

## GCSE Double Award (Unitised) Science Specimen Controlled Assessment

For first teaching from September 2011

For first assessment from November 2011

For first award in Summer 2013

Subject Code: 1370

# science

*double award - unitised*

*controlled assessment*

# Foreword

The awarding bodies have prepared new specifications to comply with revised GCSE and subject criteria. 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 controlled assessment materials contained in this booklet will help teachers and students to understand, as fully as possible, the types of tasks set at GCSE level. These specimen controlled assessments should be used in conjunction with CCEA's GCSE Double Award Science specification.

**\*The specimen assessment materials are published in three separate publications:**

- **Specimen Papers;**
- **Specimen Mark Schemes; and**
- **Specimen Controlled Assessment.**

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# GCSE Double Award Science

## Specimen Controlled Assessment Materials

The contents and page numbers below refer to those across three related publications. **Black** text has been used to indicate content and page numbers in this publication and pale **grey** text for content in the other two publications.

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## **CONTROLLED ASSESSMENT**





**General Certificate of Secondary Education**

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**GCSE Double Award Biology**

**SPECIMEN**

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**CONTROLLED  
ASSESSMENT TASK (CAT)  
AND  
GUIDANCE NOTES FOR  
TEACHERS**

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## Guidance on Controlled Assessment

### Controlled Assessment Task (CAT) – Food Tests: Vitamin C

Scurvy is a condition caused by a lack of vitamin C in the diet. Its symptoms include gum disease and pains in the muscles and joints. Scurvy was a common problem for sailors on long voyages during the eighteenth century because their diet lacked fresh fruit and vegetables. Today, scurvy is much less common because we have more fruit and vegetables in our diet. However, vitamin C deficiency can still be a problem for certain groups of people with poor diets which don't contain citrus fruits or vegetables.

Plan and carry out an investigation on one of the factors which affect vitamin C content in a range of juices.

### Guidance Notes for Teachers

Candidates should be given the opportunity to carry out an investigation on one of the different factors which affects vitamin C content in a range of juices.

One possible method would be to make up a 0.1% solution of vitamin C (100mg in 100 cm<sup>3</sup> of water giving a concentration of 1 mg cm<sup>-3</sup>) and a 1% solution of DCPIP. Measure how much DCPIP needs to be added to this known quantity of vitamin C until the end point is reached. This amount of DCPIP corresponds to 1mg cm<sup>-3</sup> of vitamin C. Repeat with the range of juices to be tested. Compare results with the known quantity of vitamin C to determine the quantity of vitamin C in each juice.

Candidates must identify the independent variable as either comparing boiled with non-boiled juice or age of juice, for a range of juices.

Candidates will be expected to process their results so that they calculate the vitamin C content for at least 3 juices in different conditions. This data must be contained within their results table and will be required for plotting a bar chart or other appropriate graph in the assessed Part C of the controlled assessment task (CA).

**Note:** This is only one suggested method. Candidates should be encouraged to engage with the scientific process by making their own planning decisions.

During the controlled assessment task (CAT), candidates must complete Part A: Planning and Risk Assessment and Part B: Data Collection in the **Pupil Response Booklet A** enclosed with this document. Part A is to be carried out under medium supervision and is assessed. Part B it to be carried out under limited supervision and is not assessed.

Candidates must complete Part C: Processing, Analysis and Evaluation in **Pupil Response Booklet B** enclosed with this document. Part C of the CAT is carried out under high control and is assessed.

## **Confidentiality**

The above notes and subsequent **Candidate Response Booklet B** must be kept confidential at all times and stored in a secure place e.g. a metal lockable cabinet.

## **Health and Safety**

Centre must ensure that all health and safety issues are addressed and that teachers supervise candidates to ensure that there is compliance with the necessary health and safety requirements during the data collection part of the CAT.

## **Marking**

Part A of the CAT should be marked using the generic mark descriptors for Planning and Risk Assessment as described in section 6.6 of the specification.

Part C of the CAT should be marked using the mark scheme provided.

**Please refer to the specification for more detailed guidance on the procedures and controls for carrying out the controlled assessment task.**

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## GCSE Double Award Biology

Controlled Assessment Task

Candidate Response Booklet A

Part A: Planning and Risk Assessment

Part B: Data Collection

**SPECIMEN**

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### INSTRUCTIONS TO CANDIDATES

- Complete your candidate name and centre number.
- Answer **all** questions in the spaces provided.
- You may ask your teacher for extra paper if required.

### INFORMATION FOR CANDIDATES

- The maximum mark for this part of the task is **18**.
- Quality of written communication will be assessed in **Part A** (Planning and Risk Assessment).

	Teacher Mark	Moderator Mark
Planning		
Risk Assessment		
Total		

Candidate Name: \_\_\_\_\_ Date: \_\_\_\_\_

Signature of candidate: \_\_\_\_\_

Signature of teacher: \_\_\_\_\_ Date: \_\_\_\_\_

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## Controlled Assessment Task

### Food Tests: Vitamin C

Candidates should read the information below carefully.

Scurvy is a condition caused by a lack of vitamin C in the diet. Its symptoms include gum disease and pains in the muscles and joints. Scurvy was a common problem for sailors on long voyages during the eighteenth century because their diet lacked fresh fruit and vegetables. Today, scurvy is much less common because we have more fruit and vegetables in our diet. However, vitamin C deficiency can still be a problem for certain groups of people with poor diets which don't contain citrus fruits or vegetables.

Plan and carry out an investigation on one of the factors which affect vitamin C content in a range of juices.









### **Part B: Data Collection**

Draw a blank results table in which to record and process your data.

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**QUESTIONS CONTINUE ON THE NEXT PAGE**

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## GCSE Double Award Biology

Controlled Assessment Task

Candidate Response Booklet B

Part C: Processing, Analysis and Evaluation

**SPECIMEN**

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### INSTRUCTIONS TO CANDIDATES

- Complete your candidate name and centre number.
- Answer **all** questions in the spaces provided.
- You may ask your teacher for extra graph paper or lined paper if required.

### INFORMATION FOR CANDIDATES

- The maximum mark for this part of the task is **27**.
- You may consult all the information and results contained in your **Candidate Response Booklet A**.

