Write your name here

Surname	Other names

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

Centre Number

Candidate Number

Combined Science

Paper 6: Physics 2

Foundation Tier

Friday 15 June 2018 – Morning
Time: 1 hour 10 minutes

Paper Reference
1SC0/2PF

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 ▶

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1/

P 6 0 4 7 3 A 0 1 2 0

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) Complete the following sentences using one of the phrases from the box below.

efficiency is reduced
the national grid
a power station
heat loss is reduced
a transformer

(i) Electrical power is generated at

(1)

....

(ii) Electricity is transmitted over long distances by transmission lines that are part of

(1)

....

(iii) Electricity is transmitted at high voltages so that

(1)

....

(b) Which statement is true for transformers?

(1)

☐ **A** Transformers can only step-up voltages.

☐ **B** Transformers can only step-down voltages.

☐ **C** Transformers can work with direct current.

☐ **D** Transformers have primary and secondary coils.

(c) In a small transformer

- the primary voltage is 230 V
- the primary current is 0.020 A
- the secondary voltage is 5.0 V

Calculate the secondary current.

Use the equation

$$I_s = \frac{V_p \times I_p}{V_s}$$

(2)

secondary current = ... A

(Total for Question 1 = 6 marks)

2 (a) Figure 1 shows the magnetic field produced by a current in a long, straight wire.

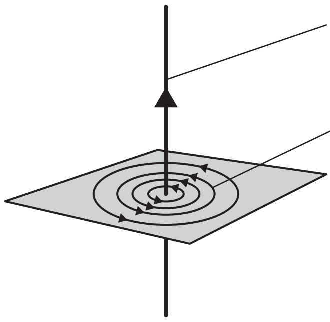

Figure 1

Which row of the table is correct when the strength of the magnetic field is greatest?

(1)

	distance from the wire	current
☒ **A**	small	small
☒ **B**	small	large
☒ **C**	large	small
☒ **D**	large	large

(b) Which of these materials would be the most suitable for making a temporary magnet?

(1)

☒ **A** copper

☒ **B** iron

☒ **C** plastic

☒ **D** steel

(c) Figure 2 shows a magnet holding some paper clips.

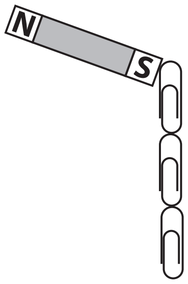

Figure 2

Describe how a student could show that the paper clips are induced magnets.

(2)

....

....

....

....

(d) Describe how you could show that the Earth has a magnetic field.

(2)

....

....

....

....

(e) A student uses a compass to investigate the magnetic field near a bar magnet.

The student places the compass near the bar magnet as shown in Figure 3.

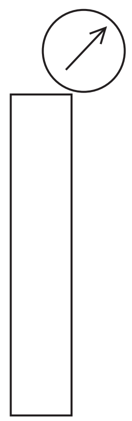

Figure 3

(i) Mark the north pole of the bar magnet with an 'N' in Figure 3.

(1)

(ii) State two ways in which the investigation could be developed to show the shape of the magnetic field around the bar magnet.

You may add to Figure 3 to help with your answer.

(2)

1 ....

....

2 ....

....

(Total for Question 2 = 9 marks)

3 (a) (i) Which of these forces keeps the Moon moving around the Earth?

(1)

☒ **A** contact

☒ **B** electrostatic

☒ **C** gravitational

☒ **D** magnetic

(ii) Which of these is a scalar quantity?

(1)

☒ **A** velocity

☒ **B** momentum

☒ **C** energy

☒ **D** acceleration

(b) Figure 4 shows a box at rest on a floor.

The force that the floor exerts on the box is shown by the vector in Figure 4.

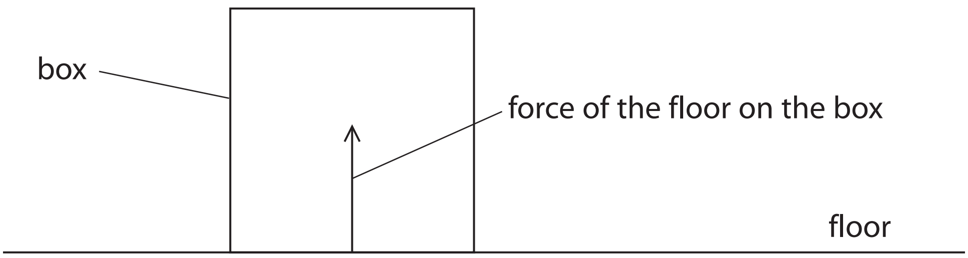

Figure 4

Add another vector to the diagram in Figure 4 to show the weight of the box.

(2)

(c) Figure 5 shows part of a cart.

