Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Physics/Additional Science

Unit P2: Physics for Your Future

Foundation Tier

Friday 17 June 2016 – Morning
Time: 1 hour

Paper Reference
5PH2F/01

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.*

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.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

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 ▶

P46512A

©2016 Pearson Education Ltd.

1/1/1/

P 4 6 5 1 2 A 0 1 2 0

PEARSON

FORMULAE

You may find the following formulae useful.

charge = current × time $Q = I \times t$

potential difference = current × resistance $V = I \times R$

electrical power = current × potential difference $P = I \times V$

energy transferred = current × potential difference × time $E = I \times V \times t$

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$\text{acceleration} = \frac{\text{change in velocity}}{\text{time taken}} \qquad a = \frac{(v - u)}{t}$$

force = mass × acceleration $F = m \times a$

weight = mass × gravitational field strength $W = m \times g$

momentum = mass × velocity

work done = force × distance moved in the direction of the force $E = F \times d$

$$\text{power} = \frac{\text{work done}}{\text{time taken}} \qquad P = \frac{E}{t}$$

gravitational potential energy = mass × gravitational field strength × vertical height

$\text{GPE} = m \times g \times h$

kinetic energy = ½ × mass × velocity^2 $\text{KE} = ½ \times m \times v^2$

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

BLANK PAGE

Questions begin on next page.

Answer ALL questions.

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 ☒.

Electricity

1 (a) (i) Which of these is a source of direct current (d.c.)?

Put a cross (☒) in the box next to your answer.

(1)

- ☐ **A** a battery
- ☐ **B** a light-dependent resistor (LDR)
- ☐ **C** a thermistor
- ☐ **D** a voltmeter

(ii) Explain what is meant by a direct current (d.c.)

(2)

.....

.....

.....

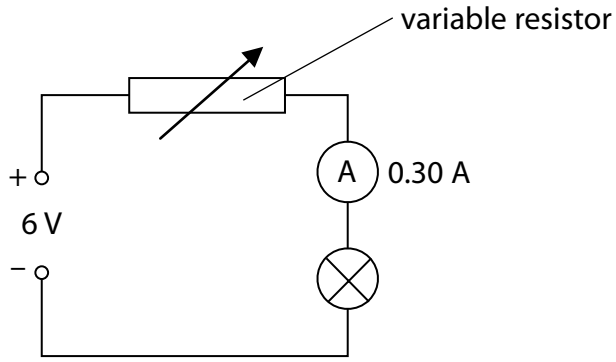
.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(b) The diagram shows an electric circuit.



(i) The current in the lamp is 0.30 A.
Calculate the charge flowing through the lamp in 30 seconds.
State the unit.

(3)

charge = ... unit .....

(ii) The resistance of the variable resistor is increased.

State the effect on the ammeter reading.

(1)

.....

.....

(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The particles moving through the metal wires are

(1)

☐ **A** atoms

☐ **B** electrons

☐ **C** neutrons

☐ **D** protons

(Total for Question 1 = 8 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

2 (a) Complete the sentence by putting a cross (☒) in the box next to your answer.

When atoms gain or lose electrons they become

(1)

☒ **A** protons

☒ **B** neutrons

☒ **C** molecules

☒ **D** ions

(b) The nuclei of some atoms can change.

These nuclei are unstable and may emit an alpha particle during radioactive decay.

Complete the table for the particles that make up an alpha particle.

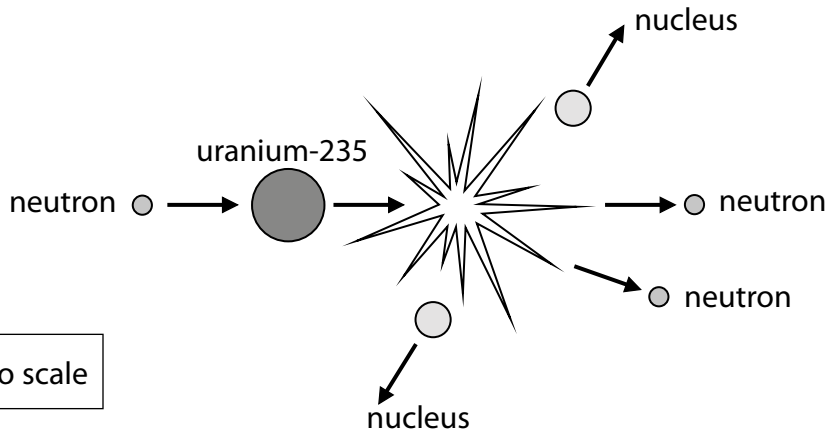
(2)

name of particle	number of particles
proton	
	2

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(c) Nuclear fission can cause changes to nuclei.

