

**Controlled Assessment – Science A ISA CU1.exemplar  
Concrete (Specimen)**

**For moderation in May 20xx or January 20xx**

**Teachers' Notes**

**This ISA relates to Science A Unit 2 C1.2 Limestone and Building Materials**

***Topic of investigation***

Evaluate the developments in using limestone, cement and concrete as building materials, and their advantages and disadvantages over other materials.

We need to know how the strength of concrete is affected by varying the proportions of sand, cement, and aggregate.

**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 this is valid, safe and manageable in the laboratory.

Candidates should be given the hypothesis:

***The force required to break concrete is related to the proportions of sand, cement and aggregate present.***

Candidates will need to decide 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 and an outline of the other method they have researched. They will also be required to say why the chosen method is better than the alternative method.

**Risk Assessment**

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

## Stage 1 – Planning (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 the need to provide the strongest beam for a road bridge, or an economic mix for garden paths. 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.

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 up to **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 for their research, textbooks or any other appropriate sources of information.

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 will require them 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
- write a detailed plan of their chosen method
- identify possible hazards and write down how the risks may be minimised
- draw a blank table suitable for the method they have planned.

Candidates may choose to use technology to draw the table, e.g. a computer spread sheet.

**This must be done under the direct supervision of the teacher**, and may be done at any convenient time between the planning session in Stage 1 and the completion of Section 1 of the ISA.

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

### **Stage 3 – Practical Work (Limited control)**

**For this part of the investigation 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, e.g. data loggers or sensors.

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 plan. An example of a suitable plan 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 - 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 part of the investigation candidates must work individually under direct supervision.**

Candidates should be given back their table of results, or a table containing the pooled results of the class, 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, e.g. 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 must be printed straight away.

Candidates should 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:

- their own table of results
- a copy of the results of other candidates in the class
- a reminder of the context in which the investigation was set. This may be printed on the class results table.
- their own chart or graph
- the Secondary Data Sheet supplied by AQA
- 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.

## Method Sheet for Controlled Assessment CU1.x exemplar

### Concrete

**Hypothesis:** The force required to break concrete is related to the proportions of sand, cement and aggregate present.

You will need to prepare a table for the results.

#### **Equipment:**

5 concrete beams of different composition ( see below for details)

2 bricks

Wire or rope strap

Several 1kg masses

,

#### **Method:**

1. Support one beam across the two bricks. See diagram
2. Wrap the strap round the middle of the beam.
3. Add masses one at a time until the beam breaks.
4. Repeat the test for the other four beams.

#### **Making your concrete beams**

Suitable ratios for the concrete beams are given in the table. Sufficient water should be added to enable a very stiff but workable mixture.

<b>Mix</b>	<b>Cement (g)</b>	<b>Sand (g)</b>	<b>Aggregate (g)</b>
A	100	200	200
B	100	200	300
C	100	200	400
D	100	200	500
E	100	200	600

The concrete should be packed into suitable moulds and left to set.

**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**

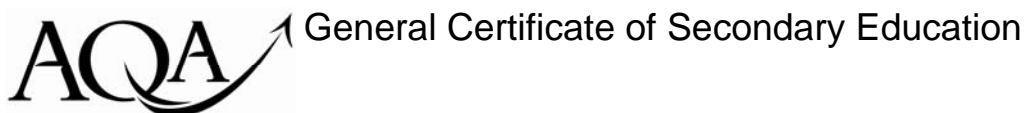
**Method(s)**

**Equipment**

**Risk assessment issues**

**Relating the investigation to the context**

Centre Number						Candidate Number					For Teacher's Use	
Surname						Other Names						
<b>Notice to Candidate.</b> 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.											Section	Mark
<b>Candidate Declaration.</b> 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 1 (/20)	
Candidate Signature						Date					Section 2 (/30)	
											TOTAL (max 50)	



# Science A (Specimen)

## Controlled Assessment ISA CU1.x Concrete Exemplar Section 1

For submission in May 20xx or January 20xx  
 Time allowed up to 45 minutes

- You will need**
- Your 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 .....

