

Controlled Assessment – Science A ISA PU1.x
Specific Heat Capacity (Specimen)

For moderation in May 20xx or January 20xx

Teachers' Notes

This ISA relates to Science A Unit 3: P1.1

The transfer of energy by heating processes and the factors that affect the rate at which that energy is transferred

Topic of investigation

Energy can be transferred from one place to another by work or by heating processes. We need to know how this energy is transferred and which heating processes are most important in a particular situation.

Overview

Candidates should:

- plan practical ways to answer scientific questions and test hypotheses
- devise appropriate methods for the collection of numerical and other data
- assess and manage risks when carrying out practical work
- collect, process, analyse and interpret primary and secondary data including the use of appropriate technology
- draw evidence-based conclusions
- evaluate methods of data collection and the quality of the resulting data.

The teacher should describe the context in which the investigation is set and outline the problem that is to be investigated.

Once the candidates have researched and written up their own plan in the first part of the ISA they should carry out their investigation providing that it is workable, safe and manageable in the laboratory.

Candidates should be given the hypothesis:

There is a link between the mass of water being heated and the temperature rise.

Candidates will need to decide on which variables need to be controlled in order to investigate the hypothesis and research a method that could be used, with particular reference to hazards and risk assessment.

Candidates will be required, in Section 1 of the ISA, to provide a full plan of the method that they have chosen to use.

Risk Assessment

It is the responsibility of the centre to ensure that a risk assessment is carried out.

Stage 1 – Planning research (Limited control)

Candidates should be given the opportunity to plan an investigation to test the hypothesis. The investigation should be set in a context by the centre. Examples of suitable contexts could include electric storage heaters, oil-filled radiators or hot water tanks. Whichever context is chosen, the teacher must take care to present it in such a way that it does not limit the candidates' choice of method for the investigation. Teachers should instruct the candidates to write the chosen context on their research notes.

Candidates should then independently research an appropriate plan to test the hypothesis and decide for themselves factors such as the range, interval and number of repeat readings that they should take, and the variables that need to be controlled. They should use at least **two** sources for this research.

They will need to undertake independent research to identify **one** method that could be used. During this time they may make **one** A4 side of their **own** Candidate Research notes for use during Section 1 of the ISA. The Candidate Research notes sheet is attached as an appendix.

Candidates may use technology such as the internet or CD-ROMs, textbooks or any other appropriate sources of information for their research.

Candidates should also research how the results of the investigation might be useful in the specified context.

There is no set time allocation for this research, but it is anticipated that it should take no longer than 3 hours of work. This research may be done in the laboratory or elsewhere.

The teacher should check and sign these notes before allowing the candidate to use them during the completion of Section 1 of the ISA. The candidate may use these notes while completing Section 1 and Section 2 of the ISA. When the candidate has completed Section 2, the notes should be stapled to the ISA.

Stage 2 – Reporting on the planning research (High control)

For this stage, candidates must work individually under direct supervision.

After the Stage 1 planning session, candidates should be given Section 1 of the ISA and should work on their own, under controlled conditions, to answer it. Candidates may take brief notes of up to **one** A4 side of their **own** research into the formal assessment period. These must be checked to ensure they do not include plagiarised text, detailed planning grids or a pre-prepared draft.

Section 1 requires candidates to:

- consider the variables (independent, dependent and control) that they will need to manage during the investigation
- report on their research into how to test the hypothesis they have been given
- give reasons for why one method is preferable to the other
- write a detailed plan of their chosen method
- identify possible hazards and write down how the risks may be minimised
- draw a suitable blank table in which the results could be recorded for the method they have planned.

Candidates may choose to use technology to draw the table, eg a computer spreadsheet.

This must be done under the direct supervision of the teacher.

It should **not** be stored, but should be printed immediately and attached to the ISA paper.

While answering Section 1 of the ISA, candidates must **not** be allowed to use textbooks, the Internet or any other source of help apart from their **own** Candidate Research notes.

Stage 3 – Practical work (Limited control)

For this stage, candidates may work individually or in groups.

Candidates may work in groups to carry out their plans, but each candidate must contribute to the collection of data.

Candidates may use appropriate technology during the practical work, eg data loggers or sensors.

If the candidate is going to carry out his or her own plan, then the teacher may photocopy the plan from Section 1 of that candidate's ISA. This photocopy may then be given to the candidate to use during the practical session.

