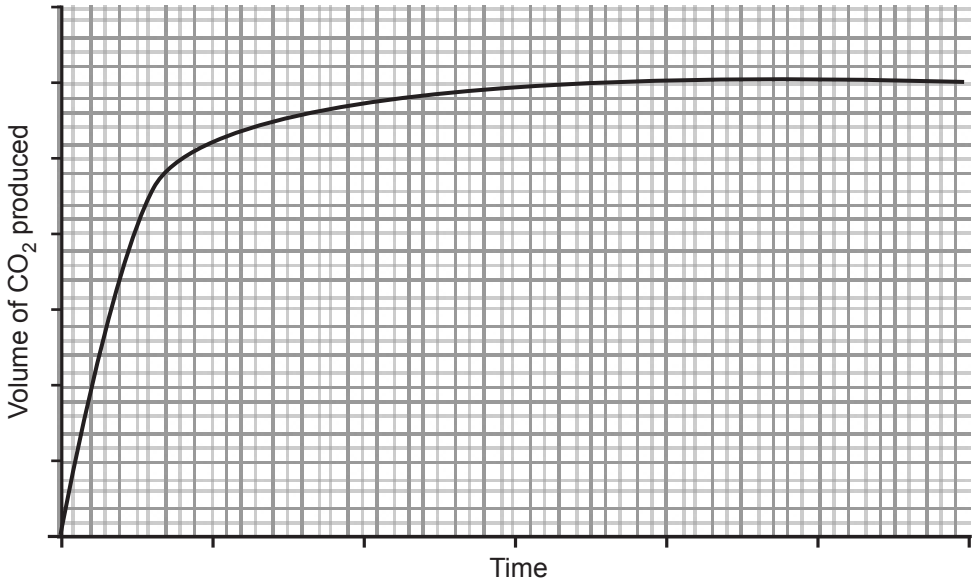
Name	**Formula**	**Acidic or Basic?**
carbon dioxide		
magnesium oxide		

[4]

Examiner Only	
Marks	Re-mark

(b) The reaction of calcium carbonate (marble chips) with hydrochloric acid is often used in the laboratory to produce carbon dioxide gas.

The curve below shows how the volume of carbon dioxide produced by reacting excess powdered marble chips (calcium carbonate) with dilute hydrochloric acid, varied with time.



The experiment was repeated. The only change was to use marble chips instead of the powdered marble chips (calcium carbonate).

On the same grid, sketch the curve you would expect for this reaction. [2]

THIS IS THE END OF THE QUESTION PAPER

Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Chemistry

Unit C2

Higher Tier

[CODE]

SPECIMEN PAPER

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 80.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet including a Periodic Table of the elements is provided.
Quality of written communication will be assessed in Question **3(b)**.

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
Total Marks	

Examiner Only	
Marks	Re-mark

1 Rusting is a common example of an oxidation reaction.

(a) **(i)** Explain what is meant by the term **oxidation**.

_____

_____ [1]

(ii) In terms of electrons, what is meant by the term **reduction**?

_____

_____ [1]

(b) Each of the following reactions can be classified as an oxidation or a reduction reaction.

Reaction 1: $CuSO_4 + Mg \rightarrow MgSO_4 + Cu$

Reaction 2: $N_2 + 3H_2 \rightarrow 2NH_3$

Reaction 3: $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

(i) Which substance is being oxidised in **Reaction 1**?

_____ [1]

(ii) Why can we say that nitrogen is being reduced in **Reaction 2**?

_____

_____ [1]

(iii) Which substance is being reduced in **Reaction 3**?

_____ [1]

(c) Reaction 3 above is the reaction which occurs in the blast furnace during the extraction of iron from its ore.

Name the ore that is usually used.

_____ [1]

(d) The reaction of nitrogen and hydrogen (Reaction 2) is part of the Haber process for the production of ammonia. This reaction can also go in the opposite direction, with the ammonia breaking down to form nitrogen and hydrogen.

(i) What is the name given to reactions of this type?

_____ [1]

(ii) When the Haber process is set up in a closed vessel, eventually the forward and backward reactions occur at the same rate.

State what has been established at this point.

_____ [1]

(e) Both ammonia and nitrogen are important commercially.

(i) Give one use of nitrogen, and explain why nitrogen is suitable for this.

Use _____ [1]

Reason _____

_____ [1]

(ii) Name an important product manufactured from ammonia.

_____ [1]

(iii) Describe the test for ammonia, giving the observation made for a positive identification.

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Re-mark

2 A student investigated displacement reactions and recorded some observations in the table below.

Reactants	Some Observations
copper + silver nitrate solution	colourless solution turned blue, solid formed
iron + zinc nitrate solution	nothing happened
silver + iron(II) nitrate solution	nothing happened
zinc + copper(II) nitrate solution	blue solution turned colourless, solid formed
iron + copper(II) nitrate solution	blue solution turned colourless, solid formed

(a) A solid is formed when copper reacts with silver nitrate solution.

What colour would you expect the solid to be?

_____ [1]

(b) Why did the blue solution turn colourless when zinc powder reacted with copper(II) nitrate solution?

_____

_____ [1]

(c) Using the information from the student's investigation, list the metals copper, iron, silver and zinc, in order of reactivity from the most reactive to the least reactive.

	most reactive ↓
	least reactive

[2]

Examiner Only

Marks	Re-mark

Examiner Only	
Marks	Re-mark

3 **(a)** Ionic compounds, such as lithium chloride, conduct electricity when molten or dissolved in water.

(i) Draw a **labelled diagram** of the assembled apparatus used to carry out the electrolysis of molten lithium chloride.

[5]

(ii) Electrodes are made from graphite.

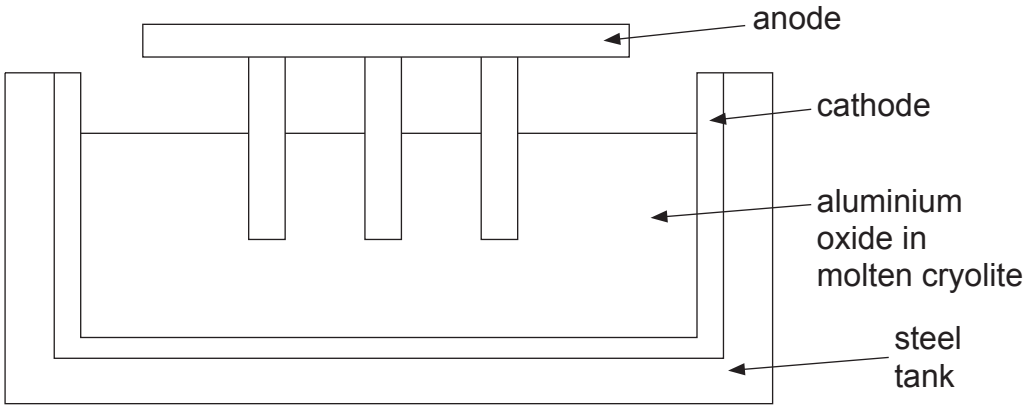
Give **one** reason why it is suitable for this use.

_____

_____ [1]

(b) Aluminium metal is extracted from pure molten aluminium oxide by electrolysis using the cell shown below.

Describe the production of aluminium metal from pure aluminium oxide in an electrolytic cell.



Your answer should include the following information:

- A reason for using electrolysis as the extraction method
- The name of the ore from which the aluminium oxide has been obtained
- Ionic equations for the reactions at the cathode and the anode
- Why the anodes must be replaced from time to time including an equation.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

4 Organic chemistry is the study of carbon compounds. For ease of classification, organic compounds are split into different homologous series.

(a) What do you understand by the term **homologous series**?

[3]

(b) Crude oil is the world's main source of hydrocarbons. It is a mixture of many different hydrocarbons, and before they can be used they must be separated by a process called fractional distillation.

(i) What is meant by the term **hydrocarbon**?

[2]

(ii) What physical property of the hydrocarbons allows them to be separated by fractional distillation?

[1]

(c) Further processing of the separated hydrocarbons is needed to provide the actual molecules needed by the petrochemical industry. Butane and ethene are obtained by the cracking of hexane.

Write a balanced symbol equation to represent the cracking of hexane, C_6H_{14}, to form butane and one other organic compound.

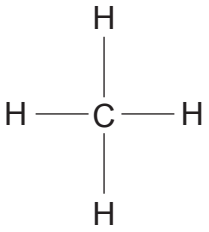
[2]

Examiner Only	
Marks	Re-mark

(d) Butane, in common with other saturated hydrocarbons such as methane, can be used as a fuel, when they burn heat is given out. The equation below shows the reaction when methane burns completely in oxygen.

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

This equation can be represented using the structural formulas below.



+ 2(O=O) → O=C=O + 2(H–O–H)

(i) Use the bond energies given in the table below to help you calculate the energy change expected for this reaction.

Bond	**Bond energy/kJ**
C–H	435
O=O	498
C=O	805
O–H	464

[4]

(ii) This is the maximum amount of energy released when the Bunsen burner's air hole is open.

Suggest why the amount of energy released is less when the air hole is closed.

_____

_____ [1]

(iii) Draw a reaction profile diagram for the reaction when methane burns completely in oxygen. Indicate the activation energy on the diagram.

[5]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

(e) Chloroethene is an alkene.
A large number of these alkene molecules, known as monomers, can join together in a long chain to form a widely used polymer, polyvinyl chloride (PVC, or polychloroethene).

(i) What is this process known as?

_____ [1]

(ii) Give an equation for the production of PVC from an individual monomer of chloroethene.

[4]

(f) Ethanol is found in the alcohol hand wash used for sterilisation purposes in hospitals and in alcoholic drinks.
The alcohol present in drinks like wine and beer is produced by fermentation.

Explain the process of fermentation.

_____

_____

_____

_____

_____ [3]

(g) If a bottle of wine is left open to the air, the ethanol can oxidise forming ethanoic acid. Ethanoic acid, in common with the other carboxylic acids, is a weak acid.

(i) Explain what you understand by the term ‘weak acid’.

_____

_____ [1]

The main constituent of vinegar is ethanoic acid.
An investigation into the reactions of ethanoic acid in salt formation was recorded in a lab book as follows:

'**Test 1**: Solid A was added to the ethanoic acid in a test tube. I saw bubbles and put a lighted splint into the test tube and heard a squeaky pop.'

(ii) Identify the gas formed.

_____ [1]

(iii) Classify Solid A.

_____ [1]

'**Test 2**: I added Solid B to the ethanoic acid in the test tube and saw bubbles. When I put the lighted splint into the test tube, the bubbles made it go out.'

(iv) Identify the gas formed.

_____ [1]

(v) Classify Solid B.

_____ [1]

'**Test 3**: Solid C was added to the ethanoic acid. No bubbles were seen.'

(vi) Classify Solid C.

_____ [1]

(vii) Draw out the full structural formula of propanoic acid, showing all bonds.

[2]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

5 **(a)** Hydrogen peroxide decomposes slowly in sunlight to produce water and oxygen.

(i) Write a balanced chemical equation for this reaction.

_____ [3]

This reaction requires a high activation energy and so is very slow. It can be speeded up by adding a black powder, MnO_2, manganese(IV) oxide, which acts as a catalyst.

(ii) What do you understand by the term activation energy?

_____

_____ [1]

(iii) Explain as clearly as possible, using the idea of activation energy, how the catalyst in this reaction works.

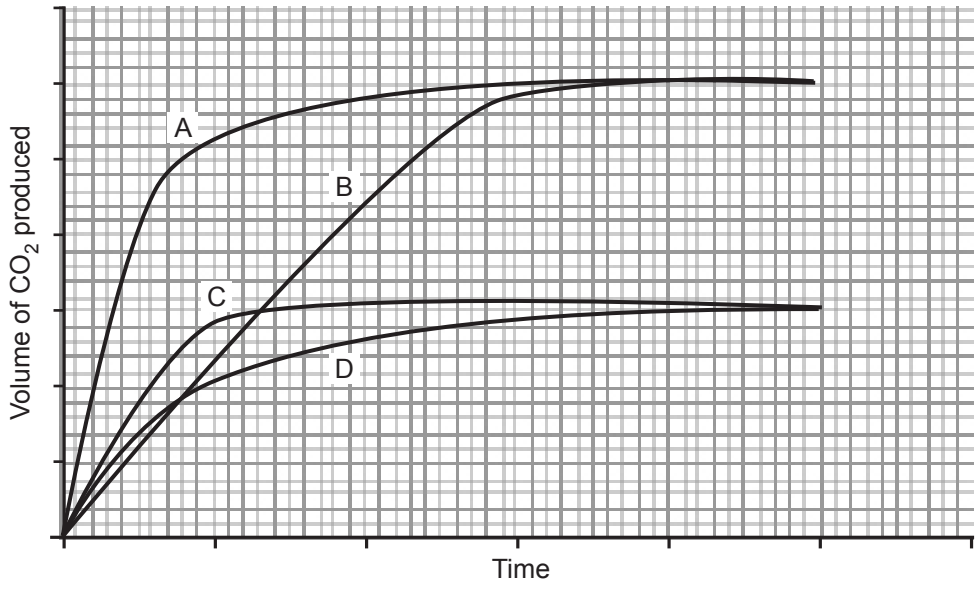
_____

_____

_____

_____ [2]

(b) The curves below show the volume of carbon dioxide formed by reacting excess marble chips (calcium carbonate) with dilute hydrochloric acid.



The curve labelled D is for the reaction of 50cm^3 of 0.1 mol/dm^3 hydrochloric acid with excess marble chips.

State which curve would be obtained by:

(i) reacting 100 cm^3 of 0.1 mol/dm^3 hydrochloric acid with excess marble chips.

_____ [1]

(ii) reacting 50 cm^3 of 0.1 mol/dm^3 hydrochloric acid with excess powdered marble chips.

_____ [1]

(iii) reacting 50 cm^3 of 0.2 mol/dm^3 hydrochloric acid with excess marble chips.

_____ [1]

(c) The reaction of marble chips with hydrochloric acid is described by the equation:

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$$

If the desired product is $CaCl_2$, calculate the atom economy for this reaction.

_____

_____

_____ [3]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

6 Since 2003, NASA has been involved with exploration of the planet Mars. They are interested in finding out about the planet, in part looking for evidence that Mars could have supported life. Unlike Earth, Mars is not habitable as it does not have an atmosphere like ours.

Earth's atmosphere contains a mixture of gases, including the oxygen which we need to live. Along with oxygen, other gases are present as shown in the table below.

(a) Complete the table below by entering the percentages of nitrogen and oxygen present in the Earth's atmosphere.

Gas	**Proportion Present**
nitrogen	
oxygen	
carbon dioxide	~ 0.3 – 0.4%
argon	~ 1%
other Noble gases	very small quantities
water vapour	variable

[2]

(b) Human activity can cause damage to the atmosphere by releasing pollutants.

Name a pollutant associated with the burning of fossil fuels and describe any adverse effects associated with this pollutant.

Pollutant	**Adverse effect**

[2]

(c) As an alternative to fossil fuels, hydrogen is often suggested as the 'fuel of the future'.

Explain why hydrogen is described as a **clean fuel**.

_____

_____ [1]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

Centre Number

Candidate Number

General Certificate of Secondary Education
2018

Double Award Science
Physics

Unit P1

Foundation Tier

[CODE]

SPECIMEN PAPER

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **10**.

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
Total Marks	

Examiner Only	
Marks	Re-mark

1 A microphone changes **sound** energy into **electrical** energy, as shown in the energy flow diagram below.

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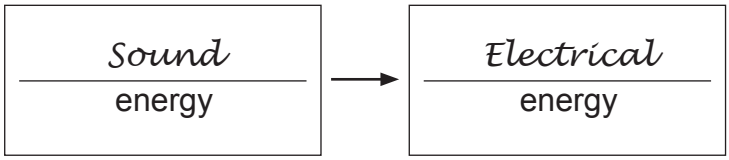
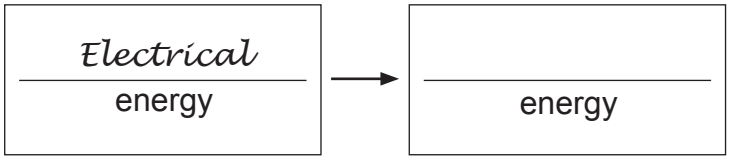


Fill in the spaces below to show the **main** types of energy changes which the device is designed to bring about.

(a) Electrical oven

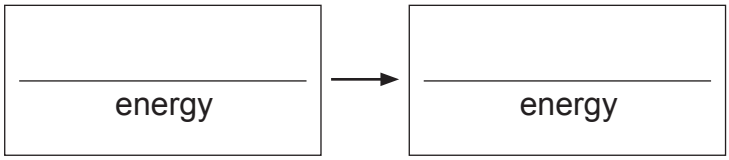
© ppart/iStock/Thinkstock



[1]

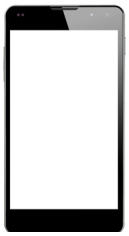
(b) Loudspeaker

© frender/iStock/Thinkstock



[2]

(c) Mobile phone



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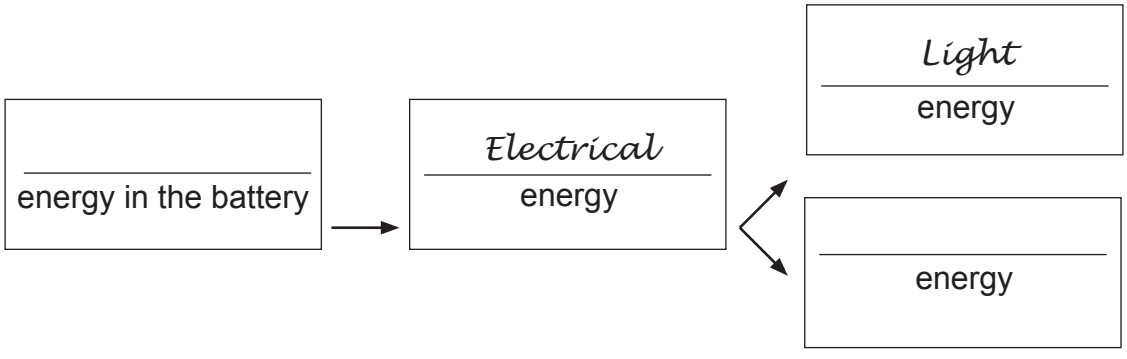
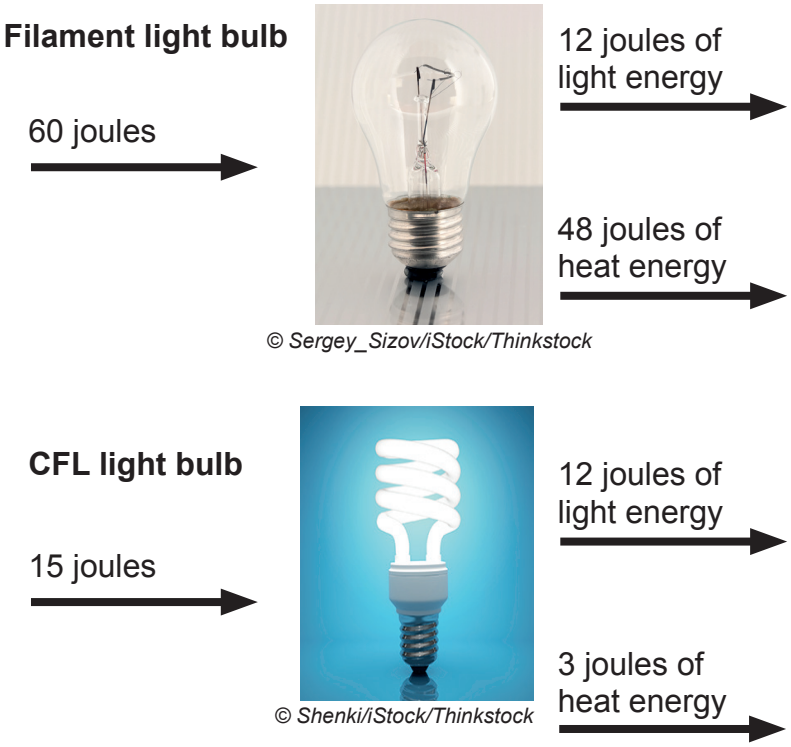


[2]

Examiner Only	
Marks	Re-mark

2 Filament light bulbs and CFL light bulbs are designed to convert electrical energy into light energy.



(a) Use the information above to explain fully why the government is encouraging the use of the more modern CFL light bulbs.

_____

_____ [1]

(b) Calculate the efficiency of the CFL light bulb.
Show your working out.

Efficiency = _____ [3]

Read the passage below.

Examiner Only	
Marks	Re-mark

Some islands off the west coast of Ireland have no **coal** or **oil**.
The islanders depend on **kinetic** energy to generate electricity.
When there is little demand for electricity, the islanders charge their batteries.
They can use the batteries if there is no wind.

(c) (i) Name one renewable and one non-renewable energy source mentioned in the passage above.

Renewable energy source _____

Non-renewable energy source _____ [2]

(ii) Name one renewable and one non-renewable energy source **not** mentioned in the passage above.

Renewable energy source _____

Non-renewable energy source _____ [2]

Examiner Only	
Marks	Re-mark

3 During the Winter Olympics, a speed skater completed the 500 m event in 40 seconds.

© 36clicks / iStock / Thinkstock

Calculate the average speed of the speed skater.
Show your working out.

Average speed = _____ m/s [3]

Examiner Only	
Marks	Re-mark

4 A cyclist and cycle have a total mass of 75 kg.

© Ljupco/iStock/Thinkstock

(a) What resultant force must the cyclist exert so that the acceleration is 2.0 m/s^2?
Show your working out.

Resultant force = _____ N [3]

(b) If a strong wind blows in the direction of the cyclist's movement state one thing the cyclist could do to maintain an acceleration of 2.0 m/s^2

_____ [1]

5 The skier below weighs 500 N. The skis have a total area of 0.5 m^2 when in contact with the snow.

© VadimPO/iStock/Thinkstock

Calculate the pressure the skier exerts on the snow.
Remember to give the correct unit for pressure.
Show your working out.

Pressure = _____ [4]

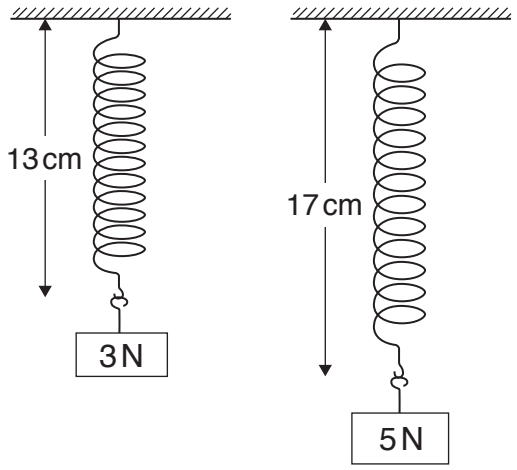
Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

6 **(a)** Name the law which links the extension of a spring to the force applied to it.

_____ [1]

When a load of 3 N hangs from a spiral spring its total length is 13 cm.
When the load is 5 N, the total length is 17 cm.



(b) **(i)** What extension would be caused by a load of 1 N?
Show your working out.

Extension = _____ cm [2]

(ii) Calculate the natural (unextended) length of the spring.
Show your working out.

Natural (unextended) length = _____ cm [2]

Examiner Only	
Marks	Re-mark

7 An atom is made up of protons, neutrons and electrons.

(a) Complete the table below to show the relative electrical charge and the location of each particle.
Two of the boxes have already been done for you.

Particle	Electrical charge	Location in the atom
Proton	+1	in the nucleus
Neutron		
Electron		

[4]

The symbol for the nucleus of Carbon-14 is shown below.

$$^{14}_{6}C$$

(b) **(i)** How many protons does the nucleus of carbon-14 contain?

Number of protons = _____ [1]

(ii) How many electrons does a neutral atom of carbon-14 contain?

Number of electrons = _____ [1]

(iii) How many neutrons does a neutral atom of carbon-14 contain?

Number of neutrons = _____ [1]

Examiner Only	
Marks	Re-mark

8 A bus, a car and an athlete are travelling at 10 m/s.

© tainasohiman/istock/Thinkstock

© Rawpixel/iStock/Thinkstock

© BONNINSTUDIO/iStock/Thinkstock

(a) Which has the greatest kinetic energy? Explain your answer.

_____

_____ [2]

(b) Calculate the kinetic energy of a 50 kg cheetah moving at 5 m/s.
Show your working out.

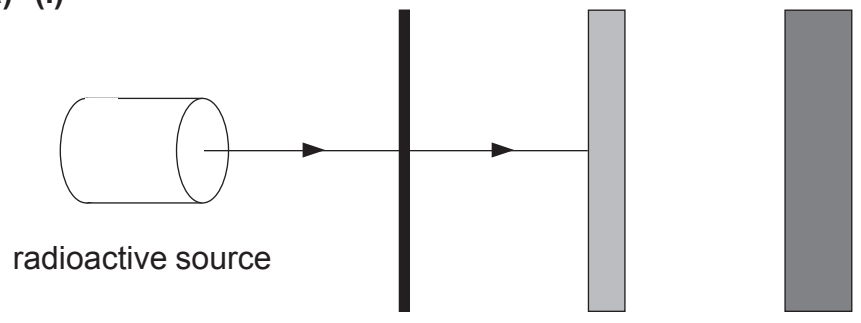
Kinetic energy of cheetah = _____ J [3]

Examiner Only	
Marks	Re-mark

9 The diagrams show two types of radiation being emitted by radioactive substances and being absorbed by different materials.

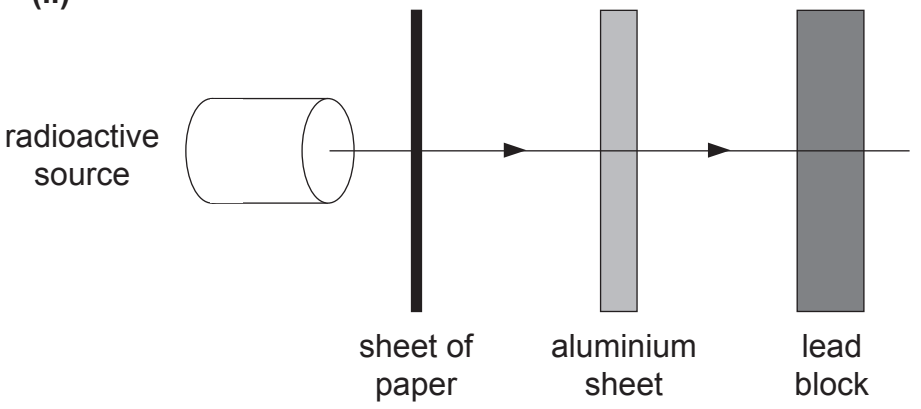
State the name of the radiation being emitted in each case, in the appropriate space below.

(a) (i)



Radiation = _____ [1]

(ii)



Radiation = _____ [1]

(b) What name is given to the electromagnetic radiation which comes from the nucleus of a radioactive atom?

Radiation = _____ [1]

10 Describe, in detail, an experiment to verify the Principle of Moments.

In your description you should include:

- how the apparatus is used; and
- the formula you would use to test the Principle of Moments.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Re-mark

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(Questions continue overleaf)

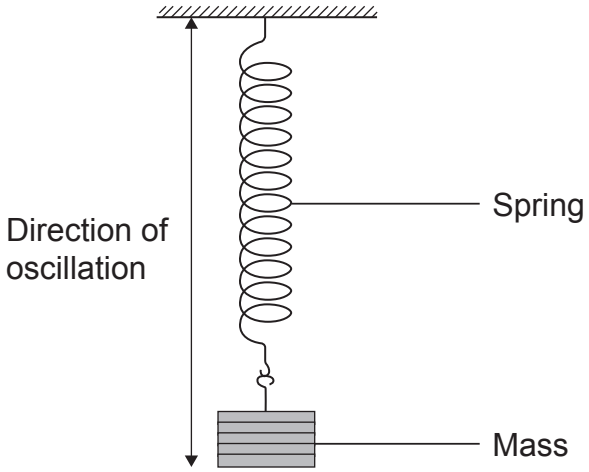
Examiner Only	
Marks	Re-mark

11 A mass hangs on the end of a helical (spiral) spring. When the mass is pulled down and released then the mass will oscillate up and down.

When the helical spring carries a mass (m), the time taken (T) for one complete up and down movement is given by the relationship:

$$\mathbf{T^2 = K\ m} \qquad \textbf{Equation 11.1}$$

Where **K** is a constant.



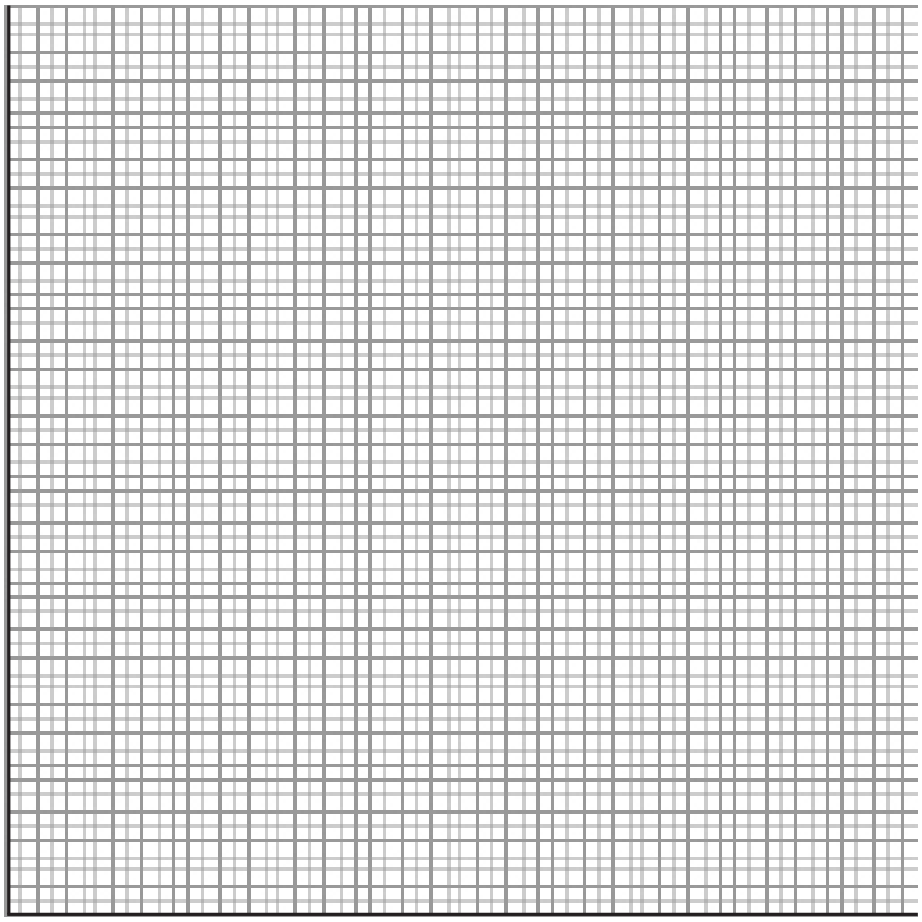
To test the relationship, the following experimental results were recorded.

m in kg	0	0.1	0.2	0.3	0.4	0.5
T in s	0	0.45	0.63	0.79	0.89	1.00
T^2 in s^2	0			0.6		

(i) Complete the table above by entering the values for T^2, to 1 decimal place.
One has been done for you. [2]

(ii) Choose a suitable scale for the vertical axis and on the graph paper on the next page, plot a graph of T^2 on the vertical axis versus m on the horizontal axis.

