Write your name here

Surname	Other names

Pearson BTEC Level 1/Level 2 First

Centre Number

Learner Registration Number

Application of Science

Unit 8: Scientific Skills

Wednesday 4 November 2015 – Morning
Time: 1 hour 15 minutes

Paper Reference
20474E

You must have:
Calculator, ruler and a protractor

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.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

P45393A

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P 4 5 3 9 3 A 0 1 2 4

PEARSON

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

1 Donna uses solutions with different pH values to see how they affect the growth of bacteria.

She uses the apparatus shown to measure the volume of the solutions.

(a) (i) Identify the apparatus shown in the diagram.

(1)

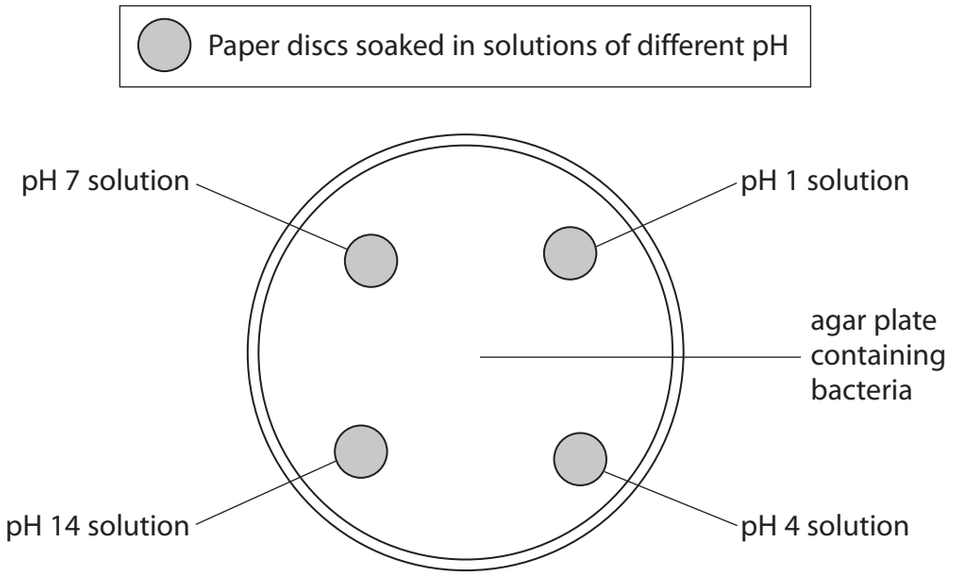
.....

(ii) Donna measured 6 ml of one of the solutions using the apparatus.

Draw a line on the diagram to show the level of the solution in the apparatus.

(1)

(b) Donna checks the effect of solutions with pH values 1, 4, 7 and 14 on the growth of bacteria.



The bacteria are a hazard when carrying out this experiment.

(i) Identify **one** other possible hazard when carrying out this experiment.

(1)

.....

.....

(ii) State a risk of using bacteria.

(1)

.....

.....

(c) Donna repeats the experiment to check her results.

State **two** variables that she will need to control.

(2)

1 .....

.....

2 .....

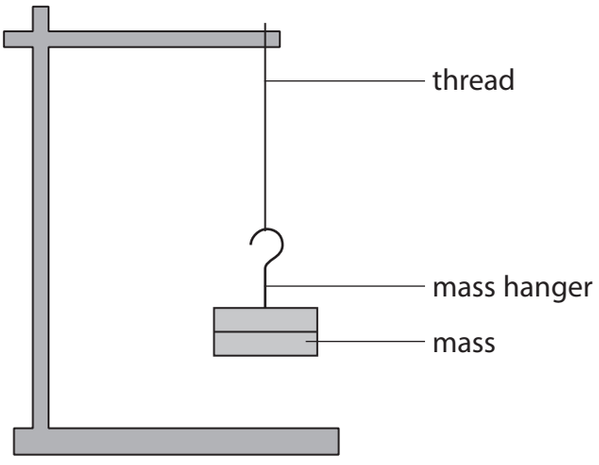
.....

(Total for Question 1 = 6 marks)

2 Julian is investigating the effect of adding masses to different threads.

The threads have different thicknesses.

He wants to find the number of masses that will make each of the threads break.



(a) State the dependent variable in the investigation.

(1)

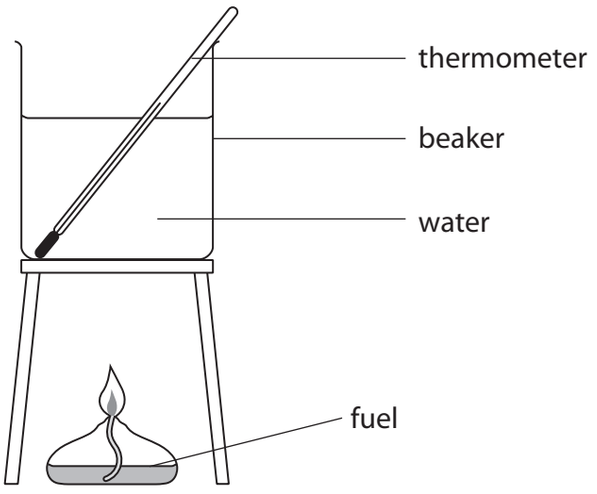
.....

(b) Write a plan for this experiment that will give a range of results.

(6)

(Total for Question 2 = 7 marks)

3 Deanne is investigating the energy changes that occur when water is heated by a fuel.



Here are her results.

starting temperature of water (°C)	final temperature of water (°C)
22	33

(a) State how the results show that energy is given out in this experiment.

(1)

.....

.....

(b) Deanne heats water for 10 minutes.

She records the temperature every 2 minutes.

10 minutes, 64 °C
2 minutes, 26 °C
6 minutes, 44 °C
4 minutes, 34 °C
8 minutes, 55 °C

Record the results appropriately in the table below.

(3)

(c) Deanne investigates how changing the mass of fuel affects the amount of energy transferred to water.

mass of fuel (g)	energy transferred to water (J)
1.0	4 800
1.1	5 280
1.2	5 760
1.3	6 240
1.4	6 720
1.5	7 200

Describe the pattern shown in these results.

(2)

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.....

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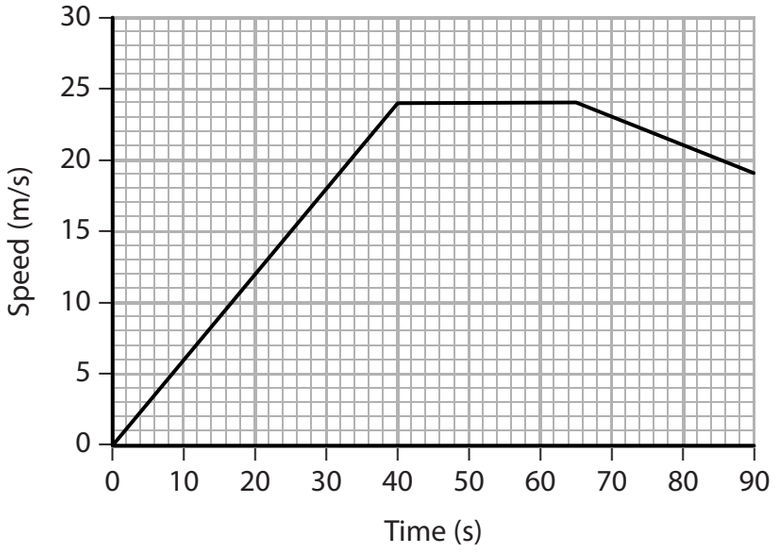
(Total for Question 3 = 6 marks)

4 Shannon investigates the speed of an electric car moving on a straight road.

Here is a graph of her results.



(a) (i) State what is happening to the speed of the electric car between 0 and 40 seconds.

(1)

.....

(ii) Use the graph to calculate the change in speed of the electric car between 65 and 90 seconds.

Show your working.

(2)

.....m/s

(b) The area under the line on the graph can be used to calculate the distance travelled by the electric car.

The area of the rectangle between 40 and 65 seconds is equal to 600 m.

area of a triangle = ½ base × height

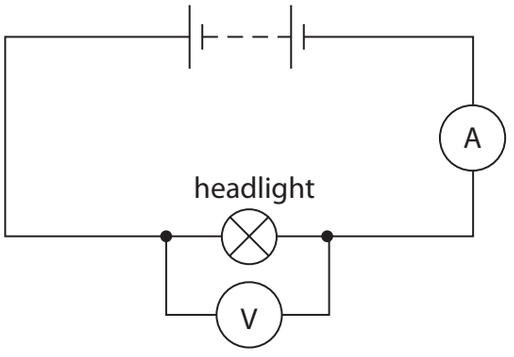
Calculate the total distance travelled by the electric car between 0 seconds and 65 seconds.

(3)

.....m

(c) Shannon is given one of the car headlights to investigate.

