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

Sample Assessment Materials for first teaching September 2016
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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Pearson

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) Three of the following are magnetic materials.

Which of these is **NOT** a magnetic material?

(1)

☒ **A** cobalt

☒ **B** copper

☒ **C** iron

☒ **D** nickel

(b) Figure 1 shows a magnet, P, hanging from a support.

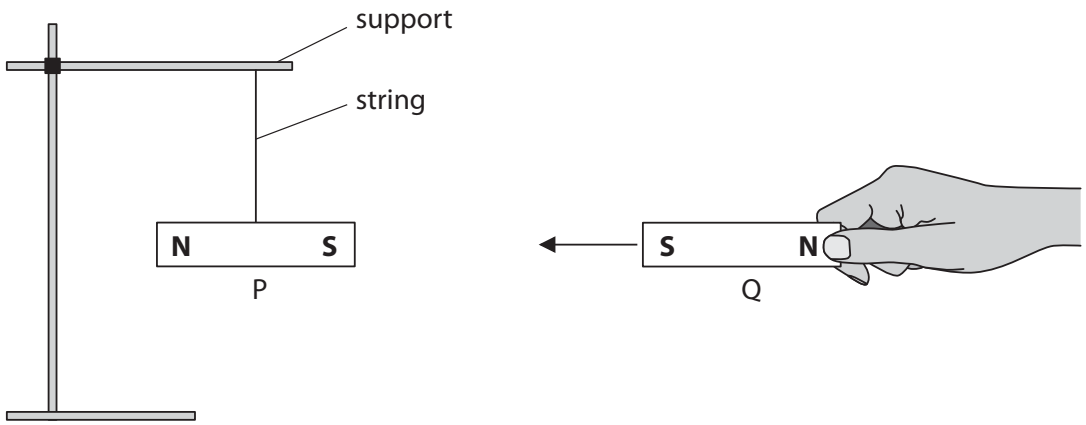

Figure 1

Explain what happens to magnet P when another magnet, Q, is brought towards it as shown.

(2)

.....

.....

.....

.....

(c) A student uses iron filings to show the pattern of a magnetic field around a bar magnet.

Figure 2 shows the pattern the student produced.

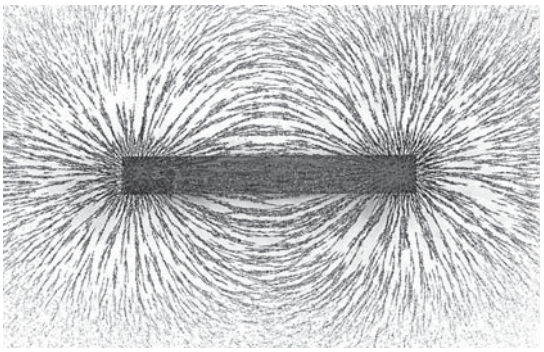

Figure 2

(i) Describe how you can tell from Figure 2 where the magnetic field is strongest.

(2)

(ii) The bar magnet is placed on a sheet of paper. Describe how the student could plot the shape and show the direction of the magnetic field around the magnet.

(3)

(Total for Question 1 = 8 marks)

2 (a) A student uses the apparatus shown in Figure 3 to investigate the extension of a spring.

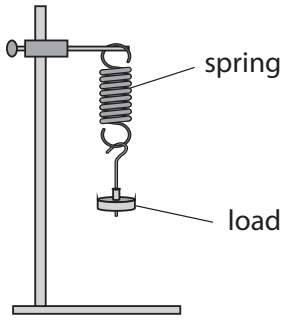

Figure 3

(i) Describe how the student could measure the extension of the spring when a load is added.

(3)

.....

.....

.....

.....

.....

.....

(ii) The extension of the spring for a load of 1.5 N is 30 mm.

Calculate the spring constant for the spring.

Use the equation

$$\text{spring constant} = \frac{\text{load}}{\text{extension}}$$

(2)

spring constant = ... N/mm

(b) The student measures the extension of the spring as he adds different loads (loading).

He then measures the extension of the spring as he takes the loads off (unloading).

He then repeats the investigation using a rubber band instead of the spring.

The tables in Figure 4 show his results.

spring		
load in N	extension in mm	extension in mm
	loading	unloading
0	0	0
1	20	20
2	40	40
3	60	60

rubber band		
load in N	extension in mm	extension in mm
	loading	unloading
0	0	0
1	14	25
2	33	42
3	60	60

Figure 4

State **two** similarities and **two** differences between the results for the spring and the results for the rubber band.

(4)

Similarity 1 .....