The diagram shows the fission of a uranium-235 nucleus.



Not to scale

Describe how this fission could cause a chain reaction.

(2)

(d) Nuclei can also be changed by nuclear fusion.

Describe what happens during nuclear fusion.

(3)

(Total for Question 2 = 8 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

3 (a) A boat is travelling across the water.

One of the forces acting on the boat is shown by the arrow.



Which of these is the correct name for the force shown acting on the boat?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** repulsion

☒ **B** weight

☒ **C** lift

☒ **D** drag

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(b) (i) The boat is travelling at a constant velocity.

Which of these statements is correct for the horizontal forces acting on the boat?

Put a cross (☒) in the box next to your answer.

(1)

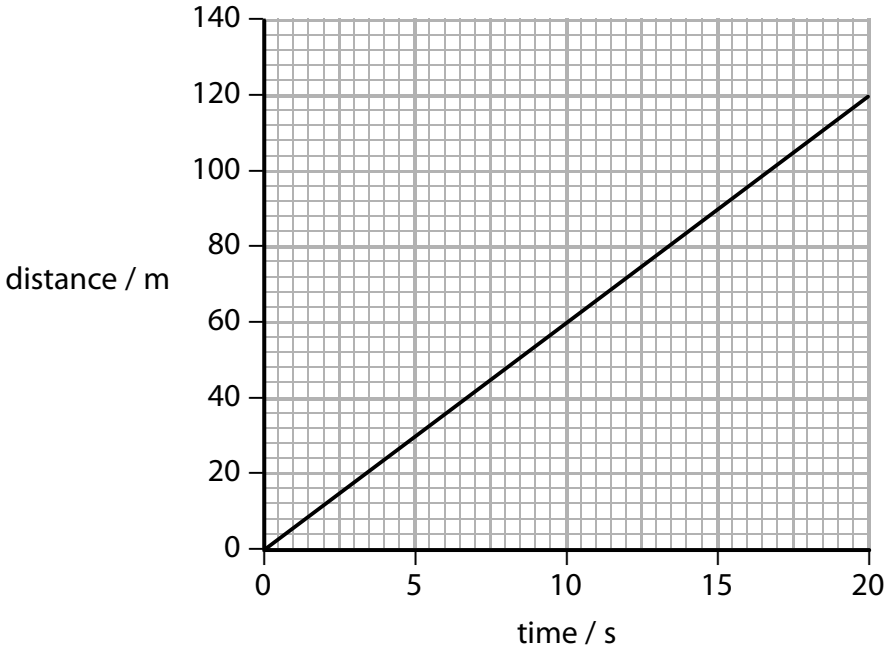
☐ **A** the friction forces are zero

☐ **B** the friction forces are bigger than the forward force

☐ **C** the friction forces are smaller than the forward force

☐ **D** the friction forces are the same size as the forward force

(ii) The graph shows the distance/time graph for the boat.



Use the graph to find the speed of the boat.

(2)

speed = ... m/s

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(c) (i) The boat now accelerates at 3.8 m/s^2.

The total mass of the boat and driver is 680 kg.

Show that the resultant force on the boat is about 2600 N.

(2)

(ii) The diagram represents the horizontal forces acting on the boat as it accelerates.

(2)

Arrows not to scale



thrust

frictional forces
1200 N

The size of the resultant force is 2600 N.

Calculate the size of the thrust.

thrust = ... N

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(d) The boat stops near the bank of the river.
The driver jumps out towards the bank without tying up the boat.

This makes the boat move away from the bank.

Explain why the boat moves away from the bank.

(2)

.....

.....

.....

.....

(Total for Question 3 = 10 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Radioactivity and its uses

4 Some nuclear reactors used to generate electricity also produce cobalt-60.

(a) (i) When cobalt-60 decays it releases high energy gamma rays.

Which of these is a correct use of gamma rays?

Put a cross (☒) in the box next to your answer.

(1)

- ☒ **A** smoke detectors
- ☒ **B** monitoring the thickness of paper
- ☒ **C** sterilising hospital equipment
- ☒ **D** reducing background radiation

(ii) Explain why gamma rays are dangerous.

(2)

.....

.....

.....

.....

(iii) A sample of nuclear waste contains 2.0 mg of cobalt-60.