Examiner Only	
Marks	Re-mark



[3]

(iii) Draw the best fit line. [1]

(iv) Does your graph support the theory described by Equation **11.1** on the previous page? Explain your answer.

_____

_____

_____ [2]

(v) Find the value of K from the graph.
Show your working out.

K = _____ s^2/kg [2]

THIS IS THE END OF THE QUESTION PAPER

Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2018

Double Award Science
Physics

Unit P1

Higher Tier

[CODE]

SPECIMEN PAPER

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **2**.

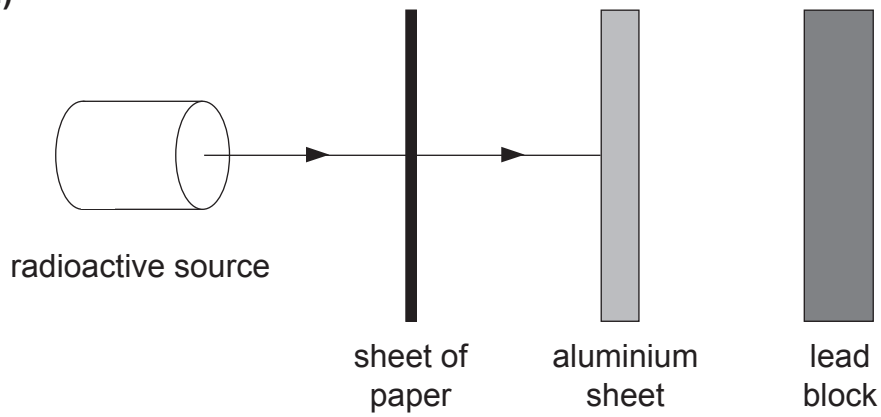
For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

Examiner Only	
Marks	Re-mark

1 The diagrams show two radiations being emitted by a radioactive substance and being absorbed by different materials.

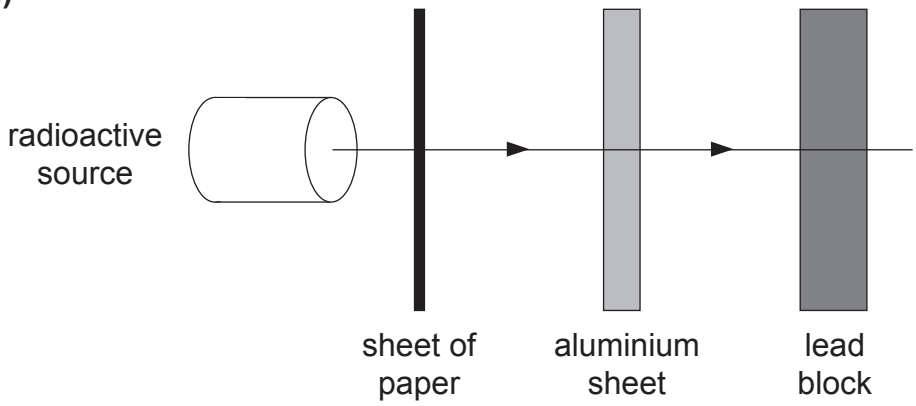
State the name of the radiation being emitted in each case, in the appropriate space below.

(i)



Radiation = _____ [1]

(ii)



Radiation = _____ [1]

(iii) What name is given to the electromagnetic radiation which comes from the nucleus of a radioactive atom?

Radiation = _____ [1]

2 Describe, in detail, an experiment to verify the Principle of Moments.

In your description you should include:

- the apparatus used;
- how the apparatus is used; and
- the formula you would use to test the Principle of Moments.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Re-mark

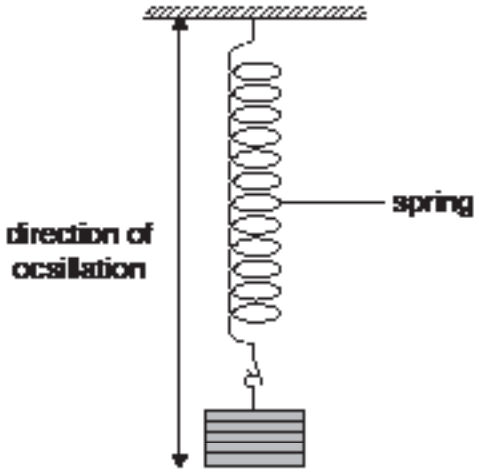
Examiner Only	
Marks	Re-mark

3 A mass hangs on the end of a helical (spiral) spring. When the mass is pulled down and released then the mass will oscillate up and down.

When the helical spring carries a mass (m), the time taken (T) for one complete up and down movement is given by the relationship:

$$T^2 = K\,m \qquad \textbf{Equation 3.1}$$

where **K** is a constant.



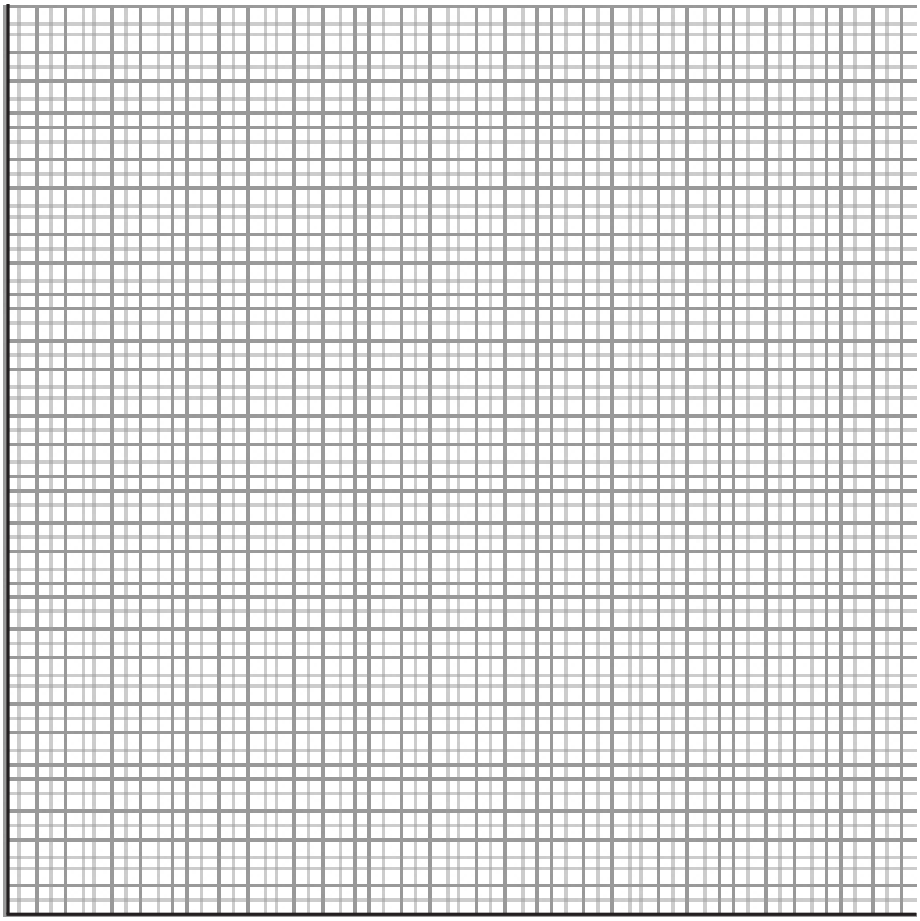
To test the relationship, the following experimental results were recorded.

m in kg	0	0.1	0.2	0.3	0.4	0.5
T in s	0	0.63	0.90	1.10	1.26	1.41
T^2 in s^2	0			1.2		

(i) Complete the table by entering the values for T^2, to 1 decimal place.
One has been done for you. [2]

(ii) Choose a suitable scale for the vertical and horizontal axis and plot a graph of T^2 on the vertical axis versus m on the horizontal axis. [3]

(iii) Draw the best fit line. [1]



Examiner Only	
Marks	Re-mark

(iv) Does your graph support the theory described by **Equation 3.1**? Explain your answer.

_____

_____

_____ [2]

(v) Find the value of K from the graph.
Show your working out.

K = _____ s^2/kg [2]

Examiner Only	
Marks	Re-mark

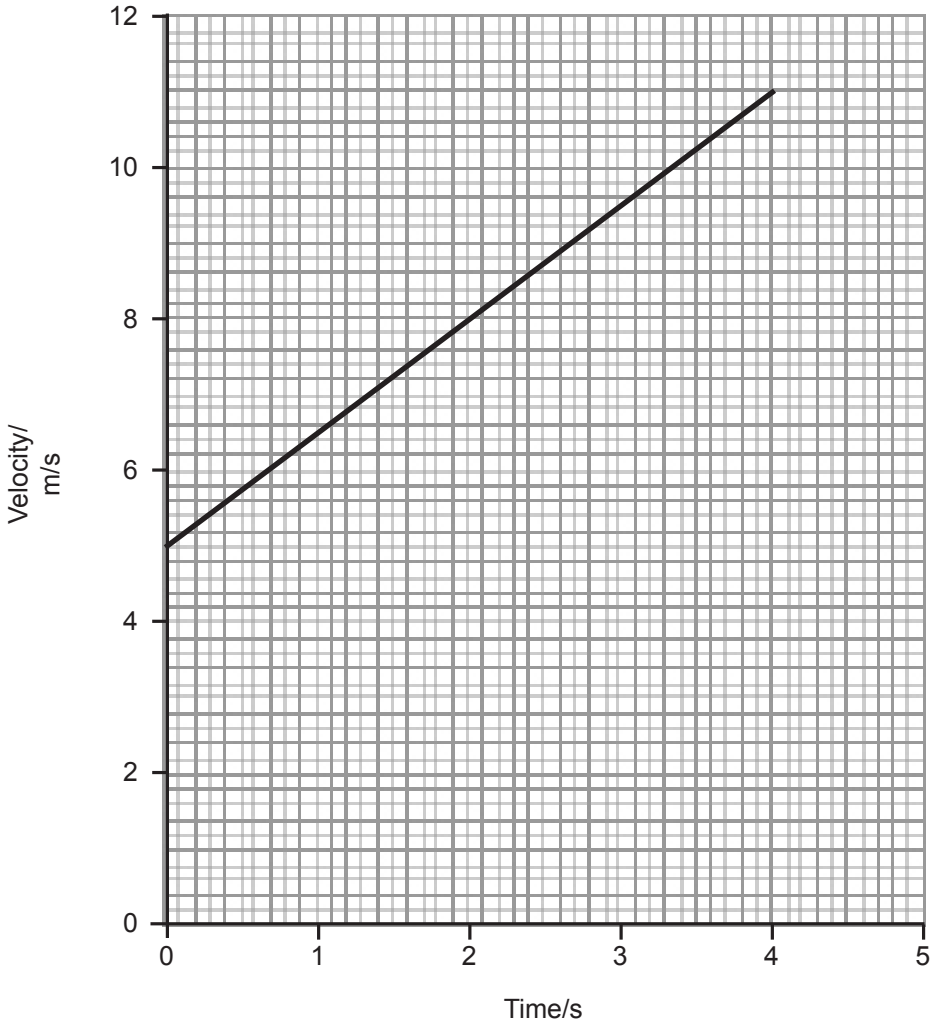
(vi) It is important in this experiment that the mass attached to the spring is kept small.

Explain why this is so.

_____

_____ [1]

4 A steel ball was thrown downwards from a height above the surface Moon. The graph below shows part of the motion of the steel ball.



Use the graph to answer the following questions.

(a) (i) What is the initial velocity of the ball?

_____ [1]

(ii) Describe the motion of the steel ball between times t = 0 s and t = 4 s.

_____ [1]

(b) Calculate the acceleration of the steel ball.
Remember to include the correct units in your answer.
Show your working out.

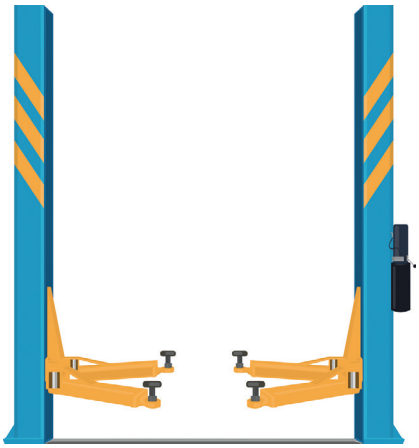
Acceleration = _____ [4]

(c) How far did the steel ball fall between t = 0 and t = 4 s?
Show your working out.

Distance = _____ m [4]

Examiner Only	
Marks	Re-mark

5 A garage lift is used to raise a car of weight 25 000 N a distance of 1.5 m.



© eduardrobert/iStock/Thinkstock

(i) Calculate the work done by the garage lift.
Show your working out.

Work done = _____ J [3]

(ii) If it took 30 seconds to do this work, calculate the power developed by the garage lift.
Show your working out.

Power = _____ W [3]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

6 **(a)** Explain in terms of mass number and atomic number the meaning of the word isotope.

_____

_____ [2]

This part of the question is about a nuclear disintegration of an isotope of potassium by beta decay.

(b) Potassium, K, undergoes beta decay to calcium, Ca.

Complete a balanced nuclear equation for this reaction.

$$\begin{matrix}40\\19\end{matrix}\mathrm{K} \xrightarrow{\text{Beta decay}} \begin{matrix}\square\\\square\end{matrix}\mathrm{Ca} + \begin{matrix}\square\\\square\end{matrix}\beta$$

[4]

Examiner Only	
Marks	Re-mark

7 **(a)** 1 g of water has a volume of 1 cm^3.
There are 1 000 000 cm^3 in 1 m^3 of water.

(i) What is the mass, in g, of 1 m^3 of water?

Mass = _____ g [1]

There are 1000 g in 1 kg.

(ii) What is the mass, in kg, of 1 m^3 of water?

Mass = _____ kg [1]

(iii) What is the density of water in kg/m^3?

Density = _____ kg/m^3 [1]

(b) A balloon is made from a material which has a mass of 150 kg.
Its volume when filled with helium is 500 m^3.
The density of helium is 0.18 kg/m^3.

Calculate the total mass of the helium-filled balloon.
Show your working out.

Total mass = _____ kg [4]

Examiner Only	
Marks	Re-mark

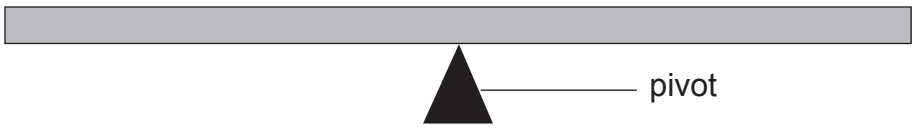
8 **(a)** Write, in words, the Principle of Moments.

_____

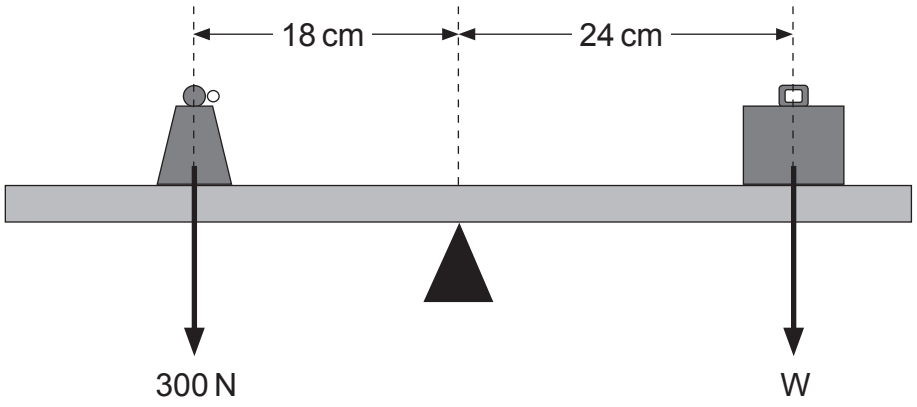
_____

_____ [3]

John must find the **weight** of his suitcase before going on holiday.
He balanced a uniform plank of wood as shown in the diagram below.



John then placed a weight of 300 N on the left hand side of the plank and his suitcase on the other side.



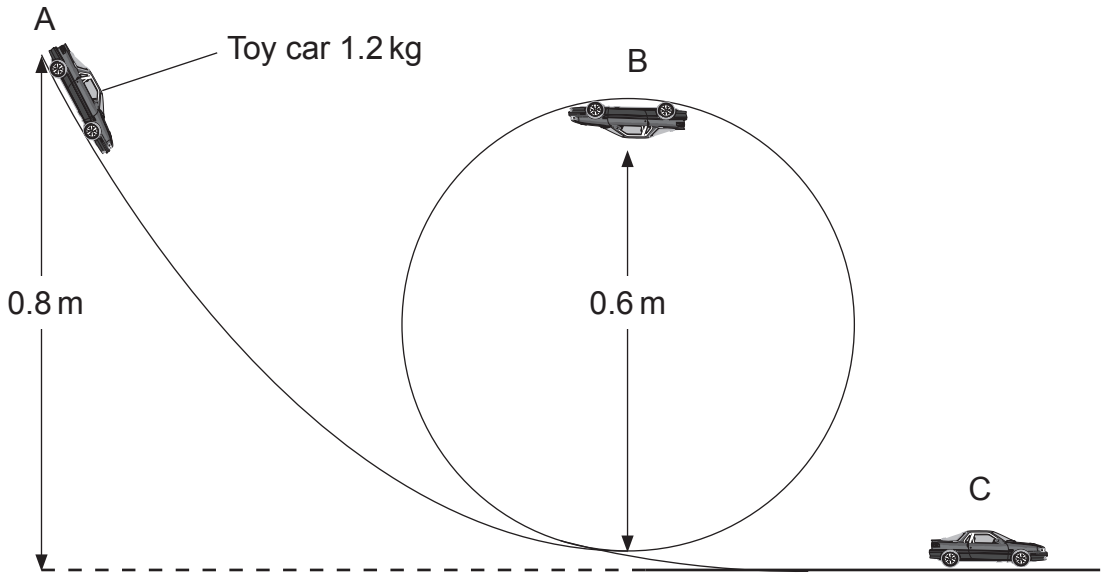
John adjusted the positions of the 300 N weight and the suitcase until the plank was in balance again.

(b) Calculate the weight of the suitcase.
Show your working out.

Weight = _____ N [4]

9 A toy car of mass 1.2 kg is released from rest at point A, before it 'loops the loop'.

Examiner Only	
Marks	Re-mark



(a) Calculate the **difference** in potential energy of the toy car at points A and B.
Show your working out.

Difference in potential energy = _____ J [4]

(b) Calculate the velocity of the toy car at point C, if its kinetic energy at C is 3.75 J.
Assume no energy losses due to friction.
Show your working out.

Velocity = _____ m/s [3]

Examiner Only	
Marks	Re-mark

10 A racing car, of mass 2500 kg, accelerates from rest from the starting grid. The engine exerts a force of 1.5×10^4 N.

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(a) Calculate the acceleration of the racing car.
Show your working out.

Acceleration = _____ m/s^2 [3]

(b) The racing car accelerates for 10 s and covers a distance of 300 m.

Calculate the work done by the engine of the racing car.
Give your answer in megajoules.
Show your working out.

Work done = _____ M J [4]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

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Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Physics

Unit P2
Foundation Tier

[CODE]

SPECIMEN PAPER

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer all questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **9(b)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
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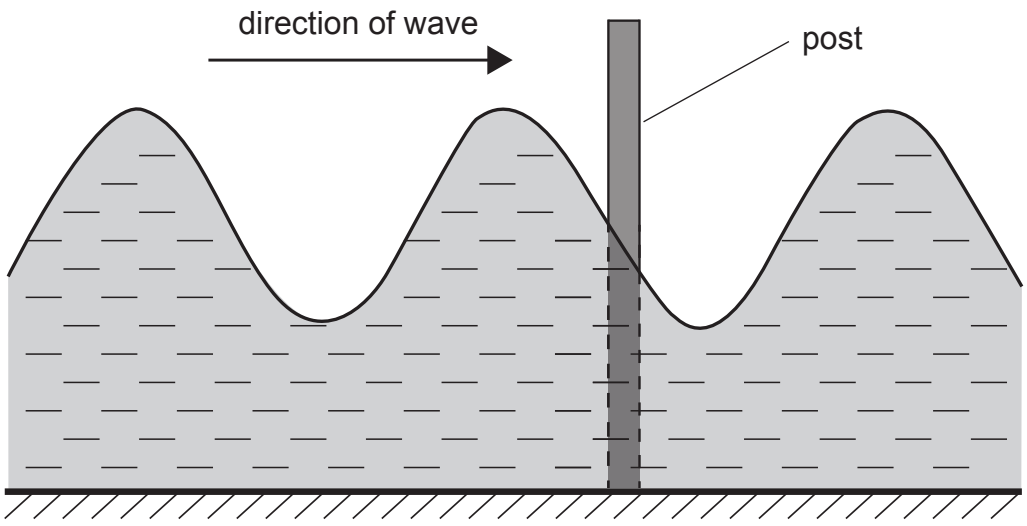
7	
8	
9	
Total Marks	

Examiner Only	
Marks	Re-mark

1 A stone is thrown into a pond and water waves are produced. These waves pass a post which projects out of the water.



Twelve waves pass the post in 4 seconds.

(a) (i) What is the frequency of the wave?
Remember to include the unit.

Frequency = _____ [2]

(ii) What do the waves carry, from the point where the stone entered the water, to the post? Choose from the list below by placing a tick (✓) in the correct box.

water ☐

sound ☐

energy ☐

[1]

A student is told that the amplitude of the wave is 3 cm and its wavelength is 5 cm.

(iii) Use your answer to part **1 (a) (i)** to calculate the speed of the water wave in cm/s.
Show your working out.

Speed = _____ cm/s [3]

(iv) Seismic P waves belong to a family of waves called 'longitudinal waves'.

Give **two** other examples of longitudinal waves.

1. _____

2. _____ [2]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

2 **(a)** **(i)** Fill in the missing word in the sentence below.

X-rays, **infra-red radiation** and **radio** waves are all part of a

family of waves called the _____ spectrum. [1]

(ii) Which one of the three waves above has a wavelength smaller than the wavelength of visible light?

_____ [1]

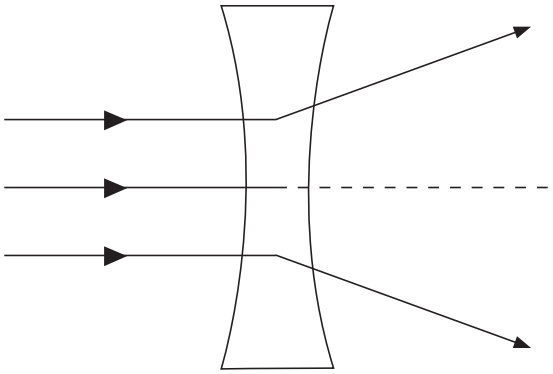
(b) Describe one use and one danger of **infra-red** radiation.

Use _____ [1]

Danger _____ [1]

Examiner Only	
Marks	Re-mark

3 (a) (i) The diagram below shows light being refracted through a lens.



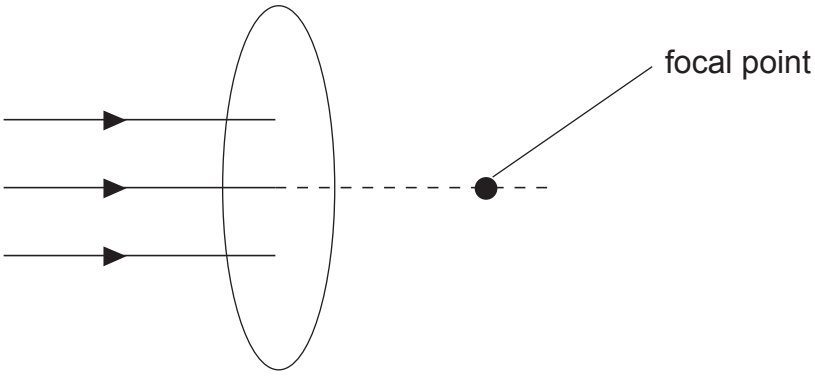
Which type of lens is this?

_____ [1]

(ii) On the diagram above continue the middle ray to show its path after it passes through the lens. [1]

(b) (i) A different type of lens is shown in the diagram below.
Name this type of lens.

_____ [1]



(ii) On the diagram above continue the two incomplete rays to show how they are refracted as they pass through the lens. [2]

(iii) State **one** practical application of the lens shown in part **(b) (i)**.

_____ [1]

Examiner Only	
Marks	Re-mark

4 In electric circuits, conductors and insulators are used.

(a) (i) State the difference between conductors and insulators.

_____

_____ [1]

(ii) When an electrical current flows through a metal wire which particles are moving?

_____ [1]

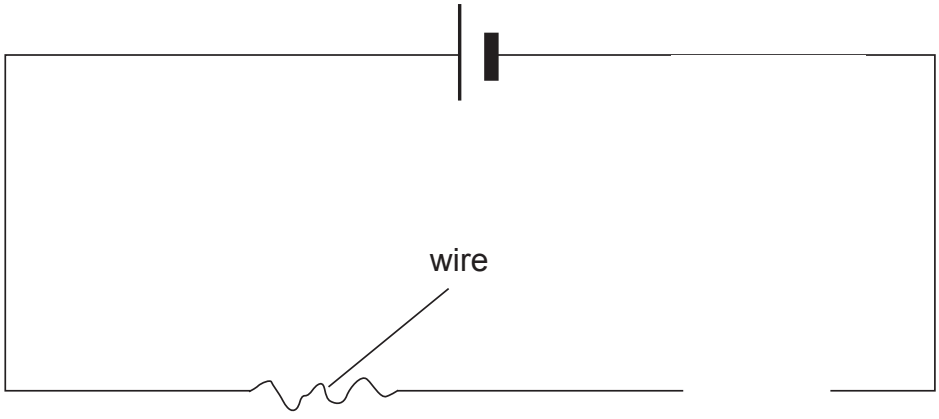
(b) A charge of 6 C passes through a resistor in 20 seconds.

Calculate the total current flowing through the resistor.
Show your working out.

Current = _____ A [3]

(c) A student sets up a circuit to find the resistance of a length of wire.

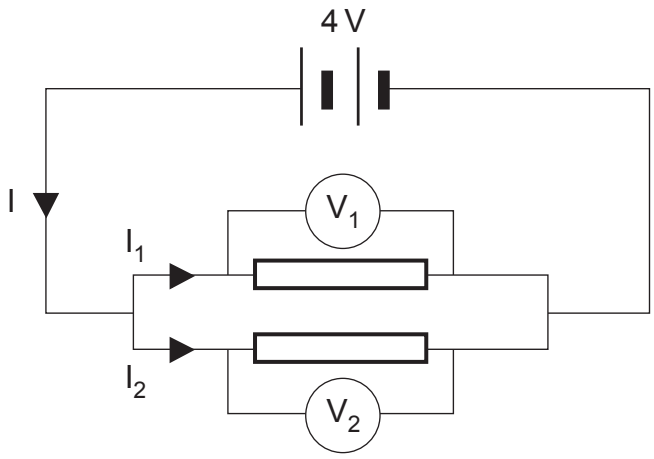
Complete the circuit diagram by adding an ammeter and a variable resistor to enable the resistance of the wire to be calculated.



[3]

Examiner Only	
Marks	Re-mark

(d) A 4 V battery is connected to two equal resistors in parallel.



(i) What is the reading on voltmeter V_1?

Voltmeter V_1 = _____ V [1]

(ii) What is the reading on voltmeter V_2?

Voltmeter V_2 = _____ V [1]

The battery supplies a total current I which divides into currents I_1 and I_2 as shown above.

Current I_1 is 0.4 A.

(iii) What is current I_2?

Current I_2 = _____ A [1]

(iv) What is current I?

Current I = _____ A [1]

(v) Each resistor has a resistance of 10 Ω.

Calculate their combined resistance.
Show your working out.

Combined resistance = _____ Ω [2]

Examiner Only	
Marks	Re-mark

5 **(a)** When we pay for electricity we pay for the number of units used.

Give another name for a 'unit of electricity'.

_____ [1]

(b) **(i)** An immersion heater, rated at 2.5 kW, is switched on for half an hour.

How many units of electricity will the heater use in this time?
Show your working out.

Units used = _____ [2]

(ii) How much will this cost if one unit of electricity costs 16 p?
Show your working out.

Cost = _____p [3]

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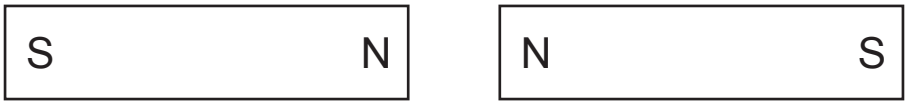
(Questions continue overleaf)

6 The diagram below shows a bar magnet.

(a) (i) What is the name given to the ends of the magnet labelled N and S?

_____ [1]

(ii) State and explain what would happen if another identical magnet is brought close to the first one, as shown below.

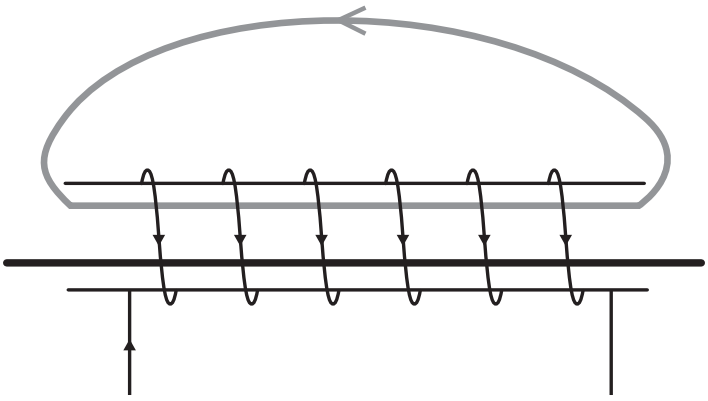


_____

_____ [2]

Examiner Only	
Marks	Re-mark

A magnetic field can also be produced by a current flowing through a wire as shown below.