If the teacher deems that the plan produced by the candidate is invalid, unworkable, unsafe, unmanageable or for any other reason unsuitable, then the teacher may provide a method. An example of a suitable method is attached to these notes.

The teacher may also provide a blank table for the results:

- if the table produced by the candidate is inadequate - in which case the candidate would not be able to score full marks for producing a table
- if the candidate carries out an investigation from a method provided by the teacher, or the teacher prefers that the candidates use a particular format - in which case the candidate would be able to score full marks for producing a table

Stage 4 – Processing primary data (High control)

For this stage, candidates must work individually under direct supervision.

Candidates should be given back their table of results, and asked to display these on a bar chart or line graph. Candidates must decide for themselves which format is the more appropriate for any particular investigation. Candidates may use appropriate technology to do this, eg a graph-drawing program on a computer.

If a candidate chooses to use a computer, this must be done under the direct supervision of the teacher and the bar chart or line graph must be printed straight away.

Candidates must not be allowed to take their results and chart or graph away, the teacher must collect them at the end of the lesson.

Stage 5 – Analysing results (High control)

For this part of the investigation candidates must work individually under direct supervision.

AQA will provide a secondary data sheet.

The candidates should also be given a table of results from other candidates in the class, or the teacher's results. Candidates should use the results of others to analyse the validity of their own results.

Candidates should be given Section 2 of the ISA and should also be given:

- a copy of the question paper
- their own table of results
- a copy of the results of other candidates in the class
- their own chart or graph
- the AQA supplied Secondary Data Sheet
- their Candidate Research notes

The teacher should have recorded the marks for each candidate's table and graph/chart before these are given back. This will ensure that a candidate cannot gain an unfair advantage by making any alterations to them at this stage.

Section 2 will require candidates to:

- analyse their own results
- draw a conclusion
- match their achieved results to the original hypothesis that was given to them
- evaluate the method of collection and the quality of the resulting data
- analyse further secondary data drawn from the same topic area as their original investigation
- relate their findings to the context set in the ISA.

Example of a Method Sheet for Physics Controlled Assessment PU1.x**Specific Heat Capacity**

It is the responsibility of the centre to ensure that a risk assessment is carried out.

Hypothesis: There is a link between the mass of water being heated and the temperature rise.

You will need to prepare a table for the results.

Equipment

Large beakers

Measuring cylinder

Low voltage immersion heater + power supply **or** a Bunsen burner

Thermometer

Stopwatch

Method:

1. Measure out 1 kg of cold water into a large beaker.
2. Measure and record the initial temperature of the water.
3. Put an immersion heater into the water and switch on for a fixed period of time, eg 10 minutes.
4. Measure and record the temperature at the end.
5. Work out the change in temperature.
6. Repeat for several other masses of water.

NOTE:

If you are using a Bunsen burner instead of an electric immersion heater, make sure that you do not change the setting on the burner during the experiment.

**GCSE Science A (4405/ 4406) Additional Science (4408/4409)
Biology (4401) Chemistry (4402) Physics (4403)**

SCA4P ☐ AS4P ☐ BL4P ☐ CH4P ☐ PH4P ☐

Centre Number _____ Centre Name _____

Candidate's Name _____ Candidate's Number _____

Investigation Title

ISA number: _____

The notes the candidate takes into the Controlled Assessment task are to be recorded in the spaces on this sheet.

This sheet should be given to the teacher for checking before it is used in Section 1 of the ISA.

When Section 1 of the ISA has been completed, this sheet should be retained by the teacher for subsequent use with Section 2

When Section 2 of the ISA has been completed, this sheet should be stapled to it.

Declaration

I confirm that these are the only preparation notes used in the Controlled Assessment task.

