

Write your name here	
Surname	Other names
Pearson BTEC Level 1/Level 2 First Award	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> Centre Number <div style="display: flex; border: 1px solid black; height: 20px; width: 100%; margin-top: 5px;"> <div style="flex: 1; border: 1px solid black;"></div> <div style="flex: 1; border: 1px solid black;"></div> <div style="flex: 1; border: 1px solid black;"></div> <div style="flex: 1; border: 1px solid black;"></div> <div style="flex: 1; border: 1px solid black;"></div> <div style="flex: 1; border: 1px solid black;"></div> </div> </div> <div style="width: 45%;"> Learner Registration Number <div style="display: flex; border: 1px solid black; height: 20px; width: 100%; margin-top: 5px;"> <div style="flex: 1; border: 1px solid black;"></div> <div style="flex: 1; border: 1px solid black;"></div> <div style="flex: 1; border: 1px solid black;"></div> <div style="flex: 1; border: 1px solid black;"></div> <div style="flex: 1; border: 1px solid black;"></div> <div style="flex: 1; border: 1px solid black;"></div> <div style="flex: 1; border: 1px solid black;"></div> <div style="flex: 1; border: 1px solid black;"></div> </div> </div> </div>
<h1 style="margin: 0;">Applied Science</h1> <h2 style="margin: 0;">Unit 1: Principles of Science</h2>	
Thursday 5 June 2014 – Afternoon Time: 1 hour	Paper Reference <h2 style="margin: 0;">20460E</h2>
You must have: Calculator and a ruler	Total Marks <div style="border: 1px solid black; height: 30px; width: 100%; margin-top: 5px;"></div>

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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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: Physics

Answer ALL questions.

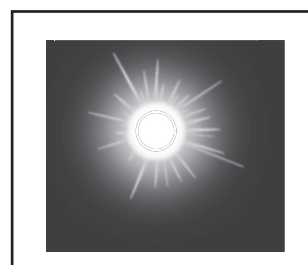
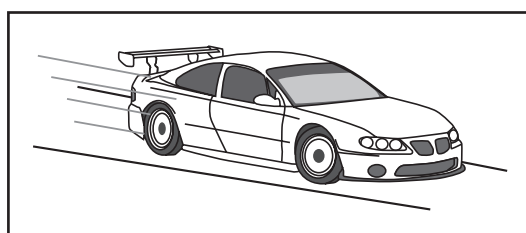
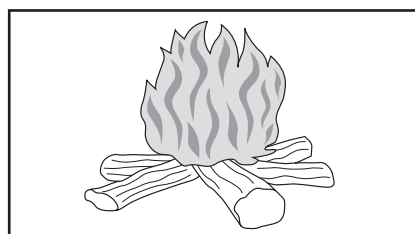
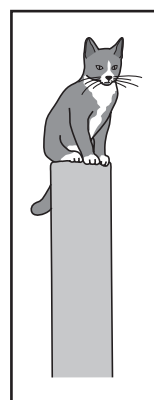
1 Energy can be in several forms.

(a) Draw a line to match each type of energy to the correct diagram in which it is shown.

(2)

Kinetic

Gravitational potential



(b) A torch produces useful energy.

(i) Name the useful energy produced.

(1)

The torch also produces some wasted energy.

(ii) Name the wasted energy.

(1)

(Total for Question 1 = 4 marks)



P 4 4 0 5 7 A 0 3 1 6

2 The diagram shows part of the electromagnetic spectrum.

Radio waves	Microwaves	Infrared	Visible light	Ultraviolet	X-rays	Gamma rays
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(a) (i) Name an electromagnetic wave that is used to sterilise medical equipment.

(1)

.....

(ii) Name the electromagnetic wave that is used in television remote controls.

(1)

.....

(b) (i) Name the electromagnetic wave that has the longest wavelength.

(1)

.....

(ii) Name the electromagnetic wave that has the highest frequency.

(1)

.....

(c) Microwaves are part of the electromagnetic spectrum.

Explain how microwaves cook food.

(2)

.....

.....

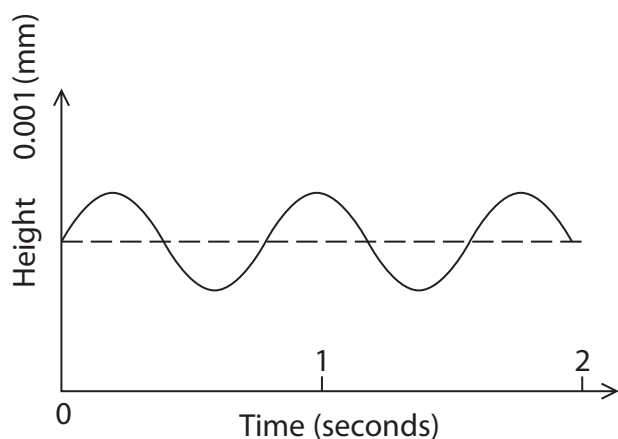
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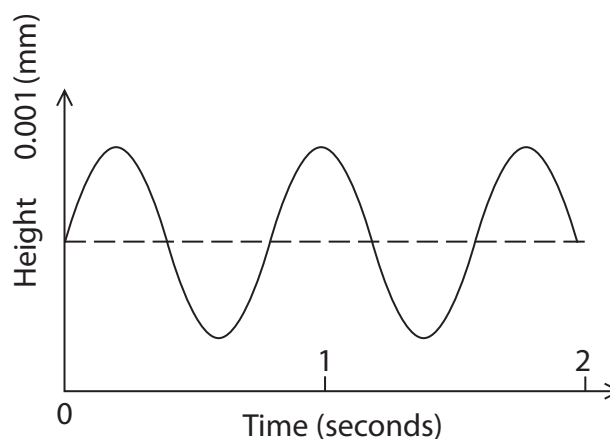
(Total for Question 2 = 6 marks)



3 The diagram shows two different waves.



Wave 1



Wave 2

(a) Identify the sentence that correctly describes these waves.

(1)

- ☐ **A** Wave 2 has a faster wave speed than Wave 1
- ☐ **B** Wave 1 has a higher frequency than Wave 2
- ☐ **C** Wave 2 has a larger amplitude than Wave 1
- ☐ **D** Wave 1 has a longer wavelength than Wave 2

(b) Frequency is measured in hertz.

Define frequency.

(1)

.....

.....



(c) Waves in the electromagnetic spectrum travel at **300 000 000 m/s**.

Wave speed (m/s) = wavelength (m) \times frequency (Hz)

(i) A radio wave has a wavelength of 200m.

Calculate the frequency of the radio wave.

(2)

..... Hz

(ii) An X-ray has a frequency of 3×10^{16} Hz.

Calculate the wavelength of the X-ray.

Give your answer in standard form.

(4)

..... m

(Total for Question 3 = 8 marks)

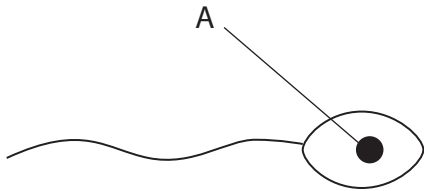
TOTAL FOR SECTION A = 18 MARKS



SECTION B: Biology

Answer ALL questions.

4 The diagram shows an animal sex cell.



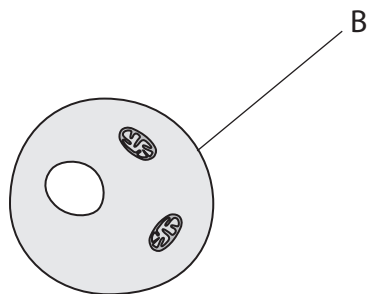
(a) (i) Name the animal sex cell.

(1)

(ii) Name the part of the cell labelled A.

(1)

The diagram shows a different animal sex cell.



(b) (i) Name the animal sex cell.

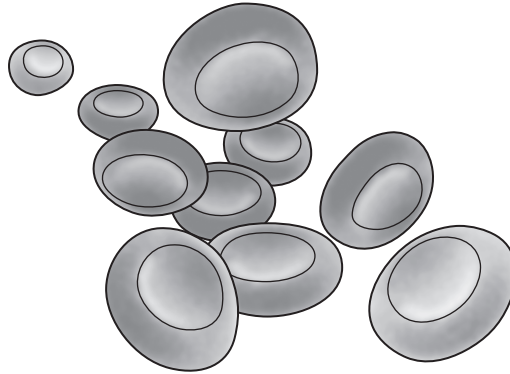
(1)

(ii) State the function of the cell membrane labelled B.

(1)



(c) The diagram shows some red blood cells.



(i) Give the function of red blood cells.

