Please check the examination details below before entering your candidate information

| Candidate surname | Other names |
|---|---|
| | |

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

| Centre Number | Candidate Number |
|---|---|
| | |

# Friday 14 June 2019

Morning (Time: 1 hour 10 minutes) | Paper Reference **1SC0/2PF**

# Combined Science

## Paper 6: Physics 2

**Foundation Tier**

**You must have:**
Calculator, ruler

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* ▶

**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) Figure 1 gives the names of three atomic particles and some descriptions of the charge on the particles and their position in the atom.

Draw one straight line from each atomic particle to its correct description.

**(3)**

| **particle** | **description** |
|---|---|
| | negative charge inside the nucleus |
| proton | no charge inside the nucleus |
| electron | positive charge inside the nucleus |
| neutron | negative charge outside the nucleus |
| | no charge outside the nucleus |

**Figure 1**





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(b) Figure 2 shows the junction of three wires, F, G and H, in a circuit.
The current in wire F is 6.0 A.
The current in wire G is 3.5 A.

Calculate the current in wire H.

**(1)**

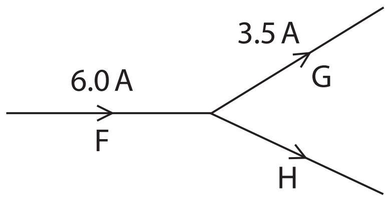


**Figure 2**

current in wire H = .............................................. A

(c) A wire in a circuit carries a current of 0.9 A.
Calculate the quantity of charge that flows through the wire in 50 s.

State the unit of charge with your answer.

Use the equation

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

**(3)**

quantity of charge = .............................................. unit ..............................................

**(Total for Question 1 = 7 marks)**

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**2** (a) Which of these is a magnetic material?

**(1)**

- ☒ **A** aluminium
- ☒ **B** carbon
- ☒ **C** cobalt
- ☒ **D** copper

(b) A student has

- a power pack
- a long piece of wire
- a stiff card
- iron filings

Describe how the student could use this equipment to show the shape of the magnetic field produced by a current in the wire.

You may draw a diagram to help with your answer.

**(4)**

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(c) Figure 3 shows two magnetic poles facing each other.

The magnetic field between the poles is uniform.

On Figure 3, draw the magnetic field lines between the two poles and show the direction of this magnetic field.

**(3)**

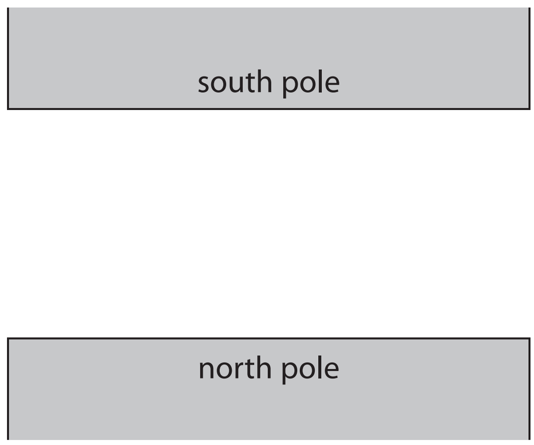


**Figure 3**

**(Total for Question 2 = 8 marks)**

**3** (a) Figure 4 shows a 10 N weight hanging from a spring.

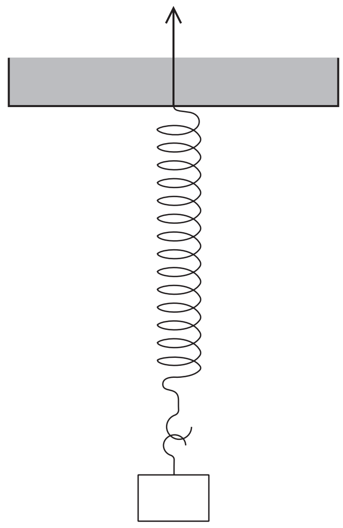


**Figure 4**

One of the forces acting to stretch the spring is shown in Figure 4.

Complete Figure 4 by adding an arrow to show the other force acting to stretch the spring.

**(2)**

(b) A weight of 4.0 N is used to extend a spring.
The extension of the spring is 0.06 m.

(i) Calculate the spring constant, *k*, of the spring.

Use the equation

$$F = k \times x$$

**(3)**

spring constant = .................................................. N/m

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P 6 0 2 5 0 A 0 6 2 0

(ii) State what measurements should be made to determine the extension of the spring produced by the 4.0 N weight.

**(2)**

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(c) Another spring has a spring constant of 250 N/m.

Calculate the work done in stretching the spring by 0.30 m.

State the unit.

Use the equation

$$E = \frac{1}{2} \times k \times x^2$$

**(3)**

work done in stretching the spring = .................................... unit ....................................

**(Total for Question 3 = 10 marks)**

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**4** (a) Solid, liquid and gas are states of matter.

Which process describes the change from a solid to a liquid?

**(1)**

- ☒ **A** melting
- ☒ **B** freezing
- ☒ **C** evaporation
- ☒ **D** condensation

(b) A student determines the density of a liquid.

The student puts an empty measuring cylinder on a balance (Figure 5a).
The student then adds liquid to the measuring cylinder (Figure 5b).

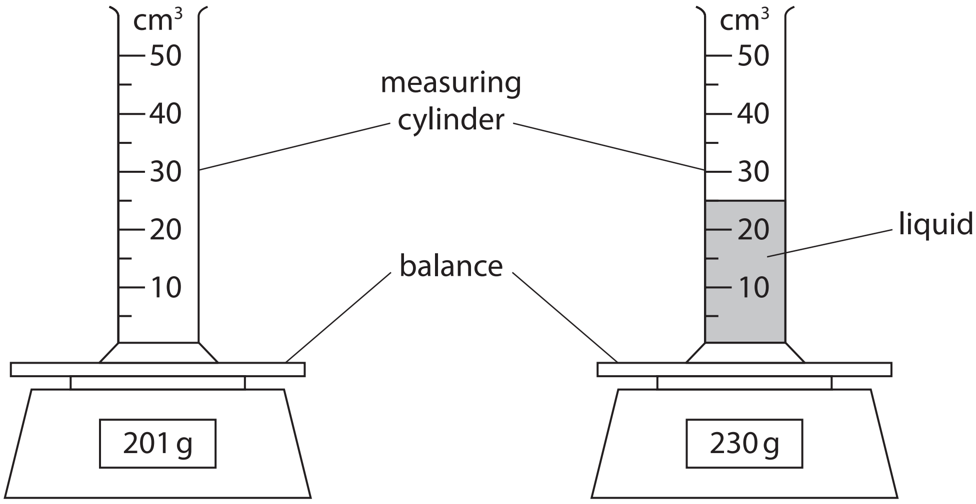


**Figure 5a** **Figure 5b**

Calculate the mass of liquid added and the volume of liquid added.

Use the information in Figures 5a and 5b.

(i) mass of liquid added = .............................................. g

**(1)**

(ii) volume of liquid added = .............................................. $cm^3$

**(1)**

(iii) Which equation should the student use to calculate the density of the liquid?

**(1)**

- ☒ **A** density = mass + volume
- ☒ **B** density = mass − volume
- ☒ **C** density = mass × volume
- ☒ **D** density = $\frac{\text{mass}}{\text{volume}}$


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(iv) State **two** improvements the student could make to this investigation.

**(2)**

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2 ..............................................................................................................................................

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(c) (i) Figure 6 shows an electric kettle.

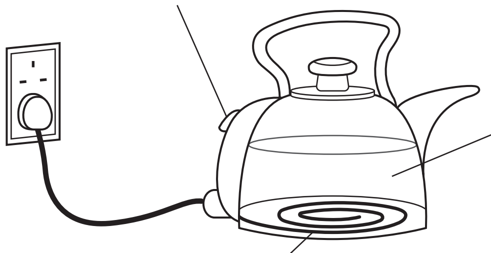


**Figure 6**

The kettle contains 1.5 kg of water.

The kettle is switched on.

Calculate the energy needed to raise the temperature of the water by 50 °C.

Specific heat capacity of water = 4200 J/kg °C

Use the equation

$$\Delta Q = m \times \mathrm{c} \times \Delta\theta$$

**(2)**

energy needed = .............................................. J

(ii) The amount of energy, $E$, needed to bring the water to boiling point is 670 000 J.

The kettle has a power of 3500 W.

Calculate the time, $t$, it takes to bring the water to boiling point.

Use the equation

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

**(3)**

time to bring the water to boiling point = .............................................. s

**(Total for Question 4 = 11 marks)**

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**5** (a) Which of these is the equation for work done?

**(1)**

- ☒ **A** work done = force ÷ distance moved in direction of force
- ☒ **B** work done = force × distance moved in direction of force
- ☒ **C** work done = force ÷ distance moved at right angles to direction of force
- ☒ **D** work done = force × distance moved at right angles to direction of force

(b) A ball has a mass of 0.046 kg.

(i) Calculate the change in gravitational potential energy when the ball is lifted through a vertical height of 2.05 m.

Use the equation

$$\Delta GPE = m \times g \times \Delta h$$

**(2)**

change in gravitational potential energy = .............................................. J

(ii) The ball is released.

Calculate the kinetic energy of the ball when the speed of the ball is 3.5 m/s.

**(3)**

kinetic energy of the ball = .............................................. J

(iii) The ball bounces several times.

Figure 7 shows how the height of the ball above the floor changes with time.

