Write your name here

Surname	Other names

Pearson BTEC Level 1/Level 2 First Award

Centre Number

Learner Registration Number

Applied Science

Unit 1: Principles of Science

Friday 4 March 2016 – Morning
Time: 1 hour

Paper Reference
20460E

You must have:
Calculator

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

Turn over ▶

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PEARSON

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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 ☒.

SECTION A: Biology

1 Roots and leaves are plant organs.

(a) State **two** functions of the root of a plant.

(2)

Function 1 .....

.....

Function 2 .....

.....

(b) One function of leaves is to absorb light for photosynthesis.

State how leaves are adapted for this function.

(1)

.....

.....

(c) Transpiration is a process that occurs in plants.

State what is meant by the term transpiration.

(1)

.....

.....

(Total for Question 1 = 4 marks)

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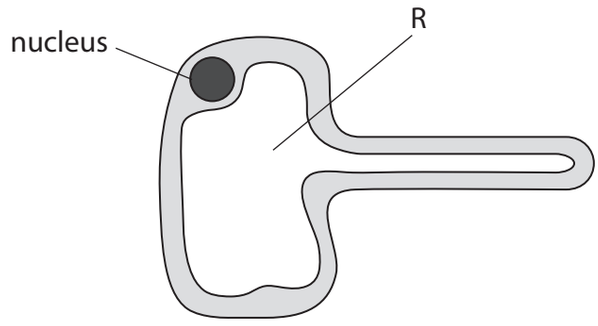
2 (a) The diagram shows a root hair cell.



(i) Identify the component of the cell labelled R.

(1)

☒ **A** cell membrane

☒ **B** cell wall

☒ **C** cytoplasm

☒ **D** vacuole

(ii) State the function of the nucleus.

(1)

.....

.....

(iii) The nucleus of a cell contains DNA.

The DNA contains a sequence of base pairs.

Adenine (A) pairs with the base thymine (T).

Name the base that pairs with **guanine (G)**.

(1)

.....

(b) Cystic fibrosis is a disease caused by abnormal alleles of a gene.

The Punnett square in the diagram shows how alleles are passed from parents to offspring.

The normal allele is dominant and can be shown as F.

The allele for cystic fibrosis is recessive and can be shown as f.

(i) Complete the Punnett square to show the genotypes of the parents.

(1)

		male	
female		FF	Ff
		Ff	ff

(ii) The offspring have a 25% chance of developing cystic fibrosis.

Explain how the Punnett square shows this.

(2)

.....

.....

.....

.....

(Total for Question 2 = 6 marks)

3 Blood contains red and white blood cells.

(a) The diagram shows some red blood cells.

Red blood cells are biconcave in shape.

Explain how this adaptation makes the red blood cells suited for their function.

(2)

.....

.....

.....

.....

(b) Explain **one** way in which white blood cells are adapted for their function.

(2)

.....

.....

.....

.....

(c) Blood glucose concentration in the body is regulated by hormones in the endocrine system.

Explain **two** ways in which this system maintains a constant blood glucose concentration.

(4)

1 .....

.....

.....

.....

2 .....

.....

.....

.....

(Total for Question 3 = 8 marks)

TOTAL FOR SECTION A = 18 MARKS

SECTION B: Physics

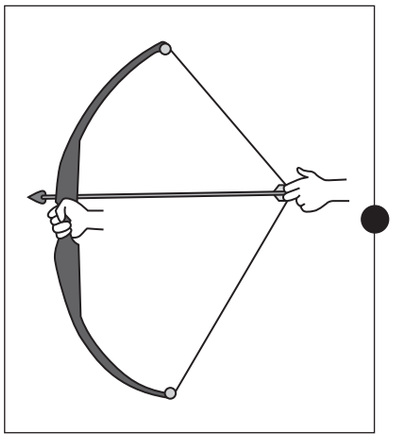
4 (a) Devices store energy in many different forms.

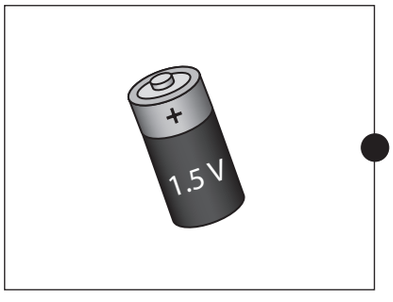
Two devices are shown.

Draw **one** line from each device to the correct form of energy it stores.

(2)

device

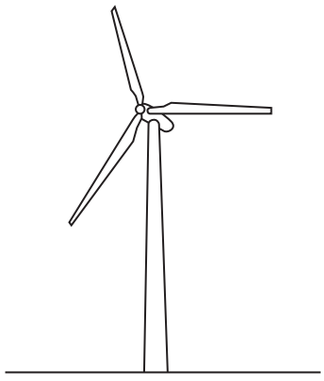




form of energy

- chemical
- elastic potential
- kinetic
- nuclear
- thermal

(b) The diagram shows a wind turbine.



(i) Wind is a renewable energy source.

