

Write your name here

Surname

Other names

**Pearson BTEC
Level 1/Level 2
First Award**

Centre Number

--	--	--	--	--	--	--

Learner Registration Number

--	--	--	--	--	--	--	--

Application of Science

Unit 8: Scientific Skills

Wednesday 2 March 2016 – Morning

Time: 1 hour 15 minutes

Paper Reference

20474E

You must have:

Calculator, Ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and learner registration number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

Information

- The total mark for this paper is 50.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

P46896A

©2016 Pearson Education Ltd.

1/1/1/1/1/1/1/



PEARSON

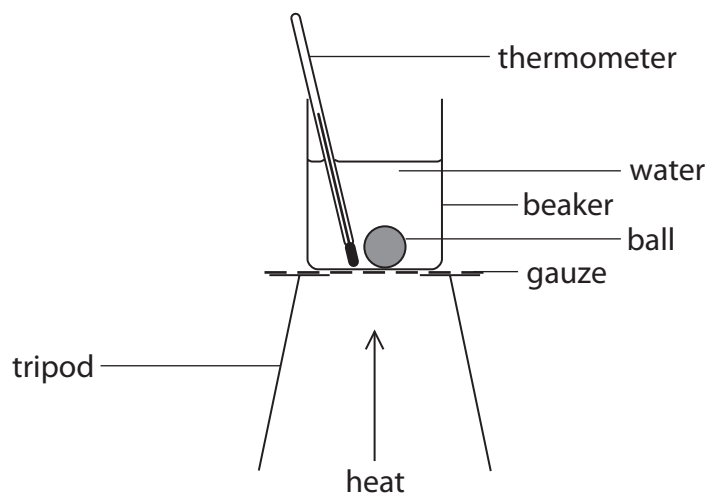
Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box . If you change your mind about an answer, put a line through the box and then put a cross in another box .

1 James investigates how the temperature of a ball affects the height of its bounce.

He places the ball in a beaker of water.

He uses a Bunsen burner to heat the water, which changes the temperature of the ball.



(a) Name the piece of equipment used to measure the temperature of the water.

(1)

(b) A hazard in this experiment is the Bunsen burner.

(i) State **one** risk in using the Bunsen burner.

(1)

(ii) Give **one** other hazard in this experiment.

(1)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

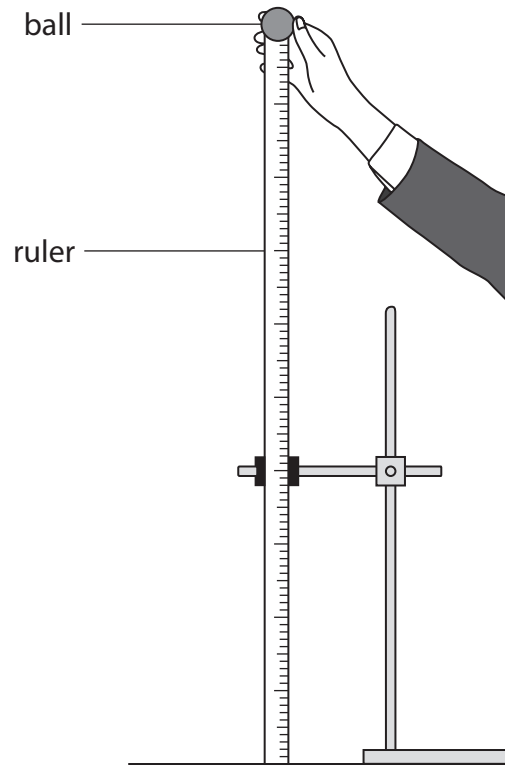
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



(c) James measures how high the ball bounces at different temperatures.



(i) State **two** controls for this experiment.

(2)

1

2

(ii) The independent variable in this experiment is the temperature of the ball.

Give the dependent variable.

(1)

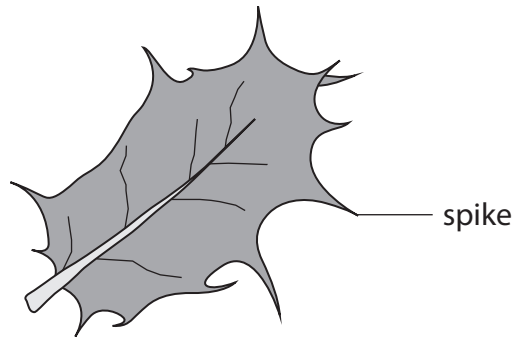
.....