Question	Teacher Mark	Moderator Mark
1		
2		
3		
4		
5		
6		
7		
<b>Total</b>		

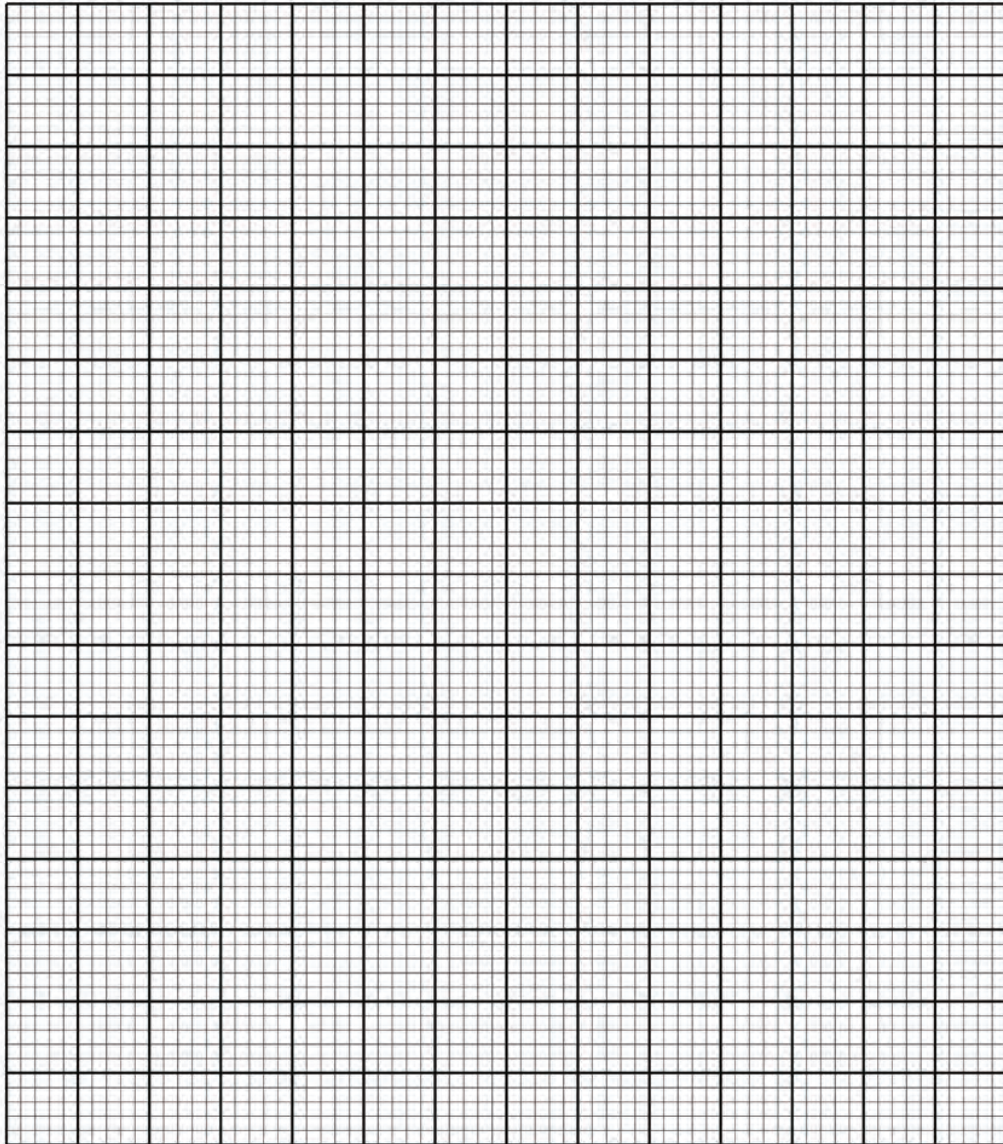
Candidate Name: \_\_\_\_\_ Date: \_\_\_\_\_

Signature of candidate: \_\_\_\_\_

Signature of teacher: \_\_\_\_\_ Date: \_\_\_\_\_

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- 1 On the graph grid below, draw an appropriate graph to show your results. Remember to include a title and to label each of the axes. Where appropriate, state the units used.



[3]



4 (a) You may have repeated readings in your experiment.

Give **two** reasons why this would be a good idea.

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[2]

(b) Are there any readings that you would repeat again if you could? Explain your answer.

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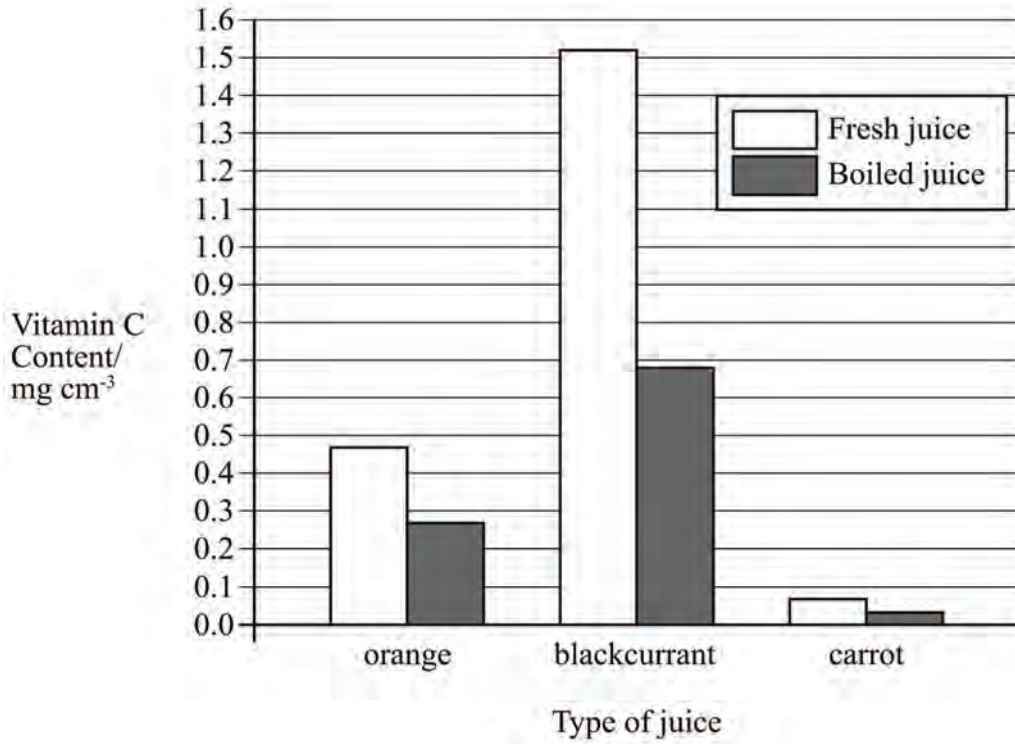
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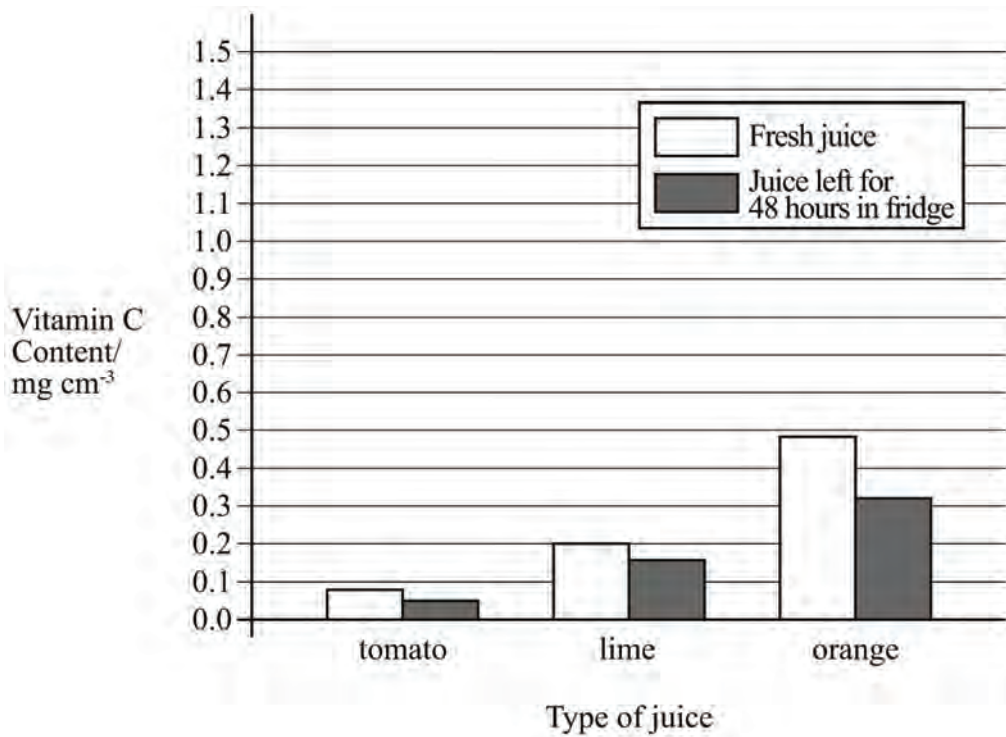
[2]

- 5 The following graphs show information from investigations to measure the vitamin C content of a range of fruit and vegetable juices under different conditions.