Examiner Only	
Marks	Re-mark

(b) (i) **On the diagram above** complete the bottom magnetic field line, remember to add an arrow to show the direction of the magnetic field. [2]

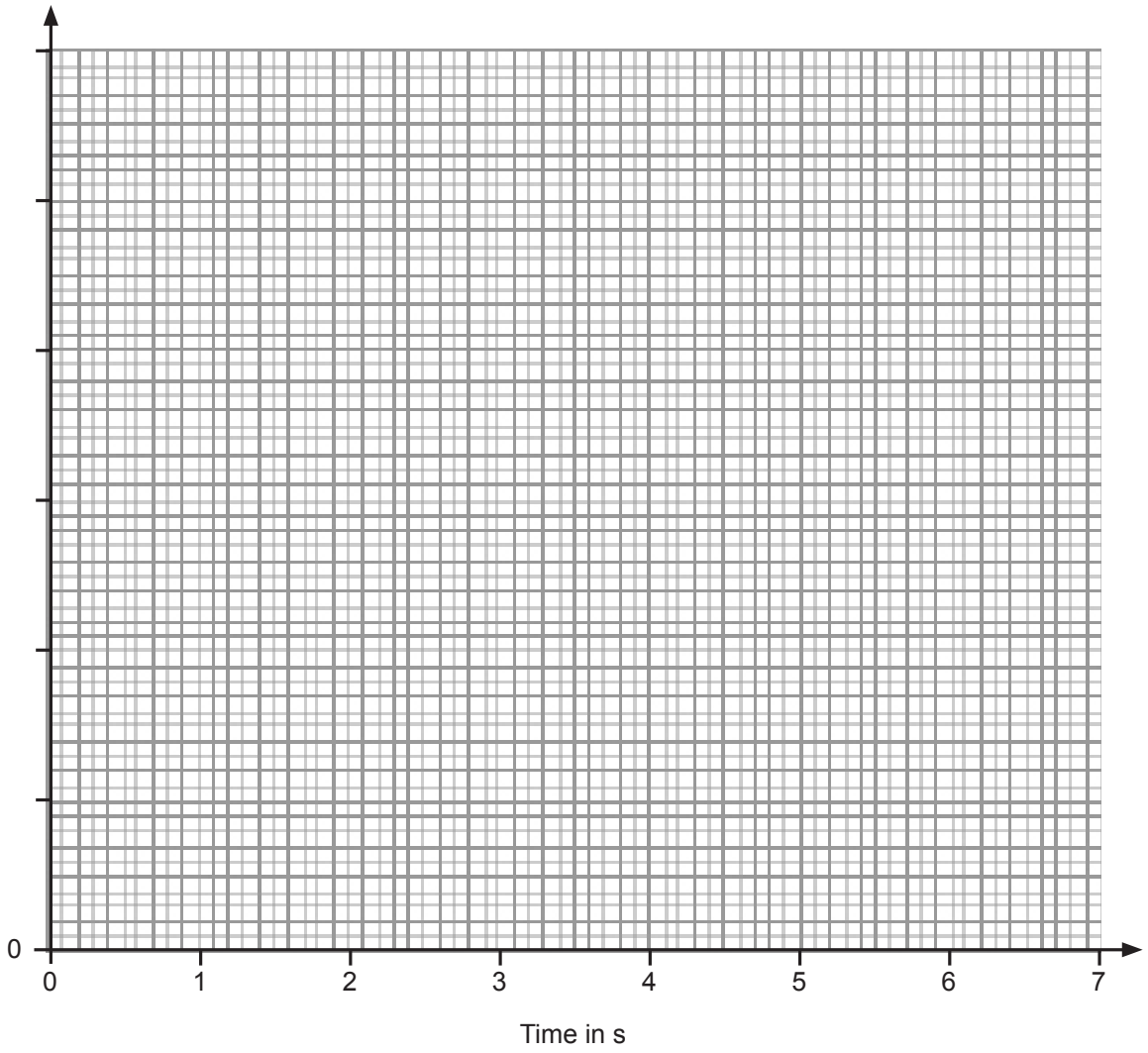
(ii) List **one** way in which the strength of the magnetic field could be increased.

_____ [1]

7 A small rock is moving within a planetary nebula. Its velocity changes with time as shown in the table.

Time in s	0	1	2	3	4	5	6	7
Velocity in m/s	0	0.2	0.4	0.6	0.8	1.0	1.0	1.0

(a) On the graph below choose a suitable scale and title for the vertical axis and plot points of velocity against time. [4]



Examiner Only

Marks	Re-mark

(b) Draw the appropriate lines on the grid to complete the graph. [2]

(c) **(i)** Which part of the graph indicates direct proportion between the two quantities?

_____

_____ [1]

(ii) Give **two** reasons for your answer.

1. _____

2. _____ [2]

Examiner Only	
Marks	Re-mark

8 The table below shows the planets in order of their distance from the Sun.

1	Mercury
2	
3	Earth
4	
5	
6	Saturn
7	Uranus
8	

(a) Complete the table above by naming the missing planets. [4]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

(b) A satellite, situated in space, may be used to pass a microwave signal from one part of the Earth to the other as shown in the diagram.

satellite

What **two** properties of microwaves allow the signal to travel from the transmitter to the satellite?

_____

_____ [2]

(c) Give **two** uses of artificial satellites, other than communications.

1. _____

2. _____ [2]

Examiner Only	
Marks	Re-mark

9 The incomplete statements below describe the formation of a star.

(a) Complete each sentence.

Clouds of dust and gas, called nebulae, come together

because of a force called _____. [1]

The two main gases found in a nebulae are Helium

and _____. [1]

Eventually the star forms and gives out energy, powered by a nuclear

process called _____. [1]

(b) Many scientists believe that the entire universe had a beginning with a single event a long time ago.

Outline the main points of this theory.
Your description should include:

- the name and nature of this event;
- how long ago the process started;
- the main evidence for this theory; and
- what is happening to the Universe now.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Physics

Unit P2

Higher Tier

[CODE]

SPECIMEN PAPER

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 80.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **4(c)(iii)**.

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
Total Marks	

Examiner Only	
Marks	Re-mark

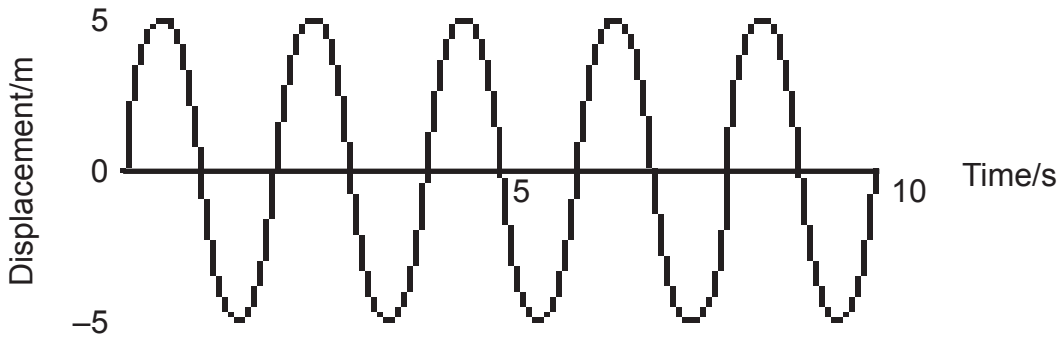
1 Waves can be divided into two types.

(a) Name the **two** types of wave.

_____

_____ [2]

(b) The outline of a water wave is illustrated below.



(i) What type of wave is the water wave?

_____ [1]

(ii) Describe the motion of the particles in the water wave.

_____

_____

_____

_____ [2]

(iii) Which one of the following three quantities **cannot** be obtained from the above graph?
Place a tick (✓) in the appropriate box.

Amplitude ☐ Frequency ☐ Wavelength ☐ [1]

(iv) Use the graph to find the values of the other two quantities. State the units in each case.

1. _____

2. _____ [2]

(c) A radio station broadcasts on 100 MHz.

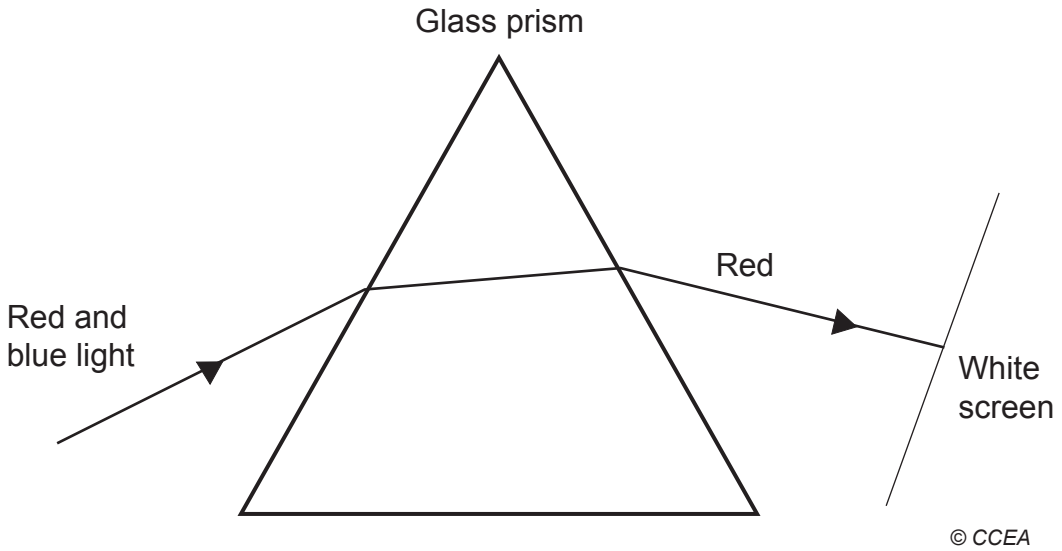
Calculate the wavelength if radio waves travel at 3.0×10^8 m/s.
Show your working out.

Wavelength = _____ m [4]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

2 Rays of red and blue light are incident on a prism. The path of the **red light** is continued on to the screen.



(a) (i) Sketch the path of the **blue light** through the prism on to the white screen. [2]

(ii) Explain why the red and blue rays travel in different directions in the prism.

_____ [1]

(iii) Infra-red radiation is a part of the electromagnetic spectrum.

(1) Name a use of infra-red radiation.

_____ [1]

(2) State a danger of infra-red radiation.

_____ [1]

(3) Name a radiation with a wavelength longer than that of infra-red radiation.

_____ [1]

(b) (i) What is ultrasound?

_____

_____

_____

_____ [2]

(ii) Describe briefly how ultrasound is used in medicine for foetal scans.

_____

_____

_____

_____ [2]

(iii) Explain why ultrasound is **not** used to detect high-flying aircraft.

_____

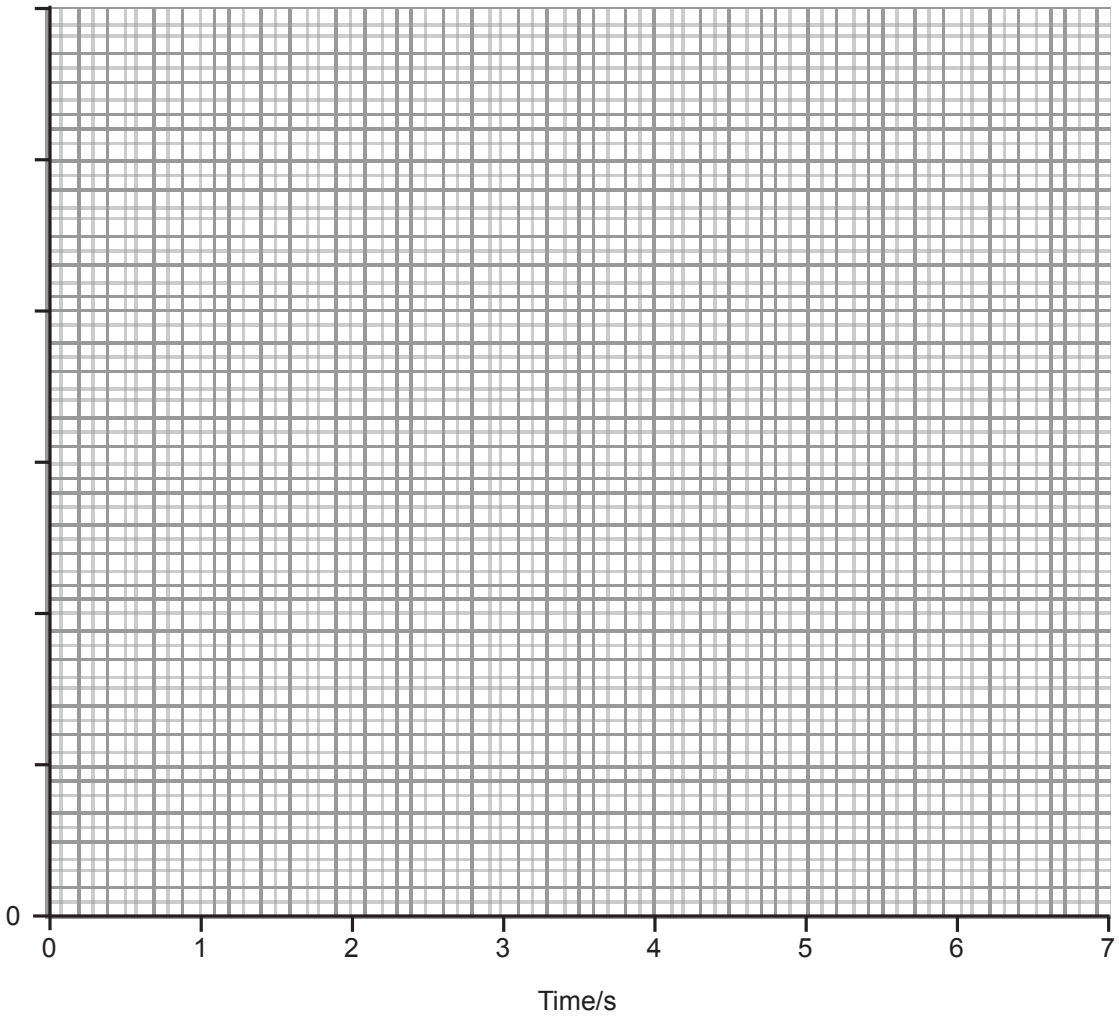
_____ [1]

Examiner Only	
Marks	Re-mark

3 A small rock is moving within a planetary nebula. Its velocity changes with time as shown in the table.

Time/s	0	1	2	3	4	5	6	7
Velocity/ m/s	0	0.2	0.4	0.6	0.8	1.0	1.0	1.0

(a) On the graph below choose a suitable scale and title for the vertical axis and plot points of velocity against time. [4]



(b) Draw the appropriate lines on the grid to complete the graph. [2]

Examiner Only

Marks	Re-mark

(c) **(i)** Which part of the graph indicates direct proportion between the two quantities?

_____

_____ [1]

(ii) Give **two** reasons for your answer.

1. _____

2. _____ [2]

(iii) Find the gradient of the first part of the graph and give its unit.

Gradient = _____

Units = _____ [3]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

4 In electric circuits, conductors and insulators are used.

(a) **(i)** State the difference between conductors and insulators.

_____ [1]

(ii) Describe how an electric current flows in a metal wire.

_____

_____ [1]

(b) A current of 0.2 A flows through a resistor for three seconds.

Calculate the charge which flows in this time interval.
Remember to include the unit for charge.
Show your working out.

Charge = _____ [3]

Unit of charge = _____ [1]

(c) A student is asked to find how the resistance of a metallic conductor depends on the length of the wire.

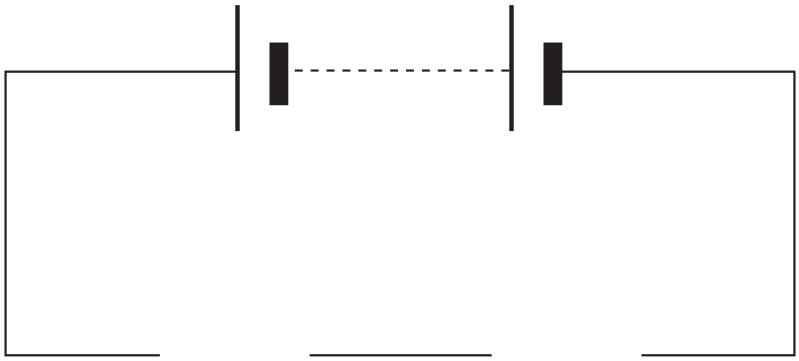
(i) State **two** precautions which must be taken to ensure the experiment is a fair test.

1. _____

2. _____ [2]

Examiner Only	
Marks	Re-mark

(ii) **Complete the circuit diagram** to show how the student would find the resistance of the length of wire.



[3]

(iii) Describe the experiment the student would carry out to investigate how the resistance of a wire would depend on its length.

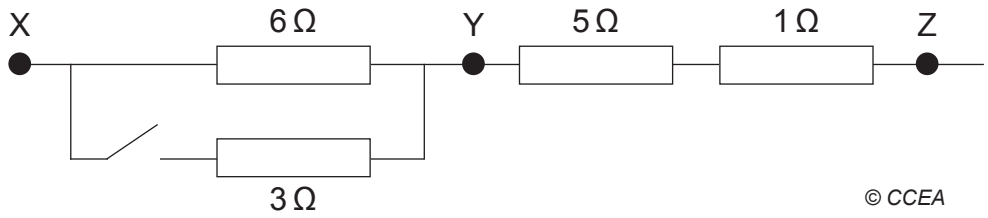
Your method should include the:

- measurements to be taken;
- calculations to be made;
- graph to be plotted; and
- the conclusion.

In this part of the question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

[6]

5 Resistors are arranged in the following formation.



(a) Complete the table below to show the total resistance between the points for the different switch settings.

Switch	Resistance between points in Ω	
Open	**X** and **Z**	
Closed	**X** and **Y**	
Closed	**X** and **Z**	

[3]

(b) When the switch is closed a current of 600 mA flows through the 1 Ω resistor.

State the currents flowing through the other resistors.

Resistor	Current in mA
5 Ω	
6 Ω	
3 Ω	

[3]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

(c) (i) What is the voltage dropped across the 5 Ω resistor when a current of 600 mA is flowing through it?
Show your working out.

Voltage dropped = _____ V [4]

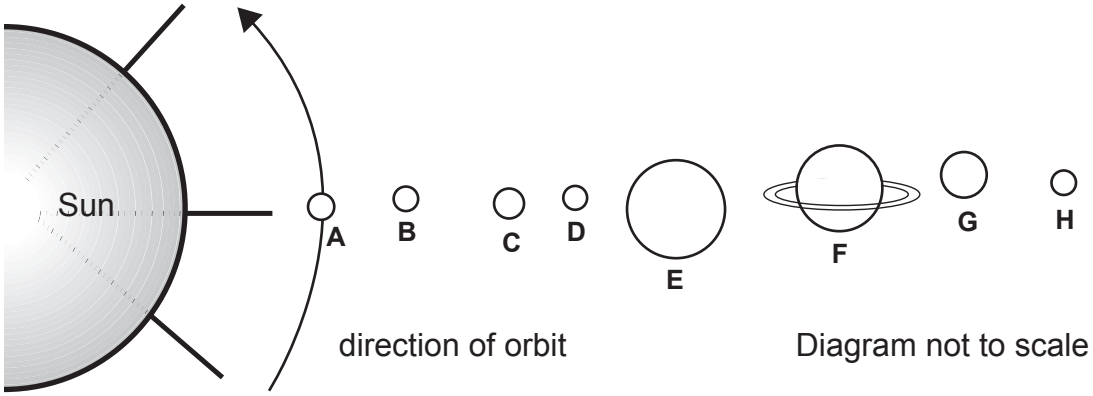
(ii) What is the power developed in the 5 Ω resistor when 600 mA flows through it?
Remember to include the unit.
Show your working out.

Power = _____

Unit = _____ [4]

Examiner Only	
Marks	Re-mark

6 The following diagram shows the planets in our Solar System.



(a) **(i)** Name planets C, D and H.

Planet C _____ [1]

Planet D _____ [1]

Planet H _____ [1]

(ii) Use a curved arrow to indicate the direction of orbit of planet E. [1]

(iii) State the name of **one** of the gas planets.

_____ [1]

(b) Describe, briefly, the first three stages in the lifecycle of a star with the mass similar to the mass of our sun.

_____

_____

_____

_____

_____

_____ [3]

(c) Explain why in the 'main sequence' period of its life cycle a star is stable.

[2]

(d) Describe the lifecycle of more massive stars.

[4]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

General Certificate of Secondary Education
2019

Double Award Science

Unit 7 Practical Skills

Booklet A

Foundation Tier & Higher Tier

[CODE]

SPECIMEN

APPARATUS AND MATERIALS LIST

It is the responsibility of the centre to ensure that appropriate risk assessments are carried out for all practical skills assessments.

BIOLOGY

Each group of candidates will require:

- 1 Bunsen burner
- 3 boiling tubes (or 1 and wash in between)
- Mounted needle/wire mesh dish
- Heatproof mat
- Tripod and gauze if using wire mesh dish for burning food
- Tongs for lighting food in bunsen – if using mesh dish to burn food in
- Thermometer
- Stirrer
- 25 cm^3 measuring cylinder
- Bunsen lighter
- 3 types of potato crisp – normal/low fat or baked/another variety (~0.5 g each)
- Safety goggles
- Scales

CHEMISTRY

Each group of candidates will require:

- 50 cm^3 of hydrochloric acid (approximately 2 mol/dm^3) labelled **hydrochloric acid** and **irritant**
- 50 cm^3 of Sodium hydroxide solution (approximately 2 mol/dm^3) labelled **sodium hydroxide** and **corrosive**
- A 50 cm^3 burette (and small funnel for filling)
- A 100 cm^3 beaker used for filling the burette
- A 50 cm^3 measuring cylinder
- A polystyrene cup, approximately 150 cm^3
- A thermometer, 0–50 °C
- Universal Indicator paper
- A disposable pipette

PHYSICS

Each group of candidates will require:

- Retort Stand 2
- Boss head and clamps 2
- Wooden slope
- Tennis ball
- Stop clock
- Metre rule

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Biology

Unit 7 Practical Skills

Booklet A

Foundation Tier

[CODE]

SPECIMEN PAPER

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

To be completed in class and submitted to CCEA for marking.
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for his paper is 15.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

For Examiner's use only	
Question Number	**Marks**
Biology	
1	
2	
3	
4	
Total Marks	

The energy content of a food can be measured by heating water with a burning food sample.

Plan and carry out an experiment to compare the energy content of three types of potato crisp.

Examiner Only	
Marks	Re-mark

1 Draw a labelled diagram of the apparatus you will use.

[3]

2 Give **two** safety precautions you will take during this experiment.

_____

_____ [2]

3 Why should you stir the water before measuring its temperature with the thermometer?

_____

_____

_____ [1]

Examiner Only	
Marks	Re-mark

4 **(a)** **(i)** Weigh the three crisps that you will use and record their masses in **Table 1** below.

- Carry out your experiment for the three types of crisp.
- Record the initial and final water temperatures in **Table 1** below.
- Repeat the experiment once for each type of potato crisp and record these results in **Table 1** below. [2]

Table 1

Type of crisp	Mass of food/ g	Initial Temperature/ °C	Final Temperature/ °C	Rise in Temperature/ °C
1				
Repeat				
2				
Repeat				
3				
Repeat				

(ii) Calculate the rise in temperature/°C for each type of crisp. Add these results to your table. [1]

Examiner Only	
Marks	Re-mark

(b) The energy in the potato crisps can be calculated using the formula below:

$$\textbf{Energy (in Joules per gram)} = \frac{\textbf{volume of water/cm}^3 \quad \textbf{temp rise/°C} \quad \textbf{4.2}}{\textbf{mass of food/g}}$$

Use the formula above to work out the energy (in Joules per gram) for each potato crisp in the experiment.

Record these results for energy (in Joules per gram) in **Table 2** below.

Table 2

Type of crisp	Energy of potato crisp (J/g)	Average energy of potato crisp (J/g)
1		
Repeat		
2		
Repeat		
3		
Repeat		

[2]

(c) Calculate the average energy in Joules for 1 gram of each type of crisp.
Record these results in the table above. [2]

(d) What conclusions can you come to from your results about the energy (in Joules per gram) contained in the three different types of crisps used in your experiment?
Give data to support your answer.

_____

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Biology

Unit 7 Practical Skills

Booklet A

Higher Tier

[CODE]
SPECIMEN PAPER

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

To be completed in class and submitted to CCEA for marking.
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

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For Examiner's use only	
Question Number	Marks
Biology	
1	
2	
Total Marks	

The energy content of a food can be measured by heating water with a burning food sample.

Plan and carry out an experiment to compare the energy content of three types of crisp.

1 Draw a labelled diagram of the apparatus you will use.

[3]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

2 (a) (i) Weigh the three types of crisps that you will use and record their masses in **Table 1** below.

- Carry out your experiment for the three types of crisp.
- Record the initial and final water temperatures in **Table 1**.
- Repeat the experiment once for each type of crisp and record these results in **Table 1**. [2]

Table 1

Type of crisp	Mass of crisp/g	Initial Temperature/ °C	Final Temperature/ °C	Rise in Temperature/ °C
1				
Repeat				
2				
Repeat				
3				
Repeat				

(ii) Calculate the rise in temperature/°C for each type of crisp. Add these results to your table. [1]

Examiner Only	
Marks	Re-mark

(b) The energy in the crisps can be calculated using the formula below:

$$\textbf{Energy (J/g)} = \frac{\textbf{volume of water/cm}^3 \textbf{ × temperature rise/°C × 4.2}}{\textbf{mass of food/g}}$$

Use this formula to work out the energy in joules per gram (J/g) for each crisp in the experiment.

Record these results for energy in joules per gram (J/g) in **Table 2** below. [2]

Table 2

Type of crisp	Energy of crisp (J/g)	Average energy of crisp (J/g)
1		
Repeat		
2		
Repeat		
3		
Repeat		

(c) Calculate the average energy in joules for 1 gram for each type of crisp.

Record these results in the table above. [2]

(d) Explain why the different crisps have different energy contents.

_____

_____ [1]

(e) This method does **not** give very accurate values for the energy content of crisps.

Give **two** problems with the method of your experiment that may have produced results that were not very accurate.
Explain how these **two** problems may have led to inaccurate results.

Problem 1 _____

_____

_____

_____ [2]

Problem 2 _____

_____

_____

_____ [2]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Chemistry

Unit 7 Practical Skills

Booklet A

Foundation Tier

[CODE]
SPECIMEN PAPER

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

To be completed in class and submitted to CCEA for marking.
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for his paper is 15.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

For Examiner's use only	
Question Number	**Marks**
Chemistry	
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

When an alkali and an acid neutralise each other, the reaction gives out heat energy. The temperature of the reaction mixture can be measured as the acid is added to the alkali, or vice versa.

Examiner Only	
Marks	Re-mark

1 Use a measuring cylinder to measure 10 cm^3 of dilute hydrochloric acid and add this into the polystyrene cup. Dip a piece of Universal Indicator paper into the solution.

(a) What colour is observed on the Universal Indicator paper?

_____ [1]

(b) What is the pH value of the solution in the polystyrene cup?

_____ [1]

2 Take the temperature of the acid and put it into the table below against volume of sodium hydroxide added = 0 cm^3. Add 1 cm^3 of sodium hydroxide solution from the burette and stir with the thermometer. Take the temperature and put it in the table. Repeat the process until you have added 20 cm^3 of sodium hydroxide solution.

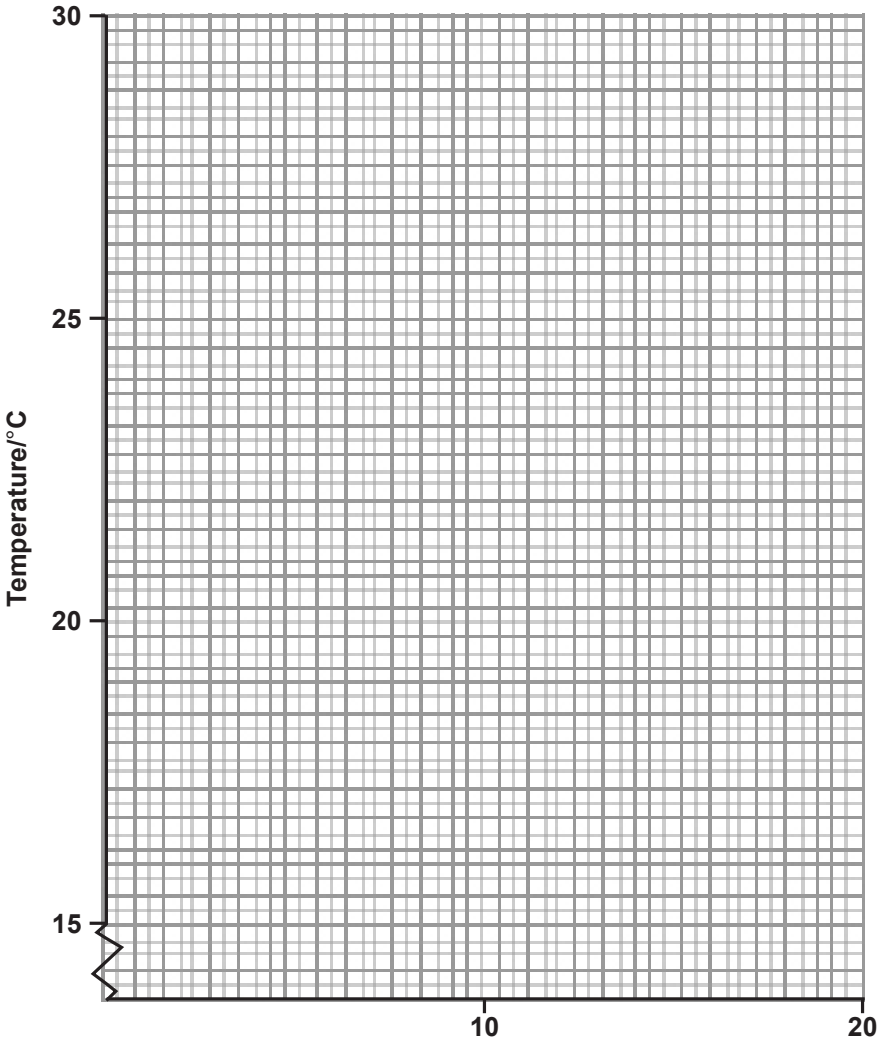
Volume of sodium hydroxide added (cm^3)	Temperature (°C)
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

[1]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

3 Use the information in your results table on the previous page to plot a graph.



[3]

4 Draw two lines of best fit, one where the temperature is increasing and the other where the temperature is decreasing, ensuring the two lines intersect. [2]

5 Use the intersect point to determine the highest possible temperature that could be obtained in this experiment.

Temperature = _____ °C [1]

6 Explain the significance of your answer to **question 5**.

_____

_____

_____

_____ [2]

7 **(a)** Suggest an improvement to the experiment which will increase accuracy.

_____

_____ [1]

(b) Explain the improvement you have suggested in **7 (a)**.

_____

_____ [1]

8 **(a)** Identify **one** risk in the experiment.

_____ [1]

(b) How would you minimise the risk identified in **8 (a)**?

_____ [1]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Chemistry

Unit 7 Practical Skills

Booklet A

Higher Tier

[CODE]
SPECIMEN PAPER

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

To be completed in class and submitted to CCEA for marking.
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for his paper is 15.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

For Examiner's use only	
Question Number	**Marks**
Chemistry	
1	
2	
3	
4	
5	
6	
7	
Total Marks	

When an alkali and an acid neutralise each other, the reaction gives out heat energy. The temperature of the reaction mixture can be measured as the acid is added to the alkali, or vice versa.

Examiner Only	
Marks	Re-mark

1 Use a measuring cylinder to measure 10 cm^3 of dilute hydrochloric acid and add this into the polystyrene cup. Dip a piece of universal indicator paper into the solution.

(a) What colour is observed on the universal indicator paper?

_____ [1]

(b) What is the pH value of the solution in the polystyrene cup?

_____ [1]

2 Take the temperature of the acid and put it into the table below against volume of sodium hydroxide added = 0 cm^3. Add 1 cm^3 of sodium hydroxide solution from the burette and stir with the thermometer. Take the temperature and put it in the table. Repeat the process until you have added 20 cm^3 of sodium hydroxide solution.