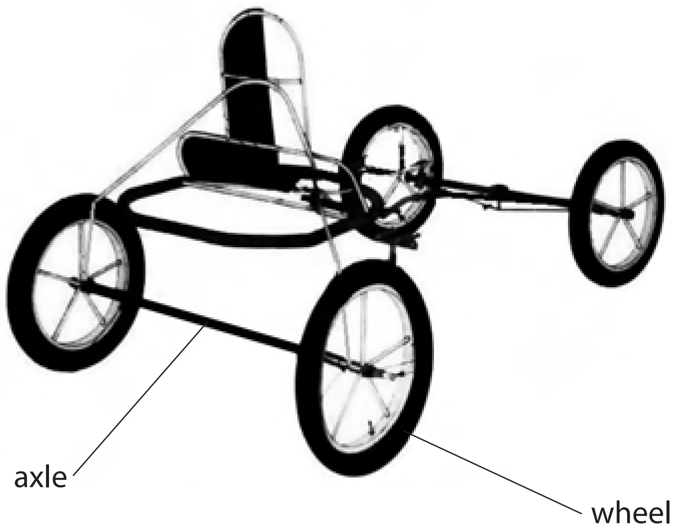

Figure 5

When the wheels turn the axles become warm.

(i) Explain why the axles become warm when the wheels turn.

(2)

....

....

....

....

(ii) Give **one** way of reducing the heating of the axles when the wheels turn.

(1)

....

....

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(d) (i) Complete the equation that relates efficiency, useful energy transferred by a device and total energy supplied to the device.

(1)

efficiency = ________________________________

(ii) In one second an engine has a total energy input of 7500 J.

In one second 3200 J is transferred to the surroundings as wasted energy.

Calculate the useful energy transferred by the engine.

(1)

useful energy transferred = ... J

(iii) Calculate the efficiency of this engine.

(2)

efficiency of the engine = ...

(Total for Question 3 = 11 marks)

4 (a) Figure 6 shows a graph of current against potential difference for an electrical component.

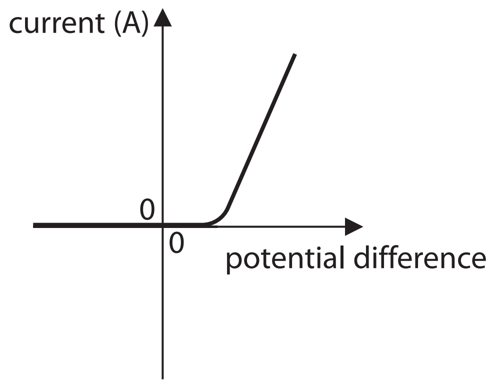

Figure 6

Which electrical component will show this variation of current with potential difference?

(1)

☒ **A** thermistor

☒ **B** low value resistor at constant temperature

☒ **C** high value resistor at constant temperature

☒ **D** diode

(b) A lamp is connected to a potential difference of 0.24 V.

The current in the lamp is 0.12 A.

(i) Calculate the power of the lamp.

Use the equation

$P = I \times V$

(2)

power of the lamp = ... W

(ii) The potential difference is changed to 0.30 V.
The current in the lamp is now 0.13 A.

The lamp is switched on for 35 s.

Calculate the energy that is transferred in this time.
Select an equation from the list of equations at the end of this paper.

(2)

energy transferred = ... J

(iii) The current in the lamp stays at 0.13 A.

Calculate the charge that flows through the lamp in 35 s.
Use the equation

$Q = I \times t$

(2)

charge = ... C

(c) A student measures the current in the lamp for several values of potential difference across the lamp.

Figure 7 shows the student's results.

potential difference across the lamp in volts (V)	current through the lamp in amps (A)
0.06	0.05
0.12	0.08
0.18	0.10
0.24	0.12
0.30	0.13
0.36	0.13

Figure 7

The student uses the results in Figure 7 to write this conclusion.

'*As the potential difference across the lamp increases, the current in the lamp increases and the relationship is directly proportional.*'

Comment on the student's conclusion.

(3)

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(Total for Question 4 = 10 marks)

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5 (a) A student uses the apparatus in Figure 8 to determine the specific heat capacity of water.

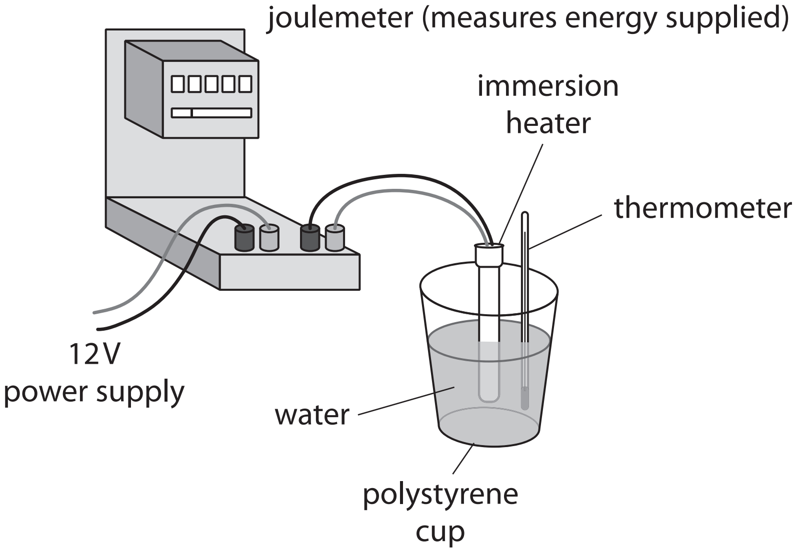

Figure 8

(i) State the measurements needed to calculate the specific heat capacity of water.