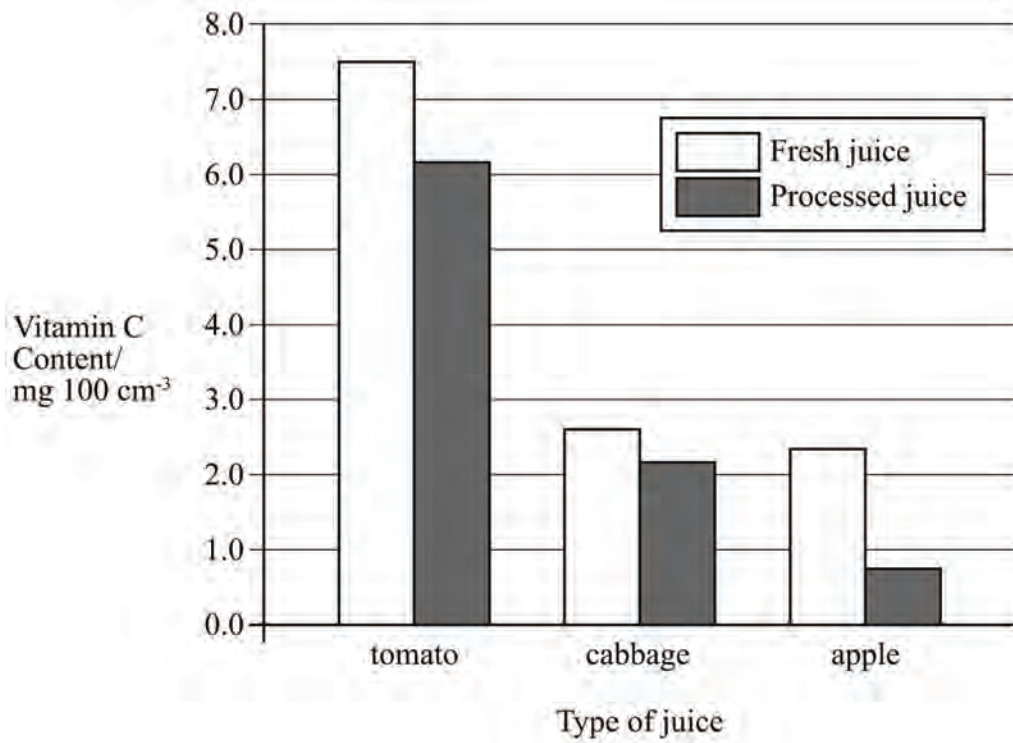
**Graph 1**



**Graph 2**



**Graph 3**



- (a) Which graph is from an investigation most similar to your own? Explain your answer.

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[2]

**The following questions relate to the graph you have chosen in part 5(a).**

- (b) Describe fully the trend shown by the results on the graph and compare this trend with the results for your own investigation.

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[3]

**6 You will need to look at graphs 1, 2 and 3 to answer this question.**

**(a)** Using evidence from these given graphs, describe the results for orange juice.

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[2]

**(b)** Explain why there are different height bars for tomato juice.

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[1]

**7** Evaluate your own results and the information in graphs 1, 2 and 3 to make some recommendations on how to increase the amount of vitamin C in our diet.

You must use the available data/information to support your answer.

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[3]

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**General Certificate of Secondary Education**

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**GCSE Double Award Biology**

**Controlled Assessment**

**[CODE]**

**SPECIMEN**

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**MARK  
SCHEME**

**(Part C – Processing, Analysis and Evaluation)**

**GCSE Double Award Biology – Controlled Assessment Task  
Food Tests: Vitamin C**

**Marking Guidelines**

<b>Question</b>	<b>Answer</b>	<b>Mark</b>	<b>Additional Guidance</b>
<b>1</b>	Both axes drawn, scaled and labelled correctly  At least three bars drawn correctly  Bars of equal width Gaps between bars (discrete data)	[1]  [1]  [1]	Tolerance for plotting top of each bar is +/- 2mm  If bar chart not drawn: Allow [1] for three points correctly plotted Where appropriate allow [1] for graph line drawn
<b>2</b>	Valid statement which reflects the trend seen  Reference to graph/results  Links independent and dependent variables  Correctly states if outcomes agree with hypothesis  Valid statement explaining why their conclusion either agrees or disagrees with their hypothesis	[1]  [1]  [1]  [1]  [1]	
<b>3(a)</b>	Any controlled variable  Only one factor can be changed	[1]  [1]	
<b>3(b)</b>	State one valid improvement  Explains correctly why improvement should be made	[1]  [1]	



Question	Answer	Mark	Additional Guidance
6(a)	<p>Amount of vitamin C in orange juice is reduced by boiling and/or leaving for a time in the fridge;</p> <p>Boiling has a greater effect/causes a greater reduction than leaving for a time in the fridge</p>	<p>[1]</p> <p>[1]</p>	
6(b)	The two graphs have different scales	[1]	Or equivalent
7	<p>Any 3 from:</p> <ul style="list-style-type: none"> <li>Blackcurrant juice at 1.52 (<math>\text{mg cm}^{-3}</math>) is the richest source of vitamin C or correct ref to higher reading from own results.</li> <li>Carrot juice at 0.6 (<math>\text{mg cm}^{-3}</math>) is the least rich source of vitamin C or correct ref to lower reading from own results.</li> <li>Correct unit used in one of readings: <math>\text{mg cm}^{-3}/\text{mg } 100\text{cm}^{-3}</math></li> <li>Referring to another poor source of vitamin C and citing amount contained</li> <li>Referring to another rich source of vitamin C and citing amount contained</li> <li>Fresh sources richer than boiled/ageing sources</li> </ul>	[3]	<p>Accept value of <math>152\text{mg } 100\text{cm}^{-3}</math> or <math>152\text{mg}/100\text{cm}^3</math> for blackcurrant</p> <p>Accept <math>\text{mg}/\text{cm}^3, \text{mg}/\text{ml}, \text{mg ml}^{-1}, \text{mg}/100\text{cm}^3, \text{mg}/100\text{ml}</math>  Allow mark if correct unit given in (i) or (ii)  No mark if incorrect unit given for (i) or (ii)</p>



General Certificate of Secondary Education

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**GCSE Double Award Chemistry**

**SPECIMEN**

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**CONTROLLED  
ASSESSMENT TASK (CAT)  
AND  
GUIDANCE NOTES FOR  
TEACHERS**

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## Guidance on Controlled Assessment

### Controlled Assessment Task (CAT) – Reaction Rates

Disappearing Statues!

The famous heads on Easter Island are wearing away! An ‘Adopt a Stone’ appeal has been launched in England to fund restoration of a famous monument. How can rainwater be wearing buildings and statues away so quickly?

Plan and carry out an investigation on one of the factors which affects the rate at which acid rain reacts with statues.

### Guidance Notes for Teachers

Candidates should be given an opportunity to investigate a factor that affects the reaction rates of an acid. Candidates should identify the independent variable as either concentration of acid or temperature.

One possible method might be measuring the mass lost from a stated mass of marble chips when reacting with hydrochloric acid over a time period.

**Note:** This is only one suggested method. Candidates should be encouraged to engage with the scientific process by making their own planning decisions.