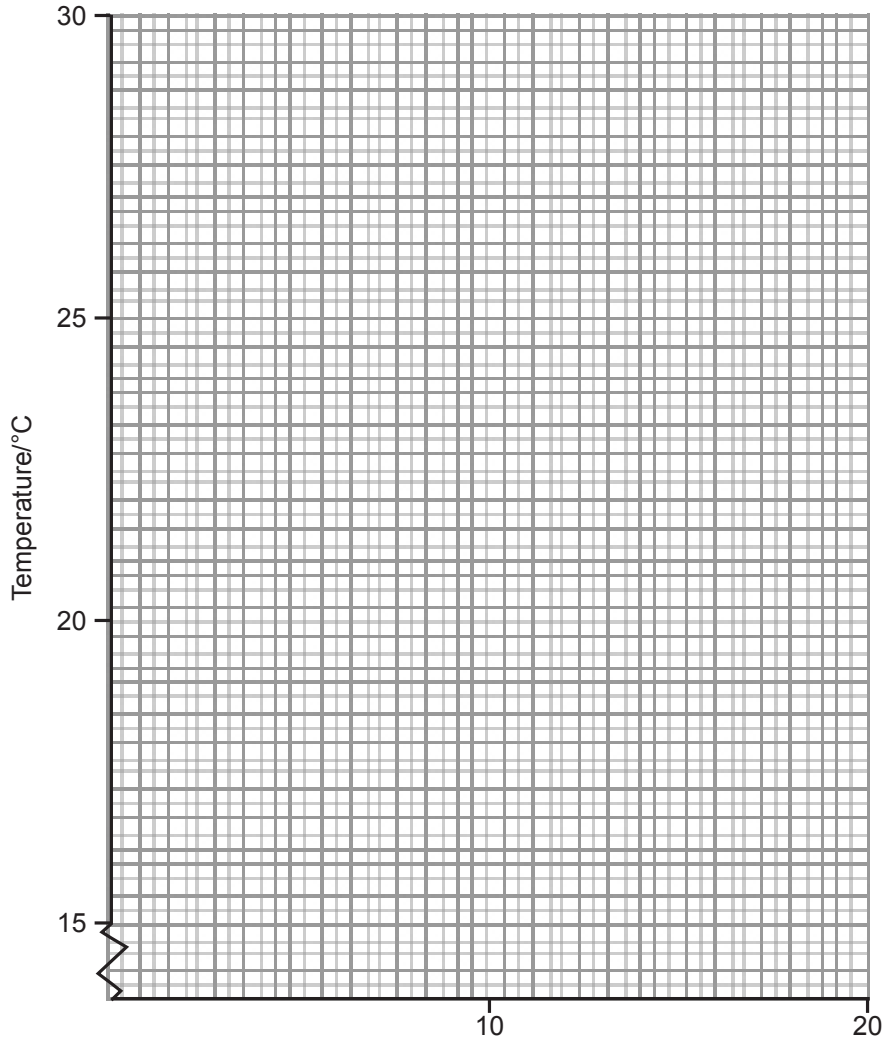
Volume of sodium hydroxide added (cm^3)	Temperature (°C)
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

[1]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

3 Use the information in your results table on the previous page to label the x-axis and plot a graph.



[4]

4 Draw two lines of best fit, one where the temperature is increasing and the other where the temperature is decreasing, ensuring the two lines intersect. [2]

5 Use the intersect point to determine the highest possible temperature that could be obtained in this experiment.

Temperature = _____ °C [1]

6 Explain the significance of your answer to **question 5**.

[2]

7 Carry out a risk assessment for the experiment.

[3]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Physics

Unit 7 Practical Skills

Booklet A

Foundation Tier

[CODE]

SPECIMEN PAPER

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

To be completed in class and submitted to CCEA for marking.
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for his paper is 15.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

For Examiner's use only	
Question Number	**Marks**
Physics	
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total Marks	

In this experiment you are going to investigate how the average speed of a tennis ball changes as the vertical height of the slope increases.

Examiner Only	
Marks	Re-mark

1 In the space below draw a labelled 2-D sketch of the apparatus setup.

Diagram of apparatus:

[2]

2 Measure the length of the slope using the metre rule provided.

Length of slope = _____ cm [1]

Position the runway so that the ball is a vertical distance of 20 cm from the desk.

3 What type of energy has the ball now more of compared to when it was sitting on the desk?

_____

_____ [1]

Examiner Only	
Marks	Re-mark

4 Release the ball and using a stop clock measure the time taken for the ball to travel the length of the slope.

Record your result in **Table 1.1** below to **2 decimal places** in the column headed (1). [1]

5 Repeat this measurement and record your new result in the column headed (2). [1]

Table 1.1

Height of slope (cm)	**Time taken to roll down the slope (s)**			**Average Speed (cm/s)**
	(1)	(2)	Average	
20				
30				
40				
50				

6 Repeat this process for slope heights of 30 cm, 40 cm and 50 cm. Record all your times in the appropriate column in **Table 1.1** to **2 decimal places.** [3]

7 Calculate an average time for each slope height using the equation:

$$\textbf{Average time} = \frac{\textbf{Time 1 + Time 2}}{\textbf{2}}$$

[2]

8 Calculate an average speed for each slope height using the equation:

$$\textbf{Average speed} = \frac{\textbf{Length of the slope}}{\textbf{Average time}}$$

[2]

9 Use data from the table on the previous page to comment on the relationship between the height of the slope and the average speed of the tennis ball.

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

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Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Physics

Unit 7 Practical Skills

Booklet A

Higher Tier

[CODE]
SPECIMEN PAPER

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

To be completed in class and submitted to CCEA for marking.
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for his paper is 15.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

For Examiner's use only	
Question Number	**Marks**
Physics	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
Total Marks	

In this experiment you are going to investigate how the average speed of a tennis ball changes as the vertical height of the slope increases.

Examiner Only	
Marks	Re-mark

1 In the space below draw a labelled 2-D sketch of the apparatus setup.

Diagram of apparatus:

[2]

2 Measure the length of the slope using the metre rule provided.

Length of slope = _____ cm [1]

Position the runway so that the ball is a vertical distance of 20 cm from the desk.

3 What type of energy has the ball gained compared to when it was sitting on the desk?

_____ [1]

4 Release the ball and using a stop clock measure the time taken for the ball to travel the length of the slope. Record your result in **Table 1.1** on the next page to 2 decimal places in the column headed (1). [1]

Examiner Only	
Marks	Re-mark

5 Repeat this measurement and record your new result in the column headed (2). [1]

Table 1.1

Height of slope (cm)	Time taken to roll down the slope (s)			Average Speed (cm/s)
	(1)	(2)	Average	
20				
30				
40				
50				

6 Repeat this process for slope heights of 30 cm, 40 cm and 50 cm.

Record all your times in the appropriate column in **Table 1.1** to **2 decimal places.** [2]

7 Calculate an average time for each slope height, and record in **Table 1.1**. [1]

8 Calculate an average speed for each slope height, and record in **Table 1.1**. [1]

Theory suggests that if the average speed was directly proportional to the height then this could be written as:

Average speed = K × height

where K is a constant.

9 Use your data for height = 20 cm to find the value of K. [2]

10 Use your data for height = 40 cm to find the value of K. [2]

11 Is the average speed **directly proportional** to the height of the slope? Explain your answer.

_____

_____ [1]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

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Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Biology

Unit 7 Practical Skills

Booklet B

Foundation Tier

[CODE]

SPECIMEN PAPER

TIME

30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 35.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **3(a)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
Total Marks	

Examiner Only	
Marks	Re-mark

1 **(a)** What is an enzyme?

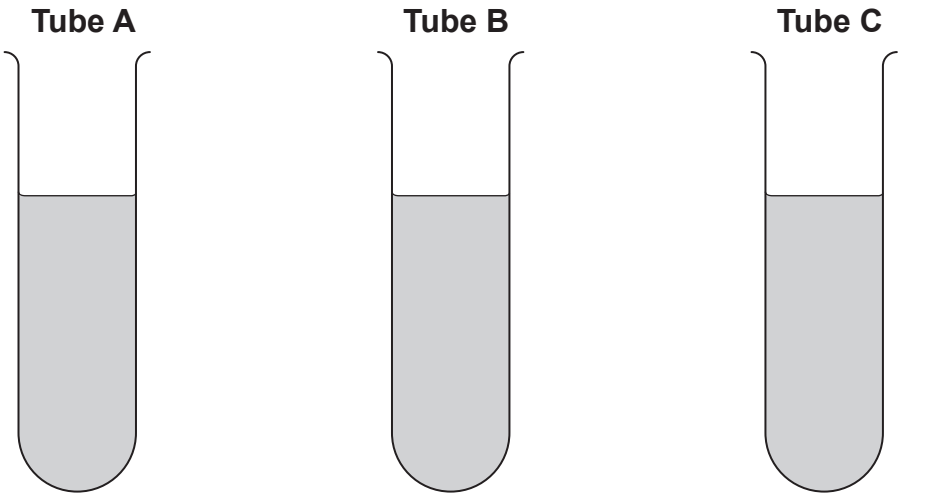
_____

_____

_____

_____ [2]

(b) The diagram below shows an investigation into the action of the enzyme amylase.



Samples were taken from each of the tubes at the start of the experiment and again after 60 minutes. The samples were tested with iodine solution.

Iodine solution is yellow-brown. It changes to blue-black in the presence of starch.

The table below shows the results of the tests on the samples.

Tube	Colour of tube contents	
	At start	**After 60 minutes**
A	Blue-black	Yellow-brown
B	Yellow-brown	Yellow-brown
C	Blue-black	Blue-black

(i) Explain why the iodine solution remained yellow-brown when added to tube **B** at the start.

_____ [1]

(ii) Explain the difference between the results for tube **A** and tube **C** after 60 minutes.

_____

_____

_____

_____

_____

_____

_____

_____ [4]

(c) Name the model that explains how enzymes work.

_____ [1]

Examiner Only	
Marks	Re-mark

2 Pulse rate varies with different types of exercise.

(a) Describe how you would carry out an investigation into the effects of **three** different types of exercise on your pulse rate.

- Include any measurements you would take and how you would take them.
- Name the types of exercise you are planning to investigate.

[4]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

(b) The table below shows the results of a pupil's resting pulse rate and the pulse rates of the same pupil after three different types of exercise.
The pupil repeated each type of exercise three times.

Type of exercise	Pulse rate/minute			Average pulse rate/minute
	1st time	2nd time	3rd time	
Resting (no exercise)	72	73	74	73
A	94	96	98	96
B	110	112	110	111
C	118	116	120	

(i) Calculate the average pulse rate for activity **C**.
Record your answer in the table above. [1]

(ii) How did the pupil make sure his results were reliable?

_____

_____ [1]

(iii) One of the types of exercise the pupil carried out was walking.

Suggest why this was most likely to be **A**.

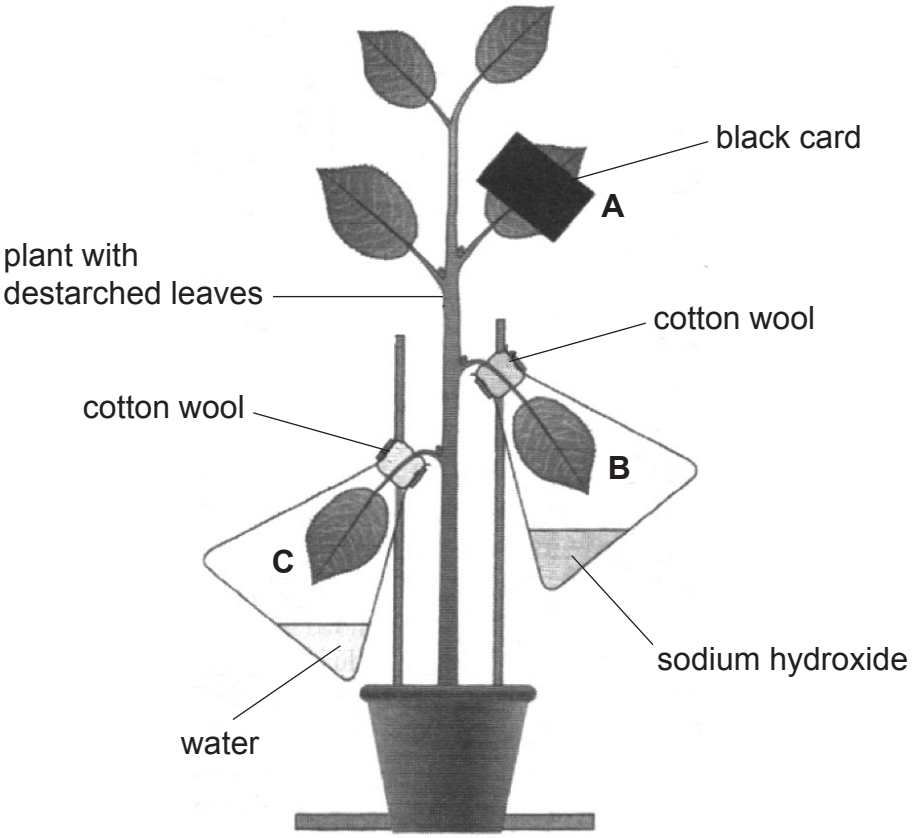
_____

_____ [1]

Examiner Only	
Marks	Re-mark

3 An experiment was carried out to investigate **two** factors needed for photosynthesis.

The plant was destarched and set up as shown in the diagram below.



'GCSE Biology for CCEA' by Rose McIlwaine and James Napier. © 2003 Rose McIlwaine and James Napier. Reproduced by permission of Hodder Education

The plant was then left in the light for two days before the starch test was carried out on leaves **A**, **B** and **C**.

Examiner Only	
Marks	Re-mark

(a) Describe how you would carry out the starch test on any one of these leaves.

Explain the reasons for carrying out **two** of the steps in the starch test.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

[6]

(b) The results for the starch test on leaf **B** and leaf **C** will be different. Give and explain the result for leaf **B**.

[2]

Examiner Only	
Marks	Re-mark

4 **(a)** The photographs below show two different types of grassland that are open and not shaded.

Grassland A

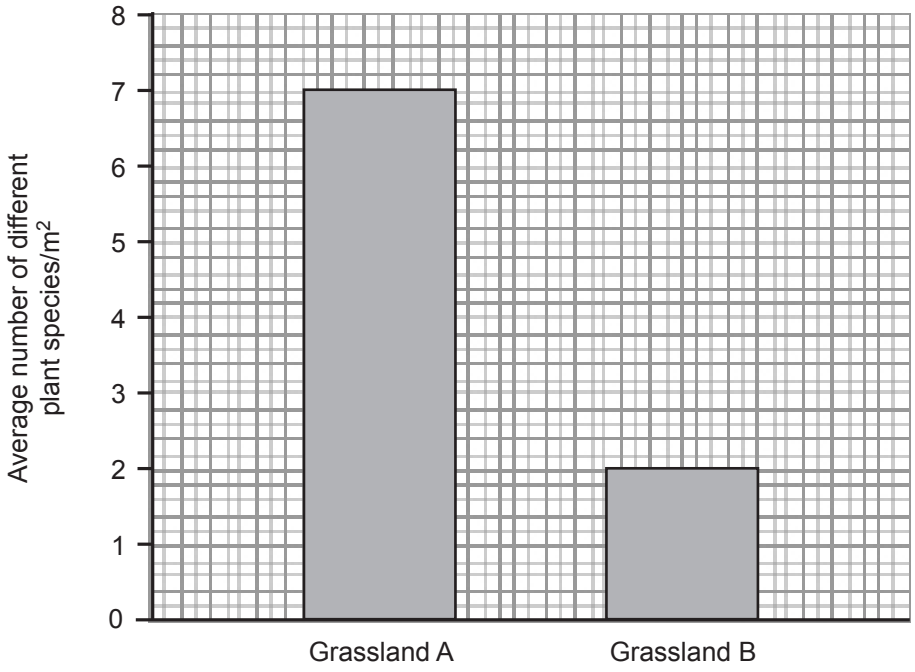
Grassland B

(i) A group of pupils each estimated the number of different plant species in 1 m^2 areas of each grassland and recorded their results.

Name the apparatus they would have used.

_____ [1]

The bar chart below shows the results they obtained.



(ii) Use the results shown on the bar chart to describe why Grassland A has a higher biodiversity.

_____

_____ [1]

(iii) Suggest **two** environmental factors that could account for the difference in the results between the two grasslands.

1. _____

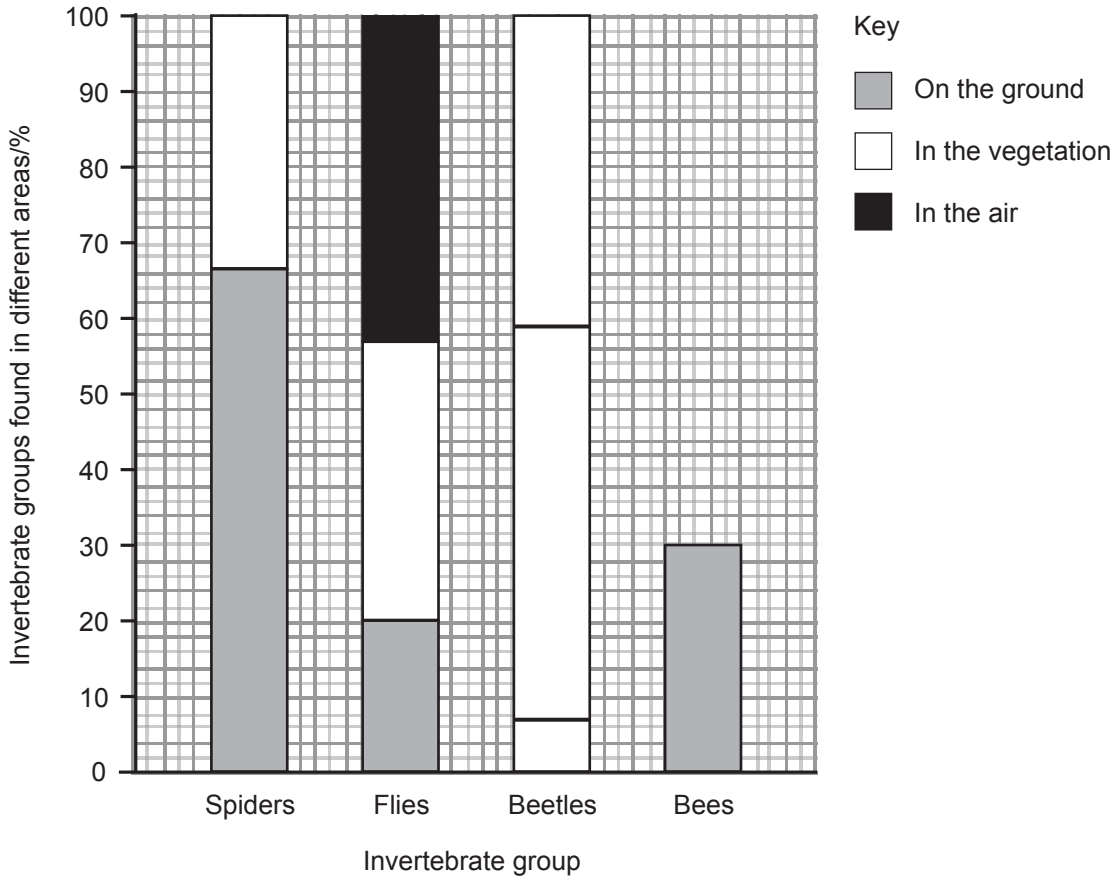
2. _____ [2]

Examiner Only	
Marks	Re-mark

(b) The table below shows the percentage of different invertebrate groups present on the ground, in the vegetation and in the air above the vegetation in Grassland A.

Area where found	Invertebrate group/%			
	Spiders	**Flies**	**Beetles**	**Bees**
On the ground	67	20	7	30
In the vegetation	33	37	52	26
In the air	0	43	41	44
Total	100	100	100	100

Some of these figures were plotted on the bar chart below.



Examiner Only

Marks	Re-mark

(i) Shade the bar chart for the beetles using the key. [1]

(ii) Use the figures in the table on the previous page to complete the bar chart to show the results in the vegetation and in the air for the bees. Use the correct shading. [2]

(iii) Use the bar chart to state which invertebrate group (spiders, flies, beetles or bees) cannot fly.

_____ [1]

Yellowhammers are small birds found mostly in the east of Northern Ireland.
The yellowhammer chicks feed on insects, while the adult birds feed on barley and wheat seeds.

Grassland A was planted with a wheat crop for three years and the numbers of yellowhammers counted.

In the fourth year the wheat crop was again planted but then sprayed with an insecticide (a chemical that kills insects).

(c) Describe and explain the impact that this spraying would have on the population of the yellowhammers.

_____

_____

_____

_____

_____

_____

_____

_____ [4]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Biology

Unit 7 Practical Skills

Booklet B

Higher Tier

[CODE]

SPECIMEN PAPER

TIME

30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 35.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **3(e)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
Total Marks	

Examiner Only	
Marks	Re-mark

1 The photographs below show two different types of grassland that are open and not shaded.

Grassland A

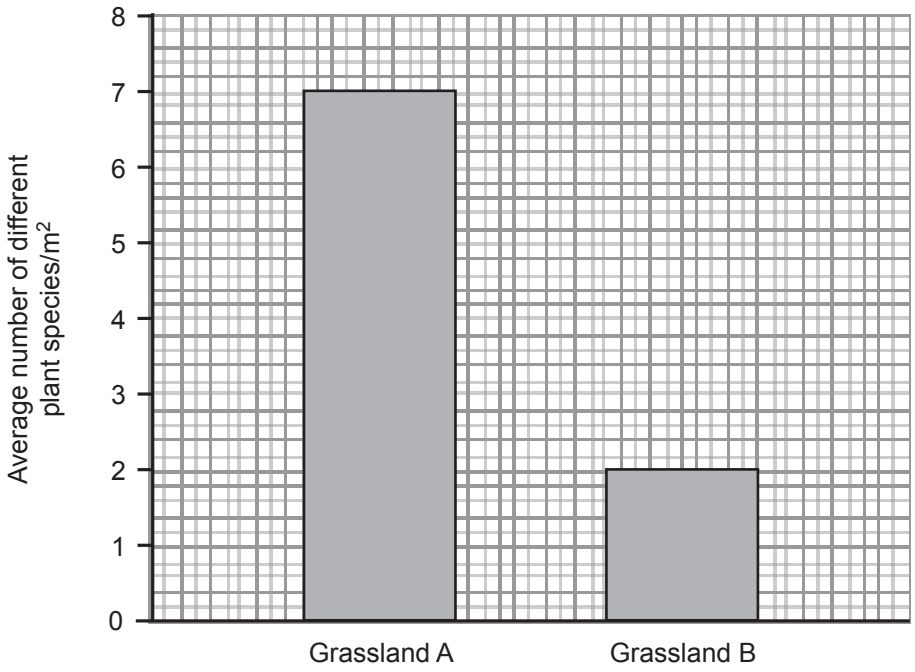
Grassland B

(a) (i) A group of pupils each estimated the number of different plant species in 1 m^2 areas in each grassland and recorded their results.

Name the apparatus they would have used.

_____ [1]

The bar chart below shows the results they obtained.



(ii) Use the results shown on the bar chart on the previous page to describe why Grassland A has a higher biodiversity.

_____

_____ [1]

(iii) Suggest **two** environmental factors that could account for the difference in the results between the two grasslands.

1. _____

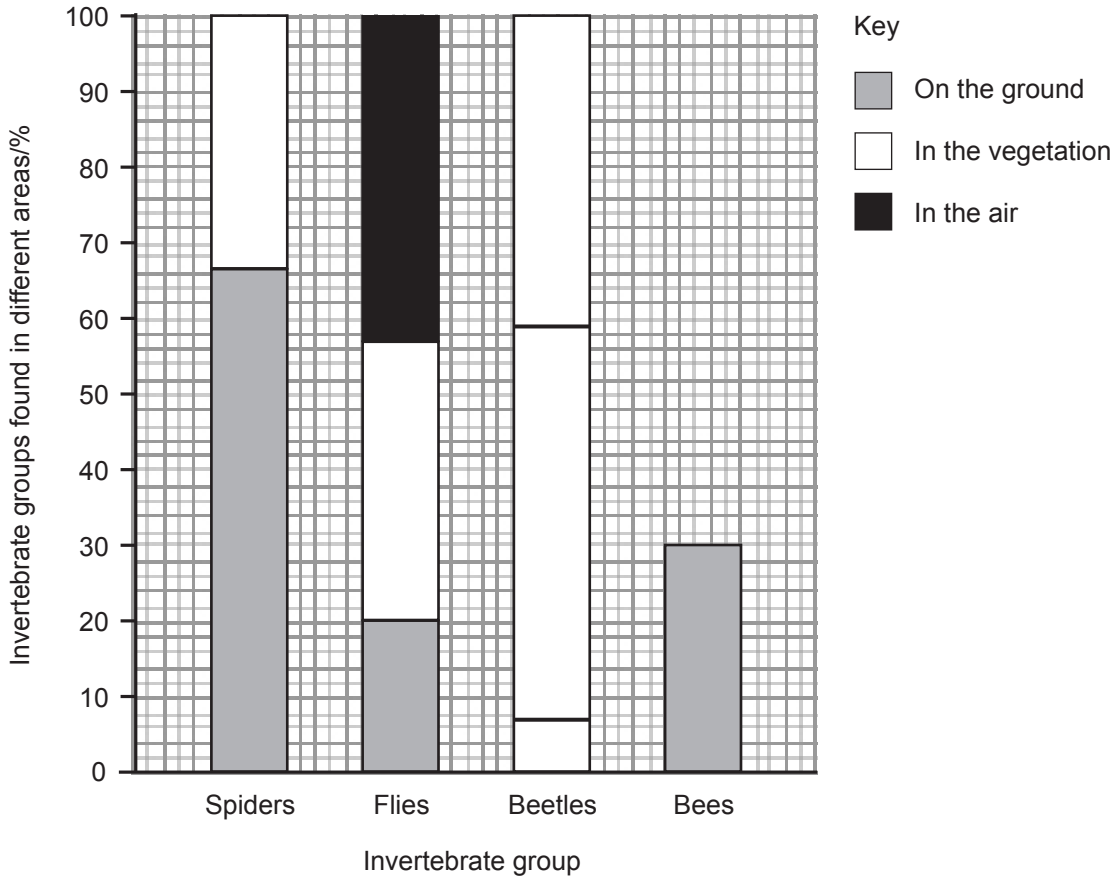
2. _____ [2]

Examiner Only	
Marks	Re-mark

(b) The table below shows the percentage of different invertebrate groups present on the ground, in the vegetation and in the air above the vegetation in Grassland A.

Area where found	Invertebrate group/%			
	Spiders	**Flies**	**Beetles**	**Bees**
On the ground	67	20	7	30
In the vegetation	33	37	52	26
In the air	0	43	41	44
Total	100	100	100	100

Some of these figures were plotted on the bar chart below.



Examiner Only

Marks	Re-mark

(i) Shade in the graph on the previous page for the beetles using the key. [1]

(ii) Use the figures in the table on the previous page to complete the bar chart to show the results in the vegetation and in the air for the bees. Use the correct shading. [2]

(iii) Use the bar chart to state which invertebrate group (spiders, flies, beetles or bees) cannot fly.

_____ [1]

Yellowhammers are small birds found mostly in the east of Northern Ireland.
The yellowhammer chicks feed on insects, while the adult birds feed on barley and wheat seeds.

Grassland A was planted with a wheat crop for three years and the numbers of yellowhammers counted.

In the fourth year the wheat crop was again planted but then sprayed with an insecticide (a chemical that kills insects).

(c) Describe and explain the impact that this spraying would have on the population of the yellowhammers.

_____

_____

_____

_____

_____

_____

_____ [4]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

2 The information on a container of washing powder. It stated that it contained a protease enzyme to break down stains on clothes caused by proteins, e.g. milk proteins.

An experiment was planned to investigate the effect of the concentration of protease enzyme on the time it took this enzyme to break down the protein in milk.

When milk protein is digested the milk changes from white to clear.

(a) State a hypothesis for this experiment.
Use your biological knowledge to explain why you think this may happen.

_____

_____

_____

_____

_____

_____

_____ [2]

The experiment was carried out.

5 cm^3 of milk were added to several test tubes followed by 0.5 cm^3 of one of the different enzyme concentration solutions. Immediately after the enzyme solution was added to the milk in each test tube the stopclock was started and the time it took for the milk solutions to go clear was recorded.

The experiment was carried out three times at each enzyme concentration. The results are shown in the table below.

Enzyme concentration/ %	Time taken for milk to go clear/s			Average time taken for milk to go clear/s
	Experiment			
	1	2	3	
0	0	0	0	0
20	650	626	642	639
40	498	528	497	508
60	326	315	337	326
80	283	254	255	264
100	264	276	252	264

(b) Are there any anomalies in these results?
Explain your answer.

_____

_____

_____ [2]

(c) Do the trends in the results agree with your hypothesis?
Explain your answer using data from the table and your knowledge of enzyme activity.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [4]

(d) Suggest **two** other factors (apart from those mentioned in **part 2 (a)**) that should have been kept constant when carrying out his experiment.

_____

_____

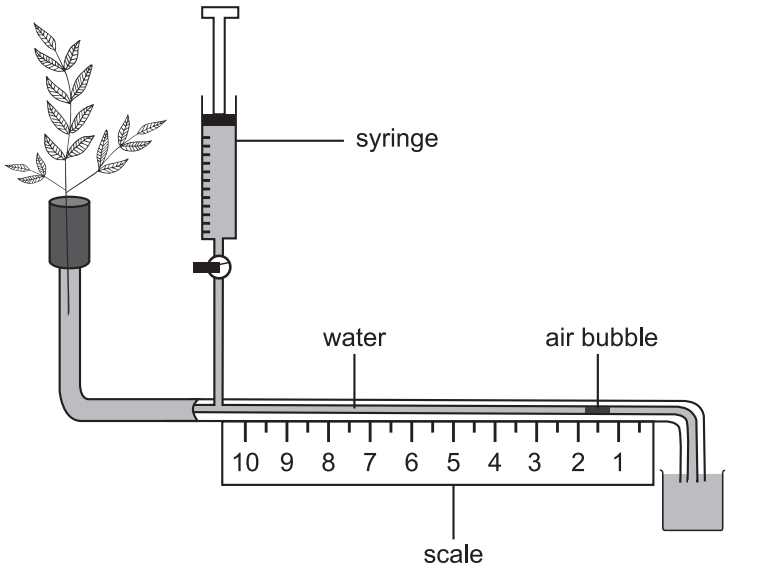
_____

_____ [2]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

3 **(a)** The diagram below shows apparatus used to investigate the rate of transpiration in a plant shoot in different environmental conditions.



(i) Name the apparatus.

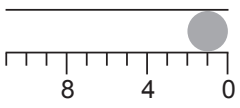
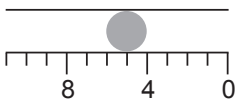
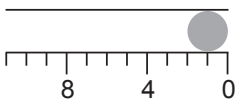
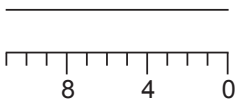
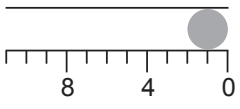
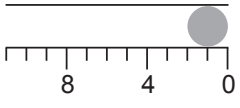
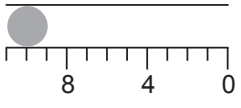
_____ [1]

(ii) How is the bubble reset to zero between experiments?

_____

_____ [1]

(b) The table below shows the distance moved by the air bubble under different environmental conditions over **30 minutes**.