.....

Similarity 2 .....

.....

Difference 1 .....

.....

Difference 2 .....

.....

(Total for Question 2 = 9 marks)

3 (a) Which row in the table is correct?

	particles in a solid	particles in a gas
☒ **A**	move freely	move freely
☒ **B**	move freely	vibrate about fixed positions
☒ **C**	vibrate about fixed positions	move freely
☒ **D**	vibrate about fixed positions	vibrate about fixed positions

(1)

(b) Room temperature is 20 °C.

What is 20 °C on the kelvin temperature scale?

(1)

☒ **A** 293 K

☒ **B** 273 K

☒ **C** 253 K

☒ **D** 120 K

(c) A student sets up an experiment to measure the specific heat capacity of a metal.

Figure 5 shows the apparatus.

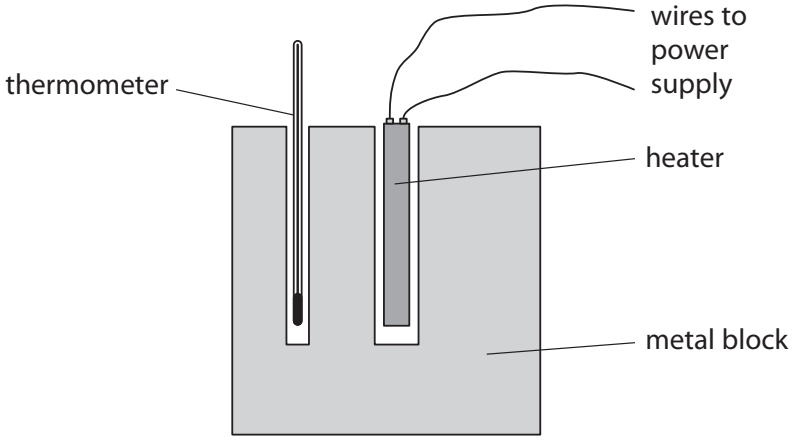

Figure 5

The heater is connected to a power supply and has a power of 50 W.

The student switches on the heater and measures the temperature rise after 5 minutes.

(i) State **two** improvements the student could make to the experiment.

(2)

1 .....

.....

2 .....

.....

(ii) Figure 6 shows the student's results.

mass of metal block	0.92 kg
power of heater	50 W
starting temperature	20 °C
finishing temperature	54 °C
time	300 s

Figure 6

Use the data in Figure 6 to calculate a value for the specific heat capacity of the metal.

Use the equation

$$\text{specific heat capacity} = \frac{\text{power} \times \text{time}}{\text{mass} \times \text{temperature rise}}$$

(3)

specific heat capacity = ... J/kg °C

(d) An electric kettle is used to boil some water.

While the water is boiling, 566 000 J of thermal energy turns 0.250 kg of water into steam.

Calculate the specific latent heat of vaporisation of water.

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

(3)

specific latent heat = ... J/kg

(Total for Question 3 = 10 marks)

4 (a) The nucleus of an atom contains

(1)

☒ **A** only electrons

☒ **B** only neutrons

☒ **C** electrons and neutrons

☒ **D** protons and neutrons

(b) A metal wire carries an electric current.

The charge that flows in the wire is made up of

(1)

☒ **A** electrons

☒ **B** protons

☒ **C** positive ions

☒ **D** negative ions

(c) Figure 7 shows a circuit used to light a lamp.

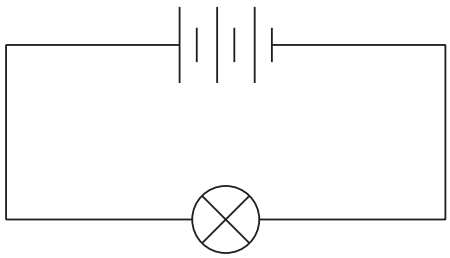

Figure 7

(i) State **two** things you could do to the circuit to make the lamp dimmer.

(2)

1 .....

.....

2 .....

.....

(ii) The energy transferred by the lamp in 20 s is 18 J.

Calculate the power of the lamp.

State the unit.

(4)

power of the lamp = ...

unit= .....

(iii) The potential difference across the lamp is 4.2 V.

The current in the lamp is then 0.19 A.

Calculate the resistance of the lamp.

(3)

resistance of the lamp = ... Ω

(Total for Question 4 = 11 marks)

5 (a) Some forces act at a distance.

One example is the gravitational attraction between the Moon and the Earth.

Describe an example of another type of force acting at a distance, where the force is **not** gravitational.