Candidates will be expected to process their results so that they calculate at least 5 rates of reaction for a range of the chosen independent variable. This data must be contained within the results table and will be required for plotting a line graph in the assessed Part C of the controlled assessment task (CAT).

During the CAT, candidates must complete Part A: Planning and Risk Assessment and Part B: Data Collection in the **Pupil Response Booklet A**, enclosed with this document. Part A is to be carried out under medium supervision and is assessed. Part B is to be carried out under limited supervision and is not assessed.

Candidates must complete Part C: Processing, Analysis and Evaluation in the **Pupil Response Booklet B** enclosed with this document. Part C of the CAT is carried out under high control and is assessed.

### Confidentiality

These guidance notes and subsequent **Candidate Response Booklet B** must be kept confidential at all times and stored in a secure place e.g. a metal lockable cabinet.

### Health and Safety

Centres must ensure that all health and safety issues are addressed and that teachers supervise candidates to ensure that there is compliance with the necessary health and safety requirements during the data collection part of the CAT.

## **Marking**

Part A of the CAT should be marked using the generic mark descriptors for Planning and Risk Assessment as detailed in section 6.6 of the specification.

Part C of the CAT should be marked using the mark scheme provided.

**Please refer to the specification for more detailed guidance on the procedures and controls for carrying out the controlled assessment task.**

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**QUESTIONS CONTINUE ON THE NEXT PAGE**

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General Certificate of Secondary Education

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## GCSE Double Award Chemistry

Controlled Assessment Task

Candidate Response Booklet A

Part A: Planning and Risk Assessment

Part B: Data Collection

**SPECIMEN**

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### INSTRUCTIONS TO CANDIDATES

- Complete your candidate name and centre number.
- Answer **all** questions in the spaces provided.
- You may ask your teacher for extra paper if required.

### INFORMATION FOR CANDIDATES

- The maximum mark for this part of the task is **18**.
- Quality of written communication will be assessed in **Part A** (Planning and Risk Assessment).

	Teacher Mark	Moderator Mark
Planning		
Risk Assessment		
Total		

Candidate Name: \_\_\_\_\_ Date: \_\_\_\_\_

Signature of candidate: \_\_\_\_\_

Signature of teacher: \_\_\_\_\_ Date: \_\_\_\_\_

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## Controlled Assessment Task

### Reaction Rates

Candidates should read the information below carefully.

#### Disappearing Statues!

The famous heads on Easter Island are wearing away! An 'Adopt a Stone' appeal has been launched in England to fund restoration of a famous monument. How can rainwater be wearing buildings and statues away so quickly?

Plan and carry out an investigation on one of the factors which affects the rate at which acid rain reacts with statues.









## **Part B: Data Collection**

Draw a blank results table. Use this to record and process your data.

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**QUESTIONS CONTINUE ON THE NEXT PAGE**

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General Certificate of Secondary Education

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Candidate Number

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## GCSE Double Award Chemistry

Controlled Assessment Task

Candidate Response Booklet B

Part C: Processing, Analysis and Evaluation

**SPECIMEN**

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### INSTRUCTIONS TO CANDIDATES

- Complete your candidate name and centre number.
- Answer **all** questions in the spaces provided.
- You may ask your teacher for extra graph paper or lined paper if required.

### INFORMATION FOR CANDIDATES

- The maximum mark for this part of the task is **27**.
- You may consult all the information and results contained in your **Candidate Response Booklet A**.

Question	Teacher Mark	Moderator Mark
1		
2		
3		
4		
5		
6		
7		
8		
9		
<b>Total</b>		

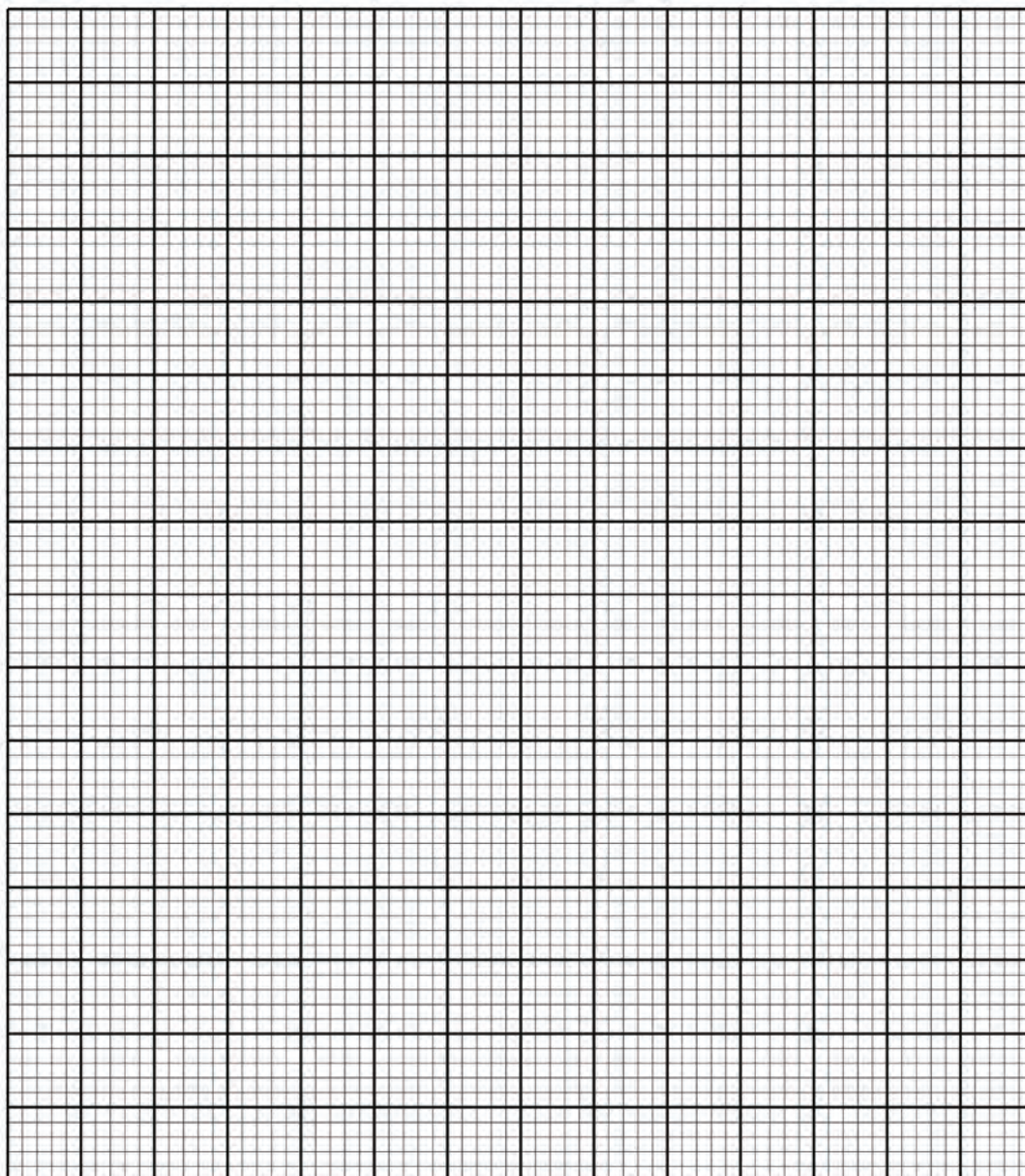
Candidate Name: \_\_\_\_\_ Date: \_\_\_\_\_

Signature of candidate: \_\_\_\_\_

Signature of teacher: \_\_\_\_\_ Date: \_\_\_\_\_

---

- 1 On the graph grid below, use the information in your results table to plot an appropriate graph. Remember to draw a line of best fit.