(Total for Question 1 = 6 marks)



2 Rami investigates the number of spikes on holly leaves.

The drawing shows a holly leaf.



He collects some holly leaves of different lengths from a holly tree.

He counts the number of spikes on each leaf.

Rami presents his data in a table.

length of leaf (cm)	number of spikes
3	7
4	9
5	11
6	14
7	16
8	16
9	16

(a) Write a hypothesis for how the length of the holly leaf affects the number of spikes found on the leaf.

Use the data in the table.

(2)

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



(b) Rami investigates whether the height of a leaf on a holly tree affects the length of the leaf.

Write a plan for this investigation that will give a range of results.

Your plan should include the:

- measurements Rami should record
- factors Rami should control.

(6)

Area with horizontal dotted lines for writing the investigation plan.

(Total for Question 2 = 8 marks)



3 Emma researches the relative formula mass of some metal carbonates.

Here is her data.

sodium carbonate 106	potassium carbonate 138
calcium carbonate 100	copper carbonate 124
magnesium carbonate 84	iron carbonate 116

Complete the table for the data.

(Total for Question 3 = 3 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

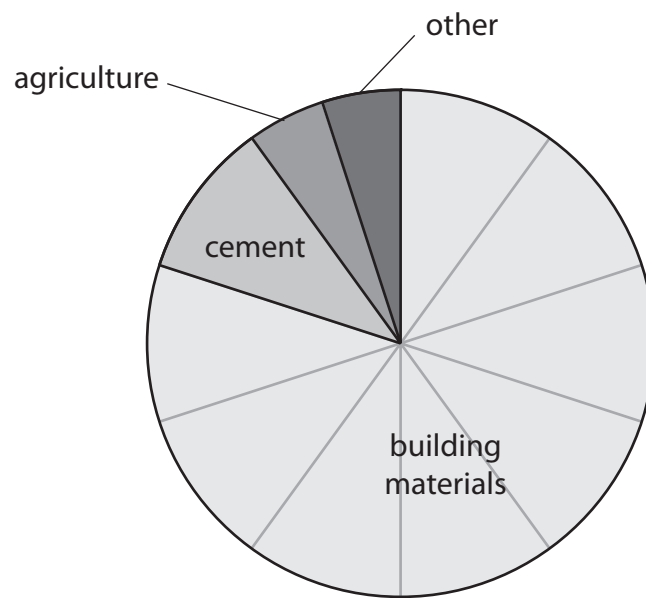
DO NOT WRITE IN THIS AREA

BLANK PAGE



4 Mia finds some information about the uses of limestone.

The information is presented in a pie chart.



(a) Give the percentage of limestone used for cement.

(1)

- A 5%
- B 10%
- C 20%
- D 80%

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



(b) Mia investigates the mass of calcium chloride produced when calcium carbonate is reacted with dilute hydrochloric acid.

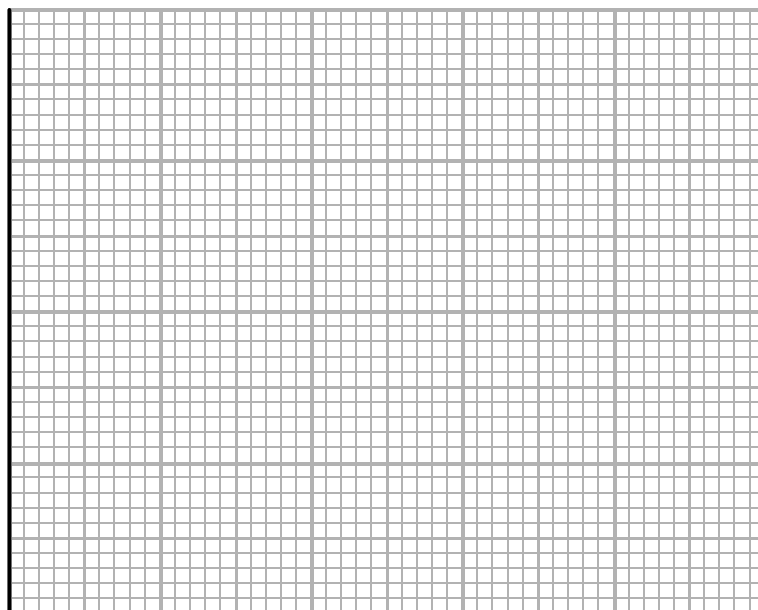
She obtains these results for different masses of calcium carbonate.

mass of calcium carbonate reacted (g)	mass of calcium chloride produced (g)
0.0	0.0
1.1	0.8
2.4	2.2
4.6	3.7
6.7	5.3
8.9	7.1

Plot a line graph of these results.