She uses the circuit shown.



voltage (Volts)	=	current (Amps)	×	resistance (Ohms)

When a voltage of 12 V is applied across the headlight the current in the circuit is 5 A.

Calculate the resistance of the headlight when 12 V is applied.

(2)

.....Ohms

(Total for Question 4 = 8 marks)

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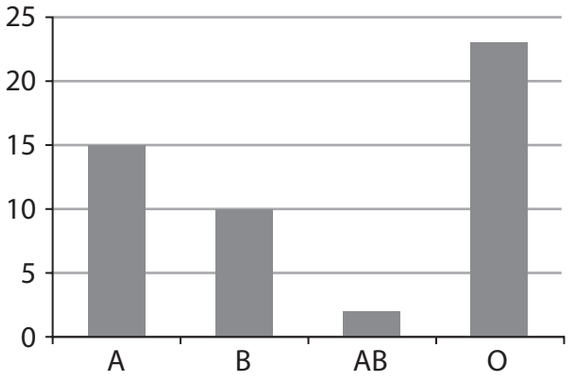
Turn over for question 5

5 Laura draws a bar chart to show the different blood groups of 50 people.



(a) (i) Label the axes on the bar chart.

(2)

(ii) Identify which blood group is most common.

(1)

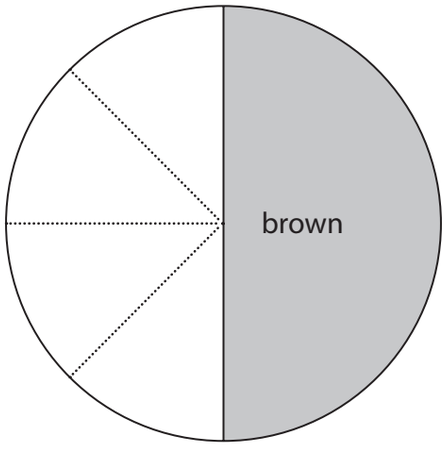
(b) Laura collected data on eye colour from 40 people.

eye colour	number of people
Blue	15
Brown	20
Green	5

Complete the pie chart to show the data for eye colour.

Brown has been completed for you.

(2)



(Total for Question 5 = 5 marks)

6 William is a sports teacher.

He asked his students to do a step test.

Here are their results.

students	step-ups per minute			
	test 1	test 2	test 3	test 4
1	49	48	47	46
2	51	51	53	52
3	48	49	47	32
4	52	52	51	53
5	49	47	47	46

(a) Calculate the average number of step-ups per minute completed by student 1.

(2)

.....

(b) William realises one of the results is anomalous.

(i) Circle this result in the table.

(1)

(ii) Explain **two** factors that might have caused this result to be anomalous.

(4)

1 .....

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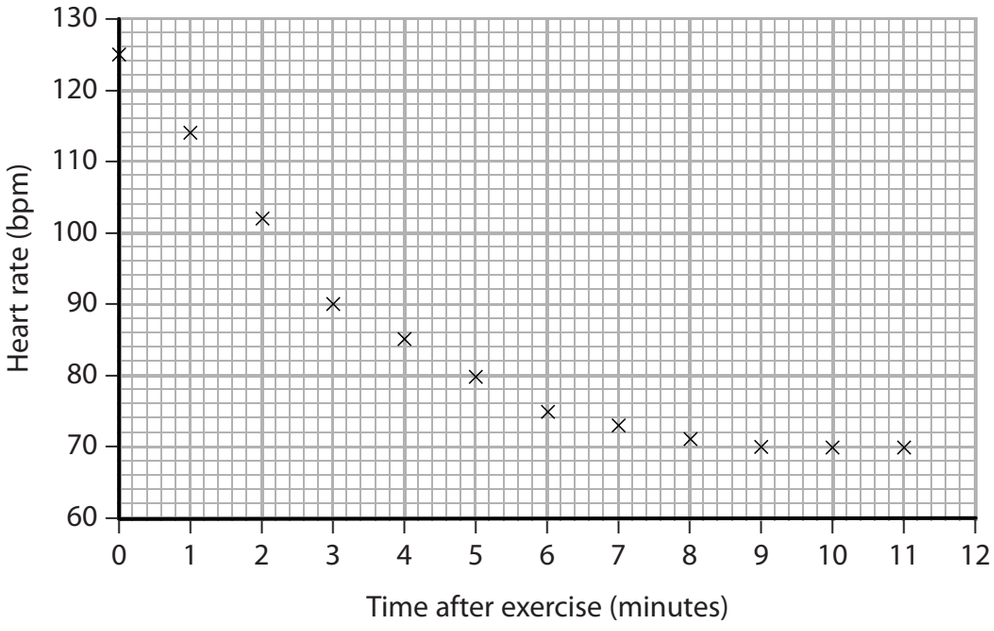
2 .....