[4]



**Table A:**

A table showing the volume of gas collected from 20g of marble chips after 5 minutes when placed in 50cm<sup>3</sup> of different concentrations of hydrochloric acid.

Concentration of hydrochloric acid (m)	Experiment 1: Volume of gas (cm <sup>3</sup> )	Experiment 2: Volume of gas (cm <sup>3</sup> )	Average Volume of gas (cm <sup>3</sup> )
2.0	76	75	75.5
1.6	70	66	
1.2	60	62	61
0.8	48	54	51
0.4	20	37	28.5

**Table B:**

A table showing the volume of gas collected from 20g of marble chips after 5 minutes when placed in 50cm<sup>3</sup> of hydrochloric acid at different temperatures.

Temperature of hydrochloric acid (°C)	Experiment 1: Volume of gas (cm <sup>3</sup> )	Experiment 2: Volume of gas (cm <sup>3</sup> )	Average Volume of gas (cm <sup>3</sup> )
20	70	74	
30	78	84	81
40	98	93	95.5
50	115	110	112.5
60	100	122	111

**Table C:**

A table showing the volume of gas collected after 5 minutes from 20g of marble chips with different surface areas when placed in 50cm<sup>3</sup> of hydrochloric acid.

	Experiment 1: Volume of gas (cm <sup>3</sup> )	Experiment 2: Volume of gas (cm <sup>3</sup> )	Average Volume of gas (cm <sup>3</sup> )
Large marble chips	48	53	50.5
Medium marble chips	64	56	
Small marble chips	74	80	77
Very small marble chips	120	92	106

- 5 Which table of data (**A, B or C**) is from an investigation most similar to yours? Explain your answer.

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[2]

**The following questions (6–7) relate to the table of data that you have chosen in Question 5.**

- 6 Was the factor being measured in this investigation the same as the one you recorded in your own results? Explain your answer.

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[2]

- 7 (a) Complete the results table (for the investigation you chose in Question 5) to show all the average values for the measurements taken.

**You must show your working.**

[1]

- (b) Describe fully the trend shown by the results in the table and compare this trend with the results for your own investigation.

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[3]

**8** Look at Tables A, B and C. Which factor has the greatest effect on the volume of gas released from the marble chips? Explain your answer.

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[2]

**9** Choose one of the Tables A, B or C. Look at the results carefully.

(a) Identify an anomalous result in the table you have chosen.

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[1]

(b) Explain the advice you would give to the person carrying out this investigation to improve the reliability of the results.

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[2]



General Certificate of Secondary Education

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**GCSE Double Award Chemistry**

**Controlled Assessment**

**[CODE]**

**SPECIMEN**

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**MARK  
SCHEME**

**GCSE Double Award Chemistry – Controlled Assessment Task**  
**Reaction Rates: Magnesium and Hydrochloric Acid**

**Marking Guidelines**

Question	Answer	Mark	Additional Guidance
1	<p>x – axis: scaled correctly, labelled with correct quantity and unit [1]</p> <p>y – axis: scaled correctly, labelled with correct quantity and unit [1]</p> <p>Points plotted correctly [1]</p> <p>Line of best fit drawn correctly [1]</p>		Tolerance for plotting points is +/- 2 mm square both vertically and horizontally. Allow one plotting error
2	<p>Valid statement which reflects the trend seen in their results [1]</p> <p>Reference to graph/results [1]</p> <p>Links the independent and dependent variable [1]</p> <p>Correctly states if outcomes agree with hypothesis [1]</p> <p>Valid statement explaining why their conclusion either agrees or disagrees with their hypothesis [1]</p>		
3(a)	<p>Only <b>one</b> factor varied [1]</p> <p>All other factors remained the same [1]</p> <p><b>or</b></p> <p>State <b>two</b> factors which remain the same 2 x [1]</p>	[2]	
3(b)	Correct answer for investigation	[1]	

Question	Answer	Mark	Additional Guidance
4	Yes – identify result [1] Explain that it doesn't fit into pattern/trend [1] <b>or</b> No – All results [1] Fitted into pattern/trend [1]	[2]	
5	<b>A</b> or <b>B</b> as appropriate to candidate's own independent variable  Same independent variable or equivalent	[1]  [1]	<b>C</b> is incorrect, no marks awarded
6	Volume of gas collected/ released/given off (Same for <b>A</b> , <b>B</b> and <b>C</b> )  Correct explanation that this was/was not the same as their investigation. If not the same, stating the factor that they measured.	[1]  [1]	Accept rate at which gas collected
7(a)	<b>A</b> : 68 <b>or</b> <b>B</b> : 72 <b>or</b> <b>C</b> : 60	[1]	

Question	Answer	Mark	Additional Guidance
7(b)	<p><b>A:</b> As concentration of acid increases [1] more gas is released/gas released faster [1]</p> <p><b>or</b></p> <p><b>B:</b> As the temperature of acid increases [1] more gas is released/gas released faster [1]</p> <p><b>or</b></p> <p><b>C:</b> As the surface area increases/chips get smaller [1] more gas is released/gas released faster [1]</p> <p>Valid comparison with own results</p>	<p>[2]</p> <p>[1]</p>	Accept converse
8	Temperature; greatest volume of gas released	<p>[1]</p> <p>[1]</p>	



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**General Certificate of Secondary Education**

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**GCSE Double Award Physics**

**SPECIMEN**

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**CONTROLLED  
ASSESSMENT TASK (CAT)  
AND  
GUIDANCE NOTES FOR  
TEACHERS**

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## Guidance on Controlled Assessment

### Controlled Assessment Task (CAT) – Efficiency: Electric Motors

An energy efficiency rating must, by law, be shown on all fridges, freezers, fridge/freezers, washing machines, tumble dryers, washer dryers, dishwashers, electric ovens and light bulb packaging in the UK. A more energy efficient product will help you cut down your energy usage, and therefore reduce your gas and electricity bills.

Many of these products contain electric motors, the efficiency of which contributes to the overall energy efficiency rating of the product.

Plan and carry out an investigation on one or more of the different factors that affect the efficiency of an electric motor.

### Guidance Notes for Teachers

Candidates should be given the opportunity to carry out an investigation on one of the different factors which affect the % efficiency of an electric motor.

Candidates should identify the independent variables as either the load (mass) lifted, the height through which the load is lifted or the voltage supplied.

One possible method might be to measure the total energy input of the motor using the voltmeter/ammeter method, however joulemeters may be used if available. The useful energy output is calculated by measuring the load and the vertical distance moved and applying the equation  $PE = mgh$ . The % efficiency can then be found for each load.

**Note:** This is only one suggested method. Candidates should be encouraged to engage with the scientific process by making their own planning decisions.

Candidates will be expected to process their results so that they calculate at least five % efficiencies for a range of the chosen independent variable. This data must be contained within their results table and will be required for plotting a line graph in the assessed Part C of the controlled assessment task (CAT).

During the CAT, candidates must complete Part A: Planning and Risk Assessment and Part B: Data Collection in the **Pupil Response Booklet A** enclosed with this document. Part A is to be carried out under medium supervision and is assessed. Part B is to be carried out under limited supervision and is not assessed.

Candidates must complete Part C: Processing, Analysis and Evaluation in **Pupil Response Booklet B** enclosed with this document. Part C of the CAT is carried out under high control and is assessed.

### Confidentiality

These guidance notes and subsequent **Candidate Response Booklet B** must be kept confidential at all times and stored in a secure place e.g. a metal lockable cabinet.

## **Health and Safety**

Centre must ensure that all health and safety issues are addressed and that teachers supervise candidates to ensure that there is compliance with the necessary health and safety requirements during the data collection part of the CAT.