Experiment	Environmental condition			Position of bubble at the start	Position of bubble at the end	Distance moved by bubble/mm
	Fan speed on/off	Temperature /°C	Humidity low/high			
1	off	20	low			4
2	on	20	low			6
3	off	30	low			
4	on	30	low			9

Complete the table above by:

(i) drawing in the position of the air bubble at the end of Experiment 2. [1]

(ii) calculating the distance moved by the air bubble in Experiment 3. [1]

(c) What is the **rate** of transpiration in Experiment 1 in mm **per hour?**

_____ mm per hour [1]

(d) **(i)** The distance moved by the air bubble in Experiment 1 was 4 mm. The distance moved by the air bubble in Experiment 2 was 6 mm.

Give the environmental condition that caused this increase.

_____ [1]

(ii) Experiment 1 was repeated with high humidity. What would you expect to happen to the distance moved by the bubble?

_____ [1]

Examiner Only	
Marks	Re-mark

(e) The distances moved by the air bubbles in Experiments 1 and 4 are different.

Describe and explain what happened inside and around the leaf to bring about the difference in Experiment 4.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Re-mark

THIS IS THE END OF THE QUESTION PAPER

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Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Chemistry

Unit 7 Practical Skills

Booklet B

Foundation Tier

[CODE]

SPECIMEN PAPER

TIME

30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 35.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet including a Periodic Table of the elements is provided.
Quality of written communication will be assessed in Question **3**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
Total Marks	

Examiner Only	
Marks	Re-mark

1 Hydrated nickel(II) sulfate, $NiSO_4.xH_2O$, was placed in an evaporating basin and heated to constant mass.

(a) Explain what is meant by the term **heated to constant mass**.

_____

_____

_____ [2]

(b) The following mass measurements were obtained during the experiment.

Mass of evaporating basin = 45.12 g
Mass of evaporating basin and hydrated nickel(II) sulfate = 50.38 g
Mass of evaporating basin and contents after heating to constant mass = 48.22 g

(i) Calculate the mass of the hydrated nickel sulfate used in the experiment.

_____ g [1]

(ii) Calculate the mass of the water lost from the compound.

_____ g [1]

(c) Anhydrous copper(II) sulfate can be used to test for water. State the colour change that would be obtained.

_____ to _____ [2]

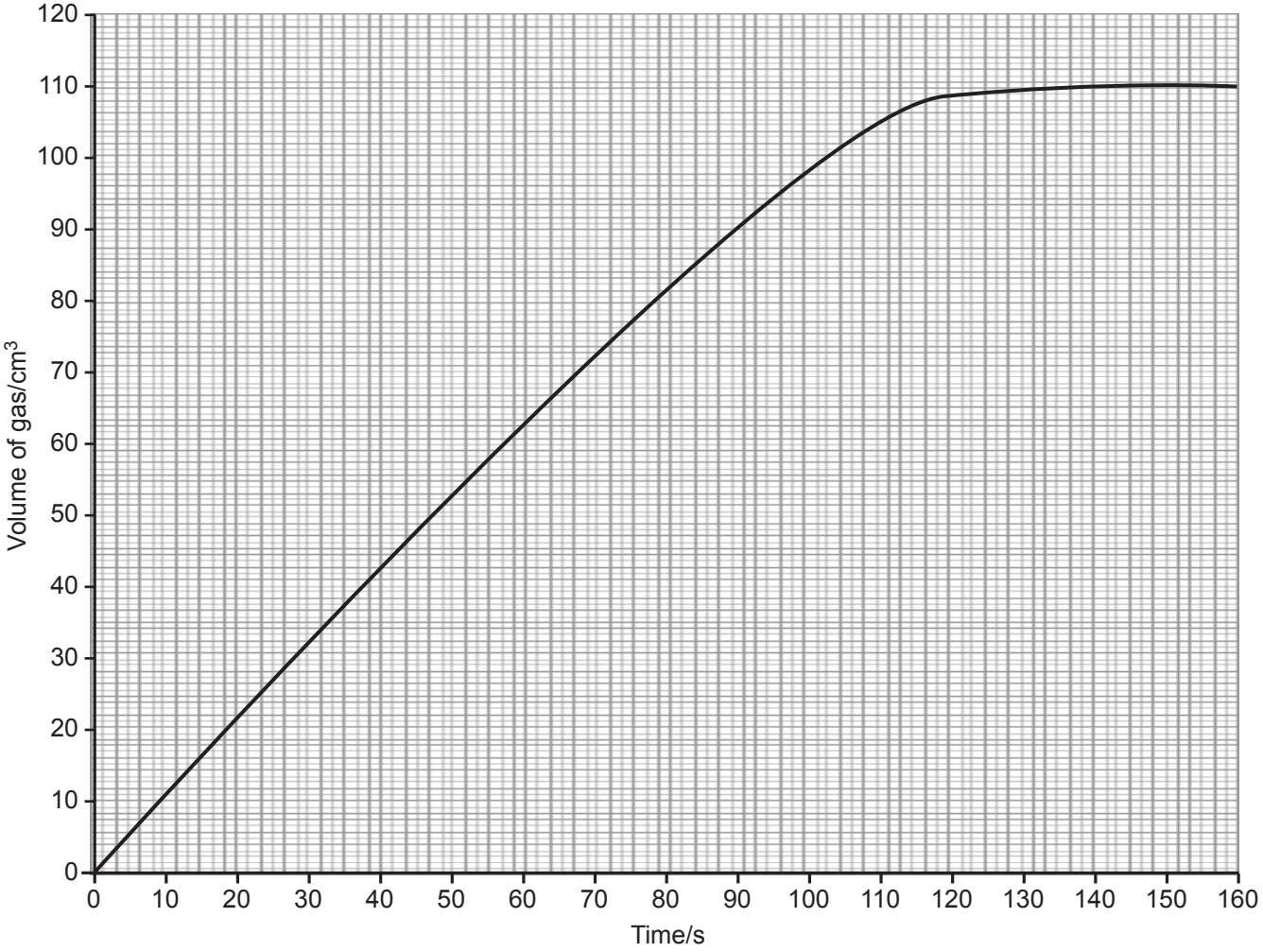
2 In an experiment to investigate the rate of a reaction, a piece of magnesium ribbon was reacted with an excess of dilute hydrochloric acid at **room temperature** (20 °C). The volume of hydrogen gas produced during the reaction was measured at 20 second intervals.

(a) Draw a labelled diagram of the apparatus used to carry out this experiment.

[5]

Examiner Only	
Marks	Re-mark

(b) The results obtained were plotted on a graph which is shown below.



Examiner Only	
Marks	Re-mark

(i) At what time did the reaction stop?

_____ [1]

(ii) Explain why the last part of the graph is horizontal.

_____

_____ [1]

(c) The experiment was repeated under identical conditions except that the temperature of the dilute hydrochloric acid was 50 °C.

Sketch a curve on the same grid showing how the volume of gas produced would change with time at this new temperature. **Label** this **curve A**.

[2]

(d) The salt produced in the reaction, magnesium chloride, is used as a catalyst for the polymerisation of ethene.

What is meant by the term **catalyst**?

_____

_____

_____ [3]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

3 A student is given three gas jars labelled A, B and C and told that one contains nitrogen, one contains carbon dioxide and one contains oxygen. The student does not know which gas jar contains which gas.

Give two similarities between the three gases and describe how, using tests for gases, you would work out which gas jar contains nitrogen. Additional gas jars containing gases A, B and C are available as needed.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

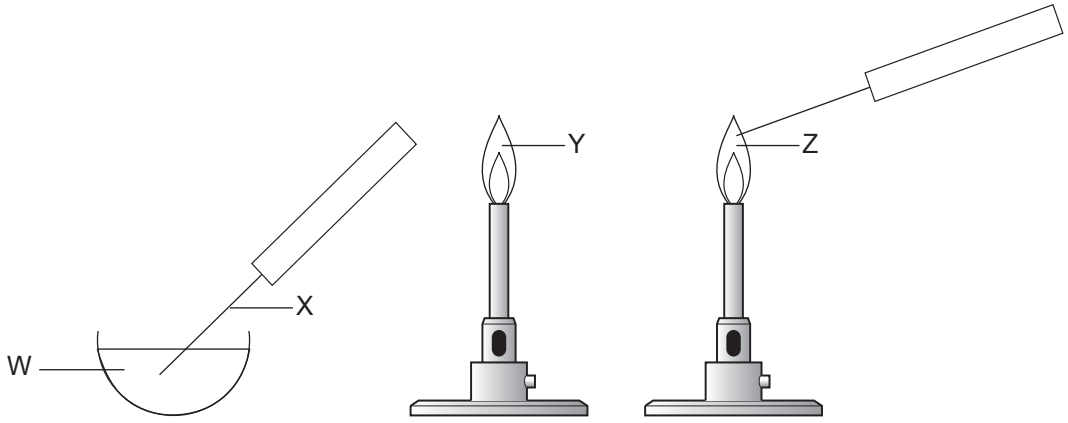
[6]

Examiner Only	
Marks	Re-mark

4 The presence of copper(II) ions in copper(II) chloride can be shown using a flame test.

(i) The diagram below shows the equipment needed for the test.

Identify the acid W, the metal wire X, the colour Y of the flame before the test and the colour Z during the test.



W _____ [1]

X _____ [1]

Y _____ [1]

Z _____ [1]

(ii) Give **two** reasons for using W.

_____

_____ [2]

Examiner Only	
Marks	Re-mark

5 Sodium and potassium are Group 1 metals which react with water.

(a) Complete the table below indicating the observations made when each metal is separately added to water with a tick (✓).

Observation	Sodium	Potassium
Burns with an orange flame		
Burns with a lilac flame		
Turns into a ball		

[3]

(b) **(i)** Universal indicator was added to the water at the end of the reactions for both metals. In both cases the universal indicator turned purple.

Suggest the reason for this.

_____

_____ [1]

(ii) The reaction was repeated in a test tube with a tiny piece of sodium. The gas formed was tested with a lighted splint and a squeaky pop was heard.

Identify the gas.

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

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Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Chemistry

Unit 7 Practical Skills

Booklet B

Higher Tier

[CODE]

SPECIMEN PAPER

TIME

30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 35.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet including a Periodic Table of the elements is provided.
Quality of written communication will be assessed in Question **3**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
Total Marks	

Examiner Only	
Marks	Re-mark

1 Hydrated nickel(II) sulfate, $NiSO_4.xH_2O$, was placed in an evaporating basin and heated to constant mass.

(a) Explain what is meant by the term **heated to constant mass**.

_____

_____

_____ [2]

(b) The following mass measurements were obtained during the experiment.

Mass of evaporating basin = 45.12 g
Mass of evaporating basin and hydrated nickel(II) sulfate = 50.38 g
Mass of evaporating basin and contents after heating to constant mass = 48.22 g

(i) Calculate the mass of the hydrated nickel(II) sulfate used in the experiment.

_____ g [1]

(ii) Calculate the mass of the water lost from the compound.

_____ g [1]

(iii) Hence deduce the mass of the anhydrous nickel(II) sulfate.

_____ g [1]

Examiner Only	
Marks	Re-mark

(c) A student carries out a similar experiment to find the formula of hydrated magnesium sulfate, $MgSO_4.xH_2O$. The results are shown below, along with the beginning of the calculations:

	magnesium sulfate ($MgSO_4$)	**water (H_2O)**
mass (g)	3.09	3.24
relative Formula Mass (M_r)		18
number of moles		
mole ratio		

(i) Calculate the Relative Formula Mass (M_r) of the $MgSO_4$ and insert it into the table.
(Relative atomic mass: Mg = 24, 5 = 23, 0 = 16) [1]

(ii) Using the mass and the M_r of each compound, calculate the number of moles of each in the sample, and fill the relevant gaps in the table. [2]

(iii) Hence calculate the mole ratio and complete the table. [1]

(iv) What is the formula of the hydrated magnesium sulfate?

_____ [1]

(d) Anhydrous copper(II) sulfate can be used to test for water.

State the colour change that would be obtained

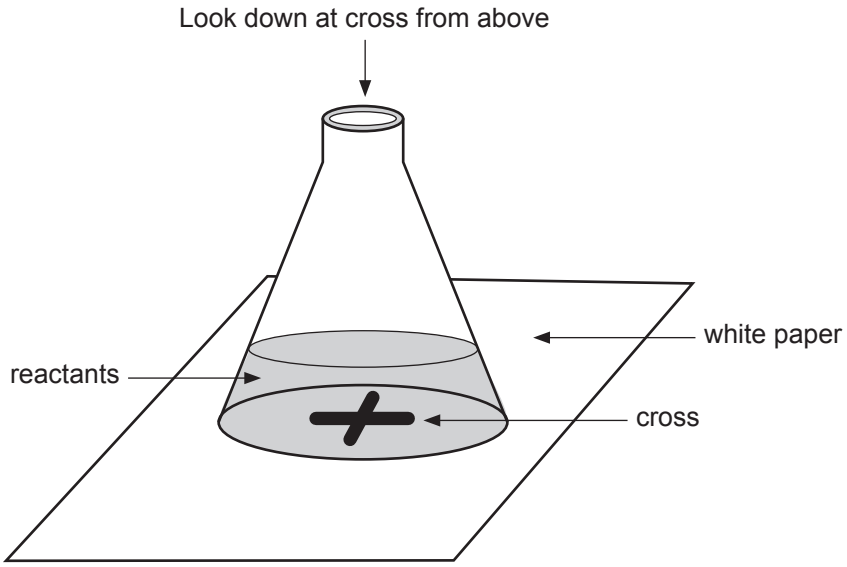
_____ to _____ . [2]

Examiner Only	
Marks	Re-mark

2 Sodium thiosulfate solution $Na_2S_2O_3(aq)$ reacts with dilute hydrochloric acid according to the equation:

$$Na_2S_2O_3(aq) + 2HCl(aq) \rightarrow 2NaCl(aq) + S(s) + SO_2(g) + H_2O(l)$$

The diagram below shows the apparatus used to investigate the effect of changing the concentration of sodium thiosulfate on the rate of this reaction.



A precipitate is produced which causes the solution to become cloudy. The rate of this reaction can be investigated by timing how long it takes for the cross drawn on the white paper to disappear from view.

(a) Which product causes the solution to become cloudy?

_____ [1]

(b) A series of experiments carried out to investigate the effect of concentration of sodium thiosulfate solution on the rate of reaction produced the following results:

Experiment	Concentration of sodium thiosulfate solution/mol/dm^3	Time taken for the cross to disappear/s	Rate of reaction/s^{-1} $\left(\frac{1}{\text{time}}\right)$
1	0.4	105	0.0095
2	0.8	79	0.0127
3	1.2	54	0.0185
4	1.6	32	

(i) State **two** precautions which should be taken to ensure a fair test.

_____

_____

_____

_____ [2]

(ii) Calculate the rate of reaction for experiment 4 and insert the value into the results table on the previous page.

[1]

(iii) From the results of the experiments, state the effect of increasing the concentration of sodium thiosulfate solution on the rate of the reaction.

_____

_____ [1]

(iv) Name **two** other factors apart from concentration of sodium thiosulfate solution that will affect the rate of **this** reaction.

1. _____

2. _____ [2]

Examiner Only	
Marks	Re-mark

3 A student is given three gas jars labelled A, B and C and told that one contains nitrogen, one contains carbon dioxide and one contains oxygen. The student does not know which gas jar contains which gas.

Give two similarities between the three gases and describe how, using tests for gases, you would work out which gas jar contains nitrogen. Additional gas jars containing gases A, B and C are available as needed.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

4 Two unlabelled powders, believed to be copper(II) chloride and lithium chloride, are left in a laboratory. A student carries out a flame test using a sample of each powder.

(a) Outline the procedure for cleaning the nichrome wire.
Include the name of the acid used.

_____

_____

_____

_____

_____

_____ [4]

(b) State the colours observed with each sample:

copper(II) chloride _____

lithium chloride _____ [2]

5 Sodium and potassium are Group 1 metals which react with water.

Examiner Only	
Marks	Re-mark

(a) Describe **two** similarities between the reactions.

_____

_____

_____

_____ [2]

(b) Describe **two** differences between the reactions.

_____

_____

_____

_____ [2]

THIS IS THE END OF THE QUESTION PAPER

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Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Physics

Unit 7 Practical Skills

Booklet B

Foundation Tier

[CODE]

SPECIMEN PAPER

TIME

30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 35.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **1**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
Total Marks	

Examiner Only	
Marks	Re-mark

1 A student decides to measure Personal Power by climbing a vertical rope as shown in **Figure 1.1**

© takoburito/iStock/Thinkstock

Figure 1.1

In the space below detail the method that the student could follow.

Your response should include:

- Any apparatus required;
- Measurements to be taken;
- Any used equations; and
- One safety precaution.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

2 An investigation was carried out to determine how the speed of a marble rolling down a slope changes as the height of the slope varies.

(a) Identify the **independent** and **dependent** variables in this investigation.

Independent variable is _____

Dependent variable is _____

[2]

(b) State **two** measurements which would need to be made in this investigation and list suitable pieces of apparatus which could be used in order to make the measurements.

Measurement 1 _____

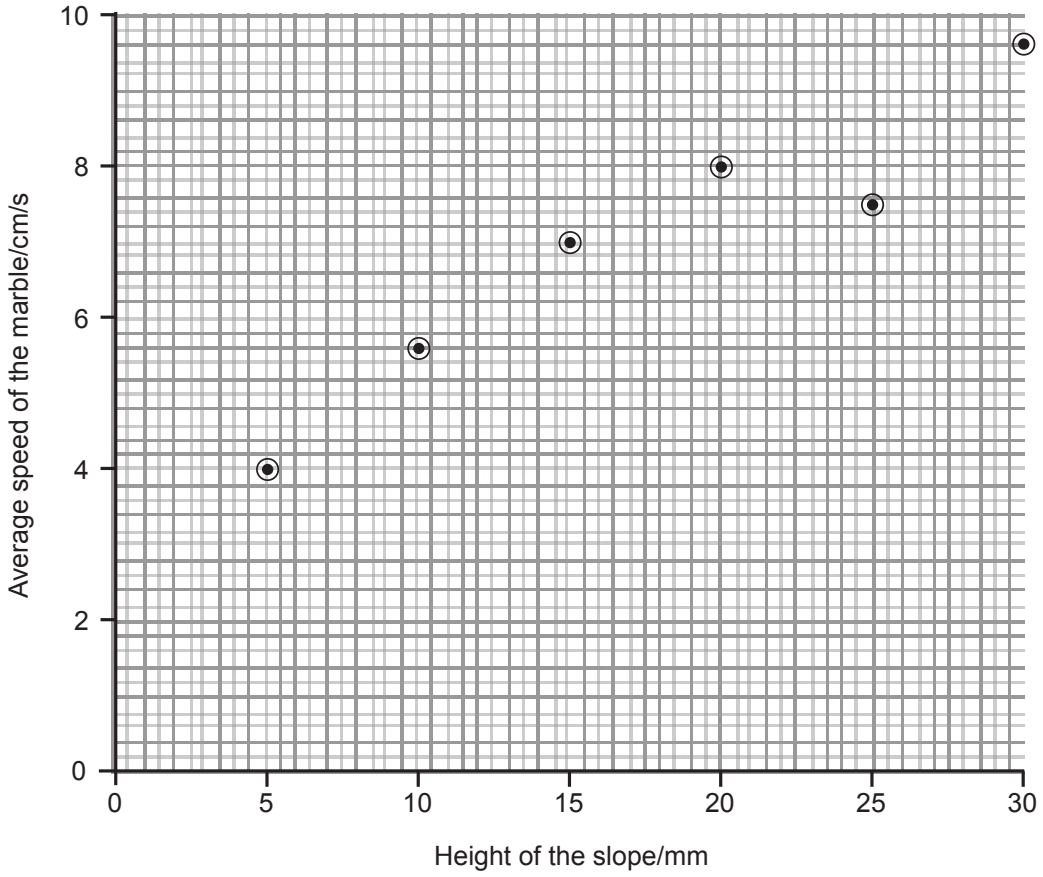
using _____ [2]

Measurement 2 _____

using _____ [2]

Tom uses his results to plot **Graph 2**.

Graph 2



Examiner Only	
Marks	Re-mark

(c) Draw a line of best fit on Graph 2 above. [1]

(d) What do the findings of this investigation tell you about how the height of the slope affects the average speed of the marble?

_____

_____ [1]

(e) Identify the anomalous result shown on Graph 2.
Explain why this result is anomalous.

_____

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Re-mark

3 A student carries out an investigation into the relationship between the current flowing in a metal wire and the voltage across it using the circuit diagram shown in **Figure 3.1** below.

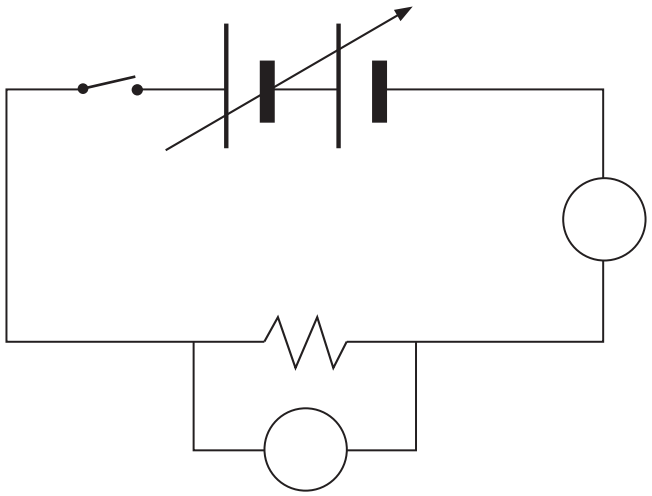


Figure 3.1

(a) On Figure 3.1 label the **variable power supply** and the **switch**. [1]

(b) Insert an **A** for the ammeter and a **V** for the voltmeter into Figure 3.1 [2]

A graph obtained from the results is shown below in Figure 3.2

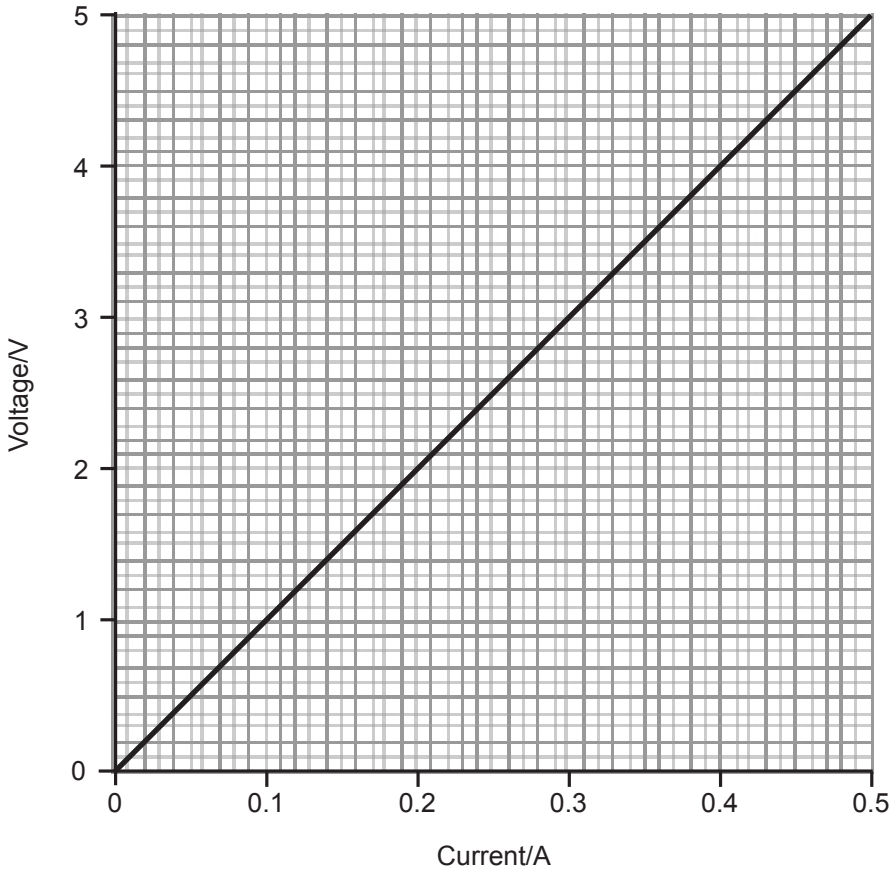


Figure 3.2

(c) What does this graph show about the relationship between current and voltage for this metal wire?

_____

_____ [1]

(d) What was the voltage across the wire when the current through it was 0.4 A?

Voltage = _____ V [1]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

4 This questions deals with the **refraction** of light as it travels into a glass block.

(a) On **Figure 4.1** below label:

- the **normal**
- the angle of incidence **i**
- the angle of refraction **r** [3]

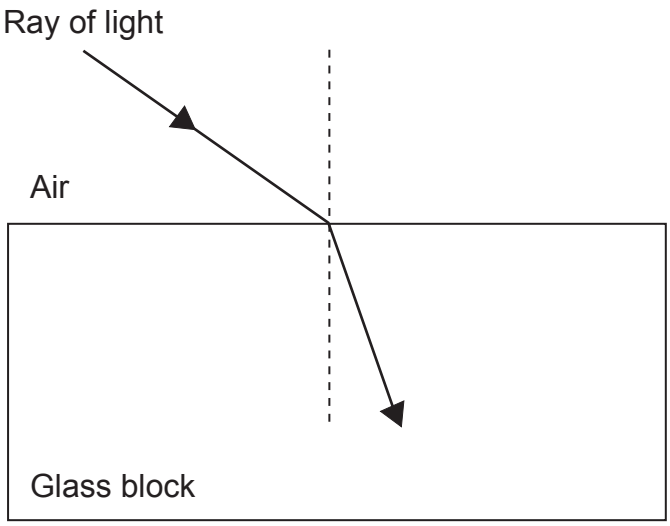


Figure 4.1

(b) What is the name of the piece of apparatus which would be required to measure the angles of incidence and refraction in this investigation?

_____ [1]

(c) What happens to the speed of light as it enters the glass block?

_____ [1]

Table 4.1 below contains results for the angles of incidence and refraction.

Angle of incidence i/°	Angle of refraction r/°
60	35
50	30
40	25
30	19
20	13

Table 4.1

You are going to use the values from **Table 4.1** on the previous page to plot a graph of **i** against **r**.

Examiner Only	
Marks	Re-mark

(d) (i) Label the vertical axis and choose an appropriate scale. [2]

(ii) Label the horizontal axis and choose an appropriate scale. [2]

(iii) Using the values from **Table 4.1** on the previous page, plot the points on **Figure 4.2** below. [4]

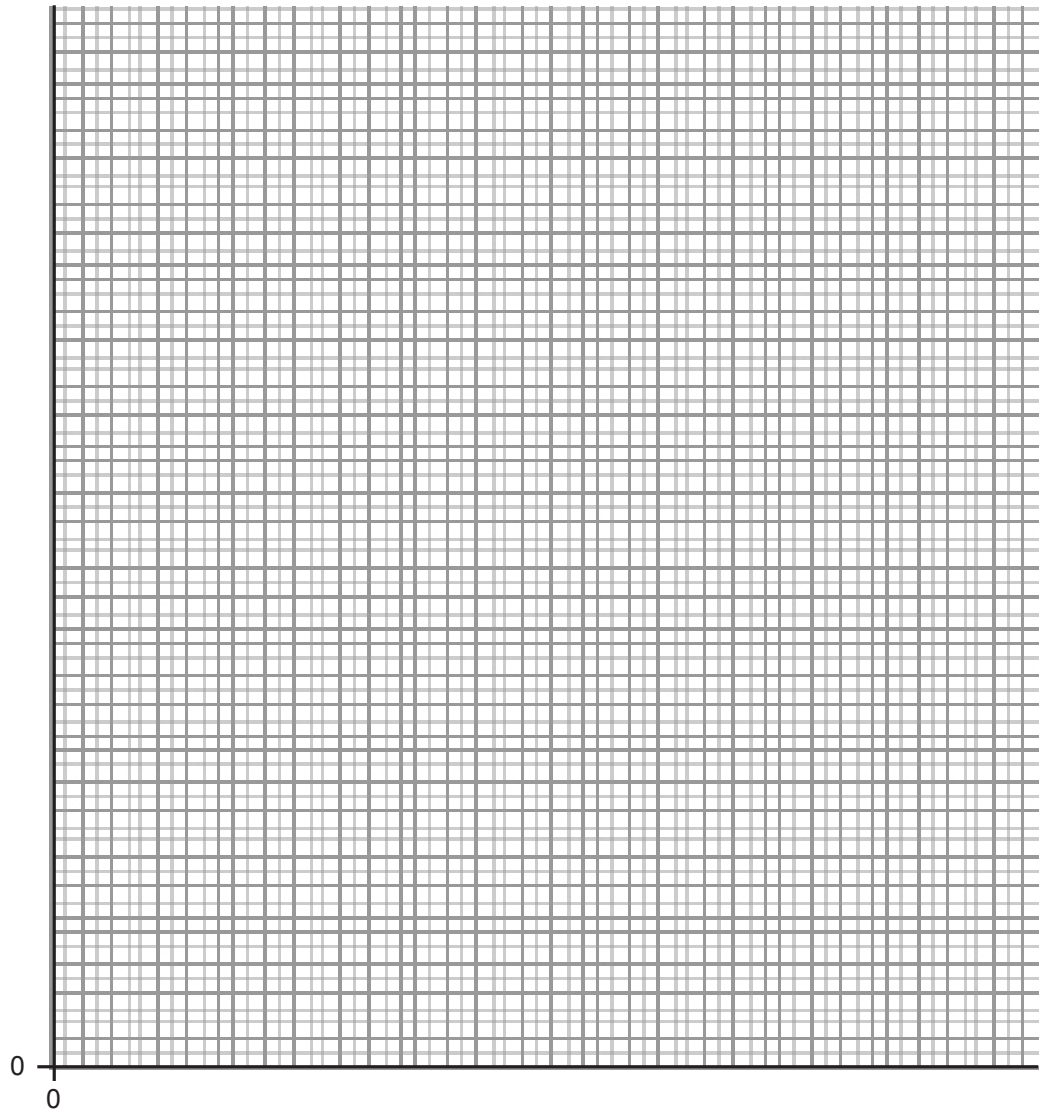


Figure 4.2

(e) Draw a line of best fit. [1]

THIS IS THE END OF THE QUESTION PAPER

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science
Physics

Unit 7 Practical Skills

Booklet B

Higher Tier

[CODE]

SPECIMEN PAPER

TIME

30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 35.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **1**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
Total Marks	

Examiner Only	
Marks	Re-mark

1 A student decides to measure Personal Power by climbing a vertical rope as shown in **Figure 1.1**

© takoburito/iStock/Thinkstock

Figure 1.1

In the space below detail the method that the student could follow.

Your response should include:

- Any apparatus required;
- Measurements to be taken;
- Any used equations; and
- One safety precaution.

In this question you will be assessed on the quality of your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

2 The apparatus shown below was set up. It is used to discover how the length of the spring changes as the force stretching it is increased. This force is changed by adding 100 g masses to a length of string attached to the spring.