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**SECTION 1**

**Hypothesis:** *The force required to break concrete is related to the proportions of sand, cement and aggregate present.*

- 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.

.....  
.....

Which of these sources was the more useful, and why?

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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.

.....

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 work will help you to decide on the best value for this variable.

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(3 marks)





- 4** When you have completed your investigation, 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.

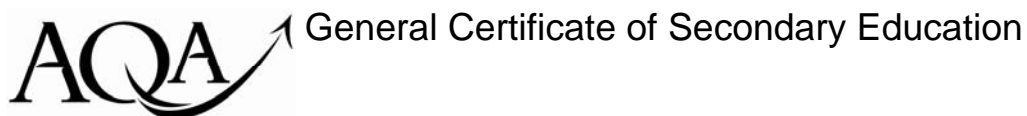
You will be awarded up to 2 marks for your table.

*(2 marks)*

**END OF SECTION 1**

Centre Number						Candidate Number					
Surname						Other Names					
<b>Notice to Candidate.</b> 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.											
<b>Candidate Declaration.</b> 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)	
<b>TOTAL</b> (/50)	



# Science A

## Controlled Assessment ISA CU1.x Concrete Exemplar - Section 2

For submission in May 20xx or January 20xx

**Time allowed** 50 minutes

<p><b>For this paper you must have:</b></p> <ul style="list-style-type: none"> <li>• Results tables and charts or graphs from your investigation</li> <li>• A copy of the pooled class results</li> <li>• The Secondary Data Sheet</li> <li>• Your Candidate Research notes</li> <li>• A pencil and ruler</li> </ul> <p style="text-align: right;">You may use a calculator</p>
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### 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. 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 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 .....

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**Section 2**

**Hypothesis:** *The force required to break concrete is related to the proportions of sand, cement and aggregate present.*

**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)** In your investigation you changed the mass of aggregate used.

What was the range of this variable?

The range was from.....g to.....g

If you had been able to use another value of this variable, either within or outside this range, what value would you have chosen?

Give a reason for your answer.

.....  
.....  
.....  
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(3 marks)

**1 (c)** Look at **your** results.

Did you repeat any of the results in your investigation?

Explain why you did or did not repeat any of your results.

Your explanation should include examples from your results.

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(3 marks)

**1 (d)** Do the results support the hypothesis you were given?  
Explain your answer.

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(3 marks)

**1 (e)** You have been given the results obtained by others in your class, or by your teacher.  
Do the results of others show similar patterns to your own results?  
Use results to justify your answer.

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(3 marks)

Turn over ►

**2** You have been given a Secondary 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 mass needed to break the beam changes with the mass of aggregate in the concrete beam.



(2 marks)

**2 (b)** Explain whether or not the results on the Secondary 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.  
Describe the relationship between the mass of aggregate and the force needed to break the concrete beam.

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(3 marks)

- 3** How could the results from your investigation be useful in the production of concrete for making a household drive?  
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 4 marks for your chart or graph.

(4 marks)

**END OF QUESTIONS**

30

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# Data Sheet – Controlled Assessment Chemistry

## CU1.x Concrete Exemplar

You will need to use all appropriate data to gain full marks in Section 2 of the ISA on Concrete.

### Case study 1

A group of students did an investigation similar to the one you have done to test the hypothesis that the force required to break concrete is related to the proportions of sand, cement and aggregate present. They kept the same mass of cement and sand and changed the mass of aggregate.

They did the investigation three times. These are their results.

Mass of aggregate in the beam in grams	Mean mass in kilograms needed to break the beam.
200	4.3
400	5.3
600	6.7
800	8.0
1000	9.3

### Case Study 2

A second group of students did an investigation to test the hypothesis that the force needed to break a concrete beam depended on the mass of aggregate in the beam. They kept the same mass of cement and sand and changed the mass of aggregate.

These are their results.

Mass of aggregate in the beam in grams	Force in newtons needed to break the beam.			
	Trial 1	Trial 2	Trial 3	Mean
200	58	54	56	56
300	82	88	85	85
400	113	117	116	115
500	146	194	149	163
600	177	173	177	176

### Case Study 3

A different group of students tested the mass needed to break a beam when the volume of water added to the mixture was varied.