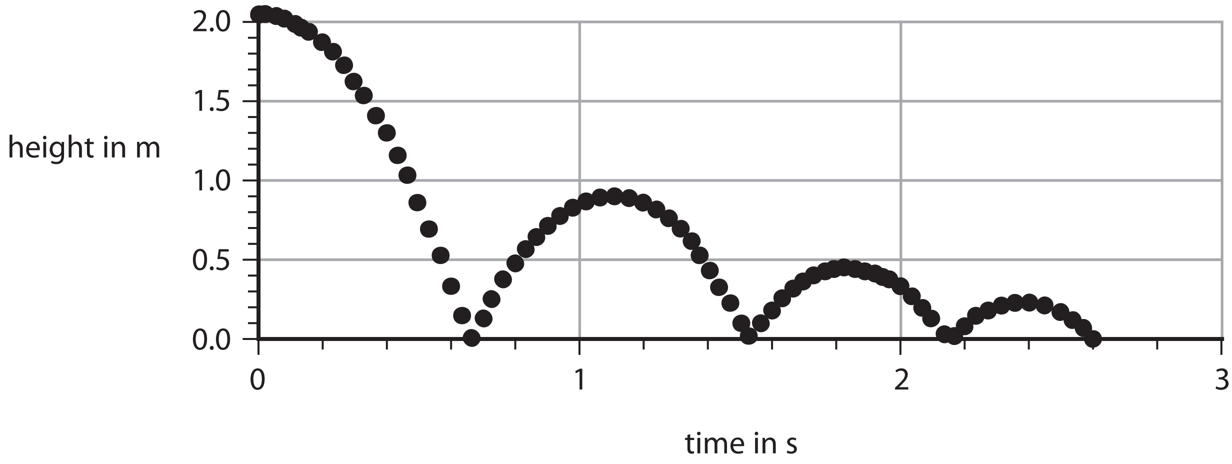


**Figure 7**

Use Figure 7 to estimate the maximum height that the ball reaches after the first bounce.

**(1)**

height after first bounce = .................................... m

(iv) Explain why the ball does not bounce back to its starting height of 2.05 m.

**(2)**

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(c) A student plots a graph showing the height at the start and the maximum height reached after each bounce.

Figure 8 shows the student's graph.

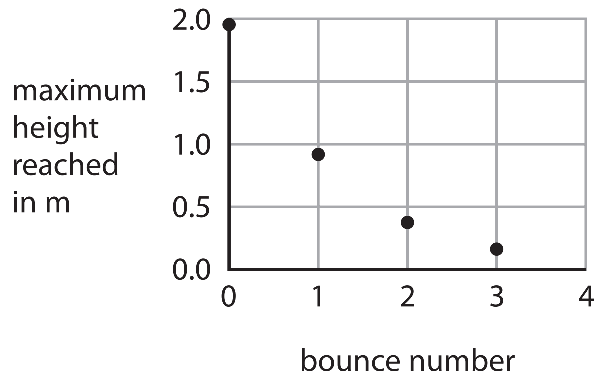


**Figure 8**

Describe how the maximum height reached changes with the bounce number in Figure 8.

**(2)**

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**(Total for Question 5 = 11 marks)**

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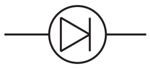
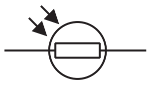
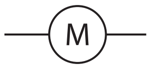
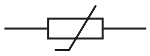
**6** (a) Which of these symbols is used to represent a thermistor in an electrical circuit?

**(1)**

☒ **A** 

☒ **B** 

☒ **C** 


☒ **D** 

(b) A student investigates how the current in a lamp changes with the potential difference across the lamp.

The student uses the results to calculate the resistance of the lamp.

The results are shown in the table in Figure 9.

| **potential difference in V** | **current in A** | **resistance in Ω** |
|---|---|---|
| 1.0 | 0.09 | 11 |
| 2.0 | 0.14 | 14 |
| 3.0 | 0.18 | 17 |
| 4.0 | 0.22 | 18 |
| 5.0 | 0.26 | |
| 6.0 | 0.30 | 20 |

**Figure 9**

(i) One value of resistance is missing from the table in Figure 9.

Calculate the value of resistance that is missing from the table.

**(3)**

missing resistance = .................................................. Ω

(ii) The student writes this conclusion:

'The resistance of the lamp is directly proportional to the potential difference.'

Comment on the student's conclusion.
Use information from Figure 9 in your answer.

**(3)**

*(c) Figure 10 shows a battery connected to a filament lamp.

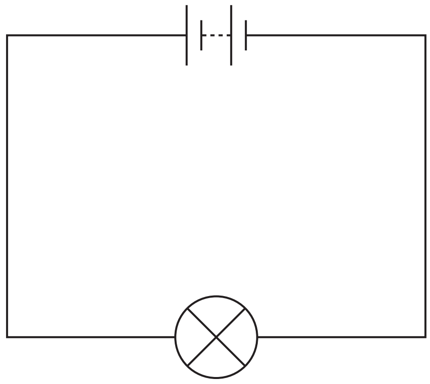


**Figure 10**

Explain, in terms of the movement of charged particles, how energy is transferred from the battery, through the lamp, to the surroundings.

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

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