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 26 January 2018 – 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 ▶

P57586A

1/1/1/1/1/1/1/1/1/1/1/

P 5 7 5 8 6 A 0 1 2 4

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 $\text{KE} = ½ \times m \times v^2$

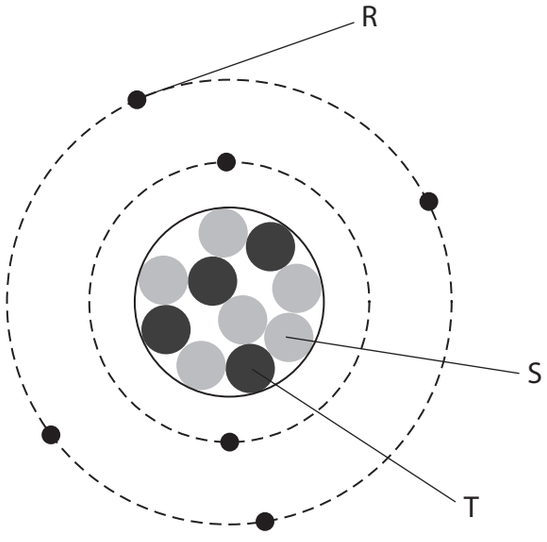
Answer ALL questions.

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 ☒.

Electric charges

1 (a) The diagram represents an atom.

The atom is neutral.

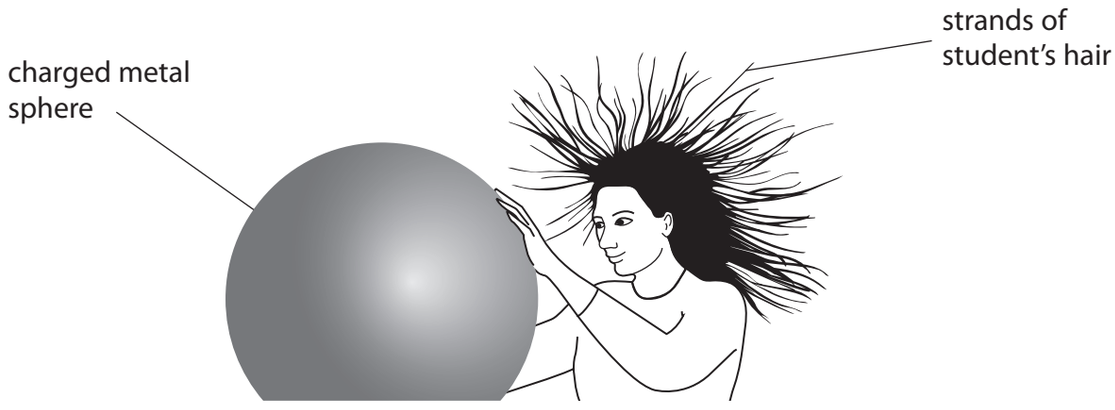


Draw **one** straight line from each **letter** box to the correct **particle** box.

(2)

letter	**particle**
R	proton
S	neutron
T	electron

(b) A student touches a charged metal sphere. Her hair becomes charged.



The student moves away from the sphere.

The sphere has a negative charge.

The sphere is then connected to the ground with a metal wire.

This removes the negative charge from the sphere.

(i) State the name of the particles that flow from the sphere to the ground.

(1)

.....

(ii) State why the flow of particles in the wire is called a direct current (d.c.).

(1)

.....

.....

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

While the student was touching the sphere, strands of the student's hair repelled each other because they had

(1)

☒ **A** the same type of electric charge

☒ **B** different types of electric charge

☒ **C** the same type of magnetic charge

☒ **D** different types of magnetic charge

(c) The metal sphere is charged using a rubber belt.

The belt is turned by a d.c. electric motor.

There is a current of 0.50 A in the motor for 3 minutes.

Calculate the charge passing through the motor in this time.