(2)

.....

.....

.....

.....

(b) A rock falls off the top of a cliff of height *h*.

Figure 8 shows the rock falling.

The Earth exerts a force of 150 N on the rock.

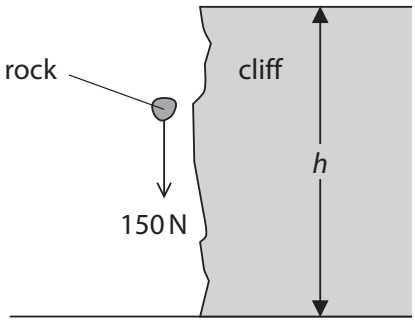

Figure 8

The work done by this force when the rock falls from the top to the bottom of the cliff is 2700 J.

(i) Calculate the height, *h*, of the cliff.

(2)

h = ... m

(ii) State the value of the kinetic energy of the rock just before it hits the ground.

(1)

kinetic energy = ... J

(iii) The mass of the rock in Figure 8 is 15 kg.

Calculate the velocity of the rock just before it reaches the bottom of the cliff.

(2)

velocity = ... m/s

(c) An electric motor is used to lift a box.

Figure 9 shows how the efficiency of the electric motor changes as the mass of the box increases.

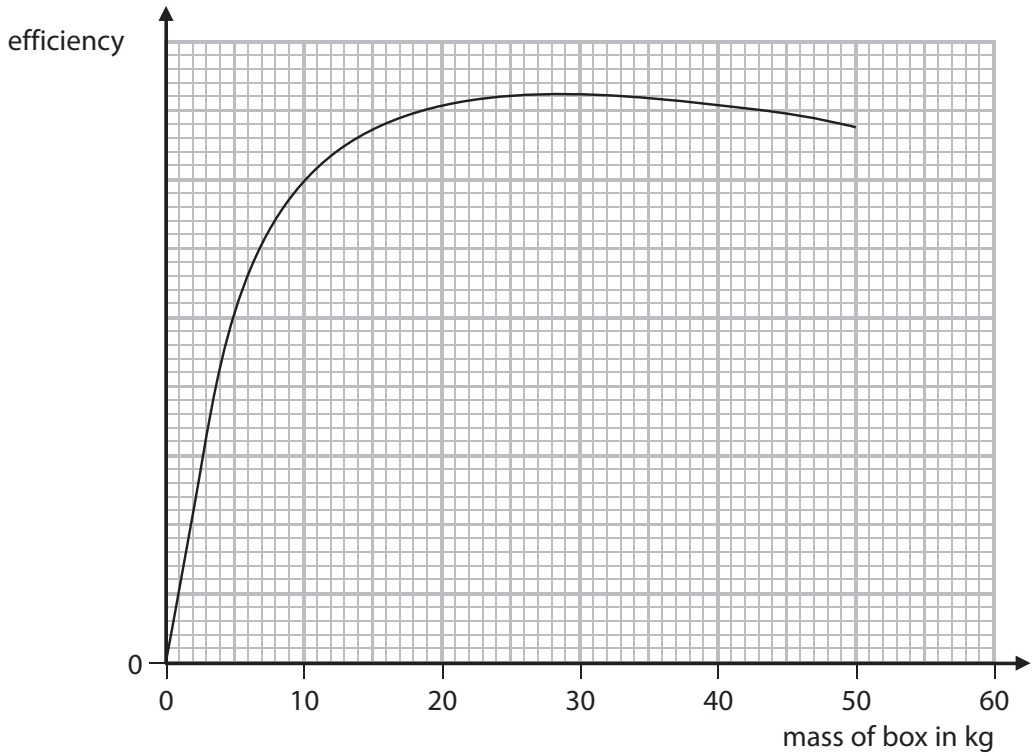

Figure 9

Describe how the efficiency of the electric motor depends on the mass of the box lifted.

(2)

.....

.....

.....

.....

(Total for Question 5 = 9 marks)

6 (a) An electric heater is connected to a 230 V supply.

The power supplied to the heater is 2.6 kW.

Calculate the current in the heater.

(3)

current = ... A

(b) A car headlamp has a power rating of 55 W when the current in the headlamp is 4.4 A.

(i) State the equation relating power, current and resistance.

(1)

(ii) Calculate the resistance of the headlamp.

(3)

resistance = ... Ω

*(c) The resistance of a thermistor changes with temperature.

Describe an experiment to investigate how the resistance of a thermistor changes with temperature.

You may draw a diagram to help with your answer.

(6)

(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 $E = ½ \times k \times x^2$

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