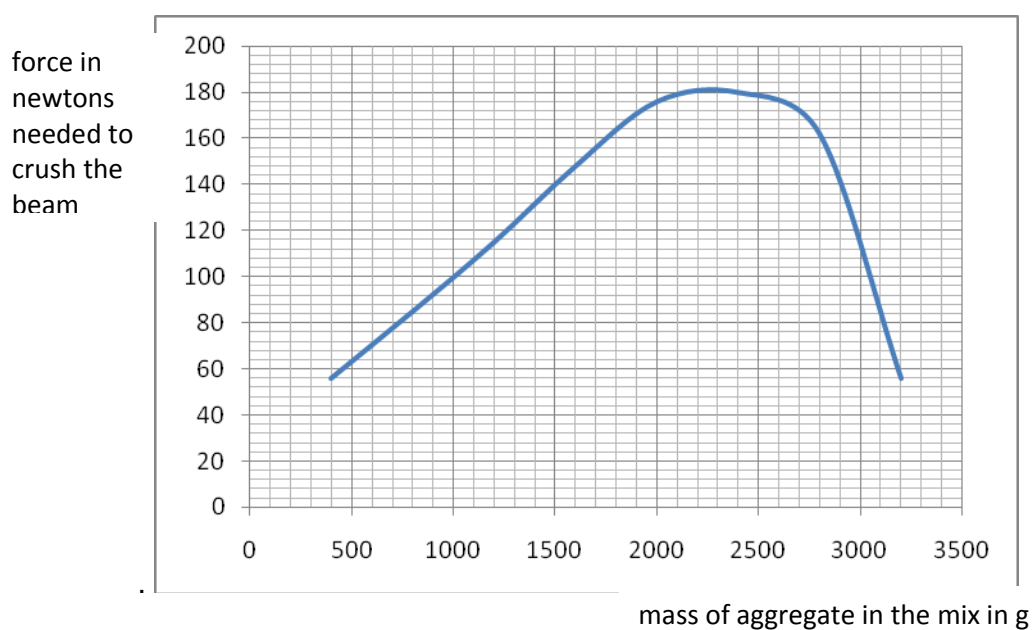
These are their results.

volume of water added in cm <sup>3</sup>	Mass of aggregate in the beam in grams	Mean mass in kilograms needed to break the beam.
500	500	5.9
600	500	6.7
700	500	7.5
800	500	7.5
900	500	6.8

### Case Study 4

A fourth group of students carried out the investigation into the force needed to break a concrete beam. They increased the mass of aggregate, and then measured the force needed to crush the beam. They repeated each test three times and calculated the mean.

They presented their results as a graph.



## CU1.x Concrete Exemplar ISA - Marking Guidelines

### GCSE Science – Controlled Assessment ISA – Marking Guidelines

#### Science ISA – CU1.x Concrete Exemplar 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 necessarily generic. Additional guidance on how to relate these generic mark schemes to particular investigations are 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 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 of a question.

#### SECTION 1

	0 marks	1 mark	2 marks	3 marks
<b>Q. No.</b> <b>1</b>	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.
<b>Additional Guidance</b>	<p><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></p> <p><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></p> <p><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. Similarly reference to their own notes or exercise book alone is insufficient.</i></p>			