(4)

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(ii) State **two** ways that the apparatus could be adapted to improve the procedure.

(2)

1 ....

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2 ....

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(b) The student decides to measure the temperature of the water every minute while it is being heated.

Figure 9 shows a graph of the student's results.

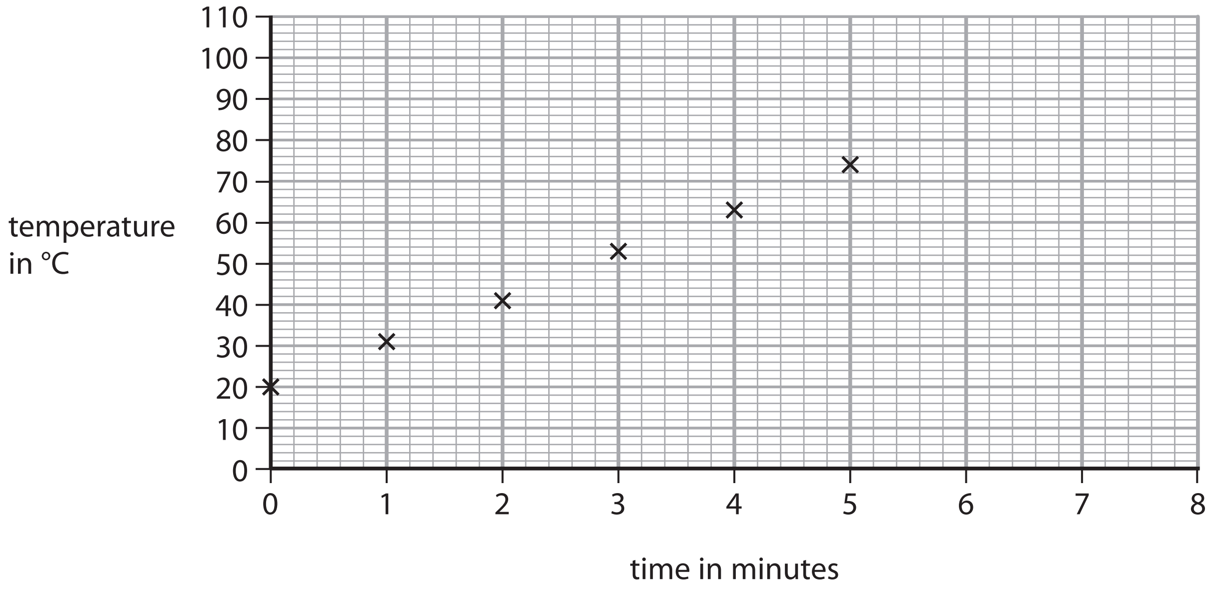

Figure 9

Predict the temperature of the water if the heating continues up to 8 minutes.

(1)

temperature of the water = ... °C

(c) Another student decides to melt some ice.

The student melts 380 g of ice at 0 °C.

The specific latent heat of fusion of ice is 3.34×10^5 J/kg.

Calculate the thermal energy needed to melt the ice.

Select an equation from the list of equations at the end of this paper.

(2)

thermal energy needed = ... J

(d) The volume of 380 g of ice is 410 cm^3.

Calculate the density of the ice in g/cm^3.

(2)

density = ... g/cm^3

(Total for Question 5 = 11 marks)

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6 A cyclist is riding a bicycle at a steady velocity of 12 m/s.

The cyclist and bicycle have a total mass of 68 kg.

(a) Calculate the kinetic energy of the cyclist and bicycle.

Use the equation

$$KE = \frac{1}{2} \times m \times v^2$$

(2)

kinetic energy = ... J

(b) Describe the energy transfers that happen when the cyclist uses the brakes to stop.

(2)

....

....

....

....

(c) The cyclist starts to cycle again.

The cyclist does 1600 J of useful work to travel 28 m.

Calculate the average force the cyclist exerts.

(3)

average force = ... N *(d) A class of students investigate the power output of each student in the class.

The class must decide whether they use a method using steps or a method using weights. The whole class must use the same method.

Plan what measurements the students should take and how these can be used to calculate and compare the power output of each student.

You may draw a diagram to help with your plan.

(6)

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(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

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