Teacher signature

Candidate signature

Date: _____

This form can be downloaded from Secure Key Materials in e-AQA

Hypothesis

Research sources

Method(s)

Equipment

Risk assessment issues

Relating the investigation to the context

Centre Number						Candidate Number					For Teacher's Use	
Surname						Other Names						
Notice to Candidate. The work you submit for assessment must be your own. If you copy from someone else or allow another candidate to copy from you, or if you cheat in any other way, you may be disqualified.												
Candidate Declaration. I have read and understood the Notice to Candidate and can confirm that I have produced the attached work without assistance other than that which is acceptable under the scheme of assessment.											Section	Mark
											Section 1 (/20)	
											Section 2 (/30)	
											TOTAL (max 50)	
Candidate Signature						Date						



Science A (Specimen)

Controlled Assessment ISA PU1.x Specific Heat Capacity Section 1

For moderation in May 20xx or January 20xx

Time allowed up to 45 minutes

For this paper you must have:

- your Candidate Research notes
 - a pencil and a ruler
- You may use a calculator.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in **Section 1** in the spaces provided. You may use extra paper.
- Do all rough work in this book.
- Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 20.
- The maximum mark for the Controlled Assessment Unit is 50.
- You are reminded of the need for good English and clear presentation in your answers.

Details of additional assistance (if any). Has the candidate received any help or information from anyone other than the subject teacher(s) in the production of this work? If the answer is yes give the details below or on a separate page.

Yes ☐ No ☐

Teacher Declaration:

I confirm that the candidate's work was conducted under the conditions laid out by the specification. I have authenticated the candidate's work and am satisfied that to the best of my knowledge the work produced is solely that of the candidate.

Signature of teacher Date

As part of AQA's commitment to assist students, AQA may make your CAU available on a strictly anonymous basis to teachers, examining staff and students in paper form or electronically, through the Internet or other means, for the purpose of indicating a typical mark or for other educational purposes. In the unlikely event that your CAU is made available for the purposes stated above, you may object to this at any time and we will remove the work on reasonable notice. If you have any concerns please contact AQA

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Section 1

Hypothesis: There is a link between the mass of water being heated and the temperature rise.

1 Think about the research that you did to find out how to test this hypothesis.

Name **two** sources that you used for your research.

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Which of these sources did you find the more useful?

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Why was this source the more useful?

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(3 marks)

2 In this investigation, you will need to control some of the variables.

Write down **one** variable that will need to be controlled.

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Describe **briefly** how you would carry out a preliminary investigation to find a suitable value to use for this variable.

You should also explain how the results of this preliminary investigation will help you to decide on the best value for this variable.

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(3 marks)

- 3** *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Describe how you plan to do your investigation to test the hypothesis given.

You should include:

- the equipment that you plan to use
- how you will use the equipment
- the measurements that you are going to make
- how you will make it a fair test
- a risk assessment

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Turn over ►

(9 marks)

- 4** When you have completed your experimental work, you will be asked to share your results with others.

Explain the advantages of sharing your results with others.

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(3 marks)

- 5** Make sure that you hand in your Candidate Research notes and your blank table for the results with this paper.

You will be awarded up to two marks for your table.

(2 marks)

20

END OF SECTION 1

Centre Number						Candidate Number					
Surname						Other Names					
Notice to Candidate. The work you submit for assessment must be your own. If you copy from someone else or allow another candidate to copy from you, or if you cheat in any other way, you may be disqualified.											
Candidate Declaration. I have read and understood the Notice to Candidate and can confirm that I have produced the attached work without assistance other than that which is acceptable under the scheme of assessment.											
Candidate Signature						Date					

For Teacher's Use	
Section	Mark
Section 1 (/20)	
Section 2 (/30)	
TOTAL (/50)	



General Certificate of Secondary Education

Science A (Specimen)

Controlled Assessment ISA PU1.x Specific Heat Capacity Section 2

For moderation in May 20xx or January 20xx

Time allowed 50 minutes

For this paper you must have:

- results tables and charts or graphs from your investigation
- the Data Sheet(enclosed)
- your Candidate Research notes
- a pencil and a ruler

You may use a calculator.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in **Section 2** in the spaces provided.
- Do all rough work in this book.
- Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 30.
- The maximum mark for the Controlled Assessment Unit is 50.
- You are reminded of the need for good English and clear presentation in your answers.

Details of additional assistance (if any). Has the candidate received any help or information from anyone other than the subject teacher(s) in the production of this work? If the answer is yes give the details below or on a separate page.

Yes ☐ No ☐

Teacher Declaration:

I confirm that the candidate's work was conducted under the conditions laid out by the specification. I have authenticated the candidate's work and am satisfied that to the best of my knowledge the work produced is solely that of the candidate.