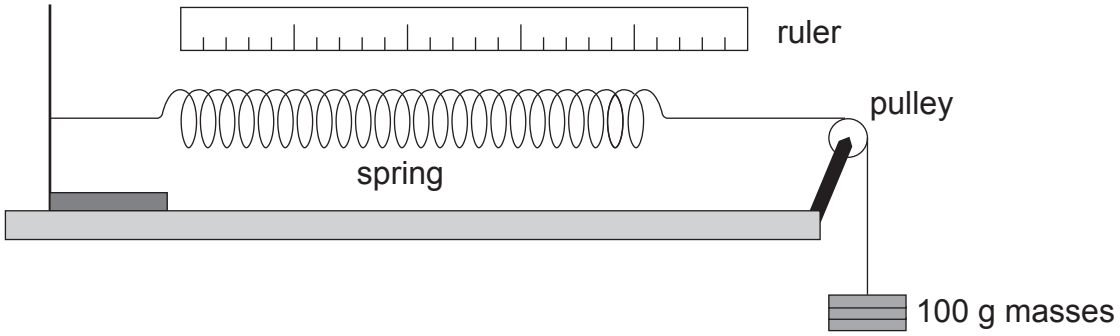


Figure 2.1 below shows some of the results.

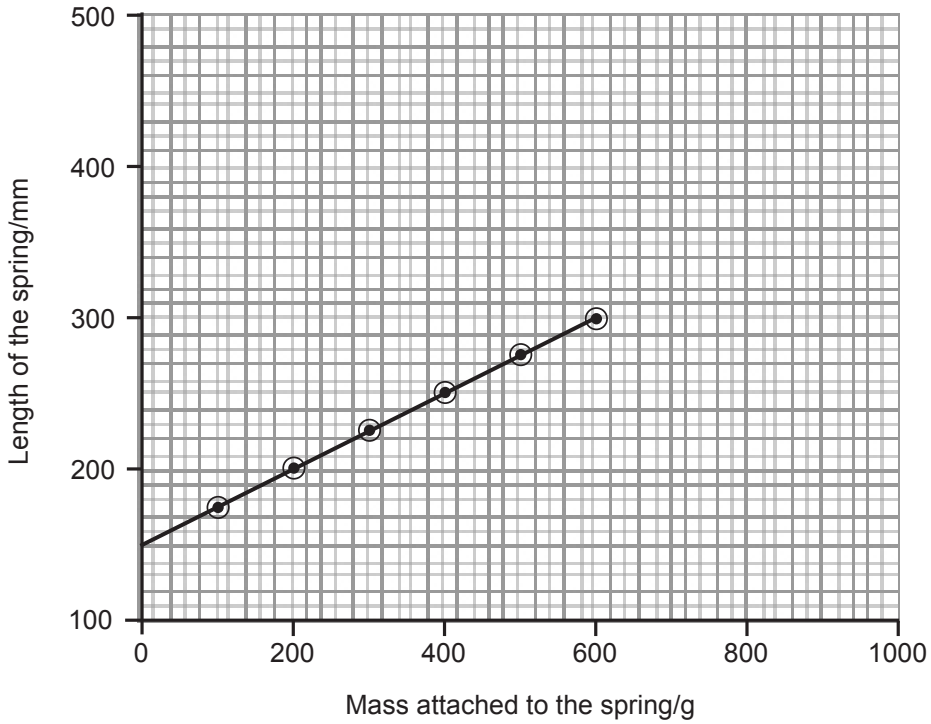


Figure 2.1

(a) With reference to **Figure 2.1**, explain why the length of the spring is not directly proportional to the mass attached to it.

_____ [1]

(b) Use **Figure 2.1** on the previous page to find the extension of the spring for each 100 g mass added.

Extension for each 100 g mass = _____ mm [1]

(c) Calculate the gradient of the graph. Remember to include an appropriate unit.

Gradient = _____

Unit = _____ [3]

(d) It was discovered that the spring obeys Hooke's law for masses up to a **maximum** of 800 g.

On **Figure 2.1**, continue the graph to show its shape up to 800 g and from 800 g to 1000 g. [2]

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

3 A student wants to investigate how the current through a metal wire changes as the voltage varies across the wire.

(a) Identify the **independent** and **dependent** variables in this investigation.

Independent variable is _____

Dependent variable is _____ [2]

(b) In the space below draw a labelled sketch of the circuit diagram required for this investigation.

[4]

(c) Explain why it is important to control all the other variables and state one of these control variables.

_____

_____

_____

_____ [2]

(d) On **Figure 3.1** below sketch the shape of graph the student would expect to get if a graph of voltage against current was plotted. [1]

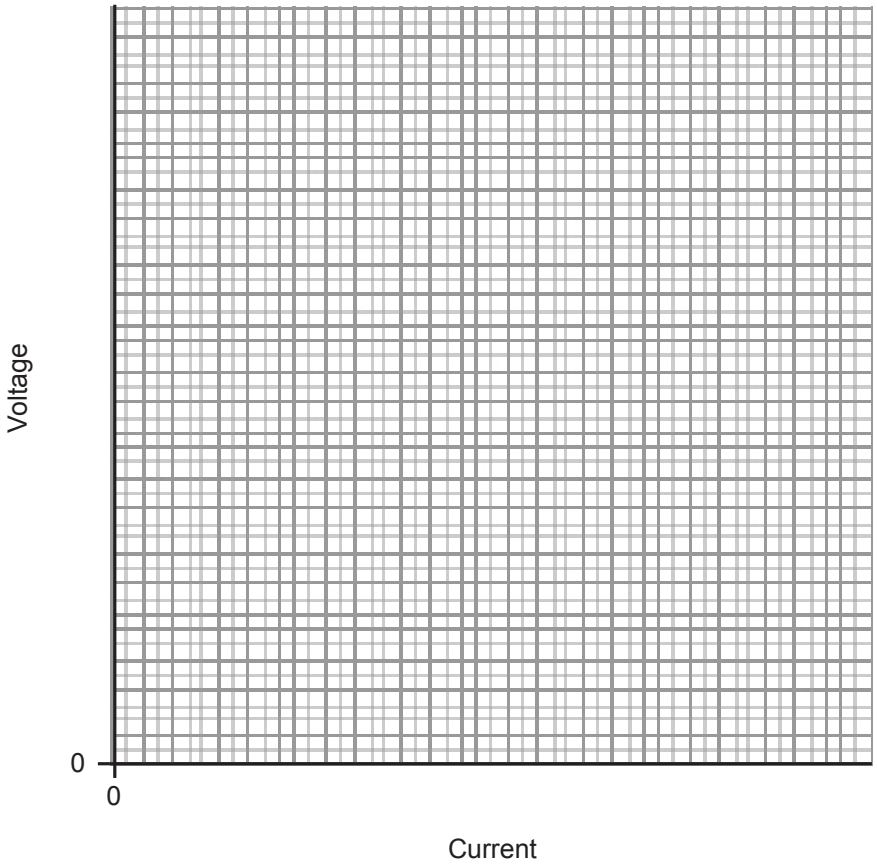


Figure 3.1

Examiner Only	
Marks	Re-mark

Examiner Only	
Marks	Re-mark

4 This questions deals with the **refraction** of light as it travels into a glass block.

(a) On **Figure 4.1** below draw a **normal** at the Air–Glass boundary. Label the angle of incidence **i** and the angle of refraction **r**. [3]

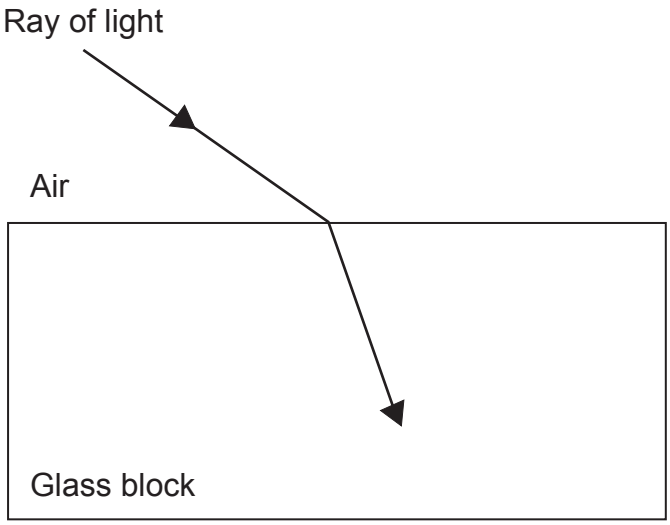


Figure 4.1

(b) What causes the ray of light to change direction when it enters the glass block?

_____

_____ [1]

Table 4.1 below contains results for the angles of incidence and refraction.

Angle of incidence i/°	Angle of refraction r/°
20	13
30	19
40	25
50	30
60	35

Table 4.1

You are going to use the values from Table 4.1 on the previous page to plot a graph of **i** against **r**.

Examiner Only	
Marks	Re-mark

(c) (i) Label the vertical axis and choose an appropriate scale. [2]

(ii) Label the horizontal axis and choose an appropriate scale. [2]

(iii) Using the values from **Table 4.1** on the previous page, plot the points on **Figure 4.2** below. [4]

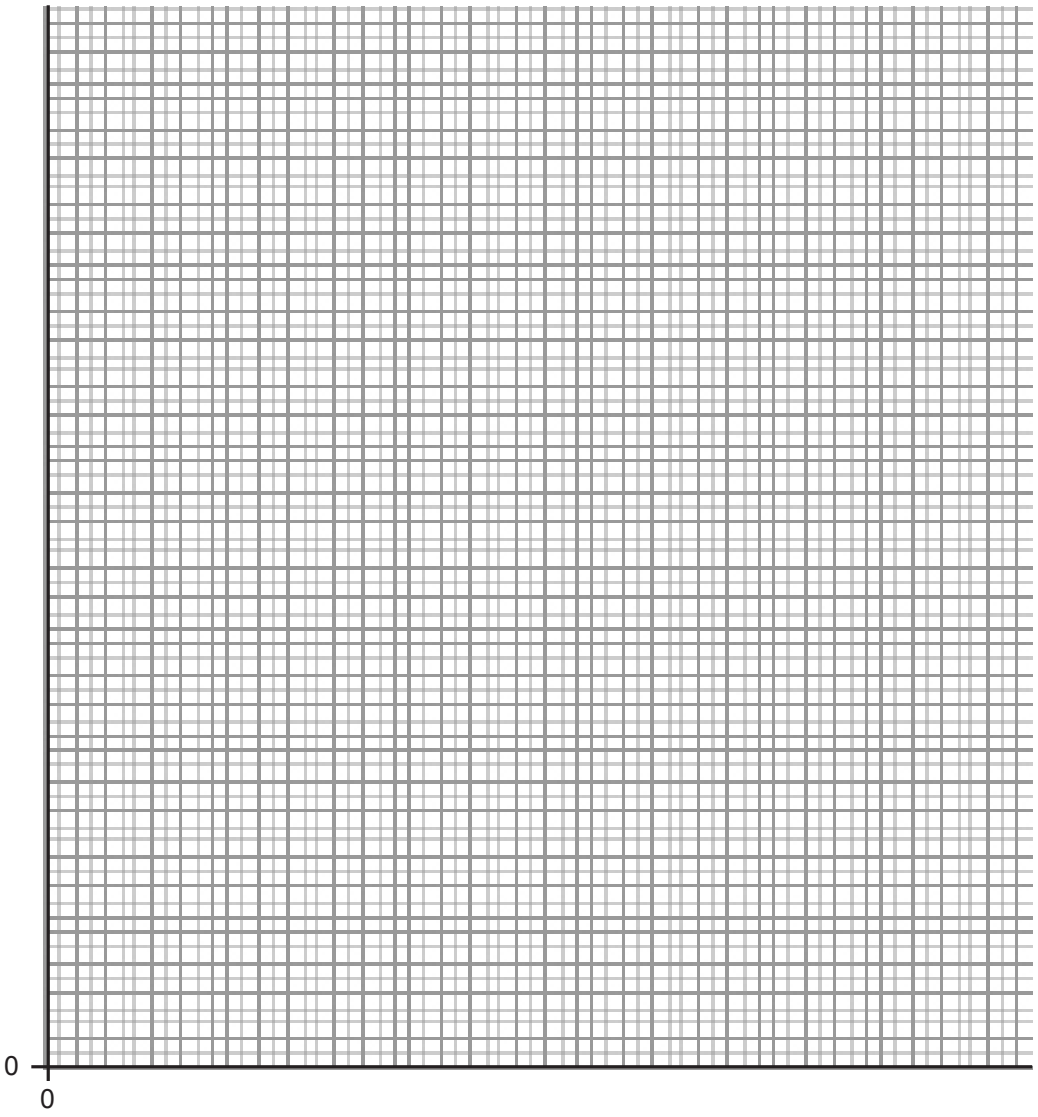


Figure 4.2

(d) Draw a line of best fit. [1]

THIS IS THE END OF THE QUESTION PAPER

MARK SCHEMES

General Certificate of Secondary Education

Double Award Science

GENERAL MARKING INSTRUCTIONS

General Marking Instructions

Introduction

Mark schemes are intended to ensure that the GCSE examinations are marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses likely to be worthy of credit. They also set out the criteria which they should apply in allocating marks to candidates' responses.

Assessment objectives

Below are the assessment objectives for GCSE Double Award Science.

Candidates must:

AO1	Demonstrate knowledge and understanding of: • scientific ideas; and • scientific techniques and procedures;
AO2	Apply knowledge and understanding of and develop skills in: • scientific ideas; and • scientific enquiry, techniques and procedures; and
AO3	Analyse scientific information and ideas to: • interpret and evaluate; • make judgements and draw conclusions; and • develop and improve experimental procedures.

Quality of candidates' responses

In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

Flexibility in marking

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

Positive marking

Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. The exception to this for GCSE Double Award Science is when examiners are marking complex calculations when the Examiners are briefed to mark by error or omission. Examiners should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate.

Awarding zero marks

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

Marking Calculations

In marking answers involving calculations, examiners should apply the 'carry error through' rule so that candidates are not penalised more than once for a computational error. To avoid a

candidate being penalised, marks can be awarded where correct conclusions or inferences are made from their incorrect calculations.

Types of mark schemes
Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

Levels of response
In deciding which level of response to award, examiners should look for the number of indicative content points in candidate responses to ensure that the answer has been written to coincide with the question. In deciding which mark within a particular level to award to any response, quality of communication will be assessed and examiners are expected to use their professional judgement.

The following guidance is provided to assist examiners.

- ***Threshold performance***: Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.
- ***High performance***: Response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

Quality of written communication
Quality of written communication is taken into account in assessing candidates' responses to all tasks and questions that require them to respond in extended written form. These tasks and questions are marked on the basis of bands of response. The description for each band of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within bands of response as follows:

Band A: Quality of written communication is excellent.
Band B: Quality of written communication is good.
Band C: Quality of written communication is basic.
Band D: Response not worthy of credit.

In interpreting these band descriptions, examiners should refer to the more detailed guidance provided below:

Band A (Excellent): Excellent reference to scientific terminology. The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is widespread and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a sufficiently high standard to make meaning clear.

Band B (Good): Good reference to scientific terminology. The candidate makes a reasonable selection and use of an appropriate form and style of writing. Relevant material is organised with some clarity and coherence. There is some use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning clear.

Band C (Basic): Basic reference to scientific terminology. The candidate makes only a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary. Presentation, spelling, punctuation and grammar may be such that intended meaning is not clear.

General Certificate of Secondary Education
2018

Double Award Science
Biology

Unit B1

Foundation Tier

[CODE]

SPECIMEN

MARK
SCHEME

			AVAILABLE MARKS
1	**(a)**	Benedict's [1]	
	(b)	Blue Green/orange/red; **not** black/blue [2]	
	(c)	**(i)** Carbohydrates – energy sources/storage [1] **(ii)** Protein – structural/functional/growth & repair [1]	5
2	**(a)**	Place in a dark cupboard for 48 hours **not** keep away from light [1]	
	(b)	Carbon dioxide/CO_2 [1]	
	(c)	**(i)** Iodine solution [1]	
		(ii)	

Leaf	Colour after starch test
A	Yellow/brown/orange
B	Blue/black

[2] 5

3	**(a)**	Cytoplasm; not chloroplast Cell membrane Nucleus [3]	
	(b)	Any **two** from: • extension • larger surface area • extension described for uptake of water/mineral salts/named mineral salt/take in H_2O [2]	5
4	**(a)**	Inhaled air contains more oxygen/less carbon dioxide [allow for converse] Inhaled air contains less water vapour [allow for converse] [2]	
	(b)	Increases rate of breathing [1] Increases depth of breathing [1] [2]	4
5	**(a)**	B [1]	
	(b)	osmoregulation [1]	
	(c)	1 filters blood 2 controls the reabsorption of water [2]	4

				AVAILABLE MARKS
6	**(a)**	**(i)**	In the blood/plasma/bloodstream [1]	
		(ii)	Lower/reduced/decreases [1]	
		(iii)	Any **two** from: • **more** respiration of glucose • **faster** uptake of glucose • glucose converted to (or stored as) glycogen • glucose converted to (or stored as) fat [2]	
	(b)	**(i)**	Eating/(sugary) drink [1]	
		(ii)	Levels change throughout the day/eat several times per day [1]	
	(c)	**(i)**	Any **two** from: • lethargy • thirst • urinate more often [2]	
		(ii)	eye damage/kidney failure/heart disease/strokes [1]	9
7	**(a)**		Any **two** from: • sensitive hearing; hear prey or faint sounds • silent flight; so prey do not hear predator/owl • talons; for grasping/carrying prey/killing prey • turn head; to see prey [4]	
	(b)		Cannot hear rodents/prey or prey stay hidden [1]	
	(c)		1. so that nesting sites/living areas are available/habitat 2. birds not poisoned 3. easier to hunt rodents/more rodents caught/helps owls find food [3]	
	(d)	**(i)**	canola → rodent → owl [2]	
		(ii)	Producer: canola [1] Consumer: rodent/owl [1] [2]	12

		AVAILABLE MARKS
8	**(a)** **(i)** [1] for enzyme [1] for substrate [1] for product molecule [3]	
	(ii) lock and key [1]	
	(iii) broken down [1]	
	(iv) different shape (at active site) [1]	
	(b) **(i)** Graph 1 – temperature Graph 2 – pH Graph 3 – enzyme concentration All three correct [2] marks two or one correct [1] mark [2]	
	(ii) protein [1]	
	(iii) small intestine/ileum/pancreas [1]	
	(c) **Indicative content** • alveoli • large surface area • good blood supply/capillary presence • thin • permeable • moist	

Band	Response	Mark
A	Candidates use appropriate terms throughout to describe **at least 5** points from the indicative content. Relevant material is organised with a high degree of clarity and coherence. They use excellent spelling, punctuation and grammar. Form and style are of a high standard.	[5]–[6]
B	Candidates use appropriate terms throughout to describe **at least 3 or 4** points from the indicative content. Relevant material is organised with a some degree of clarity and coherence. They use good spelling, punctuation and grammar. Form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe **1 or 2** points from the indicative content. The organisation of material may lack clarity and coherence. They use limited spelling, punctuation and grammar and have made little use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 16

Total **60**

General Certificate of Secondary Education
2018

Double Award Science
Biology

Unit B1

Higher Tier

[CODE]

SPECIMEN

MARK
SCHEME

				AVAILABLE MARKS
1	**(a)**	B	[1]	
	(b)	osmoregulation	[1]	
	(c)	filters blood controls the reabsorption of water	[2]	
	(d)	causes the kidney to absorb more water reduces the volume of urine produced	[2]	6
2	**(a)**	**(i)** In the blood/plasma/bloodstream	[1]	
		(ii) Lower/reduced/decreases	[1]	
		(iii) Any **two** from: • **more** respiration of glucose • **faster** uptake of glucose • glucose converted to (or stored as) glycogen • glucose converted to (or stored as) fat	[2]	
	(b)	**(i)** Eating/(sugary) drink	[1]	
		(ii) Levels change throughout the day/eat several times per day	[1]	
	(c)	**(i)** Brick red colour shows the presence of glucose/ positive **Benedict's** test/urine contains glucose	[1]	
		(ii) Any **two** from: • lethargy • thirst • urinate more often	[2]	9

			AVAILABLE MARKS
3	**(a)**	Any **two** from: • sensitive hearing; hear prey or faint sounds • silent flight; so prey do not hear predator/owl • talons; for grasping/carrying prey/killing prey • turn head; to see prey [4]	
	(b)	Cannot hear rodents/prey or prey stay hidden [1]	
	(c)	1. so that nesting sites/living areas are available/habitat 2. birds not poisoned 3. easier to hunt rodents/more rodents caught/helps owls find food [3]	
	(d) **(i)**	canola → rodent → owl [2]	
	(ii)	Producer: canola [1] Consumer: owl/rodent [1]	12

AVAILABLE MARKS

4 **(a)** **(i)** [1] for enzyme
[1] for substrate
[1] for product molecule [3]

(ii) lock and key [1]

(iii) broken down [1]

(iv) different shape (at active site) [1]

(b) **(i)** Graph 1 – temperature
Graph 2 – pH
Graph 3 – enzyme concentration
All three correct [2] marks
Two or one correct [1] mark [2]

(ii) protein [1]

(iii) small intestine/ileum/pancreas [1]

(c) **Indicative content**

- a large surface area
- a good blood supply/capillary presence
- alveoli
- thin
- moist
- permeable

Band	Response	Mark
A	Candidates use appropriate terms throughout to describe **at least 5** points from the indicative content. Relevant material is organised with a high degree of clarity and coherence. They use excellent spelling, punctuation and grammar. Form and style are of a high standard.	[5]–[6]
B	Candidates use appropriate terms throughout to describe **at least 3** points from the indicative content. Relevant material is organised with some clarity and coherence. They use good spelling, punctuation and grammar. Form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe **1 or 2** points from the indicative content. The organisation of material may lack clarity and coherence. They use limited spelling, punctuation and grammar and have made little use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 16

			AVAILABLE MARKS
5	**(a)**	Muscle must be drawn attached to the motor end plates of the motor neurone [1]	
	(b)	Synapses [1]	
	(c)	Does not involve the brain [1]	
	(d)	Sneezing, blinking or any other appropriate response [2]	5
6	**(a)**	Vary the distance of the lamp from the waterweed/ Vary the number of lamps [1]	
	(b)	**(i)** As light intensity increases, more oxygen is given off (must be trend) [1]	
		(ii) Increased light – more photosynthesis; must have both [1]	
		(iii) Repeat the experiment without the plant/use a plastic plant [1]	
		(iv) Temperature/CO_2; **not** chloroplasts, waterweed, minerals [1]	5
7	**(a)**	To make amino acids/proteins [1]	
	(b)	Cell has extension; increases surface area [2]	
	(c)	**(i)** Any **two** from: • (initial) concentration/volume (amount) of nitrate (in each test-tube) • temperature • pH • time • type/variety/size of barley seedlings/number of seedlings • light intensity [2]	
		(ii) Any **four** from: • data for description (5, 1) to (40, 10) by 9/(with more oxygen) more uptake up nitrate • oxygen used in respiration/energy • for active uptake/active transport • from low concentration of nitrate to a high concentration/ against the concentration gradient [4]	
		(iii) Oxygen is no longer the limiting factor/seedlings taking up nitrate as fast as they can/some other factor limits nitrate uptake/no more nitrate left in test-tube to be taken up [1]	
		(iv) Eutrophication [1]	11

AVAILABLE MARKS

8 **(a)** Any **two** from:

- Photosynthesis produces oxygen and respiration uses oxygen
- Respiration produces carbon dioxide and photosynthesis uses carbon dioxide
- Respiration happens 24 hours a day, but photosynthesis only happens in daylight [2]

(b)

Time	Colour of hydrogen carbonate indicator	Reason to explain colour of hydrogencarbonate indicator
		Only respiration occurs Respiration with no Photosynthesis or no light for Photosynthesis
	purple	**Photosynthesis is greater than respiration (both Photosynthesis + respration)**
		Photosynthesis equals respiration/compensation point/rates same or CO_2 in = CO_2 out

[4] 6

Total **70**

General Certificate of Secondary Education
2019

Double Award Science
Biology

Unit B2

Foundation Tier

[CODE]

SPECIMEN

MARK
SCHEME

			AVAILABLE MARKS
1	**(a)**	Even scale on y axis and more than half scale used Label on y axis Bars correctly plotted [3]	
	(b)	Continuous [1]	4
2	**(a)**	**(i)** To carry substances around the body To fight disease Carry oxygen around the body Clotting [4]	
		(ii)	

Blood part	% composition
	2
Platelets	
	54
Red blood cells	

[4]

	(b)	Biconcave shape/large surface area/contains haemoglobin/no nucleus/large surface area [1]	
	(c)	**(i)** Lungs → left atrium → left ventricle; up through aorta → down into renal artery; 3 correct arrows = 2; 2 correct arrows = 1; 1 or 0 correct arrows = 0 [2]	
		(ii) Left ventricle [1]	
		(iii) A – renal artery B – vena cava [2]	14
3	Oviduct; mitosis; uterus; foetus; amniotic fluid; placenta [6]		6
4	**(a)**	Temperature graph line increases to the right from origin Humidity graph line decreases to right from origin [2]	
	(b)	**(i)** Stop water loss from **the soil**/so that water loss is **only** from leaves [1]	
		(ii) 257.6 – 185.6 = 72. 0 [1] 72 ÷ 24 = 3 [1] [2]	
		(iii) Less surface area Less evaporation [2]	7

			AVAILABLE MARKS
5	**(a)**	T with A G with C Backbone drawn to the right of inserted bases [3]	
	(b)	Sugar/doexyribose; phosphate [2]	
	(c)	Double helix [1]	
	(d)	Nucleus [1]	7
6	**(a)**	GG and Gg [2]	
	(b)	Two heterozygous parents Punnett drawn Correct cross gg circled [4]	6
7	**(a)**	**(i)** 8 [1]	
		(ii) Concentration of solution inside the potato is the same as outside or no net movement of water at this concentration [1]	
	(b)	**(i) & (ii)** • Turgid cell – more turgid than in (ii) **or** • Plasmolysed cell (more plasmolysed than cell in **(ii)**) • Cell wall as double layer • Cell membrane detached from cell wall in some places • A labelled cell wall and membrane max [4]	
	(c)	Limit entry of water [1]	7

8 Indicative content

AVAILABLE MARKS

Any **three** correct methods:

- Hormone implant/hormone injection
- Contraceptive pill (Morning after pill)
- Condom
- Female sterilisation
- Male sterilisation/vasectomy
- Female condom/femidom/diaphragm/cap/coil

Explanation must match named method:

- hormone implant/injection/contraceptive pill: Prevents ovulation/stops development of ovum
- morning after pill: Stops implantation
- female sterilisation: Stops eggs meeting sperm/eggs can't get down oviduct
- male sterilisation: No sperm in ejaculate
- diaphragm/cap: Stops sperm travelling into vagina/oviduct/stops sperm meeting egg
- coil: Prevents implantation

Band	Response	Mark
A	Candidates use appropriate terms throughout to give **at least 5** points from the indicative content. Relevant material is organised with a high degree of clarity and coherence. Candidates use excellent spelling, punctuation and grammar skills. Form and style are of a high standard.	[5]–[6]
B	Candidates use appropriate terms throughout to give **at least 3** points from the indicative content. Relevant material is organised with some clarity and coherence. They use good spelling, punctuation and grammar. Form and style are of a satisfactory standard.	[3]–[4]
C	Candidates use appropriate terms throughout to give **1 or 2** points from the indicative content. The organisation of material may lack clarity and coherence. They use limited spelling, punctuation and grammar and have made little use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 6

			AVAILABLE MARKS
9	**(a)**	Cholesterol builds up in blood vessel Blockage reduces/stops flow of blood Less oxygen/glucose reaches heart muscle Muscle cells die [4]	
	(b) **(i)**	Reduction statement, e.g. with statins cholesterol reduced or cholesterol reduced with diet/cholesterol reduced without statins Data mark (over 6 months) with statins 6 → 3.8 or down 2.2 Data mark (over 6 months) without statins 6 → 5.5 or down by 0.5 Comparison statement: with statins cholesterol reduced faster or difference with statins is 5.5 → 3.8 or difference is 1.7 Must have at least one data reference to get [3] marks [3]	
	(ii)	To compare with the group that had statins/as a control group [1]	
	(iii)	6 ÷ 7 × 14 000 = 12 000 men 1 ÷ 7 × 14 000 = 2000 women Or 14 000 – 12000 = 2000 [2]	
	(iv)	Any **two** from: • Reduce salt intake • More exercise • Reduce stress • Give up smoking/don't smoke • Don't binge drink/drink less/no alcohol [2]	
	(c)	Stops clots forming [1]	13
		Total	**70**

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General Certificate of Secondary Education
2019

Double Award Science
Biology

Unit B2

Higher Tier

[CODE]

SPECIMEN

MARK
SCHEME

		AVAILABLE MARKS
1 **(a)** **(i)** 8 [1]		
(ii) Concentration of solution inside the potato is the same as outside or no net movement of water at this concentration [1]		
(b) **(i) & (ii)** • Turgid cell – more turgid that in **(ii)** • Plasmolysed cell (more plasmolysed than cell in **(ii)**) • Cell wall as double layer • Cell membrane detached from cell wall in some places • A labelled cell wall and membrane [4]		
(c) Limit entry of water [1]		7

2 Indicative content

AVAILABLE MARKS

Any **three** correct methods:

- Hormone implant/hormone injection
- Contraceptive pill (Morning after pill)
- Condom
- Female sterilisation
- Male sterilisation/vasectomy
- Female condom/femidom/diaphragm/cap/coil

Explanation must match named method

- hormone implant/injection/contraceptive pill: Prevents ovulation/stops development of ovum
- morning after pill: Stops implantation
- female sterilisation: Stops eggs meeting sperm/eggs can't get down oviduct
- male sterilisation: No sperm in ejaculate
- diaphragm/cap: Stops sperm travelling into vagina/oviduct/stops sperm meeting egg
- coil: Prevents implantation

Band	Response	Mark
A	Candidates use appropriate terms throughout to give **at least 5** points from the indicative content. Relevant material is organised with a high degree of clarity and coherence. They use excellent spelling, punctuation and grammar skills. Form and style are of a high standard.	[5]–[6]
B	Candidates use appropriate terms throughout to give **at least 3** points from the indicative content. Relevant material is organised with some clarity and coherence. They use good spelling, punctuation and grammar. Form and style are of a satisfactory standard.	[3]–[4]
C	Candidates use appropriate terms throughout to give **1 or 2** points from the indicative content. The organisation of material may lack clarity and coherence. They use limited spelling, punctuation and grammar and have made little use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 6

				AVAILABLE MARKS
3	**(a)**	Cholesterol builds up in blood vessel Blockage reduces/stops flow of blood Less oxygen/glucose reaches heart muscle Muscle cells die	[4]	
	(b)	**(i)** Reduction statement, e.g. with statins cholesterol reduced or cholesterol reduced with diet/cholesterol reduced without statins Data mark (over 6 months) with statins 6 → 3.8 or down 2.2 Data mark (over 6 months) without statins 6 → 5.5 or down by 0.5 Comparison statement: with statins cholesterol reduced faster or difference with statins is 5.5 → 3.8 or difference is 1.7 must have at least one data reference to get [3] marks	[3]	
		(ii) To compare with the group that had statins/as a control group	[1]	
		(iii) 6 ÷ 7 × 14 000 = 12 000 men 1 ÷ 7 × 14 000 = 2000 women Or 14 000 – 12000 = 2000	[2]	
		(iv) Any **two** from: • Reduce salt intake • More exercise • Reduce stress • Give up smoking /don't smoke • Don't binge drink/drink less/no alcohol	[2]	
	(c)	Stops clots forming	[1]	13
4	**(a)**	**(i)** Lining shed/breaks down/comes away	[1]	
		(ii) Uterine wall building up/increases in thickness	[1]	
		(iii) Progesterone	[1]	
	(b)	Day 10–14 shaded Only day 9 and 15 shaded in addition to 10–14	[2]	
	(c)	**(i)** Arrow from placenta towards baby	[1]	
		(ii) Digested food or named/minerals or named vitamin or named/antibodies/hormone or named	[1]	
		(iii) Carbon dioxide/urea	[1]	
		(iv) Increases surface area	[1]	9