Use the graph paper below.

(6)



(Total for Question 4 = 7 marks)



5 Hasan investigates three different brands of indigestion tablet, A, B and C.

(a) Different brands of indigestion tablet contain different amounts of metal carbonates.

When metal carbonates react with acid, carbon dioxide is produced.

The table shows the volume of carbon dioxide produced by each brand of indigestion tablet, A, B and C, when they are reacted with separate samples of the same volume of dilute hydrochloric acid.

brand of indigestion tablet	volume of carbon dioxide produced (cm ³)
A	110
B	185
C	80

Explain which brand of indigestion tablet contains the most metal carbonate.

(2)

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



(b) Hasan investigates the time taken for each of the three different brands of indigestion tablet, A, B and C, to react completely with separate samples of the same volume of dilute hydrochloric acid.

brand of indigestion tablet	time to react completely (s)	
	test 1	test 2
A	90	90
B	40	60
C	5	4

Hasan thinks that one of the results for brand B is anomalous.

(i) Suggest **two** reasons why the results for test 1 and test 2 are different.

(2)

Reason 1

.....

Reason 2

.....

(ii) State what Hasan should do to find out which result is anomalous.

(1)

.....

.....

(Total for Question 5 = 5 marks)

.....



6 Alice shines a light on a Light Dependent Resistor (LDR).

The resistance of the LDR varies with the brightness of light falling on it.

Alice changes the brightness of the light.

Here are her results.

brightness of light	resistance of LDR (ohms)		
	test 1	test 2	test 3
very bright	192	192	191
bright	220	222	227
dim	495	225	500

(a) (i) Explain which result is anomalous.

(2)

.....

.....

.....

(ii) Calculate the average resistance of the LDR when the light is **bright**.

Show your working.

(2)

..... ohms

(iii) Alice calculates the average resistance of the LDR when the light is **very bright**.

Her answer is 191.66666 ohms.

Explain why this is not an appropriate average for the results Alice collected for this brightness.

(2)

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

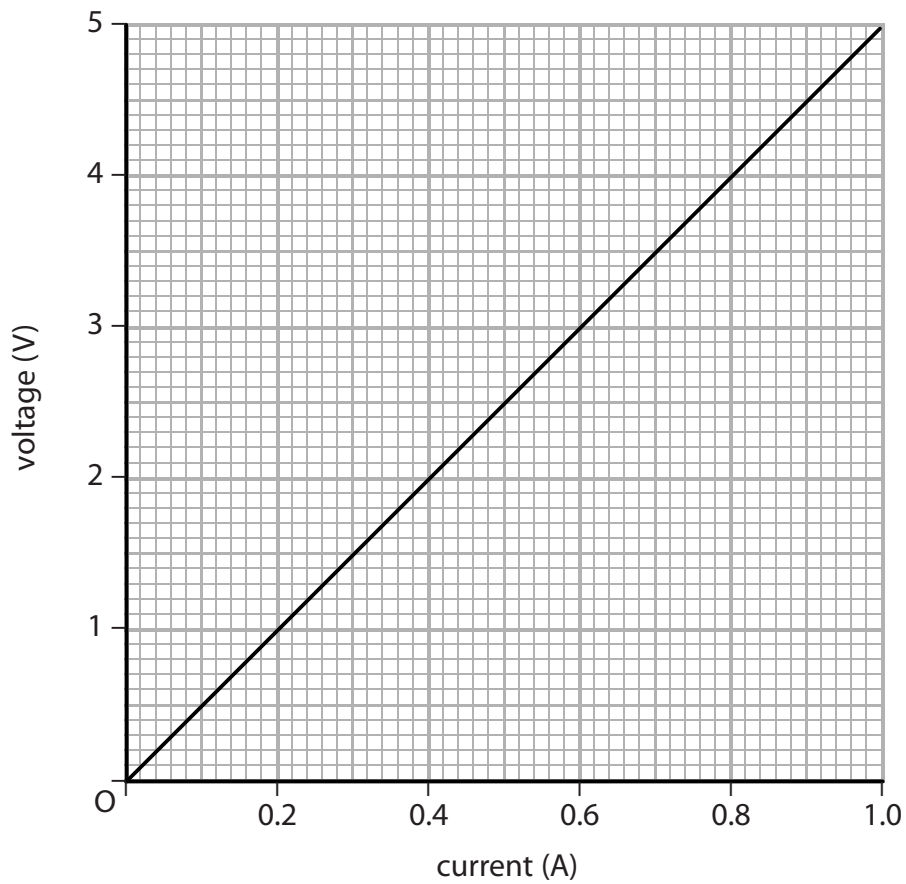
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



(b) Alice investigates the effect of changing the voltage and current in a resistor.
She plotted her results as a line graph.