(3)

charge = ... C

(Total for Question 1 = 8 marks)

Using radioactive materials

2 (a) Radioactive materials are used in nuclear power stations to generate electricity.

State **two** other uses of radioactive materials.

(2)

1 .....

2 .....

(b) A sample of nuclear waste from a nuclear reactor contains 16.0 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

(c) Workers at a nuclear power station may be exposed to radiation from radioactive materials.

Explain why this could be dangerous to the workers.

(2)

.....

.....

.....

.....

(d) Nuclear power stations produce dangerous radioactive waste.

Describe **one** method of dealing with this radioactive waste safely.

(2)

.....

.....

.....

.....

(Total for Question 2 = 8 marks)

Cars and safety

3 (a) The power of a car engine is measured in watts, W.

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

1 watt, W, is the same as

(1)

☒ **A** 1 joule per metre, J / m

☒ **B** 1 newton per second, N / s

☒ **C** 1 joule per second, J / s

☒ **D** 1 newton metre, N m

(b) A car engine produces an average driving force of 1400 N.

The car travels 6.0 m in the direction of the force.

(i) Calculate the work done by the driving force over this distance.

(2)

work done = ... J

(ii) The car has a mass of 1200 kg and travels at a velocity of 20 m / s.

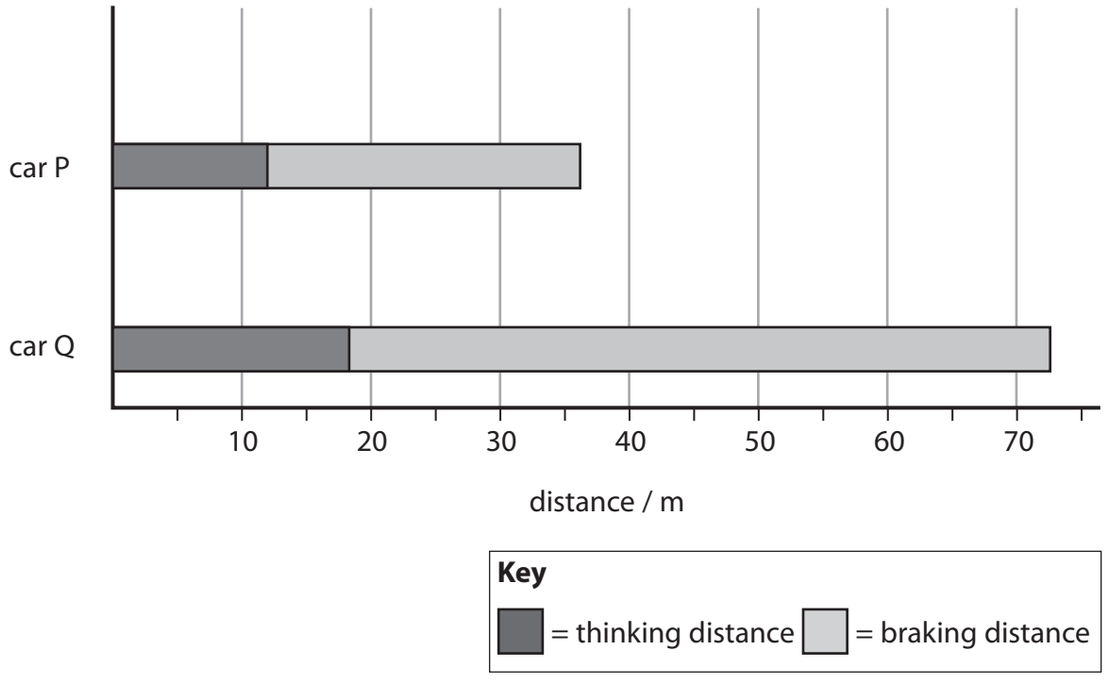
Calculate the kinetic energy of the car.

(3)

kinetic energy = ... J

(c) Two cars, P and Q, are stopping suddenly from a speed of 40 miles per hour.

The chart shows the thinking, braking and stopping distances for the two cars.