Signature of teacher Date

As part of AQA's commitment to assist students, AQA may make your CAU available on a strictly anonymous basis to teachers, examining staff and students in paper form or electronically, through the Internet or other means, for the purpose of indicating a typical mark or for other educational purposes. In the unlikely event that your CAU is made available for the purposes stated above, you may object to this at any time and we will remove the work on reasonable notice. If you have any concerns please contact cfg@aqa.org.uk

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Hypothesis: *There is a link between the mass of water being heated and the temperature rise.*

1 (a) What were the variables in the investigation you did?

The independent variable was

The dependent variable was

One control variable was.....

(3 marks)

1 (b) Think about the way in which you took your measurements.

Resolution means the smallest scale division on the measuring instrument that you were using.

What was the **resolution** of your measurement of the dependent variable?

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Do you think that this resolution was appropriate for this investigation?

Explain your answer.

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(3 marks)

1 (c) The hypothesis that you were given before you started your investigation is printed above.

Do the results support this hypothesis? Explain your answer.

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(3 marks)

1 (d) You have been given the results obtained by other people in your class or by your teacher.

Do these other results show that this investigation is reproducible?

Explain your answer using examples from the results.

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(3 marks)

1 (e) If you were to repeat your experiment, would you make any changes to your method?

Tick the box beside your answer.

Yes, I would make changes to my method

☐

No, I would not make changes to my method.

☐

Explain why you would or would not make any changes, using examples from your results.

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(3 marks)

Turn over ►

2 You have been given a **Data Sheet** which provides results from similar investigations.

2 (a) Draw a **sketch graph** of the results in **Case Study 1**.

The graph should show how the mean temperature rise varies with the mass of water being heated.



(2 marks)

2 (b) Explain whether or not the results on the Data Sheet support the hypothesis you were given.

To gain full marks your explanation should include appropriate examples from the results in Case Studies **1**, **2**, and **3**.

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(3 marks)

- 2 (c)** Use **Case Study 4** to answer this question.

What is the relationship between the specific heat capacity of a substance and the mean temperature rise of that substance?

Explain how well the information in Case Study 4 supports your answer.

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(3 marks)

- 3** Think about the context that you were given for this investigation.

How could the results of your investigation be useful in this context?

You may use information from your Candidate Research notes to help you to answer this question.

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(3 marks)

- 4** Make sure that you hand in your Candidate Research notes, results tables, and chart or graph with this paper.

You will be awarded up to four marks for your chart or graph.

(4 marks)

END OF QUESTIONS

Secondary Data Sheet – Controlled Assessment Science

PU1.x Specific Heat Capacity

Case Study 1

A group of students carried out an investigation similar to the one you did to test the hypothesis that there is a link between the mass of water being heated and the temperature rise.

The students carried out the investigation three times. They used the same spirit burner to heat the water. They heated the water for the same length of time in each test.

These are their results.

Mass of water being heated in grams	Temperature rise of water in degrees C			
	Test 1	Test 2	Test 3	Mean temperature rise in °C
100	24	26	23	24
200	13	14	13	13
300	7	9	7	8
400	6	7	5	6

Case Study 2

A second group of students carried out an investigation similar to the one you did to test the hypothesis that there is a link between the mass of water being heated and the temperature rise.

They carried out the investigation three times. They used the same electric immersion heater to heat the water. They heated the water for the same length of time in each test.

These are their results.

Mass of water being heated in grams	Temperature rise of the water in degrees C			
	Test 1	Test 2	Test 3	Mean temperature rise in °C
100	46	51	48	48
200	21	14	21	18
300	17	15	16	16
400	8	7	9	8

Case study 3

Students in a laboratory carried out tests to find out the temperature rise in 250 g of water when heated for different lengths of time. They used the same spirit burner for all tests. These are their results.

Length of time water heated in minutes	Temperature rise of the water in °C
5	37
10	62
15	74
20	85
25	94
30	100

Case study 4

Tests are being carried out in a building research laboratory. The scientists are testing four different oils and bricks.

They will use their results to find out which oil might be best for an oil filled radiator and whether night storage heaters, containing bricks, might be more cost effective for heating a room in a house.

Material	Specific heat capacity in J/kg °C
Fuel oil	1900
Light oil	2300
Olive oil	2000
Sesame oil	1600
Brick	800

The scientists heated 250 g of each of the test materials for 20 minutes. They did this by using an electric heater.

These are their results.