## CU1.x Concrete Exemplar ISA - Marking Guidelines

SECTION 1				
	0 marks	1 mark	2 marks	3 marks
<b>Q. No. 2</b>	No creditworthy response	<p>There is a clear statement of one variable to be controlled</p> <p>A method for determining the value for this variable is attempted but is incomplete.</p> <p>Only one value to be investigated in the preliminary experiment is suggested.</p> <p>Little or no mention is made of how the work will be used to decide the value for the variable.</p>	<p>There is a clear statement of one variable to be controlled</p> <p>A method for determining the value for this variable is attempted but is incomplete.</p> <p>Values for the variable to be investigated in the preliminary experiment are suggested but may not all be appropriate.</p> <p>The dependent variable is stated, but details concerning its measurement are incomplete.</p> <p>A statement concerning how the results could be used has been made, but is unclear.</p>	<p>There is a clear statement of one variable to be controlled</p> <p>A suitable method for determining the value for this variable is stated.</p> <p>Appropriate values to be investigated in the preliminary experiment are suggested.</p> <p>Measurement of the dependent variable is correctly described.</p> <p>A clear statement concerning how the results could be used to determine the best value for the interval has been made.</p>
<b>Additional Guidance</b>	<p><i>A suitable method is likely to involve controlling the mass of sand, cement or volume of water..</i></p> <p><i>The way in which the results could be used is likely to refer to deciding whether or not there is sufficient (or too much) difference between force needed to break the beams</i></p> <p><i>Do <b>not</b> give full credit to a candidate who describes how to do the entire investigation at this stage</i></p>			



## CU1.x Concrete Exemplar ISA - Marking Guidelines

SECTION 1				
<b>Q. No. 4</b>	<b>0 marks</b>	<b>1 mark</b>	<b>2 marks</b>	<b>3 marks</b>
	No creditworthy response	Enables a check to be made of the results <b>OR</b> Enables calculation of a more accurate mean	Enables a comparison of the results with those of others to see if there are any similarities or differences in any trend.	Enables a comparison of the results with those of others to see if there are any similarities or differences in any trend.
			With more data it is possible to calculate a more accurate mean and minimize the effect of random errors	With more data it is possible to calculate a more accurate mean and minimize the effect of random errors
				The data comparison will help determine if the investigation is reproducible.
Table for the results				
<b>Q. No. 5</b>	<b>0 marks</b>	<b>1 mark</b>	<b>2 marks</b>	
	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.	
<b>Additional Guidance</b>	<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>			

## CU1.x Concrete Exemplar ISA - Marking Guidelines

SECTION 2				
Q. No. 1 (a)	0 marks	1 mark	2 marks	3 marks
	No creditworthy response	Any <b>one</b> variable correctly identified	Any <b>two</b> variables correctly identified	All <b>three</b> variables correctly identified
<b>Additional Guidance</b>	<p><i>The independent is the mass of aggregate</i></p> <p><i>The dependent is the force or mass needed to break the beam</i></p> <p><i>Examples of control variables are: mass of sand, cement, or volume of water, length, cross section of beam</i></p>			
SECTION 2				
Q. No. 1 (b)	0 marks	1 mark	2 marks	3 marks
	No creditworthy response	At least one end of the range is correctly stated	The range is correctly stated, according to the candidate's own results	The range is correctly stated, according to the candidate's own results
		Another value of the independent variable is suggested, although it may not be appropriate	Another appropriate value of the independent variable is suggested	Another appropriate value of the independent variable is suggested
				The reason given for the choice of the additional reading is appropriate
<b>Additional Guidance</b>	<p><i>An appropriate extra reading will usually be one of the following:</i></p> <ul style="list-style-type: none"> <li>• <i>an intermediate reading to fill in a gap, perhaps where the trend line becomes unclear</i></li> <li>• <i>a reading outside the range already investigated, perhaps to see if the trend continues</i></li> </ul>			



## CU1.x Concrete Exemplar ISA - Marking Guidelines

SECTION 2				
	0 marks	1 mark	2 marks	3 marks
<b>Q. No. 1 (c)</b>	No creditworthy response	There is a correct statement regarding whether or not any measurements were repeated  There is mention of the presence or absence of anomalous results	There is a correct statement regarding whether or not any measurements were repeated  There is reference to either anomalous results or to systematic or random uncertainties	There is a correct statement regarding whether or not any measurements were repeated and a clear indication of which results were repeated  There is reference to either anomalous results or to systematic or random uncertainties, and the effects that these would cause
<b>Additional Guidance</b>	<p><i>In order to gain maximum marks, the candidate should quote some examples from their results.</i></p> <p><i>The candidate may refer to a clearly anomalous result that needs repeating, or to the fact that not all the points lie comfortably on a line of best fit (random uncertainties) or to a systematic uncertainty, such as that caused by some experimental issue.</i></p>			
SECTION 2				
	0 marks	1 mark	2 marks	3 marks
<b>Q. No. 1 (d)</b>	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 <b>two</b> examples from the candidate's results or a correctly identified patterns in the results
<b>Additional Guidance</b>	<ul style="list-style-type: none"> <li><i>Note that the answer should refer to the candidate's own results, and not simply to the expected result.</i></li> </ul>			

