Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Time 1 hour 10 minutes

Paper reference **1SC0/2PF**

Combined Science

PAPER 6

Foundation Tier

You must have:
Calculator, ruler, Equation Booklet (enclosed)

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 candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *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.
- A list of equations is included at the end of this exam paper.

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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Q:1/

P 6 9 4 7 3 A 0 1 2 4

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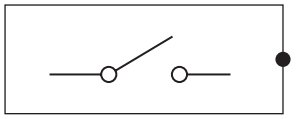
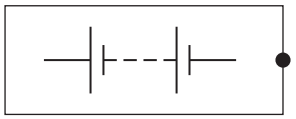
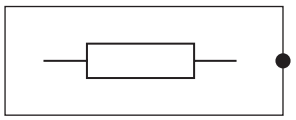
Answer ALL questions. Write your answers in the spaces provided.

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 mark your new answer with a cross ☒.

1 This question is about electrical circuits.

(a) Draw **one** straight line from each circuit symbol to its description.

(3)

circuit symbol	**description**
	battery
	LED
	switch
	resistor

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(b) Figure 1 shows a lamp in a circuit.

The lamp is switched on.

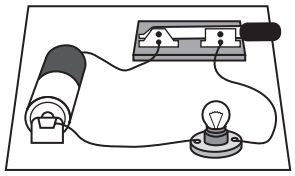


Figure 1

(i) The current in the lamp is a flow of

(1)

- ☒ **A** atoms
- ☒ **B** electrons
- ☒ **C** neutrons
- ☒ **D** protons

(ii) The current in the lamp is 0.21 A.

Calculate the charge that flows through the lamp in a time of 300 s.

State the unit of charge.

Use the equation

charge = current × time

(3)

charge = ... unit .....

(Total for Question 1 = 7 marks)

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2 (a) A teacher prepares some equipment to demonstrate electromagnetism.
Figure 2 shows the equipment.

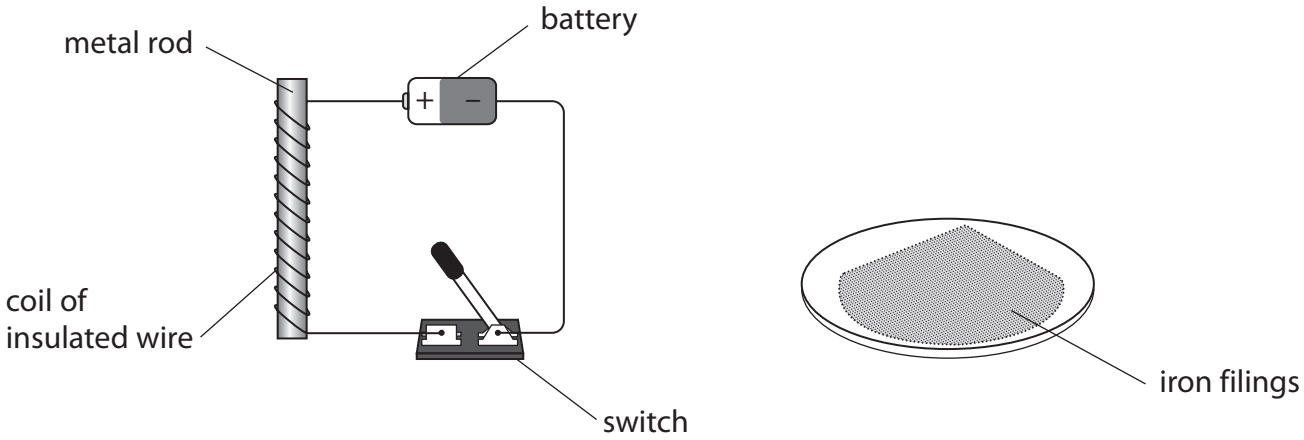


Figure 2

The teacher wants to show that iron filings

- are picked up by the metal rod when the switch is closed
- fall off the metal rod when the switch is opened again.

(i) Suggest a suitable metal for the rod.

(1)

.....

(ii) Give **two** reasons for your choice.

(2)

1 .....

.....

2 .....

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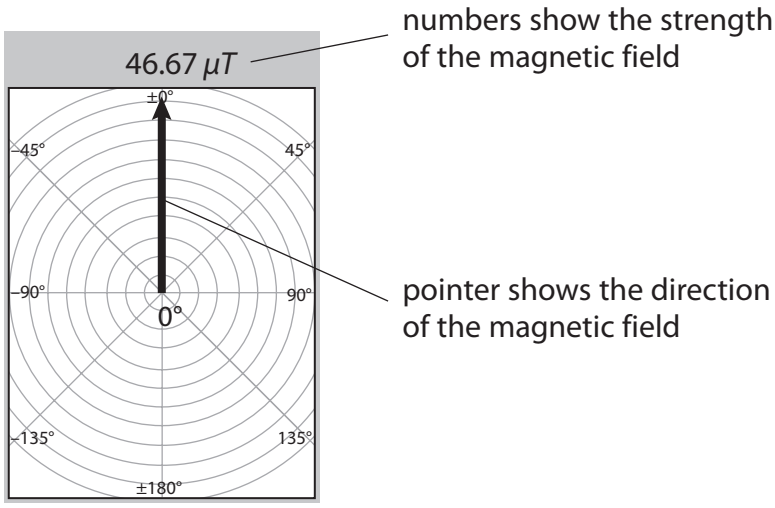
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(b) A student's mobile phone has an app to measure a magnetic field.

The student places the phone on a table and rotates the phone until it is pointing north.

There are no magnets near to the phone.

Figure 3 shows the display on the screen of the phone.



(Source: adapted from MGS Lite app for iPhone)

Figure 3

(i) State why the strength of the magnetic field shown is not zero.

(1)

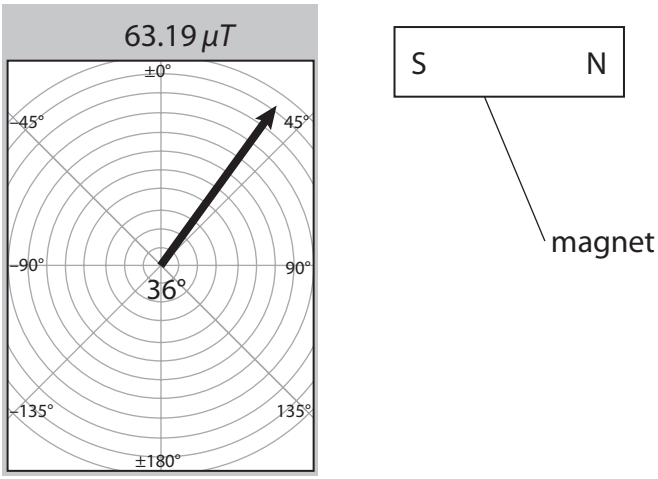
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The student places a magnet near to the phone on the table.

Figure 4 shows the magnet and the new display on the screen.



(Source: adapted from MGS Lite app for iPhone)

Figure 4

(ii) State **two** changes in the magnetic field measured by the phone from Figure 3 to Figure 4.

(2)

1 .....

.....

2 .....

.....

(iii) Describe how the student could use the mobile phone to investigate the strength of the magnetic field at different distances from the magnet.

(3)

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(Total for Question 2 = 9 marks)

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3 (a) An electric water pump is powered by the 230 V mains supply.

Figure 5 shows the inside of the plug on the cable to the pump.

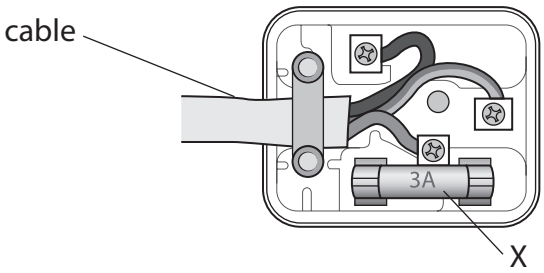


Figure 5

(i) One wire in the plug is the earth wire.

The other two wires are

(1)

☒ **A** live and negative

☒ **B** live and neutral

☒ **C** positive and negative

☒ **D** positive and neutral

(ii) Describe the purpose of the component labelled X.

(2)

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.....

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(b) The 230 V mains supply transfers 9000 J of energy to the pump motor in 1 minute.

Calculate the current in the pump motor.

Use the equation

$$I = \frac{E}{V \times t}$$

(3)

current = ... A

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(c) The system transfers 8400 J of useful kinetic energy to the water passing through the pump in 1 minute.

Figure 6 shows a diagram of the energy transfers.

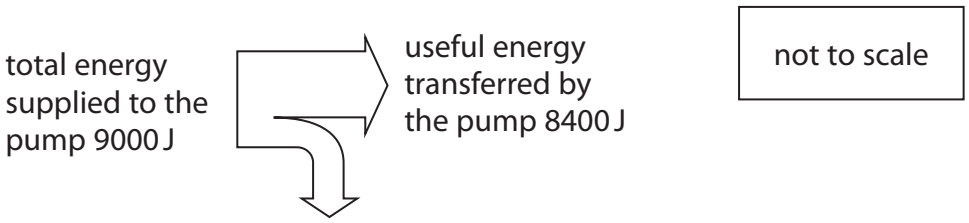


Figure 6

(i) Explain why the useful energy transferred to the water is different from the total energy supplied to the pump.

(2)

.....

.....

.....

.....

(ii) Calculate the efficiency of the pump.

Use the equation

$$\text{efficiency} = \frac{\text{useful energy transferred by the pump}}{\text{total energy supplied to the pump}}$$

(2)

efficiency = ...

(Total for Question 3 = 10 marks)

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4 Three students carry out an investigation to determine their powers when running up stairs.

(a) Figure 7 shows a diagram of the stairs with four distances, A, B, C and D, marked.

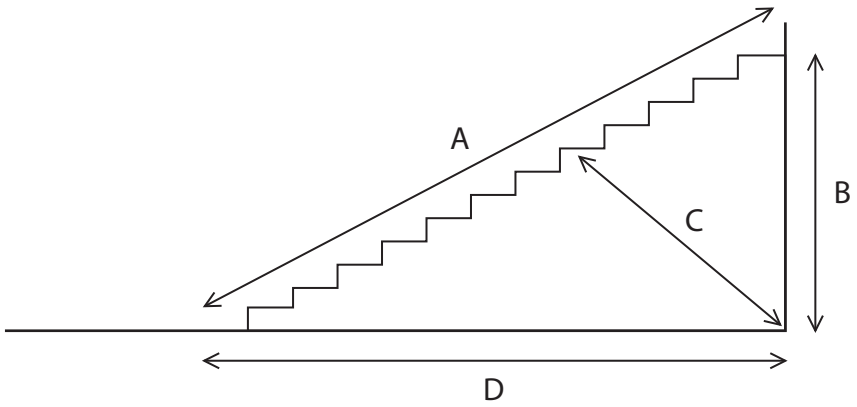


Figure 7

The students need to calculate the work done against gravity.

Which distance should be used in the calculation?

(1)

- ☒ **A** A
- ☒ **B** B
- ☒ **C** C
- ☒ **D** D

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(b) They take turns to run up the stairs and use a stopwatch to measure the time taken.

The students estimate their own weight.

Figure 8 shows a table of their results.

The table is not complete.

student	student estimate of weight in N	distance in m	work done	time taken in s	power in W
A	550	4.0	2200	5.0	440
B		4.0	1960	4.5	436
C	510	4.0	2040		425

Figure 8

(i) State the unit for work done.

(1)

unit for work done is .....

(ii) Use the data for student B to calculate his estimated weight.

(2)

weight = ... N

(iii) Use the data for student C to calculate the time she takes.

(2)

time taken = ... s

(iv) Use the data for all three students to calculate the average power of the students.

(2)

average power = ... W

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(c) Identify a significant source of error in the investigation and state how this error can be reduced.

(2)

source of error

.....

.....

can be reduced by

.....

.....

(Total for Question 4 = 10 marks)

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5 (a) Figure 9 shows a lamp connected to a d.c. power supply.

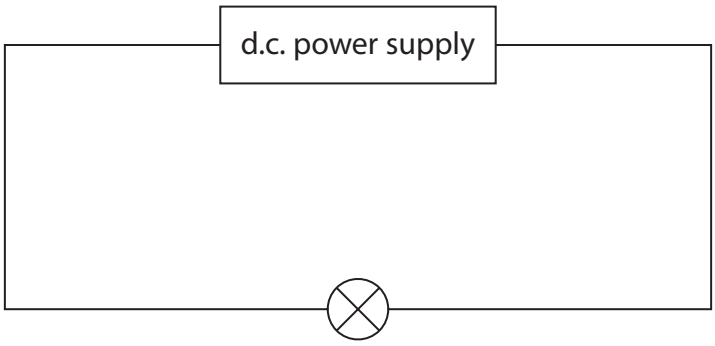


Figure 9

The power supply provides a potential difference (voltage) of 4.5 V.

The current in the lamp is 0.30 A.

(i) Calculate the resistance of the lamp.

Use the equation

$$R = \frac{V}{I}$$

(1)

resistance = ... Ω

(ii) Calculate the power supplied to the lamp.

(2)

power = ... W

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(b) Another **identical** lamp is added to the circuit, as shown in Figure 10.

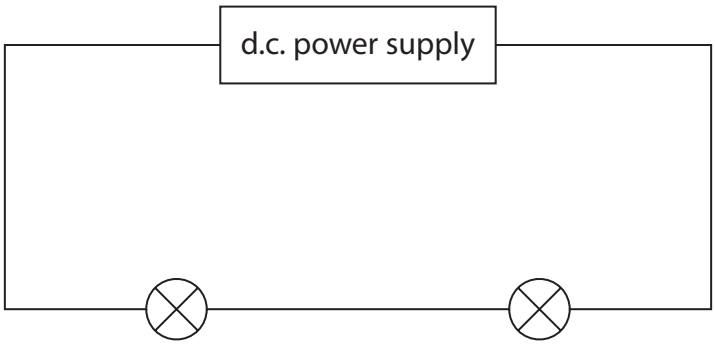


Figure 10

The power supply provides the same potential difference as it provided in the circuit in Figure 9.

State and explain the difference between the brightness of the lamp in Figure 9 and the brightness of a lamp in Figure 10.

(3)

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(c) A student is given a low voltage power supply and 1 m of resistance wire.

The student uses these and other pieces of equipment to measure the resistance of just 50 cm of the resistance wire.

Draw a diagram of the circuit that the student should use.

Your circuit diagram should identify the pieces of equipment that the student uses.

(3)

(d) Describe the difference between direct current (d.c.) and alternating current (a.c.) in electrical circuits.

(2)

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(Total for Question 5 = 11 marks)

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6 (a) When water boils and turns into steam, there are changes in the arrangement of particles and the density.

Which of these shows the changes?

(1)

		space between particles in steam	density of steam
☒	**A**	bigger than in water	greater than water
☒	**B**	bigger than in water	less than water
☒	**C**	smaller than in water	greater than water
☒	**D**	smaller than in water	less than water

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(b) Figure 11 shows some water in a measuring cylinder and a lump of iron.

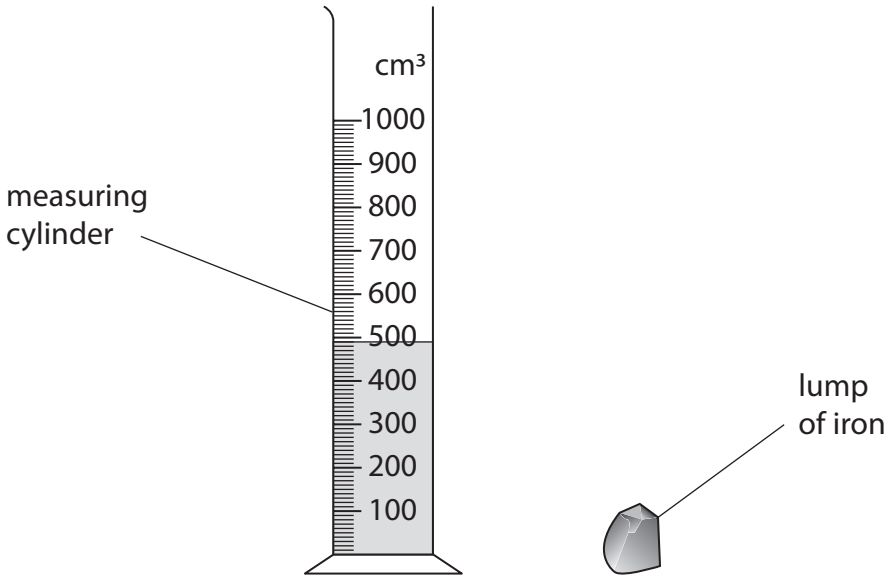


Figure 11

The lump of iron is lowered fully into the water.

The water level in the measuring cylinder rises to 530 cm^3.

The density of iron is 7.9 g / cm^3.

Calculate the mass of the lump of iron.

Use the equation

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

Give your answer to 2 significant figures.

(4)

mass = ... g

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(c) A piece of wood has a similar shape and volume to the lump of iron.

The density of the wood is 0.82 g / cm^3.

The density of water is 1.00 g / cm^3

Explain why the method used in part (b) cannot be used to determine the mass of the piece of wood.

(2)

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*(d) A student needs to determine the specific heat capacity of water.

Figure 12 shows some of the equipment the student uses.

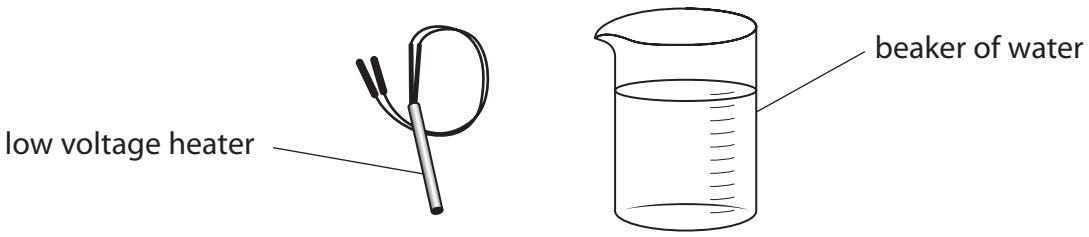


Figure 12

Describe the method the student should use to determine the specific heat capacity of water.

Your description should include, with reasons,

- any other equipment needed
- the measurements needed.

You may draw a diagram if it helps your answer.

(6)

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(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

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Equations

(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance $v^2 - u^2 = 2 \times a \times x$
energy transferred = current × potential difference × time $E = I \times V \times t$
potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil $V_p \times I_p = V_s \times I_s$
change in thermal energy = mass × specific heat capacity × change in temperature $\Delta Q = m \times c \times \Delta\theta$
thermal energy for a change of state = mass × specific latent heat $Q = m \times L$
to calculate pressure or volume for gases of fixed mass at constant temperature $P_1 V_1 = P_2 V_2$
energy transferred in stretching = 0.5 × spring constant × (extension)^2 $E = ½ \times k \times x^2$

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