Material being tested	Temperature rise in degrees C			
	Test 1	Test 2	Test 3	Mean temperature rise in °C
Fuel oil	49	31	47	48
Light oil	41	39	42	41
Olive oil	47	47	49	46
Sesame oil	50	52	54	52
Brick	108	100	107	105

PU1.x Specific Heat Capacity - Specimen ISA - Marking Guidelines
GCSE Science – Controlled Assessment ISA – Marking Guidelines
Science ISA – PU1.x Specific Heat Capacity (Specimen)
For moderation in May 20xx or January 20xx

Please mark in red ink, and use one tick for one mark. Each part of each question must show some red ink to indicate that it has been seen. Subtotals for each part of each question should be written in the right-hand margin.

Enter the marks for **Section 1 and Section 2** and the **total mark** on the front cover of the answer booklet and fasten them together with the results table(s) and the graphical work and the candidate's research work from Section 1 of the ISA.

The teacher must sign and date the front cover of the ISA.

The papers must be kept in a secure place and must **not** be returned to the candidates.

These Marking Guidelines are largely generic. Additional guidance on how to relate these generic mark schemes to particular investigations is given below the generic section.

Read through the whole of the candidate's answer and use the Marking Guidelines below to arrive at a 'best-fit' mark.

The layout of questions on the ISA has been designed to help the candidate to structure an answer, but it does not matter if the candidate has written part of the answer in what you consider to be the wrong section.

SECTION 1				
Q. No.	0 marks	1 mark	2 marks	3 marks
1	No creditworthy response	Two relevant sources are clearly identified	Two relevant sources are clearly identified The usefulness of the sources is commented on.	Two relevant sources are clearly identified The usefulness of both is explained and a detailed comparison made.
Additional Guidance	<i>A clearly identified source is referred to by title and author or for websites at least the name of the web site should be quoted.</i> <i>A clear comment on only one of the sources may be sufficient to gain 2 marks if the answer implies a comment on the other source</i> <i>If candidates have taken part in peer discussion as part of their research, simply stating this is not sufficient to qualify for quoting a source.</i> <i>Similarly reference to the candidate's own notes or exercise book alone is insufficient.</i>			

PU1.x Specific Heat Capacity - Specimen ISA - Marking Guidelines

SECTION				
Q. No.	0 marks	1 mark	2 marks	3 marks
	No creditworthy response	A suitable control variable is stated	<p>A suitable control variable is stated</p> <p>Only one value to be investigated in the preliminary experiment is suggested</p>	<p>A suitable control variable is stated.</p> <p>The limits of the range to be investigated in the preliminary experiment are appropriate</p> <p>A statement concerning how the results could be used to determine the best value has been made</p>
Additional Guidance	<p><i>Suitable control variables are likely to be eg the length of time for which the water is heated. Do not accept suggestions such as 'always use the same thermometer'.</i></p> <p><i>The dependent variable will be the temperature rise after a specified time.</i></p> <p><i>The preliminary investigation is likely to involve testing two ends of a range to see if there is sufficient variation.</i></p>			

PU1.x Specific Heat Capacity - Specimen ISA - Marking Guidelines

SECTION 1				
Q. No. 3	<p>In this question candidates are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.</p> <p>Candidates will be required to use good English, organise information clearly and use specialist vocabulary where appropriate.</p> <p>In order to attain a mark within a certain level, both the science and the QWC must be of a standard appropriate to that level.</p>			
	0 marks	1, 2 or 3 marks	4, 5 or 6 marks	7, 8 or 9 marks
	No creditworthy response	<p>Most of the necessary equipment is listed</p> <p>The method described is weak but shows some understanding of the sequence of an investigation</p> <p>The measurements to be made are stated</p> <p>An appropriate hazard is identified, but the corresponding risk assessment and control measure is weak or absent</p> <p>The answer is poorly organised, with almost no specialist terms and little or no detail given</p> <p>The spelling, punctuation and grammar is very weak</p>	<p>All of the necessary equipment is listed</p> <p>The method described will enable valid results to be collected</p> <p>The measurements to be made are stated</p> <p>At least one control variable is given</p> <p>Any significant hazards are identified, together with a corresponding control measure but the risk assessment is weak or absent</p> <p>The answer has some structure and organisation, use of specialist terms has been attempted but not always correctly, and some detail is given</p> <p>The spelling, punctuation and grammar is reasonable although there may still be some errors</p>	<p>All of the necessary equipment is listed</p> <p>The method described will enable valid results to be collected</p> <p>The measurements to be made are stated</p> <p>Control variables are clearly identified, with details of how they will be monitored or controlled</p> <p>Any significant hazards are identified, together with an assessment of the associated risks and corresponding control measures</p> <p>The answer is coherent and written in an organised, logical sequence, containing a range of relevant specialist terms used correctly</p> <p>The answer shows almost faultless spelling, punctuation and grammar</p>
	<p>Additional Guidance</p> <p><i>Typical hazards with associated risk reduction might include: very hot water, high risk of scalding if beaker knocked over, restrict temperature rise to 40 °C</i></p> <p><i>It may be possible to credit a clearly labelled diagram for some of the marks</i></p>			

