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Surname					Other names					
Pearson BTEC Level 1/Level 2 First Award	Centre Number					Learner Registration Number				
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Applied Science

Unit 1: Principles of Science

Friday 2 March 2018 – Morning Time: 1 hour	Paper Reference 20460E
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You must have: Calculator	Total Marks
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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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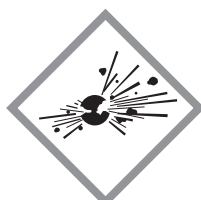

Pearson

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: Chemistry

1 (a) Hazard symbol **X** is on a container.



X

(i) Identify the hazard represented by symbol **X**.

(1)

- A** corrosive
- B** explosive
- C** gas under pressure
- D** harmful to the environment

(ii) A scientist is using a container of chlorine gas. Hazard symbol **Y** is shown on the container.



Y

Hazard symbol **Y** shows that the chlorine gas is toxic.

State **one** precaution the scientist should take when using the toxic chlorine gas.

(1)

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(b) The diagram shows a part of a periodic table.

The element chlorine is a non-metal.

	1	2														3	4	5	6	7	0	
1																						
2		G																				
3																					J	
4								M														
5																						
6																R						

(i) Identify the letter that shows the position of chlorine in the periodic table.

(1)

- A G
- B J
- C M
- D R

(ii) The symbol for an atom of chlorine is Cl.

Give the formula for a molecule of chlorine.

(1)

(Total for Question 1 = 4 marks)



2 (a) Lisa places a drop of dilute hydrochloric acid onto universal indicator paper.

The universal indicator paper turns red.

(i) Suggest the pH of the hydrochloric acid.

(1)

(ii) Name **one** other indicator that can be used to test if a solution is acidic.

(1)

(b) Lisa reacts hydrochloric acid with magnesium to produce a metal salt and a gas.

(i) Name the metal salt produced in this reaction.

(1)

(ii) Identify the gas produced in this reaction.

(1)

A carbon dioxide

B chlorine

C hydrogen

D oxygen

(c) Lisa reacts sulfuric acid, H_2SO_4 , with sodium hydroxide, NaOH , to form sodium sulfate, Na_2SO_4 , and water.

Write the balanced equation for this reaction.

(2)

(Total for Question 2 = 6 marks)

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QUESTION 3 BEGINS ON THE NEXT PAGE.



3 Atoms contain particles called electrons, protons and neutrons.

(a) The table shows the relative mass and relative charge of some of these particles.

Complete the table.

(2)

particle	relative mass	relative charge
electron	0.0005	
proton	1	+1
neutron		0

(b) A sample of the element thallium contains two isotopes.

The table shows the relative mass and percentage abundance of each isotope in the sample.

isotope	relative mass	percentage abundance
thallium-203	203	30%
thallium-205	205	70%

Calculate the relative atomic mass of this sample of thallium.

(2)

relative atomic mass =

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SECTION B: Physics

4 The diagram shows the electromagnetic spectrum with one part missing.



(a) Name the missing part of the electromagnetic spectrum. (1)

(b) Different parts of the electromagnetic spectrum have different uses.
Draw **one** line from each part to its use. (2)

part	use
	detecting forged banknotes
microwaves	fibre optics
	satellite transmissions
gamma rays	sterilising medical equipment
	thermal imaging

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(c) Infrared is a part of the electromagnetic spectrum.

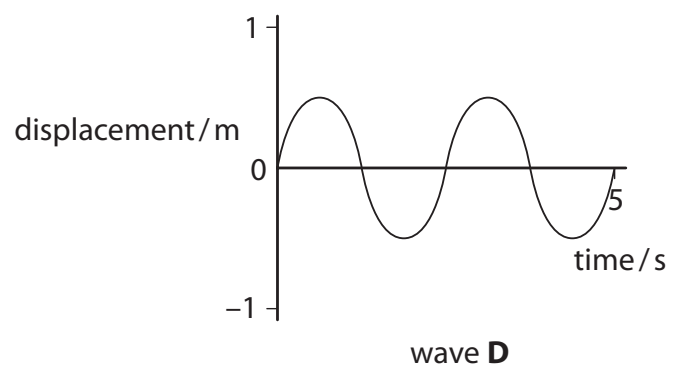
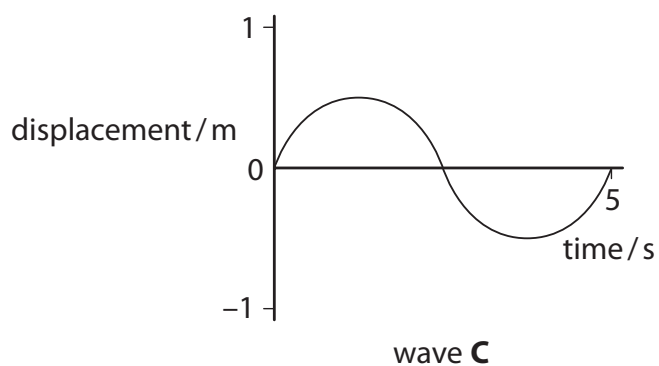
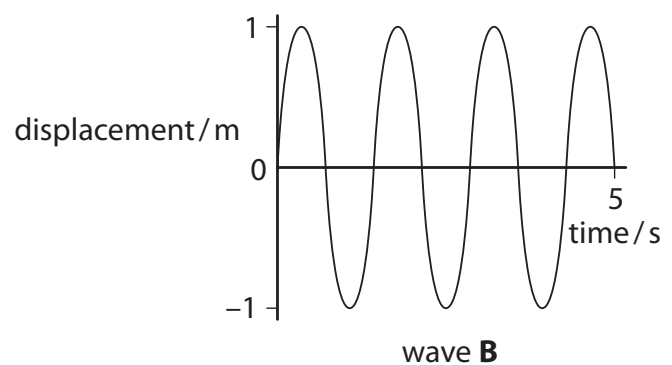
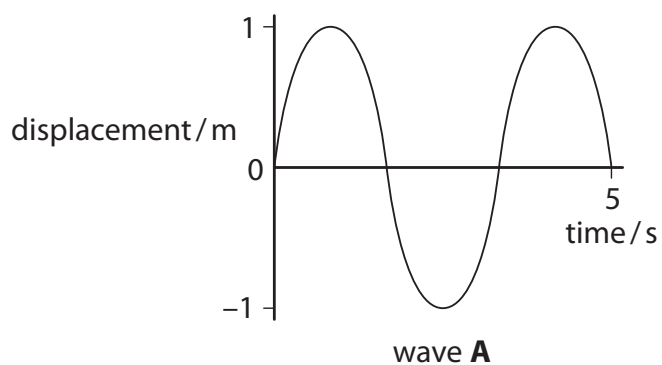
(i) Give **one** harmful effect of excessive exposure to infrared.