.....

.....

(c) A student investigates how long it took for his heart rate to return to normal after exercise.

Here is a graph of his results.



(i) Add a curve of best fit to the graph.

(1)

(ii) The student concludes that his resting heart rate is 70 beats per minute (bpm).

Identify the evidence from the graph that supports his conclusion.

(1)

.....

.....

(Total for Question 6 = 9 marks)

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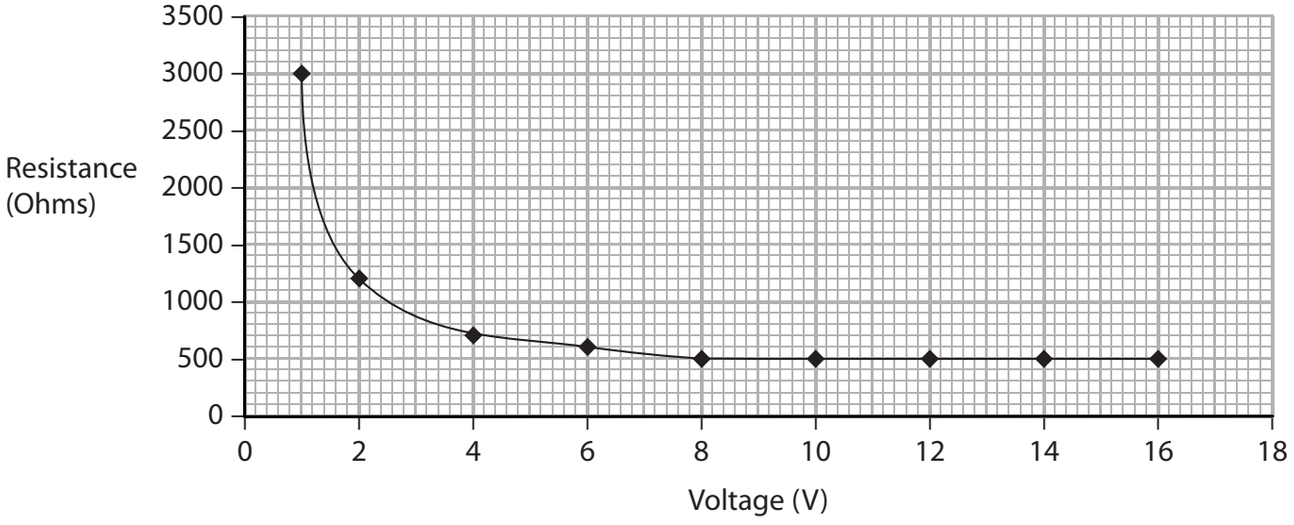
7 Sophie investigates how the resistance of a lamp changes with voltage.

Here is a graph of her results.



(a) State the resistance of the lamp when the voltage is 3 V.

(1)

.....Ohms

(b) Before the experiment Sophie made a hypothesis.

Resistance is directly proportional to voltage.

Discuss whether the data supports this hypothesis.

(2)

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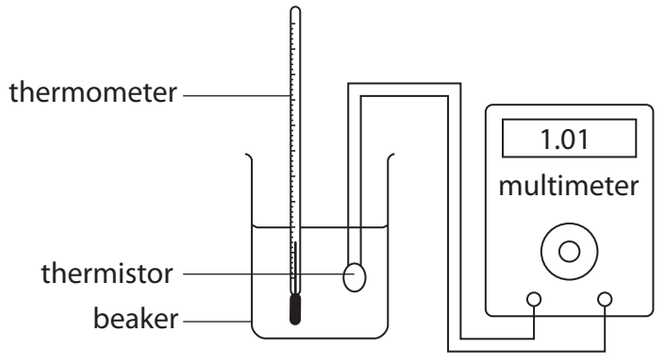
(Total for Question 7 = 3 marks)

8 A thermistor is a type of resistor.

Sophie investigates how the resistance of a thermistor changes at different temperatures.

Here is her method.

1. Connect the thermistor to a multimeter.
2. Place the thermistor in a beaker of water.
3. Use a thermometer to measure the temperature.
4. Note the resistance on the multimeter.
5. Add cold water.



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

Explain the improvements she could make to this method.

(6)

(Total for Question 8 = 6 marks)

TOTAL FOR PAPER = 50 MARKS

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