State **one** other renewable energy source.

(1)

.....

(ii) Complete the energy transfer diagram for the wind turbine.

(1)

kinetic energy	⟹	

(iii) Explain **one** disadvantage of using wind as an energy source.

(2)

.....

.....

.....

.....

(Total for Question 4 = 6 marks)

5 (a) The picture shows a filament lamp.

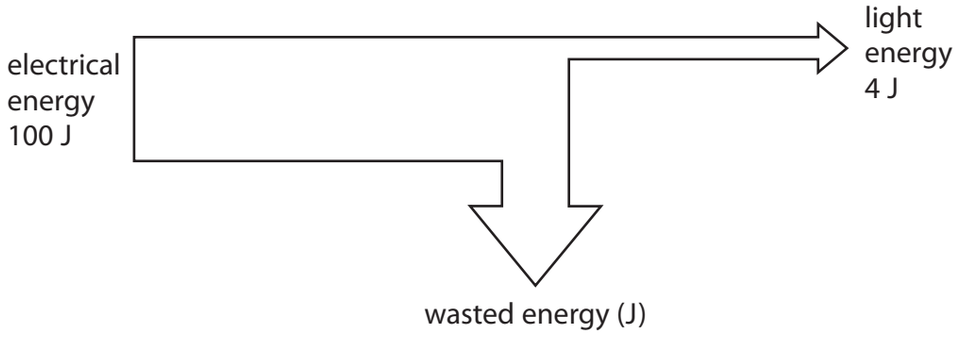
The filament lamp produces useful light energy.

(i) State the form of energy wasted by the filament lamp.

(1)

.....

(ii) The diagram shows the energy transfers in the filament lamp.



Calculate the amount of energy wasted by the filament lamp.

Show your working.

(1)

..... J

(b) The picture shows an energy saving lamp.

The energy saving lamp has a power of 15 watts.

(i) Calculate the amount of energy used by the energy saving lamp in 2 minutes.

Show your working.

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

(2)

..... J

(ii) The cost of electricity is 13 pence per kWh.

Calculate the cost of using the energy saving lamp for 8 hours.

Show your working.

(2)

..... pence

(Total for Question 5 = 6 marks)

6 Radio waves and X-rays are two types of electromagnetic radiation.

The diagram shows their positions in the electromagnetic spectrum.

radio waves	microwaves	infrared	visible	ultraviolet	X-rays	gamma rays

Describe the similarities and differences between the **properties** of radio waves and X-rays.

(6)

(Total for Question 6 = 6 marks)

TOTAL FOR SECTION B = 18 MARKS

SECTION C: Chemistry

7 (a) Bottles containing potassium show the following hazard symbol.

This hazard symbol warns that potassium is

(1)

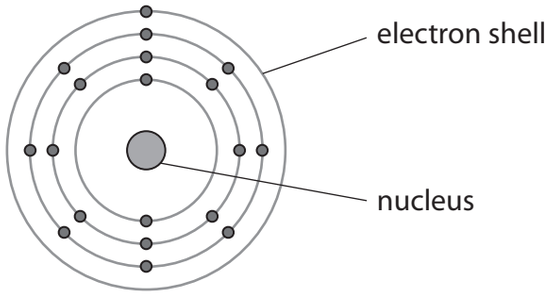
☒ **A** corrosive

☒ **B** flammable

☒ **C** oxidising

☒ **D** toxic

(b) The diagram shows an atom of potassium.



(i) Name the **two** types of particle found in the nucleus.

(2)

.....

.....

(ii) A potassium atom has 19 electrons.

Complete the electronic configuration for potassium.

(1)

2 . 8 . ...

(Total for Question 7 = 4 marks)

8 Bob makes copper sulfate by reacting sulfuric acid with copper oxide.

Water is also produced in the reaction.

(a) The formula of copper oxide is CuO.

Which **one** of these best describes copper oxide?

(1)

☒ **A** an atom

☒ **B** a compound

☒ **C** an element

☒ **D** a mixture

(b) Bob places a drop of sulfuric acid onto litmus paper.

(i) State the colour of the litmus paper after a drop of sulfuric acid is added.

(1)

.....

(ii) State the formula of sulfuric acid.

(1)

.....

(c) Complete the word equation for the reaction between copper oxide and sulfuric acid.

(1)

copper oxide	+	sulfuric acid	→		+	

(d) Bob grows plants in his garden.

His plants grow best in soils with a pH of 5.5.

Bob tests the soil in his garden and finds that it has a pH of 4.

Explain what Bob could add to his soil to make it suitable for growing his plants.

(4)

(Total for Question 8 = 8 marks)

9 Bromine is an element that has two isotopes:

bromine-79 and bromine-81.

$^{79}_{35}Br$ $^{81}_{35}Br$

A sample of bromine contains 50% bromine-79 and 50% bromine-81.

Explain why this sample of bromine has a relative atomic mass of 80.

Your explanation should include similarities and differences between bromine-79 and bromine-81.

(6)

(Total for Question 9 = 6 marks)

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