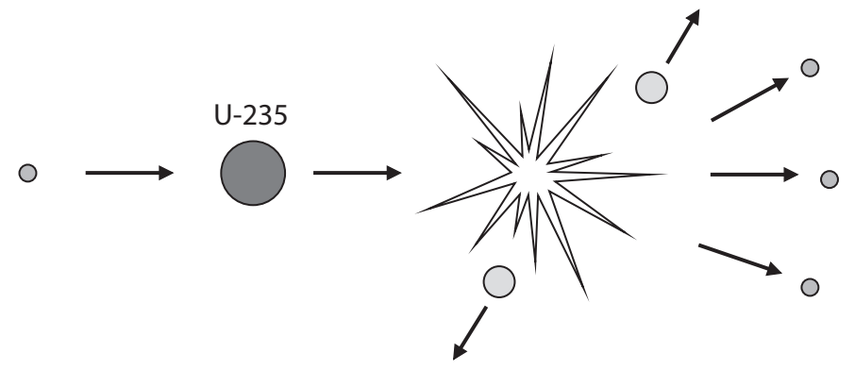
Use the factors that can affect thinking and braking distances to explain the difference in stopping distance for car Q compared with car P.

(4)

(Total for Question 3 = 10 marks)

Nuclear fission

4 (a) A student produced this poster to give information about a typical nuclear fission.



1	2	3	4
a proton is captured and the nucleus splits	when the nucleus splits, (fission) is released	two sister nuclei are produced	three electrons are released
	energy		

One word is incorrect in each of the numbered boxes.

(i) Circle the incorrect word in each box.

Box 2 has been done for you.

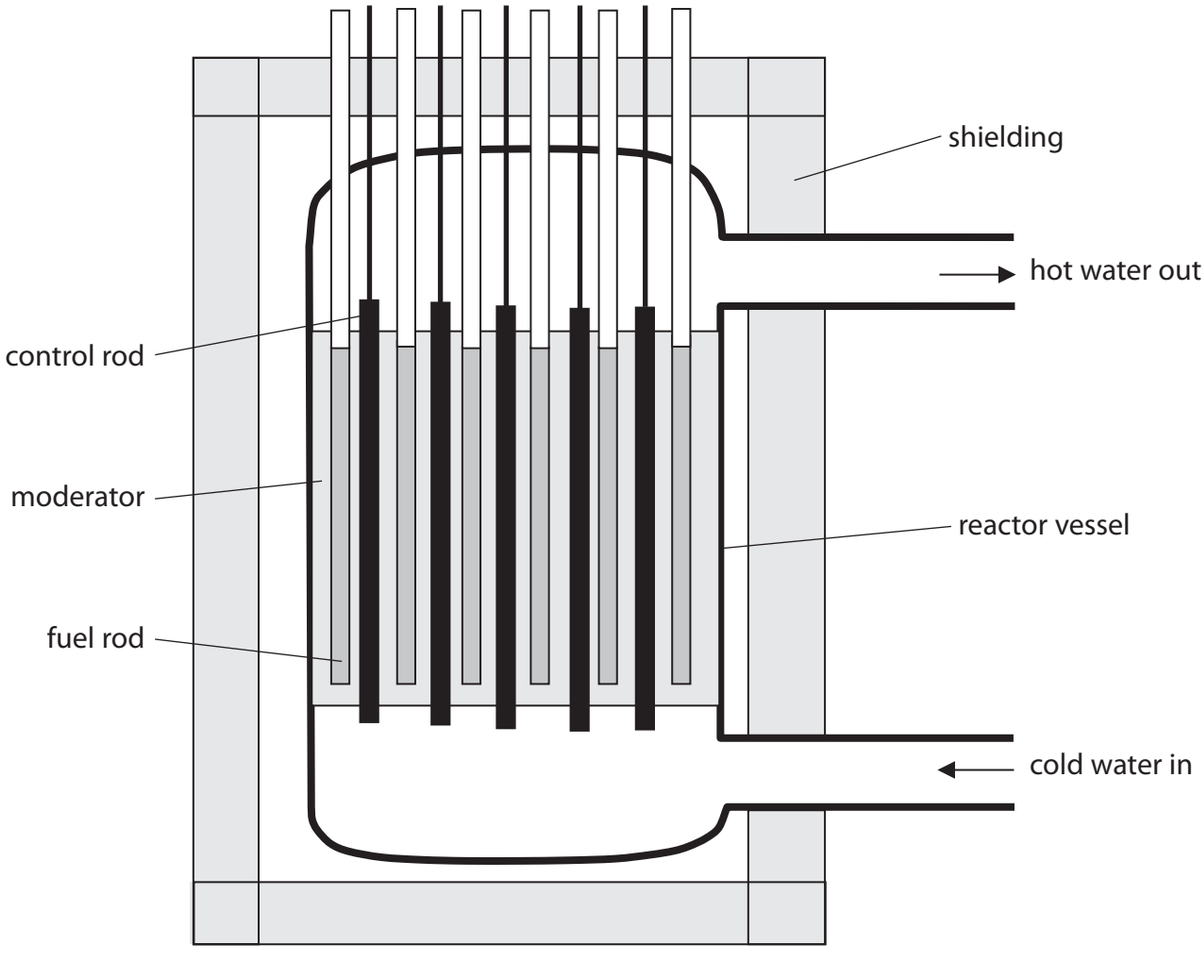
(1)

