

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature						Date					

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General Certificate of Secondary Education
June 2008 / June 2009



SCIENCE / CHEMISTRY
ISA C1.3 Testing Concrete

SCYC/CHYC/C1.3

To be conducted before 4 May 2009
For submission in May 2008 or May 2009 or May 2010

For this paper you must have:

- results tables and charts or graphs from your own investigation.

You may use a calculator.

For Teacher's Use	
Section	Mark
1	
2	
Total (max 34)	

Time allowed: 45 minutes

Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in **Section 1** and **Section 2**.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The maximum mark for this paper is 34.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

Did this candidate take part in the practical activity?	YES / NO
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Signature of teacher marking this ISA Date

SECTION 1

These questions are about the investigation that **you** did.

Answer **all** questions in the spaces provided.

1 What were you trying to find out in your investigation?

.....

.....

.....

.....

(2 marks)

2 (a) State **one** variable that it was important to keep the same in your investigation.

.....

(1 mark)

(b) It was important to keep this variable the same to make it a fair test.

Explain why.

.....

.....

.....

.....

(2 marks)

3 In your investigation, which type of variable was your **independent** variable (the variable that you deliberately changed)?

Draw a ring around your answer.

categoric

continuous

discrete

ordered

(1 mark)

4 Almost all investigations have some random errors in their results.

(a) What is meant by a *random error*?

.....
.....
(1 mark)

(b) Suggest how random errors in your results could have happened.

.....
.....
(1 mark)

(c) How could you reduce the random errors in your investigation?

Explain your answer.

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.....
.....
.....
(2 marks)

5 What did you find out from your investigation?

I found out that

.....
.....
.....
(2 marks)

6 Make sure that **your** results tables and charts or graphs are handed in with this paper.
You will be awarded up to 6 marks for these.

(6 marks)

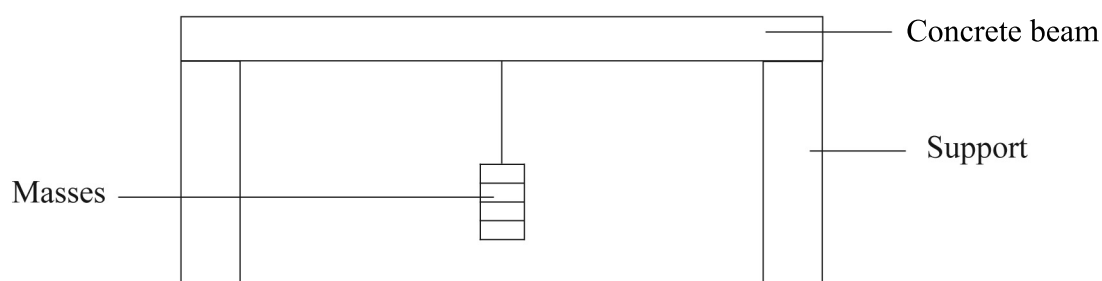
SECTION 2

These questions are about an investigation that may be similar to the one that you did.

Answer **all** questions in the spaces provided.

A farmer wanted to build a bridge to cross a small stream 2 m wide. He decided to build the bridge himself using a simple concrete beam. He needed to find out the best concrete mixture to use so that the beam would not break when people walked on it.

The farmer made a small model of the concrete beam using sand, cement and water. He placed the model beam over a 10 cm gap and hung a mass of 0.1 kg from the middle of the beam. He added more 0.1 kg masses until the beam broke.



He recorded his results in **Table 1**.

Table 1

% cement by volume	% sand by volume	Total mass added to break the model beam in kg				
		Test 1	Test 2	Test 3	Test 4	Mean
20	80	1.3	1.3	1.1	1.1	1.2
30	70	2.8	2.7	2.6	2.7	
40	60	4.1	4.3	4.2	4.2	4.2
50	50	5.1	5.3	5.2	4.4	5.2
60	40	6.6	5.7	5.8	5.9	5.8
70	30	6.3	6.0	6.1	6.4	6.2

7 Use the information in **Table 1** to answer this question.

(a) What was the range for the % cement in the model beams being tested?

