Write your name here

Surname	Other names

Pearson Edexcel BTEC Level 1/Level 2 First Award

Centre Number | | | | | | |

Learner Registration Number | | | | | | | | |

Applied Science

Unit 1: Principles of Science

Monday 2 November 2015 – Morning
Time: 1 hour

Paper Reference
20460E

You must have:
Calculator and a 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 54.
- 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 ▶

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P 4 5 8 6 1 A 0 1 1 6

PEARSON

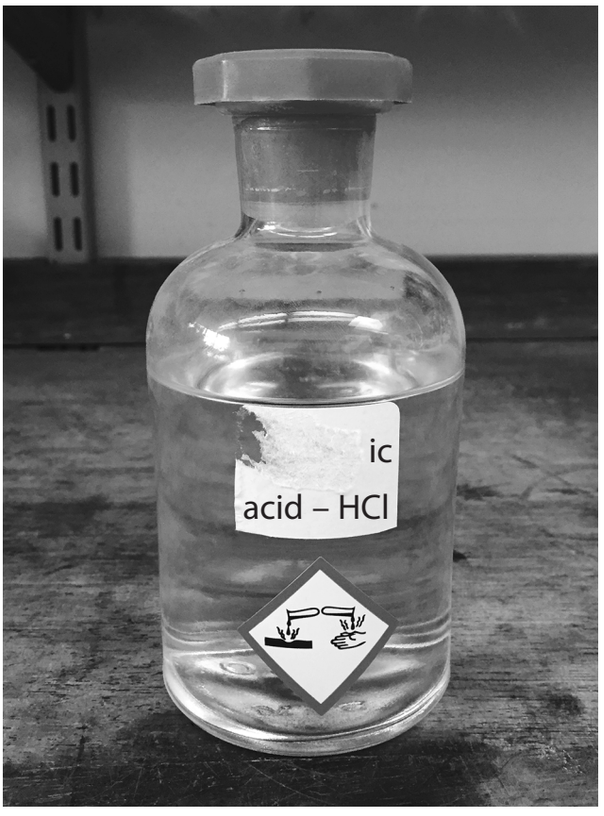
Some questions must be answered with a cross in a box ☒.
If you change your mind about an answer, put a line through the box ☒ and then put a cross in another box ☒.

SECTION A: Chemistry

Answer ALL questions.

1 A laboratory technician finds a bottle of acid in a fume cupboard.

Part of the label on the bottle has been torn off.



(a) (i) The hazard symbol on the bottle shows that the acid is

(1)

☒ **A** corrosive

☒ **B** flammable

☒ **C** oxidising

☒ **D** toxic

(ii) The formula of the acid is HCl.

Give the name of the acid.

(1)

.....

(iii) Give the name of the indicator that could be used to measure the pH of the acid.

(1)

.....

(iv) Suggest a value for the pH of the acid.

(1)

.....

(Total for Question 1 = 4 marks)

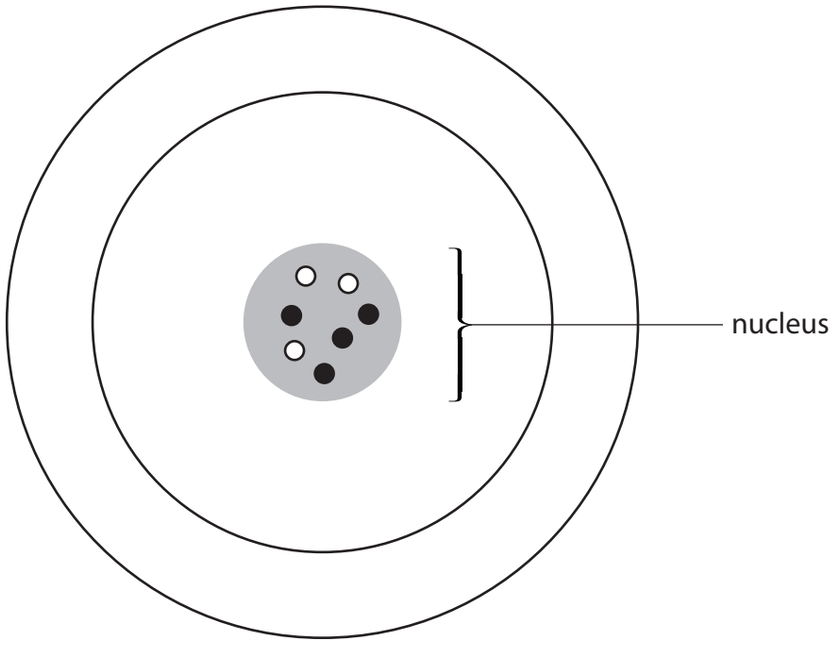
2 A lithium atom has 3 electrons.

The electronic configuration of a lithium atom is 2,1.

The nucleus contains neutrons and protons.

The diagram shows the structure of a lithium atom.

The diagram is not complete.



(a) Complete the diagram to show how the 3 electrons in a lithium atom are arranged.

(1)

(b) Identify the number of protons in this lithium atom.

(1)

☒ **A** 1

☒ **B** 3

☒ **C** 4

☒ **D** 7

(c) The table shows the relative mass and relative charge of a proton, neutron and electron.

Complete the table.

(2)

	relative mass	relative charge
proton		+1
neutron	1	
electron	0.0005	–1

(d) Lithium is in group 1 of the periodic table.

Explain in terms of electronic configuration why lithium is in group 1.

(2)

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(Total for Question 2 = 6 marks)

3 Magnesium reacts with sulfuric acid to produce magnesium sulfate and hydrogen gas.

(a) (i) Describe the test to show that the gas produced is hydrogen.