(ii) Write the correct word in the space under each box.

Box 2 has been done for you.

(2)

(b) The diagram shows a nuclear reactor.



Chain reactions in the reactor release energy.

Explain how the control rods are used to control the chain reactions.

(3)

.....

.....

.....

.....

.....

.....

(c) Strontium-90 is produced in the nuclear reactor.

A nucleus of strontium-90 can be represented as

$$^{90}_{38}Sr$$

Describe the structure of a nucleus of strontium-90.

(4)

(Total for Question 4 = 10 marks)

BLANK PAGE

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

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

(i) 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** friction

(ii) The boat is accelerating.

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)

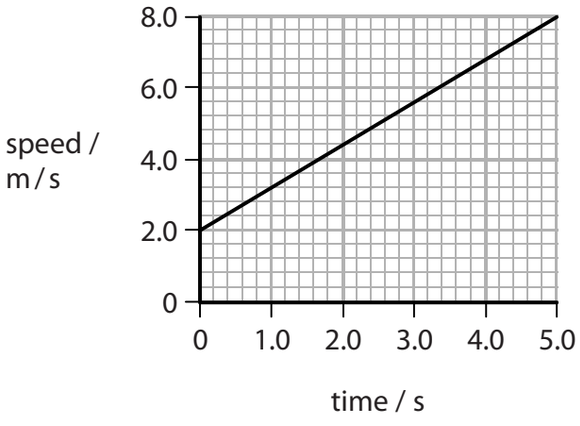
☒ **A** the friction forces are zero

☒ **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

(iii) The speed/time graph for the boat is shown.



Use the graph to determine the acceleration of the boat.

(2)

acceleration = ... m / s^2

(iv) The boat now accelerates at 3.5 m / s^2.

The total mass of the boat and driver is 720 kg.

Calculate the resultant force on the boat.