			AVAILABLE MARKS
5	**(a)**	Any **two** from: • Blood clots at wound to prevent entry • Mucous membranes (or named) to prevent entry • Skin as a physical barrier to entry [2]	
	(b)	Antigens on microorganism/antibodies complementary shape Trigger WBC/lymphocytes to produce antibodies [2]	
	(c)	Steeper gradient Higher antibody level Stays high [3]	7
6	**(a)**	**(i)** Bacterium [1]	
		(ii) Antibiotics are not effective against the bacterium [1]	
	(b)	**(i)** Decreased, increased, decreased – in this order [1]	
		(ii) Northern [1]	
		(iii) 20 cases to 4 cases/or reduced by 16 16 ÷ 20 × 100; 80% correct answer 80% = 2 marks [2]	
		(iv) Any **two** from: • Pre-test patients • Isolation of patients with MRSA • Protective clothing • Washing hands between patients more frequently • Deep clean wards • Use hand sanitisers [2]	8
7	**(a)**	rr – top level gamete r Rr for both (beside red) Gametes R r R r RR Rr Rr rr [4]	
	(b)	**(i)** Ratio 1:1 [1]	
		(ii)	

	R	r
r	Rr	rr
r	**Rr**	**rr**

[1] Punnett [1] cross [1] each correct parent [4]

	(c)	Short stem/bigger flowers/other colours/more scent/disease resistance [1]	10

				AVAILABLE MARKS
8	**(a)**	1. Haemophilia/colour blindness 2. Cystic fibrosis 3. Huntington's disease	[3]	
	(b)	**(i)** Cervical cancer; vaginal cancer; anal cancer; throat cancer	[1]	
		(ii) Malignant spread - benign encapsulated (not spread)	[1]	5
9	**(a)**	Dark moths are camouflaged/not easily seen Not eaten/not preyed upon Dark moths survive Pass on the dark allele/gene or converse related to light moths	[4]	
	(b)	Increase/goes up	[1]	
	(c)	Die out/become extinct	[1]	6
10	**(a)**	**(i)** Circle around any deoxyribose unit	[1]	
		(ii) Need to keep strand parallel/otherwise distance between strands not uniform/won't fit in space	[1]	
	(b)	**(i)** Double helix	[1]	
		(ii) C = 30% T = 20%	[2]	
	(c)	Any **four** from: • Gene for insulin removed (from human chromosome) • Plasmid removed from bacterium • Plasmid cut open • Insulin gene inserted • Plasmid inserted into bacterium • Bacterium multiplies	[4]	9
			Total	**80**

General Certificate of Secondary Education
2018

Double Award Science
Chemistry

Unit C1

Foundation Tier

[CODE]

SPECIMEN

MARK
SCHEME

				AVAILABLE MARKS
1	**(a)**	Salt dissolves [1] Sand does not dissolve [1]	[2]	
	(b)	(Retort) stand [1] (Filter) funnel [1]	[2]	
	(c)	Filtrate [1] Solution [1]	[2]	
	(d)	evaporate the water (using a Bunsen burner)	[1]	7
2	**(a)**	**(i)** C [1]		
		(ii) A [1]	[2]	
	(b)	They have full (outer) shells [1] of electrons [1]	[2]	
	(c)	Under oil	[1]	
	(d)	**(i)** Block to the right of B	[1]	
		(ii) Green [1] Black [1] Copper sulfate/Copper(II) sulfate [1] Blue [1] Anhydrous [1]	[5]	11
3	**(a)**	Electron [1] Shells/Orbits [1]	[2]	
	(b)	**(i)** Proton	[1]	
		(ii) 3	[1]	
	(c)	Group I [1] One electron in its last shell [1]	[2]	6
4	**(a)**	0.000000001 m	[1]	
	(b)	Fly straighter	[1]	
	(c)	Sun cream or other alternative	[1]	3

			AVAILABLE MARKS
5	**(a)**	Any pH in range 3–6 [1] dark green [1] any pH in range 12–14 [1] (accept blue–green) [3]	
	(b)	**(i)** Lemon juice [1]	
		(ii) Baking soda solution [1]	
	(c)	$Na_2O + 2HCl \rightarrow 2NaCl + H_2O$ [1] LHS [1] RHS [2]	
	(d)	 [1]	8
6	**(a)**	Different forms of the same element in the same physical state [1]	
	(b)	A: Carbon atom [1] B: Covalent bond [1] [2]	
	(c)	Candidates choose a property of graphene from the passage and gain a mark for an associated use Candidates may suggest common uses for the property, e.g. used in construction, linked to strength as steel or a futuristic use [1]	
	(d)	Metal: It is a (good) conductor of electricity [1] or it is a (good) conductor of heat [1] Non metal: Carbon is a non-metallic element/It is transparent/It has an extremely/very high melting point/It has covalent bonds [1] not it is an allotrope of carbon not it is a form of carbon [2]	6

AVAILABLE MARKS

7 **(a)** Candidates draw a magnesium atom with an electronic configuration 2,8,2 [1] and a chlorine atom with the electronic configuration 2,8,7 [1] [2]

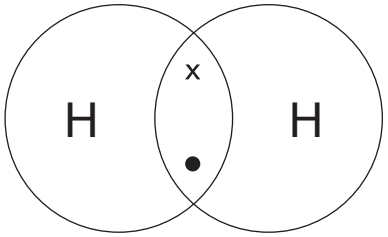
(b) **Indicative content**

- Idea of electron transfer from magnesium to chlorine
- Magnesium loses two electrons
- To 2 chlorine atoms/forms $MgCl_2$
- To become a magnesium ion with a charge of 2^+/to form Mg^{2+}
- Each chlorine atom gains one electron
- To become a chloride ion with a charge of 1^-/to become Cl^-
- The ions are held together by electrostatic forces/oppositely charged ions are attracted

Band	Response	Mark
A	Candidates make correct reference to **6–7** of the indicative points shown. Relevant material is organised with a high degree of clarity and coherence. They use excellent spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates make correct reference to **4–5** of the indicative points shown. Relevant material is organised with some clarity and coherence. They use good spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates make correct reference to **1–3** of the indicative points shown using limited spelling, punctuation and grammar. The organisation of material may lack clarity and coherence. The form and style is of limited standard and they have made no use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6]

(c)



Molecule must be H_2 for any credit [2]
Correct sharing, dot and cross, correct total electrons [2]
Correct sharing, dot and cross, incorrect total electrons [1]
Correct sharing, not dot and cross, correct total electrons [1]
Correct total electrons is dependent on correct sharing [2]

			AVAILABLE MARKS
(d)	**(i)**	Covalent [1]	
	(ii)	van der Waals' [1] [2]	12
8	**(a)**	Average mass of an atom (of an element) [1] compared with that of a carbon-12 (isotope) [1] Which has mass of exactly (clearly implied) 12 [1] [3]	
	(b)	**(i)** 142 [1]	
		(ii) 78 [1]	
	(c)	**(i)** 2 [1]	
		(ii) 51 [1]	7
		Total	**60**

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General Certificate of Secondary Education
2018

Double Award Science
Chemistry

Unit C1

Higher Tier

[CODE]

SPECIMEN

MARK
SCHEME

			AVAILABLE MARKS
1	**(a)**	Any pH in range 3–6 [1] blue-green [1] any pH in range 12–14 [1] (accept blue–green) [3]	
	(b)	**(i)** Lemon juice [1]	
		(ii) Baking soda solution [1]	
	(c)	**(i)** $CuO + H_2SO_4 \rightarrow CuSO_4 + H_2O$ LHS [1] RHS [1] [2]	
		(ii) Black solid [1] solid disappears [1] blue (solution) formed [1] Heat given out [1] [3]	
		(iii) Any **two** from: • Idea that copper(II) carbonate reacts more quickly • Idea of gas formed (with copper(II) carbonate) • Idea that copper(II) carbonate is green • Idea that CuO needs heat before it reacts or other correct answer N.B. formation of gas in reaction with CuO is wrong [2]	
		(iv) It is fully ionised in solution [1]	13
2	**(a)**	Different forms of the same element [1] in the same physical state [1] [2]	
	(b)	A: Carbon atom [1] B: Covalent bond [1] [2]	
	(c)	Candidates choose a property of graphene [1] from the passage and gain a mark for an associated use [1] Candidates may suggest common uses for the property, e.g. used in construction, linked to strength as steel or a futuristic use [1]	
	(d)	Metal: It is a (good) conductor of electricity [1] or It is a (good) conductor of heat [1] Non metal: Carbon is a non-metallic element/It is transparent/It has an extremely/very high melting point/It has covalent bonds [1] [2]	7

AVAILABLE MARKS

3 **(a)** Candidates draw a magnesium atom with an electronic configuration 2,8,2 [1] and a chlorine atom with the electronic configuration 2,8,7 [1]

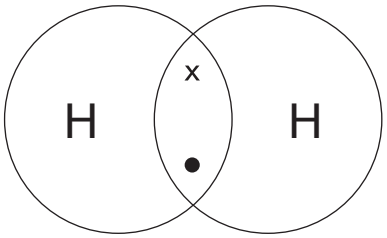
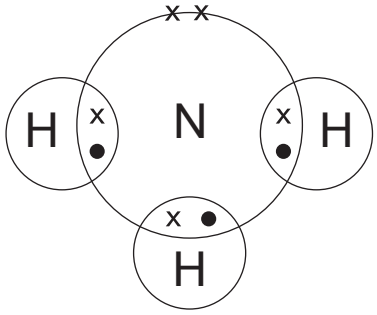
[2]

(b) **Indicative content**

- Idea of electron transfer from magnesium to chlorine
- Magnesium loses two electrons
- To 2 chlorine atoms/forms $MgCl_2$
- To become a magnesium ion with a charge of 2^+/to form Mg^{2+}
- Each chlorine atom gains one electron
- To become a chloride ion with a charge of 1^-/to become Cl^-
- The ions are held together by electrostatic forces/oppositely charged ions are attracted

Band	Response	Mark
A	Candidates make correct reference to **6–7** of the indicative points shown. Relevant material is organised with a high degree of clarity and coherence. They use excellent spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates make correct reference to **4–5** of the indicative points shown. Relevant material is organised with some clarity and coherence They use good spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates make correct reference to **1–3** of the indicative points shown using limited spelling, punctuation and grammar. The organisation of material may lack clarity and coherence The form and style is of limited standard and they have made no use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6]

				AVAILABLE MARKS
(c)				
	Molecule must be H_2 for any credit [2] Correct sharing, dot and cross, correct total electrons [2] Correct sharing, dot and cross, incorrect total electrons [1] Correct sharing, not dot and cross, correct total electrons [1] Correct total electrons is dependent on correct sharing	[2]		
(d)	**(i)** Covalent	[1]		
	(ii) van der Waals'	[1]		
(e)	**(i)** 			
	Correct sharing [1] Correct total electrons [1]	[2]		
	(ii) Correctly labelled lone pair	[1]		
	(iii) Weak (van der Waals') forces between ammonia molecules [1] Little energy needed to separate the molecules [1]	[2]		17
4	**(a)** **(i)** 233	[1]		
	(ii) 261	[1]		
	(iii) 13.05 ÷ 261 = 0.05 Allow CM	[1]		
	(iv) 11.65 Allow CM	[1]		
	(b) **(i)** 10.5 ÷ 11.65 × 100 = 90.1%	[1]		
	(ii) Any **one** from: • Loss in separation • Loss in transfer • Reaction unfinished	[1]		6

				AVAILABLE MARKS
5	**(a)**	6 electrons drawn as 2, 4 in shells around the nucleus [1] 6 protons [1] 7 neutrons [1] Both neutrons and protons in the nucleus [1] The mark for electrons can be awarded without a label but labels or a key are necessary to distinguish between the protons and neutrons	[4]	
	(b)	Idea of equal number of protons and electrons [2] For idea that the charges cancel each other out allow [1] or That there are equal numbers of positive and negative charges [1]	[2]	
	(c)	$(75 \times 35) + (25 \times 37) \div 100$ [1] = 35.5 [1]	[2]	8
6	**(a)**	Arranged in order of increasing atomic mass [1] Placed elements with similar properties in vertical columns called Groups [1] Named horizontal rows Periods [1] Left gaps for undiscovered elements [1] Predicted properties of undiscovered elements [1] Max 3	[3]	
	(b)	Arranged in order of atomic number [1] Noble gases included [1] Clear division between metals and non-metals [1] Some groups are named [1] Max 3 (more elements not credited)	[3]	6
7	**(a)**	Chlorine/sodium iodide ✓ Chlorine/sodium bromide ✓ both required for [1] Bromine/sodium chloride X [1]	[2]	
	(b)	White	[1]	
	(c)	Solution turns from colourless [1] to orange [1]	[2]	
	(d)	$Cl_2(aq) + 2Br^-(aq) \rightarrow 2Cl^-(aq) + Br_2(aq)$ LHS [1] RHS [1] Balancing [1] State symbols [1]	[4]	9
8	**(a)**	A and B	[1]	
	(b)	A and D	[1]	
	(c)	Spot = 4.3 cm Solvent = 5.6 cm [1] 4.3/5.6 = 0.77 [1] Allow +/– 0.1cm for each measurement	[2]	4
			Total	**70**

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General Certificate of Secondary Education
2019

Double Award Science
Chemistry

Unit C2

Foundation Tier

[CODE]

SPECIMEN

MARK
SCHEME

					AVAILABLE MARKS
1	**(a)**	**(i)**	Hydrated [1] iron(III) oxide [1]	[2]	
		(ii)	Moisture/water [1] air/oxygen [1]	[2]	
		(iii)	Barrier method/prevents air and/or water reaching the iron	[1]	
		(iv)	1. Galvanising [1] 2. Oiling [1] 3. Plastic coating [1]	[3]	
		(v)	Gain of oxygen or loss of hydrogen	[1]	9
2	**(a)**		Silver/grey	[1]	
	(b)		Zinc (nitrate) solution is colourless	[1]	
	(c)		Zinc Iron Copper Silver 4 in correct order [2] 2 or 3 in correct order [1] 1 or 0 in correct order [0]	[2]	
	(d)		Zinc and silver nitrate	[1]	5
3	**(a)**	**(i)**	Decomposition of ionic compounds [1] using electricity [1]	[2]	
		(ii)	Anode [1] cathode [1]	[2]	
	(b)	**(i)**	In a solid ions are fixed in position [1] When molten or in solution the ions are free to move [1] and carry charge [1]	[3]	
		(ii)	Inert/high melting point/good conductor (not cheap)	[1]	
		(iii)	Green-yellow/yellow-green [1] gas [1]	[2]	
		(iv)	Lithium	[1]	
		(v)	Idea that **chlorine** gas/fumes is/are **hazardous/toxic/poisonous**	[1]	

AVAILABLE MARKS

(c) Indicative content

- Aluminium is very reactive so electrolysis must be used/too reactive for alternative extraction methods, e.g. reduction with coke
- Bauxite
- Oxygen is produced at the anode
- At high temperature, the oxygen reacts with the anodes (and they burn away)
- $2Al_2O_3 \rightarrow 4Al + 3O_2$

Band	Response	Mark
A	Candidates make correct reference to **4–5** of the indicative points shown, including the balanced equation. Relevant material is organised with a degree of clarity and coherence. They use excellent spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates make correct reference to **2–3** of the indicative points shown. Relevant material is organised with some clarity and coherence. They use good spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates make correct reference to **1** of the indicative points shown, using limited spelling, punctuation and grammar. The organisation of material may lack clarity and coherence. The form and style is of limited standard and they have made no use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 18

4 (a) Any **two** from:

- differ by a CH_2 group
- have same general formula
- have similar chemical properties gradation in physical properties

[2]

(b) (i) (Molecule) containing hydrogen and carbon [1] only [1]
2nd mark dependent on 1st [2]

(ii) Boiling points [1]

(c) (i) Alkanes [1]

(ii) $C_6H_{14} \rightarrow C_4H_{10} + C_2H_4$
[1] [1] [2]

(iii) Carbon dioxide [1]
Water [1] [2]

			AVAILABLE MARKS
(d)	Addition [1] polymerisation [1]	[2]	
(e)	**(i)** Hydrogen	[1]	
	(ii) Metal	[1]	
	(iii) Carbon dioxide	[1]	
	(iv) (Metal) carbonate	[1]	
	(v) (Metal) hydroxide/ or (metal) oxide/ base/ Unreactive metal	[1]	17
5 **(a)**	Water which is chemically [1] combined [1] or bonded in the crystalline structure	[2]	
(b)	**(i)** 18	[1]	
	(ii) 250	[1]	
	(iii) Repeatedly heat the dish [1] until there is no further change in mass [1]	[2]	
	(iv) 1.39 g	[1]	
	(v) 1.11 g (carry error forward)	[1]	
	(vi) The copper(II) sulfate from the opened container/the same sample with the lid not replaced properly	[1]	9
6 **(a)**	**(i)** $2H_2O_2 \rightarrow 2H_2O + O_2$ [1] for RHS, [1] for LHS, [1] for balancing	[3]	
	(ii) Increases the rate of a reaction [1] Without being used up in it [1]	[2]	
	(iii) Gas syringe	[1]	
	(iv)	[4]	

Name	**Formula**	**Acidic or Basic?**
carbon dioxide	CO_2 [1]	acidic [1]
magnesium oxide	MgO [1]	basic [1]

(b)	Curve starts at same point, slope is less steep [1] Flattens at same level [1]	[2]	12
		Total	**70**

General Certificate of Secondary Education
2019

Double Award Science
Chemistry

Unit C2

Higher Tier

[CODE]

SPECIMEN

MARK
SCHEME

					AVAILABLE MARKS
1	**(a)**	**(i)**	Gain of oxygen or loss of electrons or loss of hydrogen	[1]	
		(ii)	Gain of electrons	[1]	
	(b)	**(i)**	Mg/Magnesium	[1]	
		(ii)	Addition of hydrogen, it gains hydrogen	[1]	
		(iii)	Fe_2O_3/iron (III) oxide	[1]	
	(c)		Haematite	[1]	
	(d)	**(i)**	Reversible	[1]	
		(ii)	Dynamic equilibrium	[1]	
	(e)	**(i)**	Either Use – food packaging (to prevent spoilage) [1] Reason – it is inert/unreactive [1] or Use – Coolant [1] Reason – very low melting point (of –192°C, so liquid form useful for rapid cooling) [1]	[2]	
		(ii)	Fertilisers	[1]	
		(iii)	Dip a glass rod in concentrated hydrochloric acid and then into the gas [1] White fumes [1]	[2]	13
2	**(a)**		Silver/grey	[1]	
	(b)		Zinc nitrate solution is colourless	[1]	
	(c)		Zinc [1] Iron [1] Copper [1] 4 in correct order [2] 2 or 3 in correct order [1] 1 or 0 in correct order [0]	[2]	4

AVAILABLE MARKS

3 (a) (i) Labelled diagram showing crucible [1] resting on a clay-pipe triangle [1] on a tripod [1] over a Bunsen burner/heat source [1]
Electrodes [1] connected to a cell/battery/power source
Full marks for any 4 of the points and clear labels
(no labels = no marks) [5]

(ii) Inert/high melting point/good conductor (not cheap) [1]

(b) Indicative content

- Aluminium is very reactive so electrolysis must be used/too reactive for alternative extraction methods, e.g. reduction with coke
- Bauxite
- Anodes combine with the oxygen and burn away so must be replaced
- $C + O_2 \rightarrow CO_2$
- Anode $2O^{2-} \rightarrow O_2 + 4e^-$
- Cathode $Al^{3+} + 3e^- \rightarrow Al$

Band	Response	Mark
A	Candidates make correct reference to **5–6** of the indicative points shown. Relevant material is organised with a high degree of clarity and coherence. They use excellent spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates make correct reference to **4–5** of the indicative points shown. Relevant material is organised with some clarity and coherence. They use good spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates make correct reference to **2–3** of the indicative points shown, using limited spelling, punctuation and grammar. The organisation of material may lack clarity and coherence. The form and style is of limited standard and they have made no use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6]

12

AVAILABLE MARKS

4 **(a)** Any **three** from:
- differ by a CH_2 group/have same general formula
- have similar chemical properties
- gradation in physical properties [3]

(b) **(i)** (Molecule) containing hydrogen and carbon [1] only [1]
2nd mark dependent on 1st [2]

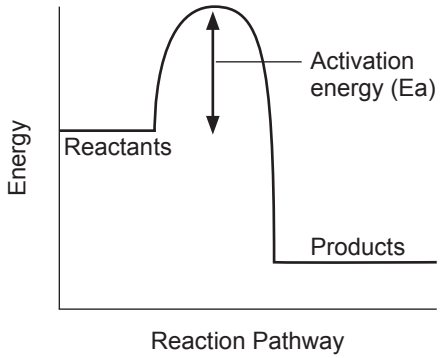
(ii) Boiling points [1]

(c) $C_6H_{14} \rightarrow C_4H_{10} + C_2H_4$
[1] [1] [2]

(d) **(i)** Bonds broken = 4 × 435(C–H) + 2 × 498(O=O) = 2736 (kJ) [1]
Bonds formed = 2 × 805(C=O) + 4 × 464(O–H) = 3466 (kJ) [1]
Overall energy change = bonds broken – bonds formed [1]
= 2736 – 3466 = –730 (kJ) [1] [4]

(ii) Idea that if the air hole isn't fully open **combustion is not complete** and so different products may be formed, e.g. CO or C, with less energy given out in formation of new products [1] [1]

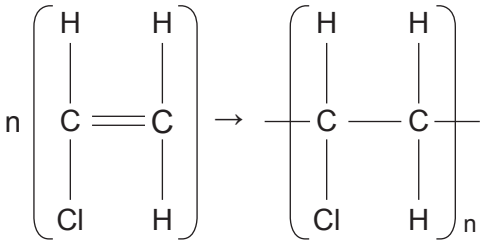
(iii)



- Products at lower energy than reactants [1]
- Axes labelled [2]
- Reactants and products labelled [1]
- Activation energy (Ea) labelled [1] [5]

(e) **(i)** Addition polymerisation [1]

(ii)



n × Monomer, with double bond intact [1]
Polymer repeating unit shown with single bond between C and C [1] and bonds extending outside the brackets (obviously crossing the line of the bracket) [1]
Indication of 'n' repeating units [1] [4]

(f) Enzymes in **yeast** [1] convert **sugar** [1]
(which may be in a sugary or starchy solution)
to ethanol, at around **35 °C/warm temperature** [1] [3]

(g) **(i)** Only partially ionised in solution [1]

(ii) Hydrogen [1]

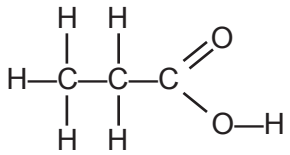
(iii) Metal [1]

(iv) Carbon dioxide [1]

(v) (Metal) carbonate [1]

(vi) (Metal) hydroxide/ metal oxide/ unreactive metal [1]

(vii)



2 marks for all bonds shown
If OH shown as a group allow 1 mark [2]

34

5 **(a)** **(i)** $2H_2O_2 \rightarrow 2H_2O + O_2$
[1] for RHS, [1] for LHS, [1] for balancing [3]

(ii) The minimum energy needed for a reaction to occur [1]

(iii) Provides an alternative reaction path [1]
With a lower activation energy [1] [2]

		AVAILABLE MARKS
(b) **(i)** B [1]		
(ii) C [1]		
(iii) A [1]		
(c) RFM of desired product = (40 + 35.5 + 35.5) = 111 [1] RFM of reactants = (40 + 12 + (3 × 16))+ 2(1 + 35.5) = 173 [1] Atom economy = 111 ÷ 173 × 100% = 64.2% [1] [3]		12
6 **(a)** Nitrogen – 78% [1] Oxygen – 21% [1] [2]		
(b) Any **one** row from the table below: [1] for name of pollutant, [1] for correct effect		

carbon dioxide	greenhouse effect – sea level rises, flooding, climate change
carbon monoxide	toxic gas
soot/carbon	can cause lung damage
sulfur dioxide	leads to acid rain, damaging buildings, vegetation and killing fish

[2]

(c) Only water (vapour) is formed when hydrogen is burnt and water is not classified as a pollutant [1]	5
Total	**80**

General Certificate of Secondary Education
2018

Double Award Science
Physics

Unit P1

Foundation Tier

[CODE]

SPECIMEN

MARK
SCHEME

				AVAILABLE MARKS
1	**(a)**	Heat	[1]	
	(b)	Electrical [1], sound [1]	[2]	
	(c)	Chemical [1], sound [1]	[2]	5
2	**(a)**	Produces less heat energy/more efficient	[1]	
	(b)	Eff = $\frac{\text{useful output energy}}{\text{input energy}}$ [1] = 12 ÷ 15 [1] = 0.8 or 80% [1]	[3]	
	(c) **(i)**	Wind [1] oil/coal [1]	[2]	
	(ii)	Solar/tidal/geothermal etc [1] Nat. gas/nuclear [1]	[2]	8
3		Average Speed = total distance ÷ total time taken [1] = 500 ÷ 40 [1] = 12.5 [1] (m/s)	[3]	3
4	**(i)**	R.F. = m × a [1] = 75 × 2 [1] = 150 [1] (N)	[3]	
	(ii)	Increase drag forces/sit upright	[1]	4
5		Pressure = force ÷ area [1] = 500 ÷ 0.5 [1] = 1000 [1] Pa or N/m^2 [1]	[4]	4
6	**(a)**	Hooke's law	[1]	
	(b) **(i)**	2 N = 4 cm [1] 1 N = 2 cm [1]	[2]	
	(ii)	3 N = 6 cm [1] (efc from 6(i)) 13 – 6 = 7 [1] (cm)	[2]	5

			AVAILABLE MARKS
7	**(a)** Neutron 0 [1] in the nucleus [1] Electron –1 [1] orbits nucleus [1] [4]		
	(b) **(i)** 6 [1]		
	(ii) 6 [1]		
	(iii) 8 [1]		7
8	**(a)** Bus [1], bigger mass [1] [2]		
	(b) KE =1 ÷ 2 m v^2 [1] = 0.5 × 50 × 25 [1] = 625 [1] (J) [3]		5
9	**(a)** **(i)** Beta/symbol [1]		
	(ii) Gamma/symbol [1]		
	(b) Gamma/symbol [1]		3

10 Indicative content

Metre stick and weights both mentioned [1]
Balance metre stick [1]
Place objects on both sides [1]
Record weights [1]
Record distances to pivot [1]
Use $F_1 \times d_1 = F_2 \times d_2$ [1]
Repeat [1]

Band	Response	Mark
A	Candidates mention **at least 5** of the above points. Relevant material is organised with a high degree of clarity and coherence. They use excellent spelling, punctuation and grammar. The form and style are of a high standard and specialist terms are used appropriately.	[5]–[6]
B	Candidates explain **at least 3** of the above points. Relevant material is organised with some clarity and coherence. They use good spelling, punctuation and grammar. The form and style are of a satisfactory standard and they have made use of some specialist terms.	[3]–[4]
C	Candidates explain **1** of the above points. The organisation of material may lack clarity and coherence. They use limited spelling, punctuation and grammar. The form and style is of a limited standard and they have made no use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 6

11 (i) 0.2, 0.4, 0.8, 1.0 ([½] mark each – round up) [2]

(ii) Values on scale [1]
scale > ½ [1]
T^2/s^2 [1] [3]

(iii) Best fit line [1]

(iv) Yes [1]
Straight line through origin [1] [2]

(v) K = gradient = 0.6 ÷ 0.3 [1]
= 2.0 [1] [2] 10

Total **60**

AVAILABLE MARKS

General Certificate of Secondary Education
2018

Double Award Science
Physics

Unit P1

Higher Tier

[CODE]

SPECIMEN

MARK
SCHEME

			AVAILABLE MARKS
1	**(i)** Beta	[1]	
	(ii) Gamma	[1]	
	(iii) Gamma	[1]	3

2 **Indicative content**
Place objects on both sides [1]
Balance metre stick [1]
Record weights [1]
Record distances to pivot [1]
Use $F_1 \times d_1 = F_2 \times d_2$ [1]
Repeat [1]

Band	Response	Mark
A	Candidates mention **at least 5** of the above points. Relevant material is organised with a high degree of clarity and coherence. They use excellent spelling, punctuation and grammar. The form and style are of a high standard and specialist terms are used appropriately.	[5]–[6]
B	Candidates explain **at least 3** of the above points. Relevant material is organised with some clarity and coherence. They use good spelling, punctuation and grammar. The form and style are of a satisfactory standard and they have made use of some specialist terms.	[3]–[4]
C	Candidates explain **1** of the above points. The organisation of material may lack clarity and coherence. They use limited spelling, punctuation and grammar. The form and style is of a limited standard and they have made no use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 6

3	**(i)** 0.4, 0.8, 1.6, 2.0	[2]	
	(ii) Vertical Scale more than half [1] 5 or 6 points correct [2] 3 or 4 points correct [1] < 3 points correct [0]	[3]	
	(iii) Line of best fit through points	[1]	
	(iv) (Yes) Graph is straight line [1] through (0,0) [1]	[2]	

				AVAILABLE MARKS
	(v)	K = gradient or K = 1.6 ÷ 0.4 [1] = 4 (s^2/kg) [1]	[2]	
	(vi)	Spring would permanently deform	[1]	11
4	**(a)**	**(i)** 5 [1] (m/s)	[1]	
		(ii) (Uniform) acceleration [1]	[1]	
	(b)	A = gradient [1] = (11 – 5) ÷ 4 [1] = 1.5 [1] m/s^2 [1]	[4]	
	(c)	Distance = area [1] = (11 + 5) ÷ 2 × 4 [2] = 32 [1] (m)	[4]	10
5	**(i)**	Work = force × distance [1] = 25 000 × 1.5 [1] = 37 500 [1] (J)	[3]	
	(ii)	Power = work ÷ time [1] = 37500 ÷ 30 [1] (ecf from (i)) = 1250 [1] (W)	[3]	6
6	**(a)**	Same atomic no. [1] different mass no. [1]	[2]	
	(b)	40, 20 [2]; 0, –1 [2]	[4]	6
7	**(a)**	**(i)** 1 000 000	[1]	
		(ii) 1000	[1]	
		(iii) 1000	[1]	
	(b)	Mass = density × volume [1] = 0.18 × 500 [1] = 90 [1] Total mass = 240 [1] (kg)	[4]	7
8	**(a)**	When a body is in equilibrium [1] Sum of clockwise moments is equal to the sum of the anticlockwise moments [1] About any point [1]	[3]	
	(b)	ACM = CM [1] 300 × 18 = W × 24 [2] W = 225 [1] (N)	[4]	7