(1)

(ii) Name **one** part of the electromagnetic spectrum with a longer wavelength than infrared.

(1)

(d) The diagram shows four waves, **A**, **B**, **C** and **D**.



Identify the wave with the highest frequency.

(1)

- A** wave A
- B** wave B
- C** wave C
- D** wave D

(Total for Question 4 = 6 marks)



5 The image shows a laptop computer.

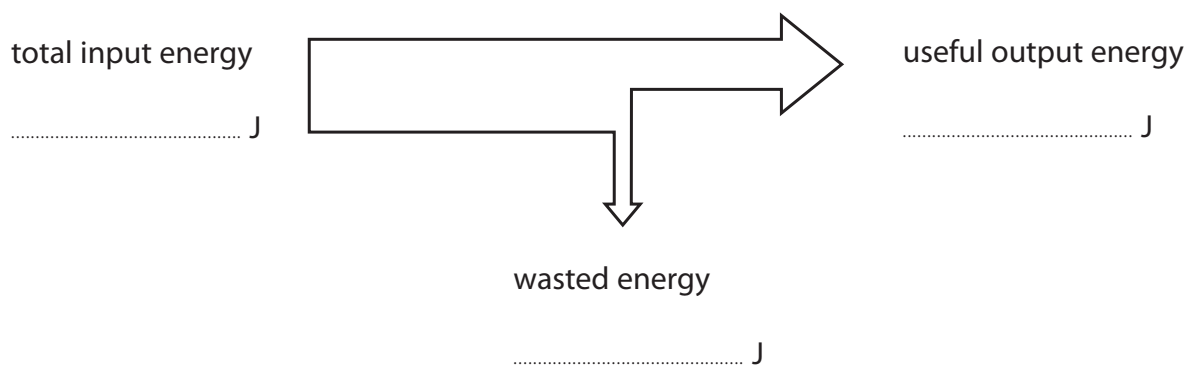


(a) The laptop computer has a total input energy of 900 J.

The laptop computer has a useful output energy of 720 J.

(i) Complete the diagram to show the energy transfers in the laptop computer.

(2)



(ii) Calculate the efficiency of the laptop computer.

$$\text{efficiency} = \frac{\text{useful energy}}{\text{total energy supplied}} \times 100\%$$

Show your working.

(2)

efficiency =

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(b) The cost of electricity is 14 pence per kWh.

The laptop computer has a power of 65 W.

Calculate the cost of using the laptop computer for 8 hours.

Show your working.

(2)

cost = pence

(Total for Question 5 = 6 marks)



SECTION C: Biology

7 (a) The human body responds to stimuli.

These responses are sometimes involuntary.

Identify the involuntary response.

(1)

- A eating
- B kicking a ball
- C sneezing
- D watching television

(b) The maintenance of a constant internal environment in the human body is known as homeostasis.

Give **two** homeostatic mechanisms that increase body temperature.

(2)

1

2

(c) Hormones are involved in homeostasis.

Name the hormone released when blood sugar levels are too high.

(1)

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(Total for Question 7 = 4 marks)

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8 (a) DNA is made up of a sequence of complementary base pairs.

(i) State where DNA is found in an animal cell.

(1)

(ii) The bases found in the DNA double helix are:

Adenine (A), Cytosine (C), Guanine (G) and Thymine (T).

Give **one** correct complementary base pair.

(1)

(b) A Punnett square is shown, the genotypes of the offspring have been completed.

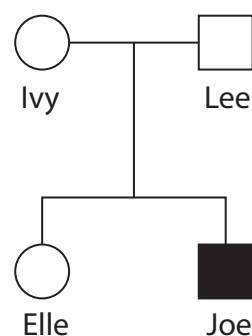
Complete the Punnett square to show the genotypes of the parents.

(2)

	EE	Ee
	EE	Ee

(c) A genetic condition is caused when an individual inherits two recessive alleles, dd.

The diagram shows a family pedigree analysis for this genetic condition.



Key

unaffected male



affected male



unaffected female



affected female



Explain why Joe is affected with the genetic condition but Elle is not.

Use the pedigree analysis diagram provided.

You may draw Punnett squares to help you.

(4)

Area with horizontal dotted lines for writing the answer.

(Total for Question 8 = 8 marks)

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