## **Marking**

Part A of the CAT should be marked using the generic mark descriptors for Planning and Risk Assessment as detailed in section 6.6 of the specification.

Part C of the CAT should be marked using the mark scheme provided.

**Please refer to the specification for more detailed guidance on the procedures and controls for carrying out the controlled assessment task.**

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**QUESTIONS CONTINUE ON THE NEXT PAGE**

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General Certificate of Secondary Education

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Candidate Number

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## GCSE Double Award Physics

Controlled Assessment Task

Candidate Response Booklet A

Part A: Planning and Risk Assessment

Part B: Data Collection

**SPECIMEN**

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### INSTRUCTIONS TO CANDIDATES

- Complete your candidate name and centre number.
- Answer **all** questions in the spaces provided.
- You may ask your teacher for extra paper if required.

### INFORMATION FOR CANDIDATES

- The maximum mark for this part of the task is **18**.
- Quality of written communication will be assessed in **Part A** (Planning and Risk Assessment).

	Teacher Mark	Moderator Mark
Planning		
Risk Assessment		
Total		

Candidate Name: \_\_\_\_\_ Date: \_\_\_\_\_

Signature of candidate: \_\_\_\_\_

Signature of teacher: \_\_\_\_\_ Date: \_\_\_\_\_

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## Controlled Assessment Task

### Efficiency: Electric Motors

Candidates should read the information below carefully.

An energy efficiency rating must, by law, be shown on all fridges, freezers, fridge/freezers, washing machines, tumble dryers, washer dryers, dishwashers, electric ovens and light bulb packaging in the UK. A more energy efficient product will help you cut down your energy usage, and therefore reduce your gas and electricity bills.

Many of these products contain electric motors, the efficiency of which contributes to the overall energy efficiency rating of the product.

Plan and carry out an investigation on one or more of the different factors that affect the efficiency of an electric motor.









## **Part B: Data Collection**

Draw a blank results table. Use this to record and process your data.

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General Certificate of Secondary Education

Centre Number

71

Candidate Number

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## GCSE Double Award Physics

Controlled Assessment Task

Candidate Response Booklet B

Part C: Processing, Analysis and Evaluation

**SPECIMEN**

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### INSTRUCTIONS TO CANDIDATES

- Complete your candidate name and centre number.
- Answer **all** questions in the spaces provided.
- You may ask your teacher for extra graph paper or lined paper if required.

### INFORMATION FOR CANDIDATES

- The maximum mark for this part of the task is **27**.
- You may consult all the information and results contained in your **Candidate Response Booklet A**.

Question	Teacher Mark	Moderator Mark
1		
2		
3		
4		
5		
6		

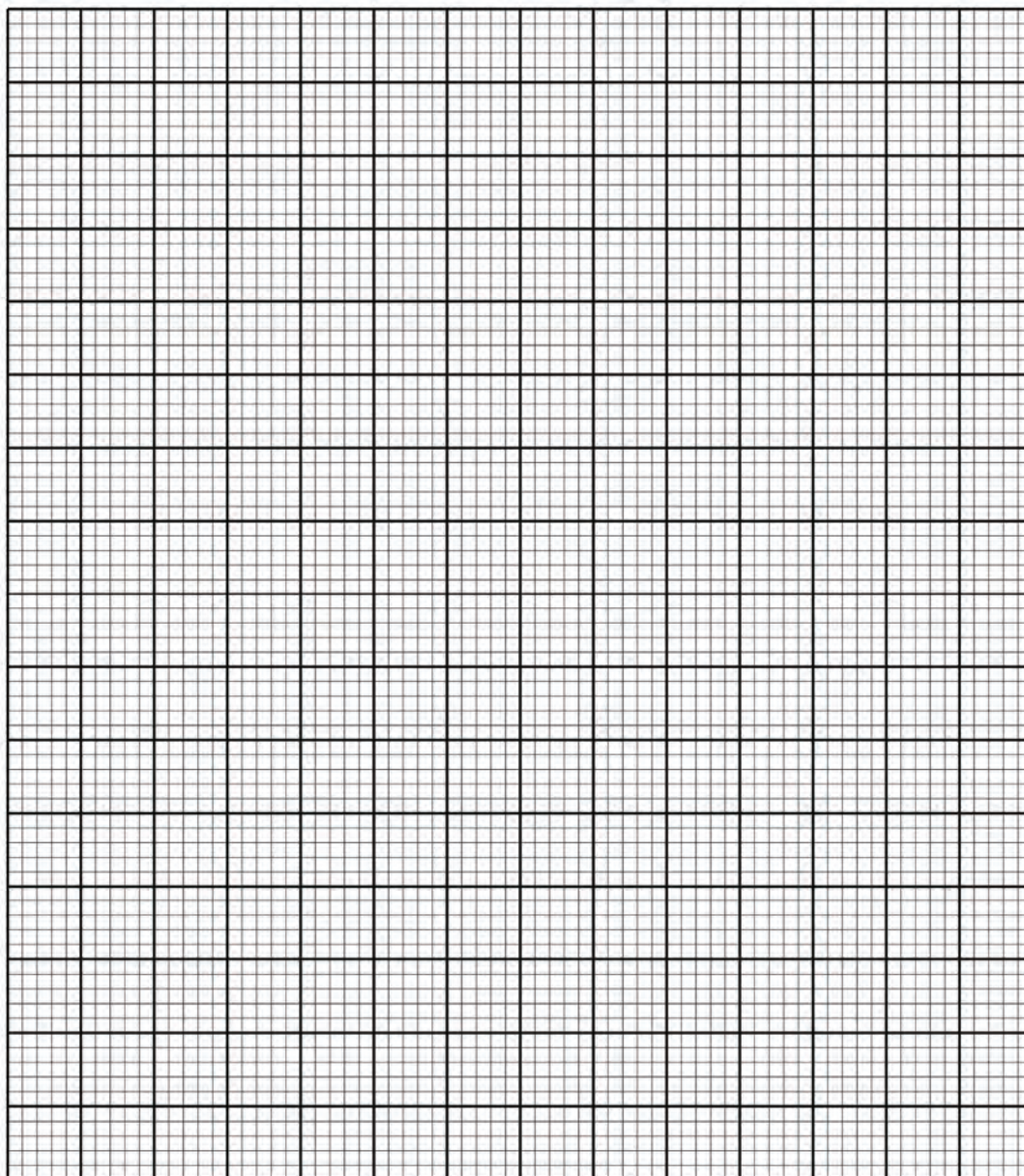
Candidate Name: \_\_\_\_\_ Date: \_\_\_\_\_