			AVAILABLE MARKS
9	**(a)**	Diff. in P.E. = m × g × diff. in height [1] = 1.2 × 10 × 0.2 [2] = 2.4 [1] (J) or allow alternative method using $PE_A - PE_B$	[4]
	(b)	K.E. = $\frac{1}{2}$ m v^2 [1] or $v = \sqrt{\frac{2KE}{m}}$ [1] k v = $\sqrt{(2 \times 3.75 \div 1.2)}$ [1] k v = 2.5 [1] (m/s)	[3]
			7
10	**(a)**	a = F ÷ m [1] = 1.5 × 10^4 ÷ 2500 [1] = 6 [1]	[3]
	(b)	Work done = force × distance [1] = 1.5 × 10^4 × 300 [1] = 4.5 × 10^6 [1] = 4.5 [1] (MJ)	[4]
			7
		Total	**70**

General Certificate of Secondary Education
2019

Double Award Science
Physics

Unit P2

Foundation Tier

[CODE]

SPECIMEN

MARK
SCHEME

					AVAILABLE MARKS
1	**(a)**	**(i)**	3 [1] Hz [1]	[2]	
		(ii)	Energy	[1]	
		(iii)	$v = f \times \lambda$ [1] $v = 3 \times 5$ [1] (est from (i)) = 15 [1]	[3]	
		(iv)	Sound [1] Ultrasound [1]	[2]	8
2	**(a)**	**(i)**	Electromagnetic	[1]	
		(ii)	X-Ray	[1]	
	(b)		Toaster, TV remote, burglar alarm, night vision etc [1] Burns [1]	[2]	4
3	**(a)**	**(i)**	Diverging or concave	[1]	
		(ii)	Straight along dotted line	[1]	
	(b)	**(i)**	Converging or convex	[1]	
		(ii)	Top ray straight through focal point [1] Bottom ray straight through focal point [1]	[2]	
		(iii)	Camera or projector	[1]	6
4	**(a)**	**(i)**	Conductors allow electricity to pass through them easily (or converse for insulations)	[1]	
		(ii)	Electrons	[1]	
	(b)		$I = Q \div t$ [1] $= 6 \div 20$ [1] = 0.3 [1]	[3]	
	(c)		Correct symbols ammeter and variable resistor [1] Ammeter in series [1] Variable resistor in series [1]	[3]	
	(d)	**(i)**	4 V	[1]	
		(ii)	4 V	[1]	
		(iii)	0.4 A	[1]	
		(iv)	0.8 A (allow ecf from **(iii)**)	[1]	
		(v)	Parallel therefore HALF [1] 5 [1]	[2]	14

				AVAILABLE MARKS
5	**(a)**	kWh or Kilo-Watt-Hour [1]		
	(b)	**(i)** Units = power × time or Units = P × t [1] = 1.25 [1] [2]		
		(ii) Cost = units × price [1] = 1.25 × 16 [1] = 20p [1] (e.c.f. from **(b)(i)** for units) [3]		6
6	**(a)**	**(i)** Poles [1]		
		(ii) Repel or move away from each other [1] Like (poles) repel [1] [2]		
	(b)	**(i)** 1 complete loop similar to top [1] Arrow from N to S [1] [2]		
		(ii) Increase the current or number of coils or insert a (soft) iron core [1]		6
7	**(a)**	Scale [1] Axis label with unit [1] Points [2] [4]		
	(b)	Best fit (by eye) lines – 2 aspects for [1] each [2] Reject: dot-to-dot [2]		
	(c)	**(i)** 0 to 5 (seconds) [1]		
		(ii) Straight line [1] through origin [1] – Independent marks [2]		9
8	**(a)**	2 = Venus 4 = Mars 5 = Jupiter 8 = Neptune 1 mark for each planet [4]		
	(b)	Can travel through a vacuum [1] Travels in straight lines [1] [2]		
	(c)	Weather tracking **or** observation of earth **or** astronomy Or any other sensible alternative [2]		8

AVAILABLE MARKS

9 **(a)** Gravity [1]
Hydrogen [1]
Fusion [1] [3]

(b) **Indicative Content**

- Big Bang
- Huge Explosion
- Around 12–15 billion years ago
- Light from distant galaxies
- Is shifted to a longer wavelength or (red shifted)
- Expanded [6]

Band	Response	Mark
A	Candidates describe **5 or 6** of the above points. Relevant material is organised with a high degree of clarity and coherence. They use excellent spelling, punctuation and grammar. The form and style are of a high standard and specialist terms are used appropriately.	[5]–[6]
B	Candidates describe **3 or 4** of the above points. Relevant material is organised with some clarity and coherence. They use good spelling, punctuation and grammar. The form and style are of a satisfactory standard and they have made use of some specialist terms.	[3]–[4]
C	Candidates describe **1 or 2** of the above points. The organisation of material may lack clarity and coherence. They use limited spelling, punctuation and grammar. The form and style is of a limited standard and they have made no use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

9

Total **70**

General Certificate of Secondary Education
2019

Double Award Science
Physics

Unit P2

Higher Tier

[CODE]

SPECIMEN

MARK
SCHEME

				AVAILABLE MARKS
1	**(a)**	Transverse [1] Longitudinal [1]	[2]	
	(b)	**(i)** Transverse	[1]	
		(ii) Particles vibrate/oscillate [1] Perpendicular to wave direction or flow of energy [1]	[2]	
		(iii) Wavelength	[1]	
		(iv) Amplitude = 5m [1] Frequency = 0.5 Hz [1]	[2]	
	(c)	$\lambda = v \div f$ [1] $\lambda = 3 \times 10^8 \div 100 \times 10^6$ [2] (1 mark per substitution) = 3 m [1]	[4]	12
2	**(a)**	**(i)** Correct refraction entering glass [1] Below red ray [1]	[2]	
		(ii) They travel at different speeds	[1]	
		(iii) (1) Toaster, TV remote, burglar alarm, night vision etc [1] (2) Burns [1] (3) Microwaves or radio [1]	[3]	
	(b)	**(i)** Sound with a frequency [1] Greater than 20 000 Hz [1]	[2]	
		(ii) Ultrasound waves sent into body by probe/transducer [1] Reflection (echo) [1] Detected by receiver [1] (Any **two** points)	[2]	
		(iii) Speed ultrasound << speed of aircraft Will never hit/bounce off aircraft	[1]	11
3	**(a)**	Suitable scale [1] labelled correctly [1] 6 or more points correctly plotted [2] 5 points [1]	[4]	
	(b)	Straight line [1] levels off [1]	[2]	
	(c)	**(i)** Up to 5 (seconds) [1] or 0 to 5 (seconds)	[1]	
		(ii) Straight line [1], through origin [1] – Independent marks	[2]	
		(iii) Grad = rise/run or equivalent [1] = 0.20 [1] cm/s^2 [1]	[3]	12

AVAILABLE MARKS

4 **(a)** **(i)** Conductors contain free electrons insulators do not [1]

(ii) Electrons move [1]

(b) Q = I × t [1]
= 0.2 × 3 [1]
= 0.6 [1]
C [1] [4]

(c) **(i)** Keep temperature [1] and type of material constant [1] [2]

(ii) Correct symbols for ammeter, voltmeter and wire [1]
Ammeter in series [1]
Voltmeter in parallel [1] [3]

(iii) **Indicative content**

- Measure current and voltage [2]
- Use R = VI [1]
- Repeat [1] for different lengths [1]
- Draw a graph of R versus length [1]
- Conclusion R is directly proportional to length [1]

(Any five points) [6]

Band	Response	Mark
A	Candidates use appropriate specialist terms throughout to discuss fully and in a logical sequence **5** points shown in the indicative content above. Relevant material is organised with a high degree of clarity and coherence. They use excellent spelling, punctuation and grammar throughout and the form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms throughout to discuss and in a logical sequence **3 or 4** points shown in the indicative content above. Relevant material is organised with some clarity and coherence. They use good spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates use limited specialist terms to discuss **1 or 2** points shown in the indicative content above. The organisation of material may lack clarity and coherence. Their spelling, punctuation and grammar, form and style are of a limited standard.	[1]–[2]
D	Response not worthy of credit.	[0]

17

				AVAILABLE MARKS
5	**(a)**	12 Ω [1] 2 Ω [1] 8 Ω [1] Allow ECF from X and Y	[3]	
	(b)	600 mA [1] 200 mA [1] 400 mA [1]	[3]	
	(c)	**(i)** $V = I \times R$ [1] $= 600 \times 10^{-3}$ [1] $\times$ 5 [1] = 3 [1] V	[4]	
		(ii) $P = V \times I$ or $P = I^2 \times R$ [1] $= 3 \times 600 \times 10^{-3}$ [1] ECF from (c)(i) = 1.8 [1] W [1]	[4]	14
6	**(a)**	**(i)** C = Earth [1] D = Mars [1] H = Neptune [1]	[3]	
		(ii) Same direction as arrow on A	[1]	
		(iii) Jupiter, Saturn, Uranus or Neptune	[1]	
	(b)	Protostar [1] → Main Sequence [1] → Red giant [1]	[3]	
	(c)	Inward gravitational collapse [1] Is balanced by outward fusion pressure [1]	[2]	
	(d)	Red giants [1] Explode/super nova [1] Collapse [1] Neutron star or black hole [1]	[4]	14
			Total	**80**

General Certificate of Secondary Education
2019

Double Award Science

Unit 7

Practical Skills

Booklet A

Foundation Tier

[CODE]

SPECIMEN

MARK SCHEME

BIOLOGY

AVAILABLE MARKS

1 Any **three** from:
- mark for mesh dish with food/food on mounted needle/food basket held with tongs
- mark for boiling tube/test tube with water
- mark for no Bunsen burner under the food
- mark for thermometer in water/beside apparatus

[3]

2 Any **two** from:
- care when lighting Bunsen
- care when placing crisp on mounted needle
- care if burning crisp drops
- wear goggles
- care when clamping test tube/boiling tube in place/removing tube after experiment [2]

3 To make sure the heat is evenly distributed [1]

4 **(a)** **(i)** Record initial temperature
Record final temperature (must be higher than initial temperature [2]

(ii) Correct temperature rises calculated [1]

(b) Correct energy values calculated from their results (–1 for each error) [2]

(c) Correct average energy values calculated (–1 for each error) [2]

(d) Correct comparison of energy content of three types of crisps from their results; appropriate data given [2] 15

Biology Total **15**

CHEMISTRY

AVAILABLE MARKS

1 **(a)** Red [1]

(b) 1–2 [1]

2 Sample results:

Volume of sodium hydroxide added (cm^3)	Temperature (°C)
0	16
1	18
2	20
3	21
4	22
5	23
6	24
7	24
8	25
9	25
10	25
11	24
12	24
13	23
14	23
15	22
16	22
17	21
18	21
19	20
20	20

[1]

3 19–20 points correctly plotted [3]
15–18 points correctly plotted [2]
12–15 points correctly plotted [1] [3]

4 First line of best fit [1]
Second line of best fit [1] [2]

		AVAILABLE MARKS
5	Correctly identified from graph [1]	
6	All [1] the acid is neutralised (by the alkali) [1] 1st mark is dependent on the 2nd mark [2]	
7	**(a)** Temperature probe/pH meter [1]	
	(b) More precise reading/gives a reading to a certain decimal place [1]	
8	**(a)** Acid/alkali is corrosive/glassware can break/other relevant alternative [1]	
	(b) Wear gloves/goggles/other relevant alternative [1]	15
	Chemistry Total	**15**

PHYSICS

		AVAILABLE MARKS
1	Appropriate sketch [1] Labels [1] [2]	
2	Slope length recorded in cm e.g. 110 cm [1]	
3	(Gravitational) **Potential Energy** or **GPE** [1]	
4	Time recorded to 2 d.p. [1]	
5	Additional time consistent with (d) Don't penalise 2 d.p. if already penalised in (d) [1]	
6	Values recorded for each height (30cm, 40cm, 50cm) [1] mark each [3]	
7	Correct average time calculated for each height [½] mark for each correct calculation– round (up) [2]	
8	Correct average speed calculated for each height [½] mark each – round (up) [2]	
9	As height increases [1] average speed increases [1] [2]	15
	Physics Total	**15**

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General Certificate of Secondary Education
2019

Double Award Science

Unit 7

Practical Skills

Booklet A

Higher Tier

[CODE]

SPECIMEN

MARK SCHEME

BIOLOGY

	AVAILABLE MARKS

1 Any **three** from:
- mark for mesh dish with food/food on mounted needle/food basket held with tongs
- mark for boiling tube/test tube with water
- mark for no Bunsen under the food
- mark for thermometer in water/beside apparatus

[3]

2 **(a)** **(i)** Record initial temperature
Record final temperature (must be higher than initial temperature) [2]

(ii) Correct temperature rises calculated [1]

(b) Correct energy values calculated from their results (–1 for error) [2]

(c) Correct average energy values calculated (–1 for error) [2]

(d) Most fat in crisp has most energy [1]

(e) Any **two** problems with correct explanations:
Not stirred; not even distribution of heat; temperature not measured accurately; energy lost will not be accurate; energy lost to air/glass; temperature rise will not include all the energy from the crisp; incomplete burning of crisp/not all the energy from the crisp will be incorporated; crisp position not the same for all experiments; affects transfer of heat to test tube [4] 15

Biology Total **15**

CHEMISTRY

AVAILABLE MARKS

1 **(a)** Red [1]

(b) 1–2 [1]

2 Sample results:

Volume of sodium hydroxide added (cm^3)	Temperature (°C)
0	16
1	18
2	20
3	21
4	22
5	23
6	24
7	24
8	25
9	25
10	25
11	24
12	24
13	23
14	23
15	22
16	22
17	21
18	21
19	20
20	20

[1]

3 x-axis labelled with volume of sodium hydroxide added/cm^3 [1]
19–20 points correctly plotted [3]
15–18 points correctly plotted [2]
12–15 points correctly plotted [1] [4]

4 First line of best fit [1]
Second line of best fit [1] [2]

5 Correctly identified from graph [1]

6 All [1] the acid is neutralised (by the alkali) [1]
1st mark is dependent on the 2nd mark [2]

		AVAILABLE MARKS
7	Risk identified [1] e.g. acid is corrosive Hazard associated with the risk identified [1] e.g. acids can burn skin and/or eyes Steps taken to reduce this risk [1] e.g. goggles/gloves [3]	15
	Chemistry Total	**15**

PHYSICS

		AVAILABLE MARKS
1	Appropriate sketch [1] labels [1] [2]	
2	Slope length recorded in cm e.g. 110 cm [1]	
3	(Gravitational) **Potential Energy** or **GPE** [1]	
4	Time recorded to 2 d.p. [1]	
5	Additional time consistent with (d) Don't penalise 2 d.p. if already penalised in (d) [1]	
6	Values recorded for each height [1] All values to 2 d.p. [1] [2]	
7	Average times calculated for each height [1]	
8	Average speed calculated for each height [1]	
9	Correct substitution into $K = \frac{\text{Average Speed}}{\text{Height}}$ [1] Correct value of K from candidates table h = 20 cm [1] [2]	
10	Correct substitution into $K = \frac{\text{Average Speed}}{\text{Height}}$ [1] Correct value of K from candidates table h = 40 cm [1] [2]	
11	No, K values not constant [1]	15
	Physics Total	**15**

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General Certificate of Secondary Education
2019

Double Award Science
Biology

Unit 7 Practical Skills

Booklet B

Foundation Tier

[CODE]

SPECIMEN

MARK
SCHEME

		AVAILABLE MARKS
1	**(a)** Any **two** from: • Biological catalyst • Speeds up rate of reactions • Protein [2]	
	(b) **(i)** No starch present/iodine does not test for protein/iodine only tests for starch [1]	
	(ii) Starch is completely broken down in tube A/no starch in tube A 30 °C is correct temperature for amylase to function Starch is NOT broken down/remains in tube C/incompletely broken down/starch is still present Amylase is denatured/shape damaged in tube C [4]	
	(c) Lock and key [1]	8
2	**(a)** Any **four** points: • Use the fore and index fingers to measure the pulse on neck or wrist/use pulse meters/use ipad app • Measure pulse rate for a specified time • Example of how to work out pulse rate per minute (if measured) for less than one minute • Carry out process of taking pulse after each different exercise type • Leave time between each activity • Repeat each measurement of pulse three times [4]	
	(b) **(i)** 118 [1]	
	(ii) Carried out repeats [1]	
	(iii) Pulse just greater than resting/likely to be least strenuous/pulse less than other activities [1]	7

AVAILABLE MARKS

3 (a) Indicative Content

Boil in water
To stop reactions/kill the leaf

Heat in alcohol
To decolourise/remove chlorophyll

Add to warm water
To soften

Add iodine
explanation needs to match with correct description

Band	Response	Mark
A	Candidates use appropriate terms throughout to give **at least 5 or 6** points from the indicative content. Relevant material is organised with a high degree of clarity and coherence. Candidates use excellent spelling, punctuation and grammar skills. Form and style are of a high standard.	[5]–[6]
B	Candidates use appropriate terms throughout to give **at least 3 or 4** points from the indicative content. Relevant material is organised with a some degree of clarity and coherence They use good spelling, punctuation and grammar. Form and style are of a satisfactory standard.	[3]–[4]
C	Candidates use appropriate terms throughout to give **1 or 2** points from the indicative content. The organisation of material may lack clarity and coherence They use limited spelling, punctuation and grammar and have made little use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6]

(b) No carbon dioxide present in B but is present in C [1]
Carbon dioxide needed for photosynthesis/for starch formation[1] [2] 8

					AVAILABLE MARKS
4	**(a)**	**(i)**	Quadrat	[1]	
		(ii)	More species	[1]	
		(iii)	Any **two** from: • Soil moisture/soil fertility/nutrient status • pH/temperature (Do not accept light)	[2]	
	(b)	**(i)**	Shading correct	[1]	
		(ii)	Vegetation and air figure plotted correctly Shading correct	[2]	
		(iii)	Spiders	[1]	
	(c)		Any **four** from: • Less insects/food for chicks to feed on • Population decreases • Fewer breeding adults as chicks do not survive to adults • Chicks may be affected by eating insects with insecticide	[4]	12
			Booklet B Total		**35**

General Certificate of Secondary Education
2019

Double Award Science
Biology

Unit 7 Practical Skills

Booklet B

Higher Tier

[CODE]

SPECIMEN

MARK SCHEME

				AVAILABLE MARKS
1	**(a)**	**(i)**	Quadrat [1]	
		(ii)	More species [1]	
		(iii)	Any **two** from: • Soil moisture/soil fertility • nutrient status • pH/temperature (**do not** accept light) [2]	
	(b)	**(i)**	Shading correct [1]	
		(ii)	Vegetation and air figure plotted correctly [1] Shading correct [1] [2]	
		(iii)	Spiders [1]	
	(c)		Any **four** from: • Less insects/food for chicks to feed on • Population decreases • Fewer breeding adults as chicks do not survive to adults • Chicks may be affected by eating insects with insecticide [4]	12
2	**(a)**		Hypothesis: Increasing enzyme concentration shortens the time taken to break down milk/solution become clear Explanation: Because increasing enzyme concentration means there are more active sites Increasing enzyme concentration increases collisions between protein and enzyme Increasing enzyme concentration – more ES complexes formed More products formed/more amino acids formed [1] mark hypothesis [1] mark about collisions/enzyme structure/product [2]	
	(b)		For 100% enzyme concentration [1] Wide variation from mean/average [1] [2]	
	(c)		1st part up to 80% concentration agrees with hypothesis; As enzyme concentration increases (or data) time taken decreases 2nd part at 80–100 % levels off or no change Enzyme working as fast as possible/no more substrates/protein to break down/no more active sites available/substrate is limiting [4]	
	(d)		Any **two** from: • Temperature • pH • Same milk type [2]	10

		AVAILABLE MARKS
3 **(a)** **(i)**	Potometer [1]	
(ii)	Use the syringe [1]	
(b) **(i)**	Air bubble drawn in correctly/right hand side of the bubble at 6 [1]	
(ii)	8mm [1]	
(c)	**8** [1]	
(d) **(i)**	Fan or wind [1]	
(ii)	Bubble moves less/decrease/doesn't move at all [1]	

(e) Indicative content

Any **five** from:
- Warmer or temperature higher in 4
- Windier/the fan is on in 4
- More evaporation (inside the air spaces or cells in leaf)
- More diffusion (inside the air spaces or cells in leaf)
- Higher rate of transpiration/more transpiration through the stomata maintain diffusion gradient

Band	Response	Mark
A	Candidates use appropriate terms throughout to give **at least 5 or 6** points from the indicative content. Relevant material is organised with a high degree of clarity and coherence. Candidates use excellent spelling, punctuation and grammar skills. Form and style are of a high standard.	[5]–[6]
B	Candidates use appropriate terms throughout to give **at least 3 or 4** points from the indicative content. Relevant material is organised with a some clarity and coherence. They use good spelling, punctuation and grammar. Form and style are of a satisfactory standard.	[3]–[4]
C	Candidates use appropriate terms throughout to give **1 or 2** points from the indicative content. The organisation of material may lack clarity or coherence. They use limited spelling, punctuation and grammar and have made little use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 13

Booklet B Total **35**

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General Certificate of Secondary Education
2019

Double Award Science
Chemistry

Unit 7 Practical Skills

Booklet B

Foundation Tier

[CODE]

SPECIMEN

MARK
SCHEME

			AVAILABLE MARKS
1	**(a)** Heat and weigh [1] Until mass does not change [1]	[2]	
	(b) **(i)** 5.26 g	[1]	
	(ii) 2.16 g	[1]	
	(c) White [1] to blue [1]	[2]	6
2	**(a)** Individual marks are awarded for correctly labelled and recognisable drawing: No labels = [0] Reaction vessel [1] with reactants in contact [1] Connecting tube [1] Sealed vessel/system [1] Syringe [1] **essential** Stopclock [1] maximum [5]	[5]	
	(b) **(i)** 132 ± 2	[1]	
	(ii) Reaction is finished/no more gas is produced	[1]	
	(c) Steeper curve [1] Levels off at same volume – 110 cm^3 [1]	[2]	
	(d) Substance which increases [1] the rate of a reaction [1] **or** speeds up [1] a reaction [1] Without being used up/chemically unchanged at end (of reaction) [1]	[3]	12

3 Indicative Points

AVAILABLE MARKS

Similarities
All three gases are:
- colourless
- odourless
- not toxic
- tasteless
- all found in air

any other correct answer (for all three gases)
maximum 2 indicative points for similarities

Testing
- idea of testing in logical order, e.g. take **a** jar (not **the** gas jar) and test all three
- use a glowing splint/lit splint
- result: it relights/burns more brightly with oxygen
- add limewater
- result: it turns milky with carbon dioxide
- nitrogen identified by elimination

N.B. indicative points for results are dependent on correct tests

Band	Response	Mark
A	Candidates must use specialist terms throughout to plan the experiment (**7–8** indicative points required including the idea of testing in order). Relevant material is organised with a high degree of clarity and coherence. They use excellent spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some specialist terms to plan the experiment (**4–6** indicative points required). Relevant material is organised with some degree of clarity and coherence. They use good spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates give **1–3** of the indicative points but not necessarily in a logical sequence. the organisation of material may lack clarity and coherence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 6

		AVAILABLE MARKS
4 **(i)**	W: concentrated hydrochloric acid [1] X: nichrome/platinum [1] Y: blue [1] Z: green-blue [1] [4]	
(ii)	Clean the wire [1] Make the solid stick to the wire/dissolve the solid [1] [2]	6

5 **(a)**

Observation	Sodium	Potassium
Burns with an orange flame	✓ [1]	
Burns with a lilac flame		✓ [1]
Turns into a ball	✓ [1]	

[3]

(b) **(i)** Alkali is present [1]

(ii) Hydrogen [1] 5

Total **35**

General Certificate of Secondary Education
2019

Double Award Science
Chemistry

Unit 7 Practical Skills

Booklet B

Higher Tier

[CODE]

SPECIMEN

MARK SCHEME

			AVAILABLE MARKS
1	**(a)** Heat and weigh [1] Until mass does not change [1]	[2]	
	(b) **(i)** 5.26 g	[1]	
	(ii) 2.16 g	[1]	
	(iii) 3.10 g	[1]	
	(c) **(i)** 120	[1]	
	(ii) 0.026 [1] 0.018 [1]	[2]	
	(iii) 1:7 (carry error forward)	[1]	
	(iv) $MgSO_4.7H_2O$	[1]	
	(d) White [1] to blue [1]	[2]	12
2	**(a)** Sulfur/S	[1]	
	(b) **(i)** Any **two** from: • Same conical flask • Same concentration of hydrochloric acid • Same volume of hydrochloric acid • Same volume of sodium thiosulfate • Same total volume • Same temperature • Same cross (Do not accept same amount)	[2]	
	(ii) 0.03125	[1]	
	(iii) Increases	[1]	
	(iv) Any **two** from: • temperature • Volume of HCl, volume of $Na_2S_2O_3$ • Concentration of hydrochloric acid (do not accept catalyst or reference to surface area)	[2]	7

	AVAILABLE MARKS

3 Indicative Points

Similarities
All three gases are:
- colourless
- odourless
- not toxic
- tasteless
- all found in air

any other correct answer (for all three gases)
maximum 2 indicative points for similarities

Testing
- idea of testing in logical order, e.g. take **a** jar (not **the** gas jar) and test all three
- use a glowing splint/lit splint
- result: it relights/burns more brightly with oxygen
- add limewater
- result: it turns milky with carbon dioxide
- nitrogen identified by elimination

N.B. indicative points for results are dependent on correct tests

Band	Response	Mark
A	Candidates must use specialist terms throughout to plan the experiment (**7–8** indicative points required including the idea of testing in order). Relevant material is organised with a high degree of clarity and coherence. They use excellent spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some specialist terms to plan the experiment (**4–6** indicative points required). Relevant material is organised with some degree of clarity and coherence. They use good spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates give **1–3** of the indicative points but not necessarily in a logical sequence. the organisation of material may lack clarity and coherence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 6

			AVAILABLE MARKS
4	**(a)** Dip (the nichrome) wire [1] In concentrated [1] hydrochloric acid [1] Hold in blue Bunsen flame until no colour is produced/wire is clean [1]	[4]	
	(b) Copper(II) chloride: blue-green [1] Lithium chloride: crimson [1]	[2]	6
5	**(a)** Any **two** from: • Catches fire • Metal moves about the surface • Metal disappears • Heat given out • Vigorous reaction/bubbles/fizz • Gas given off	[2]	
	(b) Sodium – yellow flame/potassium – lilac flame [1] Sodium turns into a ball; potassium doesn't [1]	[2]	4
		Total	**35**

General Certificate of Secondary Education
2019

Double Award Science
Physics

Unit 7 Practical Skills

Booklet B

Foundation Tier

[CODE]

SPECIMEN

MARK
SCHEME

1 Indicative Content

AVAILABLE MARKS

Apparatus
- Scales/Stopclock/Measuring tape (Any 2)

Measurements
- Vertical distance **and** Time Taken (to climb)
- Weight of person (or mass × 10)

Equations
- Work Done = Force × Distance
- Power = Work Done ÷ Time Taken

Safety
- Place crash mat below (in case of a fall) [6]

Band	Response	Mark
A	Candidates describe **5 or 6** of the above points. Relevant material is organised with a high degree of clarity and coherence. They use excellent spelling, punctuation and grammar. The form and style are of a high standard and specialist terms are used appropriately.	[5]–[6]
B	Candidates describe **3 or 4** of the above points. Relevant material is organised with some clarity and coherence. They use good spelling, punctuation and grammar. The form and style are of a satisfactory standard and they have made some use of specialist terms.	[3]–[4]
C	Candidates describe **1 or 2** of the above points. The organisation of material may lack clarity and coherence. They use limited spelling, punctuation and grammar. The form and style are of a limited standard and they have made no use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

6

				AVAILABLE MARKS
2	**(a)**	Independent = Height (of slope) [1] Dependent = (Average) speed [1]	[2]	
	(b)	Any **two** from: Measurement → Height [1] using → Metre Rule [1] Measurement → Time [1] using → Stop clock [1] Measurement → Length (of slope) [1] using → Metre Rule [1]	[4]	
	(c)	Line through points (ignore origin)	[1]	
	(d)	As height increases average speed increases	[1]	
	(e)	Height = 25 cm [1] Because it does **not** fit the trend of the other points [1]	[2]	10
3	**(a)**	Variable power supply and switch both labelled	[1]	
	(b)	A inside circle in **series** [1], V in circle **parallel** with wire [1]	[2]	
	(c)	The current is directly **proportional** to the voltage	[1]	
	(d)	4 V	[1]	5
4	**(a)**	Normal – Dashed line **perpendicular** to boundary [1] i = Between incident ray and Normal [1] r = Between refracted ray and Normal [1]	[3]	
	(b)	Protractor	[1]	
	(c)	Speed **decreases** or slows down	[1]	
	(d)	**(i)** Vertical axis labelled [1] scale [1]	[2]	
		(ii) Horizontal axis labelled [1] scale [1]	[2]	
		(iii) 5 points correct –[1] mark for each incorrect point	[4]	
	(e)	Smooth curve through points	[1]	14
			Booklet B Total	**35**

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General Certificate of Secondary Education
2019

Double Award Science
Physics

Unit 7 Practical Skills

Booklet B

Higher Tier

[CODE]

SPECIMEN

MARK
SCHEME

		AVAILABLE MARKS
1	**Indicative Content**	
	Apparatus • Scales/Stopclock/Measuring tape (Any 2)	
	Measurements • Vertical distance **and** Time Taken (to climb) • Weight of person (or mass × 10)	
	Equations • Work Done = Force × Distance • Power = Work Done ÷ Time Taken	
	Safety • Place crash mat below (in case of fall) [6]	

Band	Response	Mark
A	Candidates describe **5 or 6** of the above points. Relevant material is organised with a high degree of clarity and coherence. They use excellent spelling, punctuation and grammar. The form and style are of a high standard and specialist terms are used appropriately.	[5]–[6]
B	Candidates describe **3 or 4** of the above points. Relevant material is organised with some clarity and coherence. They use good spelling, punctuation and grammar. The form and style are of a satisfactory standard and they have made some use of specialist terms.	[3]–[4]
C	Candidates describe **1 or 2** of the above points. The organisation of material may lack clarity and coherence. They use limited spelling, punctuation and grammar. The form and style are of a limited standard and they have made no use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

6

2 **(a)** Not a straight line through the origin [1]

(b) 25 mm [1]

(c) Large Triangle [1]
Value = 0.25 [1]
Unit = mm/g [1] [3]

(d) Straight line up to (800,350) [1]
Then a curve **upwards** [1] [2]

7

			AVAILABLE MARKS
3	**(a)** Independent = Voltage [1] Dependent = Current [1]	[2]	
	(b) Circuit diagram to include: • Ammeter • Voltmeter • Variable Power Supply (or fixed power supply and variable resistor) • Length of wire –1 for incorrect symbols (once only) –1 for no labels (once only)	[4]	
	(c) To make it a fair test [1] Control variable named, e.g. Temperature, CSA of wire, Type of material [1]	[2]	
	(d) Straight line through the origin	[1]	9
4	**(a)** Normal – (dashed) line **perpendicular** to boundary [1] i = Between incident ray and Normal [1] r = Between refracted ray and Normal [1]	[3]	
	(b) Change in **speed** or light slows down	[1]	
	(c) **(i)** Vertical axis labelled [1] scale [1]	[2]	
	(ii) Horizontal axis labelled [1] scale [1]	[2]	
	(iii) 5 points correct –[1] mark for each incorrect point	[4]	
	(d) Smooth curve through points	[1]	13
		Booklet B Total	**35**

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