PU1.x Specific Heat Capacity - Specimen ISA - Marking Guidelines

SECTION 1				
Q. No.	0 marks	1 mark	2 marks	3 marks
	No creditworthy response	Allows you to check your results or calculate a more accurate mean	Enables you to compare your results with those of others to see if there are any similarities or differences. With more data you are able to calculate a more accurate mean and minimize the effect of random errors	Enables you to compare your results with those of others to see if there are any similarities or differences. With more data you are able to calculate a more accurate mean and minimize the effect of random errors Enables reproducibility to be confirmed
Table for Results				
Q. No.	0 marks	1 mark	2 marks	
	No table or a table with incomplete headings or units for the measured variables Fewer than half of the required elements are present	A table with incomplete headings or units for the measured variables At least half of the required elements should be present	Correct headings and units present for all measured variables	
Additional Guidance	<i>The table should be able to accommodate all the variables that the candidate is going to measure or record during the investigation. There is no need for the candidate to include columns for repeats, means or derived values.</i>			

PU1.x Specific Heat Capacity - Specimen ISA - Marking Guidelines

SECTION 2				
Q. No.	0 marks	1 mark	2 marks	3 marks
1 (a)	No creditworthy response	Any one variable correctly identified	Any two variables correctly identified	All three variables correctly identified
Additional Guidance	<p><i>The variables are likely to be:</i></p> <p><i>Independent - the mass of water heated</i></p> <p><i>Dependent - the temperature rise after a set period of time (simply "temperature rise" is insufficient)</i></p> <p><i>Control - the length of time for which energy was supplied or the amount of energy supplied</i></p>			
Q No.	0 marks	1 mark	2 marks	3 marks
1 (b)	No creditworthy response	A correct value for the resolution is given	<p>A correct value for the resolution is given</p> <p>A correct statement as to whether or not the resolution was appropriate is given, but the explanation is not clear</p>	<p>A correct value for the resolution is given</p> <p>A correct statement as to whether or not the resolution was appropriate is given and there is a clear explanation</p>
Additional Guidance	Look at the candidate's table of results in order to confirm the resolution. A clear explanation will convey that the candidate understands the term resolution.			

PU1.x Specific Heat Capacity - Specimen ISA - Marking Guidelines

SECTION 2				
	0 marks	1 mark	2 marks	3 marks
Q. No. 1 (c)	No creditworthy response	A simple statement is made as to whether or not the results support the hypothesis	A simple statement is made as to whether or not the results support the hypothesis and an explanation is provided using either an example from the candidate's results or a correctly identified pattern	A simple statement is made as to whether or not the results support the hypothesis and a detailed explanation is provided using either two examples from the candidate's results or a correctly identified patterns in the results
Additional Guidance	<i>Note that the answer should refer to the candidate's own results, and not simply to the expected result.</i>			
	0 marks	1 mark	2 marks	3 marks
Q No. 1 (d)	No creditworthy response	A statement is made as to whether or not the results are reproducible, with a reason stated	A statement is made as to whether or not the results are reproducible, with a reason stated and explained	A statement is made as to whether or not the results reproducible, with a reason stated and explained There is a detailed explanation supported by at least one example from the results
Additional Guidance		<i>e.g. other people have got the same results</i>	<i>e.g. other people have got the same results and they had the same shape of graph</i>	<i>e.g. other people have got similar results to mine, and we all got a 2 °C temperature rise for 1 kg of water and a 4 °C for 500 g water</i>

PU1.x Specific Heat Capacity - Specimen ISA - Marking Guidelines

SECTION 2				
Q. No. 1 (e)	NOTE: there is no mark for ticking the 'Yes' or 'No' box			
Yes, I would make changes	0 marks	1 mark	2 marks	3 marks
	No creditworthy response	Simple appropriate suggestion given as to why changes would be made	Simple appropriate suggestion given as to why changes would be made together with examples quoted from the results	Simple appropriate suggestion given as to why changes would be made together with examples quoted from the results plus an explanation of why these changes would improve the results
Additional Guidance	<p><i>Suggested reasons for changing or not changing the method are likely to refer to e.g.</i></p> <ul style="list-style-type: none"> <i>there is or is not a clear pattern,</i> <i>the range or interval was or was not suitable,</i> <i>the number of repeats was or was not appropriate</i> <i>the choice of measuring instruments was or was not suitable</i> 			
No, I would not make changes	0 marks	1 mark	2 marks	3 marks
	No creditworthy response	Simple appropriate suggestion given as to why no changes would be made	Simple appropriate suggestion given as to why no changes would be made together with examples quoted from the results	Simple appropriate suggestion given as to why no changes would be made together with examples quoted from the results plus a detailed explanation of why any change would not necessarily improve the results

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SECTION 2				
Q. No. 2 (a)	0 marks	1 mark		2 marks
	No creditworthy response	Both axes labelled (units not essential)		Both axes labelled (units not essential)
				and an appropriate line drawn
Additional Guidance	Axes should be labelled "mass (of water)" and either "temperature <u>rise</u>)" Accept axes drawn either way round (i.e. it doesn't matter which axis the mass is on) The line should be a concave curve, sloping from top left to bottom right			
Q. No. 2 (b)	0 marks	1 mark	2 marks	3 marks
	No creditworthy response	A clear statement is made that Case study 1 supports the hypothesis A simple correct statement is made about one of the other Case studies	A clear statement is made that Case study 1 supports the hypothesis Correct statements are made about both Case studies 2 and 3 supported by a more detailed explanation of one of them.	A clear statement is made that Case study 1 supports the hypothesis A clear statement is made that Case Study 2 supports the hypothesis accompanied by criticism of the experimental procedure. A clear explanation is given of why Case study 3 is irrelevant
Additional Guidance	An example of a clear statement for case study 1 is "the greater the mass of water, the smaller the temperature rise" Further explanation for case study 2 could include reference to the wider variation in results, or the incorrect calculation of a mean (for 200g) as an anomalous result has been included Further explanation for Case study 3 could include reference to the fact that the independent variable is not the same as the other two Case Studies			

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SECTION 2				
Q. No.	0 marks	1 mark	2 marks	3 marks
	No creditworthy response	There is a statement that the higher the specific heat capacity the smaller the temperature rise produced in the substance	There is a statement that the higher the specific heat capacity the smaller the temperature rise produced in the substance and some data is quoted to support this	There is a statement that the higher the specific heat capacity the smaller the temperature rise produced in the substance and some data is quoted to support this There is a realisation that any discerned relationship can only be an approximation using the data in the table, as the data contains some anomalies
Additional Guidance	<i>Data quoted might be eg the specific heat capacity of sesame oil is twice that of brick but the temperature rise produced is only half</i>			
Q. No.	0 marks	1 mark	2 marks	3 marks
	No creditworthy response	An idea from the research has been related to the context	An idea from the research has been related to the context There is a simple explanation of how this idea can be applied and used in the given context	An idea from the research has been related to the context There is a detailed explanation of how this idea can be applied in the given context
Additional Guidance	<i>The candidate should attempt to explain, e.g. how manufacturers of domestic hot water tanks could work out the optimum size for the tank</i>			

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Graph or chart			
Q. No. 4	Answer	Additional Guidance	Mark
	X axis: suitable scales chosen and labelled with quantity and units	Scale should be such that the plots occupy at least one third of each axis	1
	Y axis: suitable scales chosen and labelled with quantity and units	Accept axes reversed It may not always be necessary to show the origin	1
	Points or bars plotted correctly to within ± 1 mm	Allow one plotting error out of each 5 points/bars plotted	1
	Suitable line drawn on graph or bars correctly labelled on bar chart	Allow error carried forward from incorrect points If wrong type of graph / chart, maximum 3 marks If the independent variable is: <ul style="list-style-type: none"> continuous, should draw a best fit line NB If no line possible because there is no correlation, candidates should state this on the graph to gain the mark <ul style="list-style-type: none"> categoric, should draw a bar chart 	1