Signature of candidate: \_\_\_\_\_

Signature of teacher: \_\_\_\_\_ Date: \_\_\_\_\_

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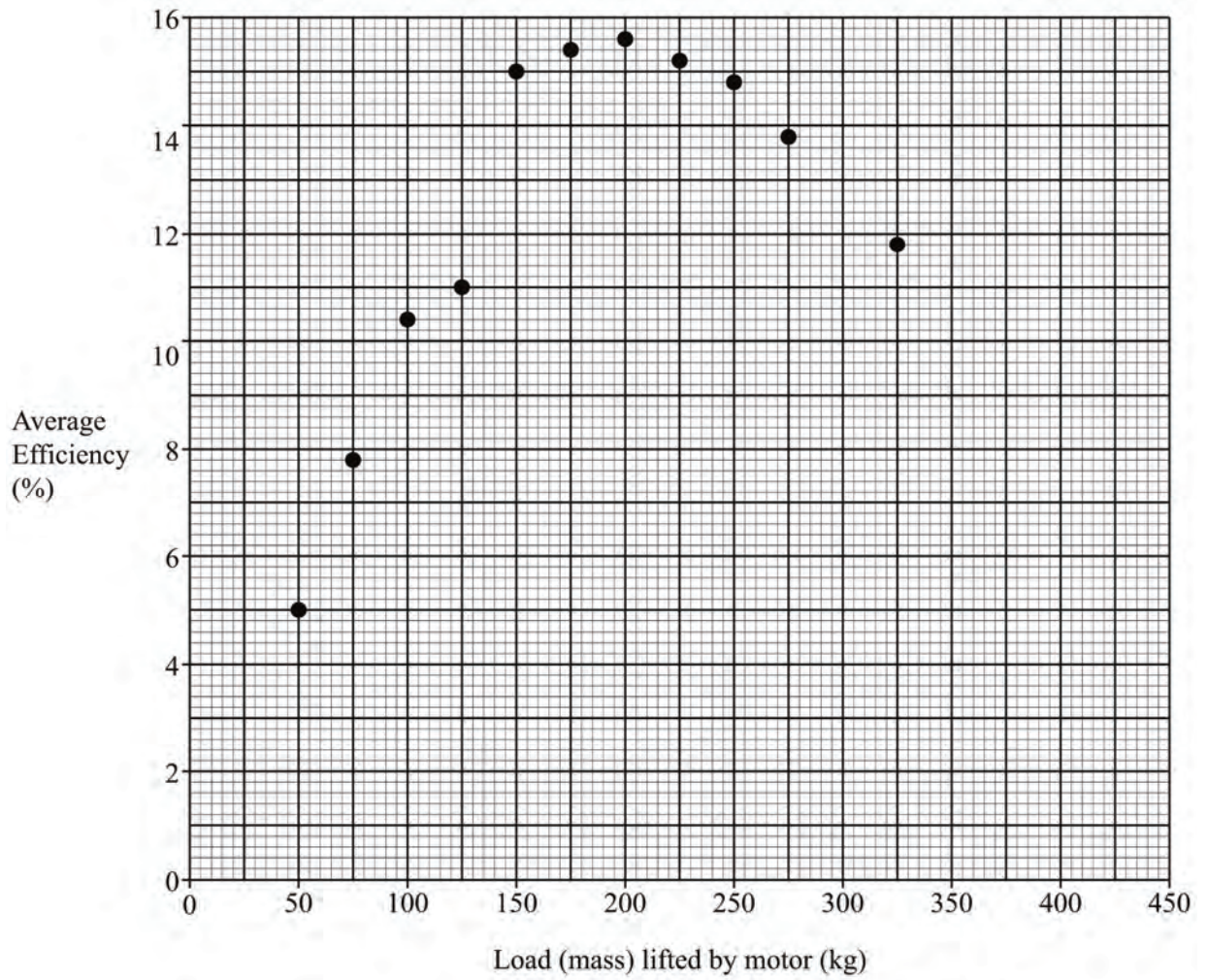
- 1 On the graph grid below, use the information in your results table to plot an appropriate graph. Remember to draw a line of best fit.



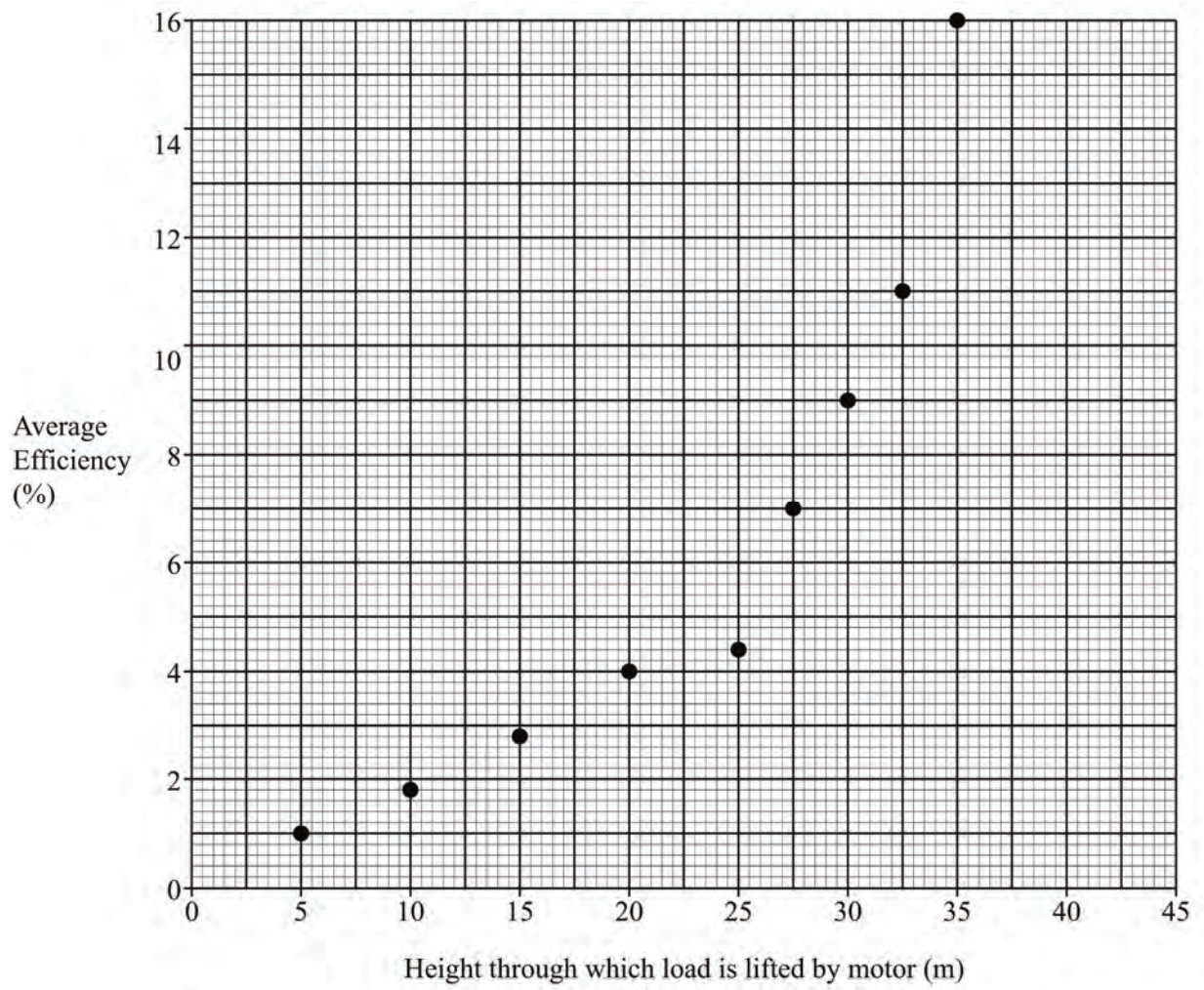
[4]



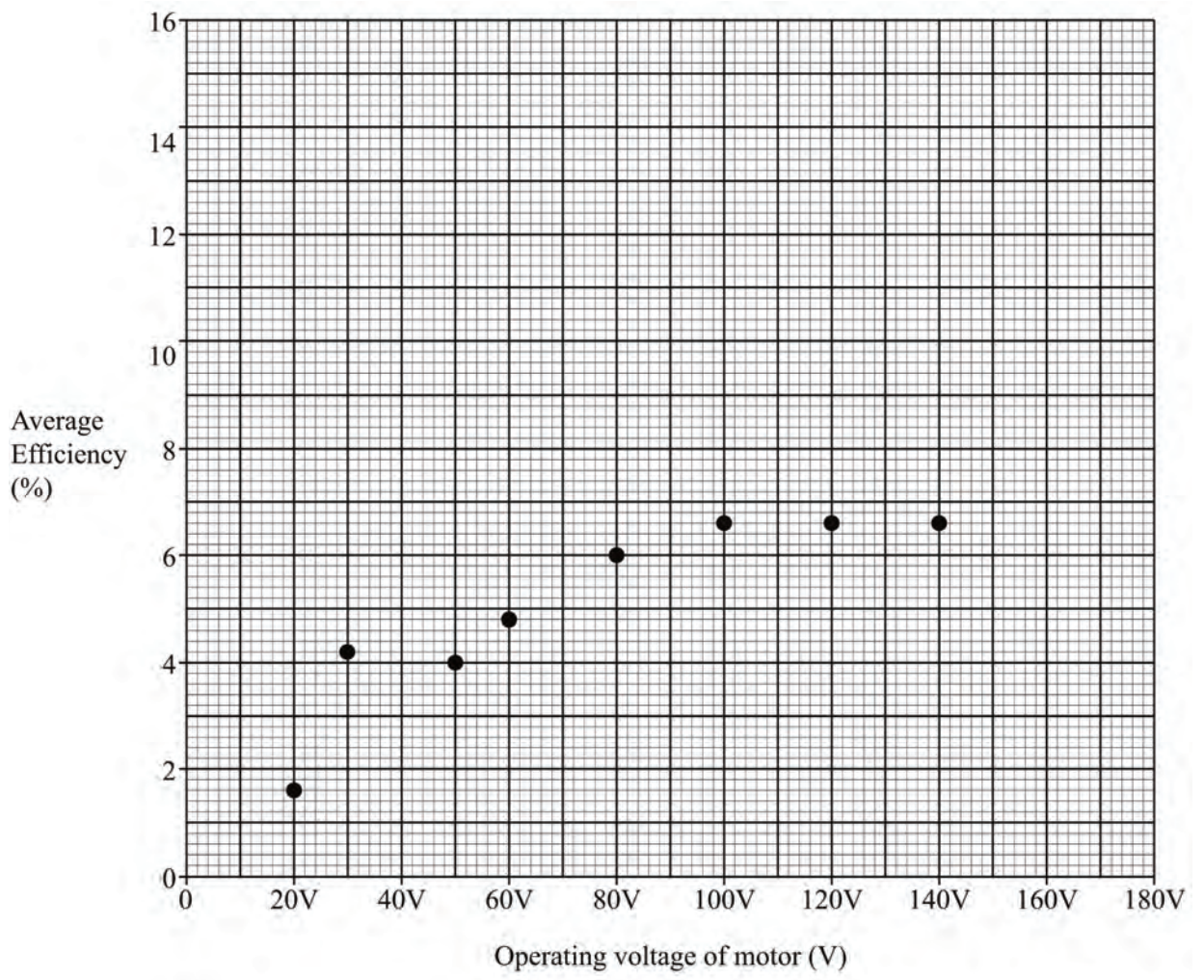
- 4 An electric crane manufacturer carries out a number of tests on the efficiency of the electric motor used in one of its electric cranes. The results for each test are shown below and overlaid on graphs 1–3.



**Graph 1**



**Graph 2**



**Graph 3**

- (a) Which graph is from an investigation most similar to your own?  
Explain your answer.

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[2]

**The following questions relate to the graph you have chosen in part 4(a).**

- (b) Are there any anomalous results in the graph you have chosen?  
Explain your answer.

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[2]

- (c) Describe fully the trend shown by the results on the graph and compare this trend with the results for your own investigation.

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[3]

5 Compare the largest % efficiency in your experiment with the largest % efficiency plotted on the graph you have chosen in **Question 4(a)**.

(a) What is the largest % efficiency plotted:

(i) On your **chosen** graph: \_\_\_\_\_%

(ii) On your **own** graph: \_\_\_\_\_% [1]

(b) Estimate the ratio of the above % efficiencies.

\_\_\_\_\_ [1]

(c) Look at the graph you have chosen.

Could this experiment be carried out in the school science laboratory? Give **one** reason for your answer.

\_\_\_\_\_  
\_\_\_\_\_ [1]

6 **Look carefully at graph 3.**

(a) Draw a best fit line for this graph. [1]

(b) Estimate the % efficiency of the motor when the operating voltage is 40V.

\_\_\_\_\_V [1]

(c) The manufacturer recommends that the motor should not be used at an operating voltage of <100V. Explain why this is the case.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

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General Certificate of Secondary Education

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**GCSE Double Award Physics**

**Controlled Assessment**

**[CODE]**

**SPECIMEN**

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**MARK  
SCHEME**

(Part C – Processing, Analysis, Evaluation)

**GCSE Double Award Physics – Controlled Assessment Task**  
**Efficiency: Electric Motors Text**

**Marking Guidelines – Part C (Processing, Analysis and Evaluation)**

<b>Question</b>	<b>Answer</b>	<b>Mark</b>	<b>Additional Guidance</b>
<b>1</b>	X axis: scaled correctly, labelled with correct quantity and unit [1] Y axis: scaled correctly, labelled with correct quantity and unit [1]  Points plotted correctly  Line of best fit drawn correctly	[2]  [1]  [1]	Tolerance for plotting points is +/- 1 small square both vertically and horizontally Allow one plotting error
<b>2</b>	Valid statement which reflects the trend seen  Reference to graph/results  Links the independent and dependent variable  Correctly states if outcomes agree/disagree with hypothesis  Valid statement explaining why their conclusion either agrees/disagrees with their hypothesis	[1]  [1]  [1]  [1]	
<b>3(a)</b>	Any controlled variable  Only one factor can be changed	[1]  [1]	Allow weight for load/mass  No mark for “To make it a fair test”
<b>3(b)</b>	States one valid improvement  Explains correctly why improvement should be made	[1]  [1]	A variety of responses may be worthy of credit. Teachers should use their professional judgement when considering these responses

Question	Answer	Mark	Additional Guidance
4(a)	<p>Graph 1, 2 or 3 as appropriate to candidate's own independent variable</p> <p>Same independent variable or equivalent</p>	<p>[1]</p> <p>[1]</p>	
4(b)	<p>Graph 1: Yes Explanation: 150kg for load does not fit the pattern/trend <b>or</b> Graph 2: Yes Explanation: 25m result for height does not fit the pattern/trend <b>or</b> Graph 3: Yes Explanation: 30V result for voltage does not fit the pattern/trend</p>	[2]	Accept "One result does not fit the pattern/trend"
4(c)	<p>Graph 1: Increases at start [1] Then decreases [1] <b>or</b> Graph 2: As height increases, efficiency increases [1] Graph not linear (or equivalent) [1] <b>or</b> Graph 3: (linear) increase at start [1] Then levels off [1] Valid comparison with their own results</p>	<p>[2]</p> <p>[1]</p>	

<b>5(a)</b>	Correctly reads maximum % efficiency from both chosen graph and own results	[1]	Must be exact
<b>5(b)</b>	Correct ratio calculated	[1]	Allow inverse ratio
<b>5(c)</b>	Values too large	[1]	Allow correct reference to safety
<b>6(a)</b>	Line of best fit drawn correctly	[1]	
<b>6(b)</b>	Efficiency is 3.2(%) +/- 0.2(%)	[1]	Allows +/- 0.2(%) efficiency This equates to +/- 1small square
<b>6(c)</b>	Below 100V	[1]	
	The efficiency decreases	[1]	

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