The half-life of cobalt-60 is 5 years.

Calculate the mass of cobalt-60 remaining after 10 years.

(2)

mass = ...mg

(iv) State one safety precaution that should be taken when storing cobalt-60.

(1)

.....

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(b) The main purpose of nuclear reactors is to generate electricity.

(i) Describe two advantages of generating electricity using nuclear reactors compared to generating electricity using fossil fuels.

(2)

1 .....

.....

2 .....

.....

(ii) Nuclear reactors used to generate electricity produce dangerous radioactive waste.

Describe one method of dealing with this radioactive waste safely.

(2)

.....

.....

.....

.....

(Total for Question 4 = 10 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

Electrical measurements

5 (a) A student investigates the resistance of a lamp.
She obtains these readings for the potential difference (voltage) across the lamp and the current in the lamp.

voltage in V	current in A
6.0	0.40

(i) Calculate the resistance, R, of the lamp.

(2)

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

resistance = ... Ω

(ii) Calculate the power supplied to the lamp.

(2)

power = ... W

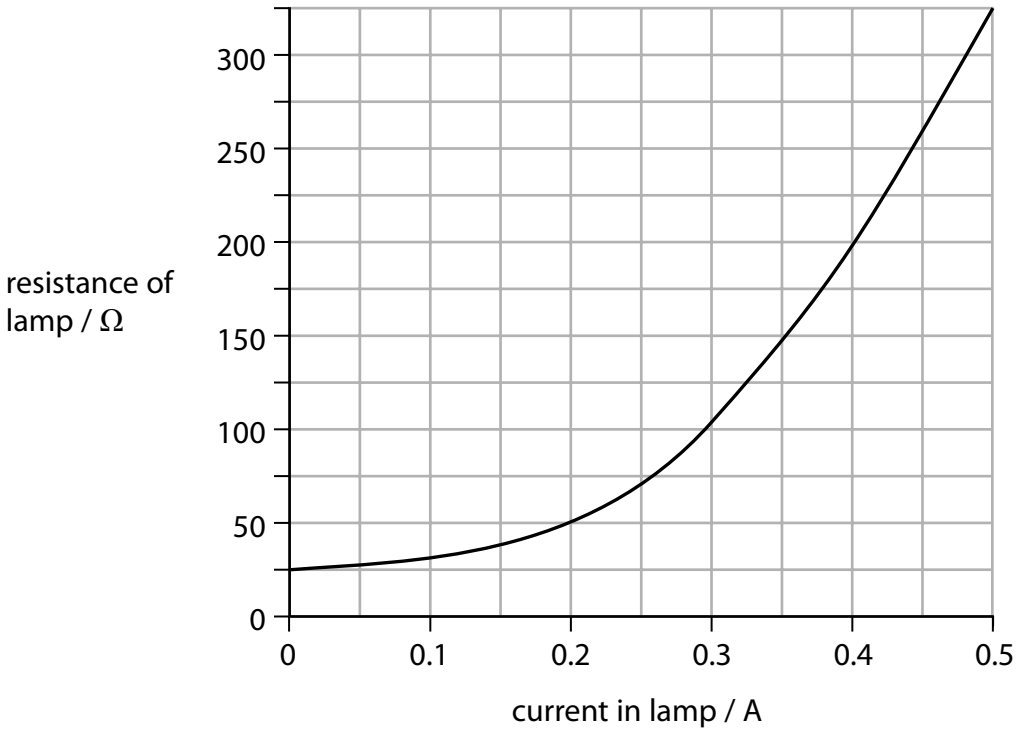
(iii) Calculate the amount of energy transferred by the lamp in 40 s.

(2)

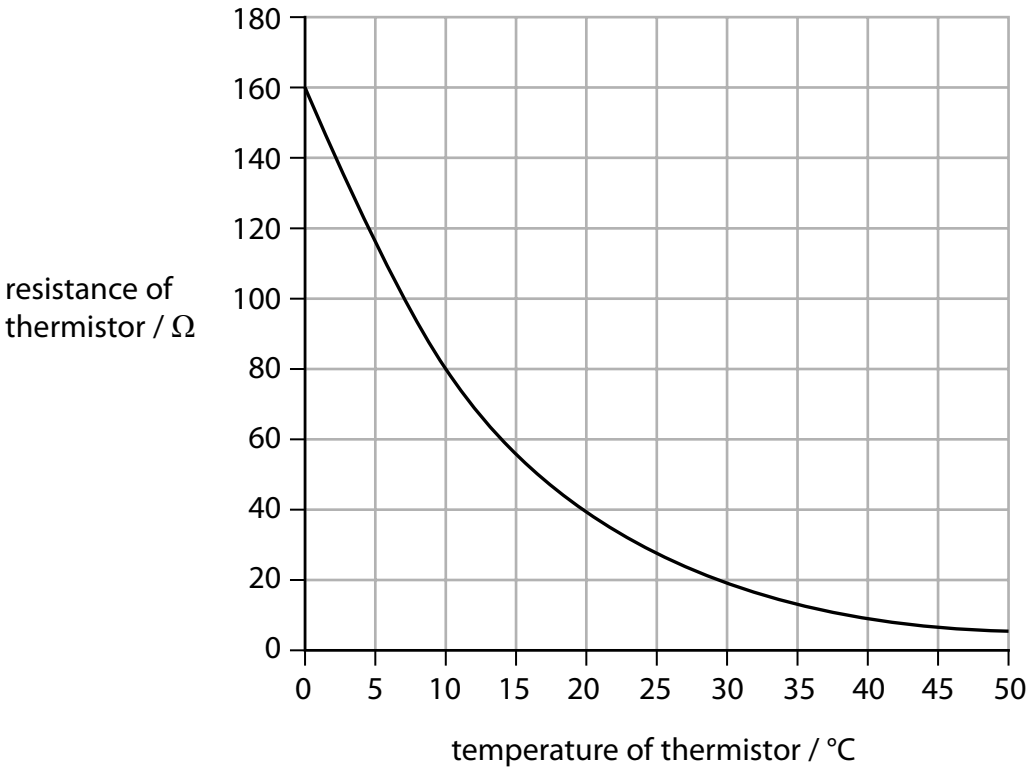
energy = ... J

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

*(b) The student produces this graph, showing how resistance of another lamp varies with the current in the lamp.



The student researches resistance and finds this graph, which shows how the resistance of a thermistor varies with temperature.



DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Describe how the resistance changes for the lamp and how the resistance changes for the thermistor.

(6)

(Total for Question 5 = 12 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

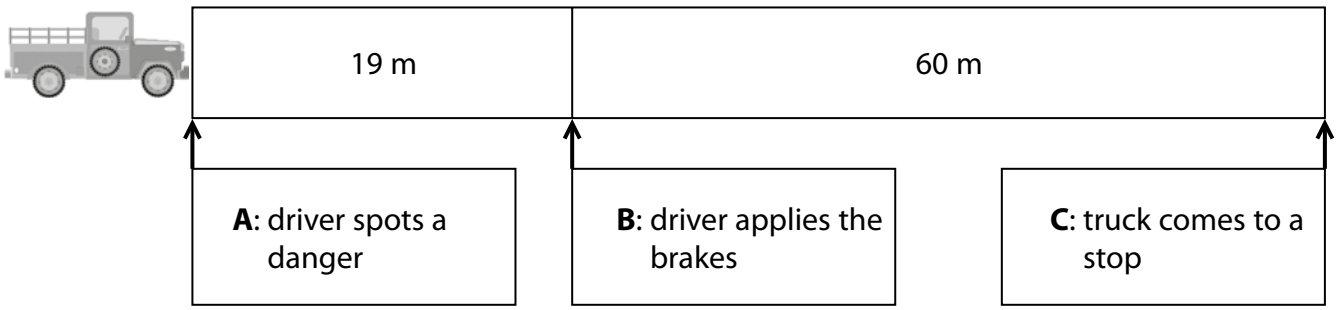
Road safety

6 (a) The diagram shows what happens to a truck being driven at a constant speed along a flat, straight road.

At **A** the driver spots a danger.

At **B** the driver applies the brakes.

At **C** the truck comes to a stop.



(i) State what is happening between **A** and **B**.

(1)

.....

.....

(ii) The brakes exert a constant force of 700 N on the truck from when they are applied until the truck comes to a stop.

Calculate the work done by the brakes.

(2)

work done = ... J

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(iii) The diagram gives information about the stopping of the truck when it is not carrying a load.

Explain how the stopping distance is different when the truck, moving at the same speed, carries a heavy load.

(3)

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

*(b) Airbags in cars have reduced the injuries to people involved in car crashes.

Explain how airbags reduce the injuries to people involved in car crashes.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Every effort has been made to contact copyright holders to obtain their permission for the use of copyright material. Pearson Education Ltd. will, if notified, be happy to rectify any errors or omissions and include any such rectifications in future editions.