(i) Give the value for the voltage across the resistor for a current of 0.8A.

(1)

..... V

(ii) Describe the trend shown in the graph.

(2)

.....

.....

.....

.....



(iii) Alice sets the voltage across the resistor to 1.5V.

This gives a current in the resistor of 0.3A.

Calculate the resistance of the resistor.

$$\begin{array}{l} \text{voltage} = \text{current} \times \text{resistance} \\ \text{(V)} \quad \quad \quad \text{(A)} \quad \quad \quad \text{(\Omega)} \end{array}$$

Show your working.

(2)

..... ohms

(Total for Question 6 = 11 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

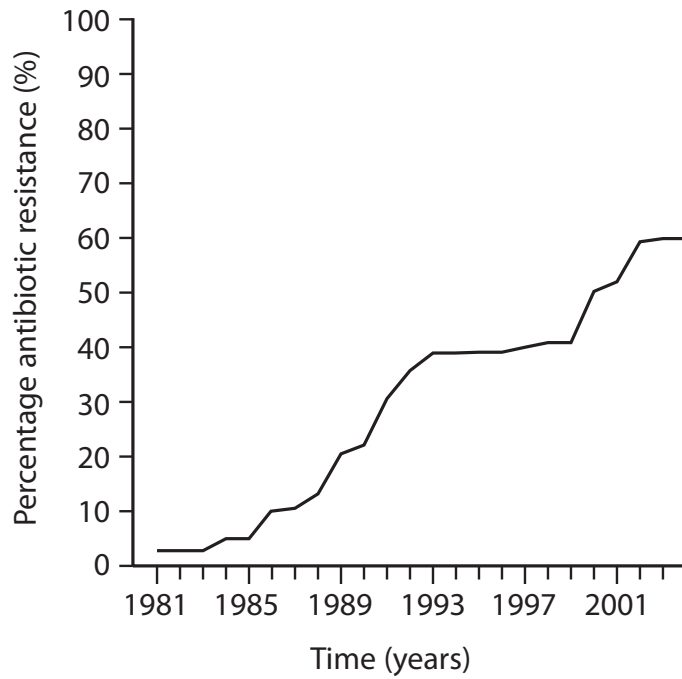
DO NOT WRITE IN THIS AREA



7 Antibiotics can stop the growth of or kill bacteria.

MRSA is a type of harmful bacteria that has developed a resistance to some antibiotics.

Pardy finds a graph that displays information about the increase in the antibiotic resistance of MRSA.



Pardy wrote a conclusion about the graph.

'I think that the percentage antibiotic resistance has increased steadily from 1981 to 2016'

(a) Explain **two** weaknesses in Pardy's conclusion.

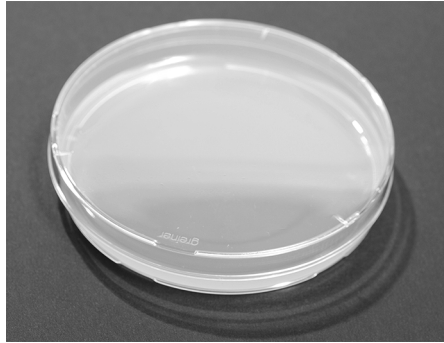
(4)

1

2



(b) Agar plates are used to grow bacteria.



Pardy investigates how antibiotics will affect bacterial growth on agar plates.

She writes the following method:

- 1 Put bacteria onto an agar plate
- 2 Place antibiotics on an agar plate
- 3 Put the agar plate in a warm place
- 4 See how much of the bacteria is killed

Pardy thinks that she can improve her method so that it is repeatable.

Explain the improvements she could make to this method.

(6)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Area with horizontal dotted lines for writing.

(Total for Question 7 = 10 marks)

TOTAL FOR PAPER = 50 MARKS





DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE



P 4 6 8 9 6 A 0 1 9 2 0

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