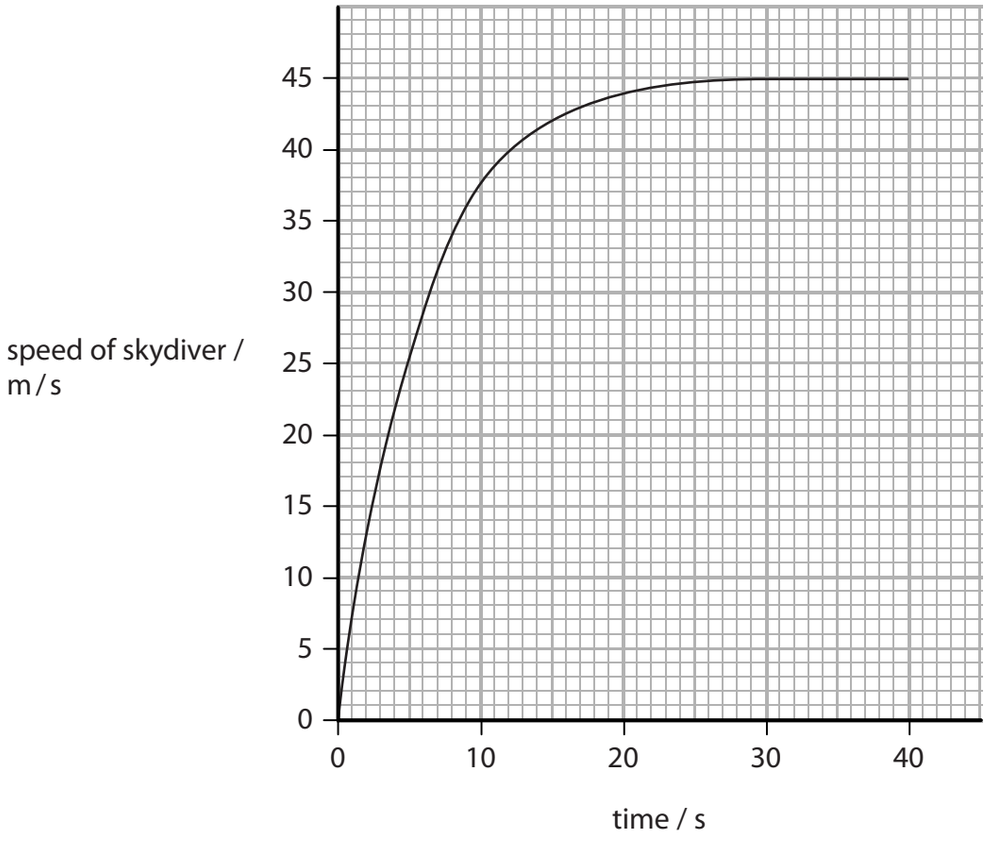
(2)

resultant force = ... N

*(b) The photograph shows a skydiver 40 seconds after jumping from an aeroplane.

He has not yet opened his parachute.

The graph shows how the speed of the skydiver changes during the first 40 seconds after jumping from the aeroplane.



Describe what happens to the speed of the skydiver during the first 40 seconds of the jump.

Your answer should refer to points on the graph.

(6)

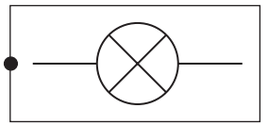
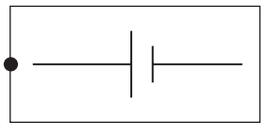
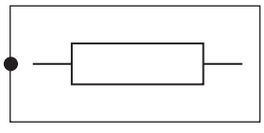
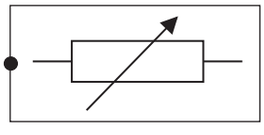
(Total for Question 5 = 12 marks)

BLANK PAGE

Circuits

6 (a) Draw **one** straight line from each **name** box to the correct **circuit symbol** box.

(2)

name	**circuit symbol**
lamp	
fixed resistor	
	
	

(b) A student investigates the resistance of a lamp.

She obtains these readings for the potential difference (p.d. or voltage) across the lamp and the current in the lamp.

potential difference (p.d. or voltage) across the lamp / V	current in the lamp / A
3.0	0.40

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

(2)

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

resistance = ... Ω

(ii) Calculate the amount of energy transferred by the lamp in 50 s.

(2)

energy = ... J

*(c) Describe how the student should investigate how the current in the lamp changes when the potential difference (p.d. or voltage) across the lamp is changed.

You may draw a circuit diagram to help with your description.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

BLANK PAGE

BLANK PAGE

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE