Paper Reference(s) 1SC0/2PF
Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Total Marks

Combined Science
PAPER 6
Foundation Tier

Friday 14 June 2024 – Afternoon

Time: 1 hour 10 minutes

In the boxes below, write your name, centre number and candidate number.

Surname						
Other names						
Centre Number						
Candidate Number						

V74482A

Pearson

YOU MUST HAVE

Calculator, ruler, Equation Booklet (enclosed)

YOU WILL BE GIVEN

Diagram Booklet

INSTRUCTIONS

Answer ALL questions.

Answer the questions in the spaces provided in this Question Paper or in the separate Diagram Booklet – there may be more space than you need.

Calculators may be used.

Any diagrams may NOT be accurately drawn, unless otherwise indicated.

You must show all your working out with your answer clearly identified at the end of your solution.

INFORMATION

The total mark for this paper is 60.

The marks for EACH question are shown in brackets – use this as a guide as to how much time to spend on each question.

In questions marked with an ASTERISK (*), marks will be awarded for your ability to structure your answer logically, showing how the points that you make are related or follow on from each other where appropriate.

There may be spare copies of some diagrams.

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.

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 mark your new answer with a cross ☒.

1 (a) Look at Figure 1 for Question 1(a) in the Diagram Booklet. It shows a circuit containing a battery and FOUR other components.

Label the FOUR components in Figure 1, using words from the list below.

(4 marks)

ammeter

lamp

LDR

switch

thermistor

variable resistor

(continued on the next page)

1 continued.

(b) The circuit in Figure 1 is switched on.

A charge of 1·2 C leaves the battery in a time of 4·0 s

Calculate the current in the circuit.

Use the equation

$$\text{current} = \frac{\text{charge}}{\text{time}}$$

(2 marks)

current = _____ A

(Total for Question 1 = 6 marks)

2 (a) Look at Figure 2 for Question 2(a) in the Diagram Booklet. It shows the shape of the magnetic field lines around a bar magnet.

(i) Draw ONE arrow on a magnetic field line in Figure 2 to show the direction of that magnetic field line.
(1 mark)

(ii) Draw an X on Figure 2 to show where the magnetic field is strongest.
(1 mark)

(iii) Give a reason why Figure 2 shows the magnetic field is strongest at point X.
(1 mark)

2 continued.

(b) A student places two magnets on a smooth bench.

Look at Figure 3 for Question 2(b) in the Diagram Booklet. The student holds the magnets close to each other, as shown in Figure 3.

(i) Draw some magnetic field lines on Figure 3 to show the shape of the magnetic field BETWEEN the two magnets.
(2 marks)

(continued on the next page)

2(b) continued.

(ii) The student is holding the two magnets on the smooth bench.

State what would happen if the student let go of one of the magnets.

(1 mark)

(continued on the next page)

2 continued.

(c) Look at Figure 4 for Question 2(c) in the Diagram Booklet. A student is given two permanent magnets and some paper clips, as shown in Figure 4.

The paper clips are NOT magnets, but they are made from a magnetic material.

(i) Which of these is a magnetic material? (1 mark)

☐ A aluminium

☐ B iron

☐ C plastic

☐ D wood

(continued on the next page)

2(c) continued.

(ii) Describe how the student could use the paper clips to find out which of the two permanent magnets is the stronger magnet. (2 marks)

(Total for Question 2 = 9 marks)

3 (a) Look at Figure 5 for Question 3(a) in the Diagram Booklet. It shows a truck on a horizontal road.

(i) A force of **1200 N** pulls the truck along the road for a distance of **8·0 m**

Calculate the work done by the **1200 N** force.

Use the equation

work done = force × distance moved in the direction of the force

State the unit of work done.

(3 marks)

Answer space continues on the next page.

3(a)(i) continued.

work
done = _____

unit _____

(continued on the next page)

3(a) continued.

(ii) At 8·0 m the force is removed and the truck slows down until it stops.

Describe the energy transfers as the truck slows down. (2 marks)

(continued on the next page)

3 continued.

(b) A box has a mass of 90 kg

Which of these is the weight of the box?
(1 mark)

☐ A 9 N

☐ B 90 N

☐ C 900 N

☐ D 9000 N

(continued on the next page)

3 continued.

(c) Look at Figure 6 for Question 3(c) in the Diagram Booklet. It shows a truck lifting a different box.

A student calculates the change in gravitational potential energy, ΔGPE, for the box at different heights.

Look at Figure 7 for Question 3(c) in the Diagram Booklet. It shows the results of the student's calculations.

(i) The student has made one incorrect calculation.

On Figure 7, draw a circle round the ● for this incorrect calculation.
(1 mark)

(continued on the next page)

3(c) continued.

(ii) The truck lifts the box from the ground to a height of 2·0 m

This takes a time of 5·0 s

Using data from the graph in Figure 7, calculate the power needed to lift the box.
(3 marks)

Use the equation

$$\text{power} = \frac{\Delta\text{GPE}}{\text{time}}$$

Answer space continues on the next page.

3(c)(ii) continued.

power = _____ W

(Total for Question 3 = 10 marks)

4 Look at Figure 8 for Question 4 in the Diagram Booklet. It shows a saucepan of milk being heated on an electric cooker.

(a) Look at Figure 9 for Question 4(a) in the Diagram Booklet. It is a table of data about the milk being heated.

(i) Using data from the table in Figure 9, calculate the increase in temperature of the milk.
(1 mark)

increase in temperature = _____ °C

(continued on the next page)

4(a) continued.

(ii) Using data from the table in Figure 9, calculate the specific heat capacity of the milk.

Use the equation

$$\text{specific heat capacity} = \frac{\text{change in thermal energy}}{\text{mass} \times \text{increase in temperature}}$$

(2 marks)

specific heat capacity = _____ J / kg °C

(continued on the next page)

4 continued.

(b) The cooker supplies 130 000 J of energy in a time of 87 s.

(i) Calculate the power supplied by the cooker.

Use the equation

$$P = \frac{E}{t}$$

Give your answer to 2 significant figures.
(3 marks)

Answer space continues on the next page.

4(b)(i) continued.

power = _____ W

(continued on the next page)

4(b) continued.

(ii) The cooker supplies 130 000 J of energy but only 96 000 J of this energy is used to heat the milk.

Calculate the efficiency of heating the milk using this cooker.

Use the equation

$$\text{efficiency} = \frac{\text{useful energy transferred}}{\text{total energy supplied}}$$

(2 marks)

Answer space continues on the next page.

4(b)(ii) continued.

$$\text{efficiency} = \frac{\qquad\qquad\qquad\qquad}{\qquad\qquad\qquad\qquad}$$

(continued on the next page)

4 continued.

(c) The wiring for the cooker has safety features.

(i) Which of these wires would help to protect a person from getting an electric shock if a fault developed in the cooker? (1 mark)

☐ A earth

☐ B live

☐ C negative

☐ D positive

(continued on the next page)

4(c) continued.

(ii) Explain how a fuse can prevent overheating of the wiring for the cooker.
(2 marks)

(Total for Question 4 = 11 marks)

5 (a) Look at Figure 10 for Question 5(a) in the Diagram Booklet. It is a circuit diagram.

The current at P is
(1 mark)

☐ A 0·05 A

☐ B 0·10 A

☐ C 0·15 A

☐ D 0·20 A

(continued on the next page)

5 continued.

(b) Some students investigate resistors in parallel.

The students set up a circuit containing FOUR identical resistors.

Look at Figure 11 for Question 5(b) in the Diagram Booklet. The circuit used is shown in Figure 11.

The students measure the current from the power supply and the voltage (p.d.) across the resistors.

(i) On Figure 11, draw a voltmeter connected to measure the voltage (p.d.) across the resistors.
(1 mark)

(continued on the next page)

5(b) continued.

The students remove one resistor and measure the current and voltage again with only 3 resistors in the circuit.

They repeat the measurements of current and voltage with only 2 resistors in the circuit and then with only 1 resistor in the circuit.

Look at Figure 12 for Question 5(b)(ii) in the Diagram Booklet. It is a table of their results.

(continued on the next page)

5(b) continued.

(ii) Using data from the table in Figure 12, predict the current from the power supply when there are 4 resistors in the circuit.

(1 mark)

current = _____ mA

(continued on the next page)

5(b) continued.

(iii) Using data from the table in Figure 12, calculate the resistance of ONLY 1 resistor. (3 marks)

resistance = _____ Ω

(continued on the next page)

5(b) continued.

(iv) Using data from the table in Figure 12, explain what happens to the **total resistance of the circuit** as the number of resistors in parallel decreases.
(3 marks)

(continued on the next page)

5 continued.

(c) An electric fire is connected to a 230 V mains supply.

A current of 9·0 A is supplied to the fire.

Calculate the power supplied to the fire.

Use the equation

power = current × voltage

(2 marks)

Answer space continues on the next page.

5(c) continued.

power = _____ W

(Total for Question 5 = 11 marks)

6 (a) A coil of copper wire has a mass of $14{\cdot}1\,g$

The density, ρ, of copper is $8{\cdot}96\,g/cm^3$

Calculate the volume of the copper wire.

Use the equation

$$\rho = \frac{m}{V}$$

(3 marks)

Answer space continues on the next page.

6(a) continued.

volume = _____ cm^3

(continued on the next page)

6 continued.

(b) Look at Figure 13 for Question 6(b) in the Diagram Booklet. It gives information about the density of aluminium.

Explain the difference between the density of solid aluminium and the density of liquid aluminium in terms of the arrangement of particles.
(2 marks)

(continued on the next page)

6 continued.

(c) A student boils some water.

Calculate the amount of thermal energy needed to change 60·0 g of water to steam at its boiling point.

The specific latent heat of vaporisation of water, L, is $2{\cdot}26 \times 10^6$ J/kg

Use the equation

$$Q = m \times L$$

(2 marks)

Answer space continues on the next page.

6(c) continued.

amount of
thermal energy = _____ J

(continued on the next page)

6 continued.

*(d) A student is investigating the melting of ice.

The student has some crushed ice in a beaker at a temperature of −20 °C

The student heats the beaker and its contents for 20 minutes.

Look at Figure 14 for Question 6(d) in the Diagram Booklet. It is a graph of the student's results.

Using information from the graph, describe the changes that take place in the 20 minutes shown on the graph.

(continued on the next page)

6(d) continued.

Your answer should refer to

- data from the graph
- the state (solid, liquid or gas) of the contents of the beaker.

(6 marks)

Answer space continues on the next 2 pages.

6(d) continued.

Turn over

6(d) continued.

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

END OF PAPER