(2)

Test .....

.....

Result .....

.....

(ii) Complete the balanced symbol equation for this reaction.

(2)

$Mg + H_2SO_4 \rightarrow$ ..... + ...

(b) Calcium carbonate is an ingredient in indigestion remedies.

Explain how calcium carbonate can help reduce acid indigestion in the stomach.

You may include appropriate word or symbol equations to support your answer.

(4)

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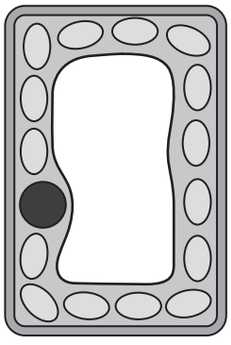
(Total for Question 3 = 8 marks)

TOTAL FOR SECTION A = 18 MARKS

SECTION B: Biology

Answer ALL questions

4 The table shows two different types of cell.

	
plant cell	animal cell

(a) (i) Name one cell component that is in both plant and animal cells.

(1)

.....

(ii) Draw a line to label a chloroplast in the **plant cell** in the table.

(1)

(iii) The plant cell shown in the table is from the surface of a leaf.

Describe the function of a chloroplast.

(2)

.....

.....

.....

.....

(b) The diagram shows some red blood cells.

Red blood cells carry oxygen around the body.

Explain how red blood cells are adapted for their function.

(2)

.....

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.....

(Total for Question 4 = 6 marks)

5 The human body maintains a constant internal environment.

(a) State the term used to describe this process.

(1)

.....

(b) The spinal cord is one part of the central nervous system.

Give the other part of the central nervous system.

(1)

.....

(c) It is important that the levels of glucose in the bloodstream are controlled.

(i) Name the system that uses hormones to regulate blood glucose levels.

(1)

.....

(ii) Name the hormone that is released to lower blood glucose levels.

(1)

.....

(d) The human body works to keep a constant internal temperature of 37 °C.

Explain how raised hairs on the skin help to keep the internal temperature of the body at 37 °C.

(2)

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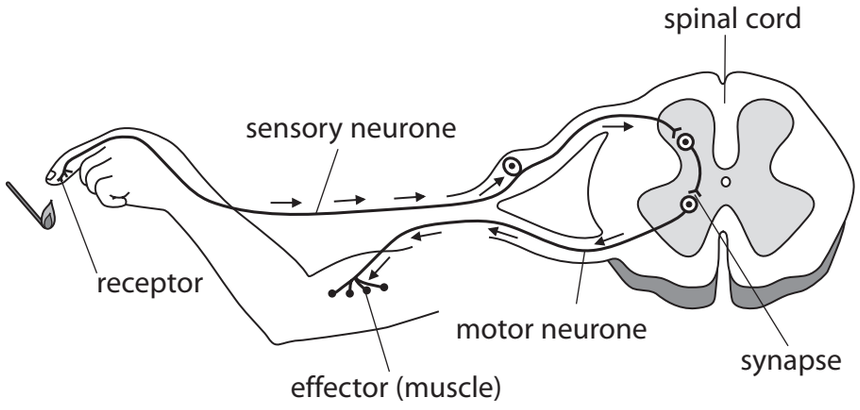
(Total for Question 5 = 6 marks)

6 Involuntary responses allow the body to react very quickly to danger in order to keep the body from harm.

The diagram shows a reflex arc.



Explain how the reflex arc allows the body to respond quickly in order to keep the body from harm.

(6)

(Total for Question 6 = 6 marks)

TOTAL FOR SECTION B = 18 MARKS

SECTION C – Physics

7 Natural gas can be used to generate electricity in a power station.

In the power station natural gas is burned to heat water to produce steam.

The steam passes into a turbine.

This makes the blades in the turbine spin.

(a) Natural gas is a non-renewable energy source.

State a renewable energy source.

(1)

.....

(b) Give the type of energy stored in natural gas.

(1)

.....

(c) Give a form of wasted energy released when natural gas is burned.

(1)

.....

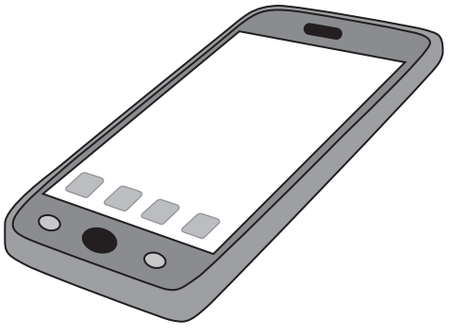
(d) Name the form of energy produced by the blades in the turbine.

(1)

.....

(Total for Question 7 = 4 marks)

8 Energy stored in a mobile phone battery can be transferred into useful energy.



(a) Give **two** types of useful energy produced by a mobile phone.

(2)

1 .....

2 .....

(b) The mobile phone charger uses 5 W of power.

Calculate the amount of energy the phone charger uses in one minute.

$$\text{power (watts)} = \frac{\text{energy (joules)}}{\text{time (secs)}}$$

Show your working.

(2)

..... J

(c) Mobile phones use microwave radiation to receive signals.

This microwave radiation has a wave speed of 300 000 000 m/s and a frequency of 8.8×10^8 Hz.

Calculate the wavelength of the microwave radiation.

wave speed (m/s) = wavelength (m) × frequency (Hz)

Show your working.

Give your answer in standard form.

(4)

..... m

(Total for Question 8 = 8 marks)

9 Discuss the advantages and disadvantages of using gamma rays in the detection and treatment of cancer.

(6)

(Total for Question 9 = 6 marks)

TOTAL FOR SECTION C = 18 MARKS
TOTAL FOR PAPER = 54 MARKS

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