(1)

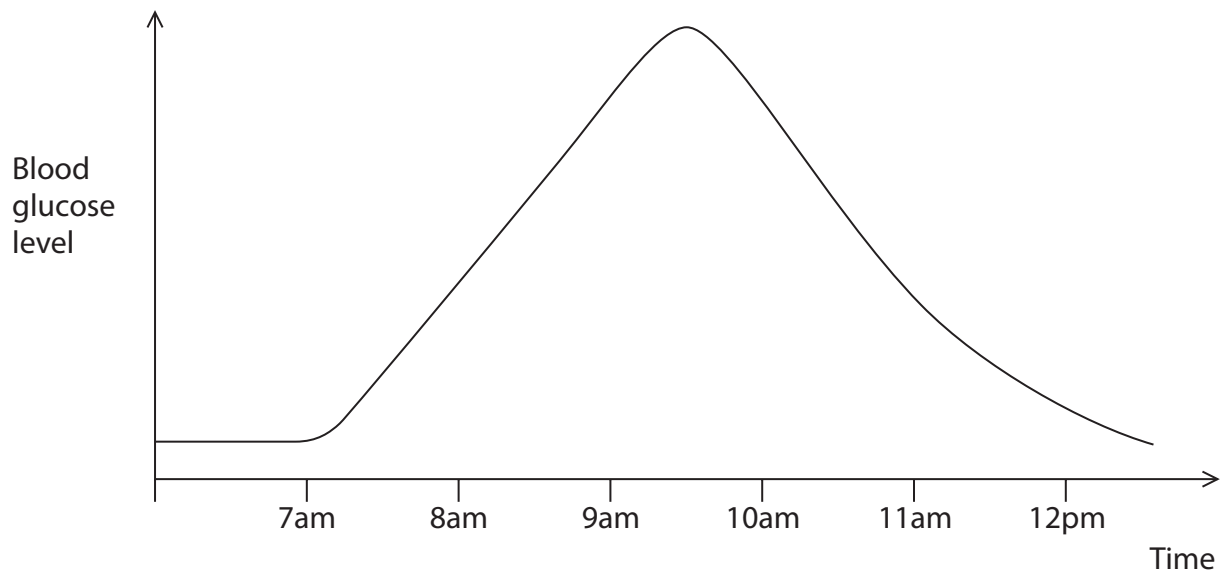
(ii) State how red blood cells are adapted to their function.

(1)

(Total for Question 4 = 6 marks)

5 Toby ate cereal for breakfast.

The graph shows Toby's blood glucose level at different times.



- (a) (i) Label the graph with an X to show when Toby's blood glucose level is at its highest.

(1)

- (ii) Suggest what time Toby ate his breakfast.

(1)

- (b) Toby's body produces a hormone that lowers the level of glucose in his body.

- (i) Name the hormone.

(1)

- (ii) Glucose is converted to glycogen. Where is the glycogen stored?

(1)

- (c) Describe how the endocrine system regulates Toby's blood glucose level after 11am.

(2)

(Total for Question 5 = 6 marks)



P 4 4 0 5 7 A 0 9 1 6

6 Genetic mutations can happen spontaneously or because of exposure to radiation or chemicals.

Explain **one beneficial** effect and **two harmful** effects of genetic mutations.

Beneficial effect

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Harmful effect

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Harmful effect

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(Total for Question 6 = 6 marks)

TOTAL FOR SECTION B = 18 MARKS



SECTION C: Chemistry

Answer ALL questions.

7 Atoms are made up of protons, neutrons and electrons.

(a) Complete the table to show the characteristics of protons, neutrons and electrons.

Some of the answers have been completed for you.

(3)

Characteristics	Proton	Neutron	Electron
Position in atom	In nucleus	In shell
Charge	No charge

(b) Every atom has a mass number.

Mass number is the number of:

(1)

- ☐ A electrons
- ☐ B neutrons
- ☐ C protons plus number of neutrons
- ☐ D electrons plus number of protons

(Total for Question 7 = 4 marks)



P 4 4 0 5 7 A 0 1 1 1 6

8 Magnesium sulfate can be made by a neutralisation reaction.

(a) Give the chemical symbol for magnesium.

(1)

(b) Magnesium has an electronic structure of 2.8.2

(i) How many electrons does an atom of magnesium have?

(1)

(ii) How many electron shells does an atom of magnesium have?

(1)

(c) What type of chemical is magnesium sulfate?

(1)

- ☐ **A** Acid
- ☐ **B** Alkali
- ☐ **C** Base
- ☐ **D** Salt



(d) (i) Name the chemical that must react with magnesium to form magnesium sulfate.

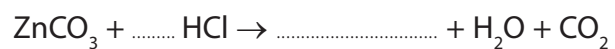
(1)

(ii) Name the other substance produced in this reaction.

(1)

(e) Metal carbonates react with acids.

Complete and balance the equation for the reaction between zinc carbonate and hydrochloric acid.



(2)

(Total for Question 8 = 8 marks)



P 4 4 0 5 7 A 0 1 3 1 6



Davina knows two bottles contain acid, one of which is more concentrated than the other. She thinks the third bottle might contain limewater.

- which bottles contain acid
- which bottle contains the more concentrated acid
- if the third bottle does contain limewater.

[illegible]

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