## CU1.x Concrete Exemplar ISA - Marking Guidelines

SECTION 2				
	0 marks	1 mark	2 marks	3 marks
<b>Q. No. 1 (e)</b>	No creditworthy response	A simple statement is made as to whether or not the pattern of the pooled results is similar to the candidate's results.	A simple statement is made as to whether or not the pattern of the pooled results is similar to the candidate's results.  and an explanation is provided using either an example from the pooled results or a correctly identified pattern	A simple statement is made as to whether or not the pattern of the pooled results is similar to the candidate's results.  and a detailed explanation is provided using either <b>two</b> examples from the pooled results or a correctly identified patterns in the results
<b>Additional Guidance</b>	<i>Note that the answer should refer to the pooled results, and not simply to the expected result.</i>			

SECTION 2			
	0 marks	1 mark	2 marks
<b>Q. No. 2 (a)</b>	No creditworthy response	<b>Either:</b> both axes labelled with the variables (units not essential) <b>Or</b> a suitable line drawn	Both axes labelled with the variables (units not essential) <b>and</b> a suitable line drawn
<b>Additional Guidance</b>	<i>Accept axes drawn either way round (i.e. it doesn't matter which axis the area is on) The line should be a straight line, sloping from bottom left to top right</i>		

## CU1.x Concrete Exemplar ISA - Marking Guidelines

SECTION 2				
	0 marks	1 mark	2 marks	3 marks
<b>Q. No. 2 (b)</b>	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 3 supports the hypothesis accompanied by criticism of the experimental procedure.  A clear explanation is given of why Case study 2 is irrelevant
<b>Additional Guidance</b>	<p><i>An example of a clear statement for case study 1 is "the greater the mass of aggregate the greater the mass/force needed to break the beam.</i></p> <p><i>Further explanation for case study 2 will be that that results support the hypothesis when the anomalous result is excluded (500g and 194N)</i></p> <p><i>Further explanation for Case study 3 could include reference to the investigation varies the water volume as well as mass of aggregate so it is not relevant.</i></p>			
SECTION 2				
	0 marks	1 mark	2 marks	3 marks
<b>Q. No. 2 (c)</b>	No creditworthy response	Increasing the mass of aggregate increases the force needed to break the beam up to a point.	Increasing the mass of aggregate increases the force needed to break the beam up to a point.  beyond 2000g the concrete starts to get weaker	Increasing the mass of aggregate increases the force needed to break the beam up to a point.  beyond 2000g the concrete starts to get weaker  the weakening of strength is at a greater rate than the increase in strength.
<b>Additional Guidance</b>				

## CU1.x Concrete Exemplar ISA - Marking Guidelines

SECTION 2				
	0 marks	1 mark	2 marks	3 marks
<b>Q. No. 3</b>	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
<b>Additional Guidance</b>	<i>The candidate should attempt to explain, eg how the mass of aggregate should be varied to meet the expected force likely on the drive, created by a vehicle.</i>			
Graph or chart				
	Answer	Additional Guidance		Mark
<b>Q. No. 4</b>	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.		<b>1</b>
	Y axis: suitable scales chosen and labelled with quantity and units.	Accept axes reversed.  It may not always be necessary to show the origin.		<b>1</b>
	Points or bars plotted correctly to within $\pm 1$ mm.	Allow one plotting error out of each 5 points/bars plotted.		<b>1</b>
	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 <b>3</b> marks. If the independent variable is: <ul style="list-style-type: none"> <li>• continuous, a best fit line should be drawn</li> </ul> <b>NB</b> If no line is possible because there is no correlation, candidates should state this on the graph to gain the mark <ul style="list-style-type: none"> <li>• caticoric, a bar chart should be drawn</li> </ul>		<b>1</b>