The range was from% to%.
(1 mark)

(b) What was the interval for the % cement in the model beams being tested?

The interval was%.
(1 mark)

8 Use **Table 1** to calculate the mean total mass added to break the model beam with 30 % cement.

Show clearly how you work out your answer.

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.....

Write your answer into the table. (2 marks)

9 Choose **one** result in **Table 1** that should have been checked and tested again.

Result: % cement by volume Test

Explain why you chose this result.

.....
.....
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.....

(2 marks)

10 What is the relationship between the total mass which broke the model beam and the % of cement in the mixture used to make the model beam?

.....
.....

(1 mark)

- 11 Suggest **one** variable that should have been recorded by the farmer when he was making the mixture for the test beams.

.....

(1 mark)

- 12 The farmer used 0.1 kg masses to test his beams. He also had a set of 0.2 kg masses.

What effect would using the 0.2 kg masses have had on the measurements?

Put a tick (✓) in the box next to your choice.

The measurements would have been less precise.

The measurements would have been less reliable.

The measurements would have been less valid.

(1 mark)

- 13 The farmer wanted to check the reliability of his test results but did not want to do any more tests.

Explain **one** way in which he could have done this.

.....

(1 mark)

- 14 The farmer orders a new load of sand to use to make the beam for his bridge. He claims that **all** sand is the same and he can still rely on his test results.

Do you think that he should still rely on his test results?

Draw a ring around your answer.

Yes / No

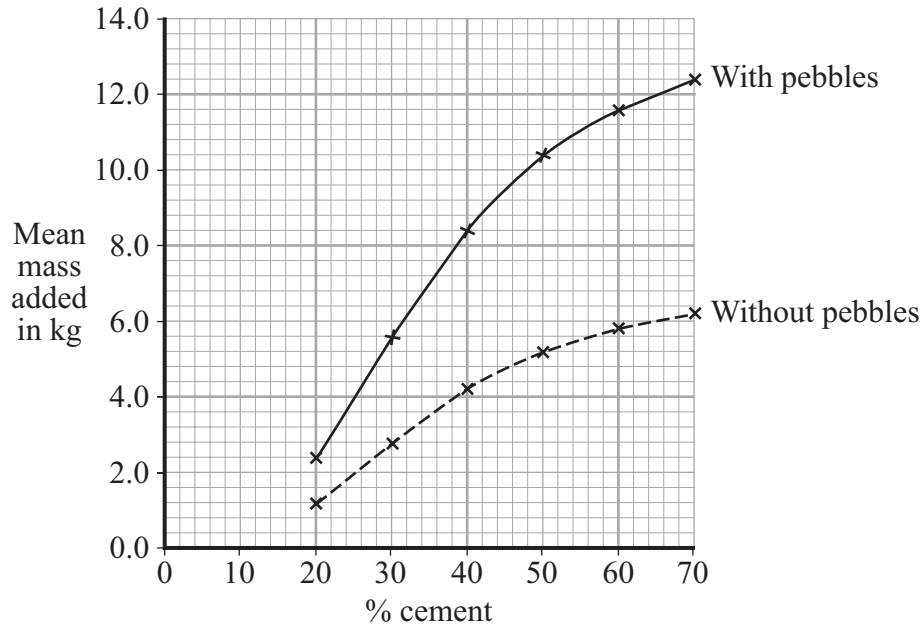
Explain your answer.

.....

(1 mark)

- 15 The farmer realised that he had not added any pebbles to his mixture. He decided to repeat his tests after making up new mixtures from sand containing 10% pebbles.

He plotted both sets of results on a graph.



Use the graph to compare the mean masses added to break the test beams with pebbles and the test beams without pebbles.

What difference has adding the pebbles made?

.....

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(2 marks)

Turn over for the next question

16 The farmer said that using a concrete bridge instead of a wooden bridge would be more environmentally friendly as no trees would need to be cut down.

Discuss the farmer’s claim.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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(3 marks)

16

END OF QUESTIONS