Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Physics/Additional Science

Unit 2: Physics for Your Future

Foundation Tier

Thursday 24 May 2012 – 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.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 4 0 2 4 7 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 $P = m \times v$

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 $\text{KE} = ½ \times m \times v^2$

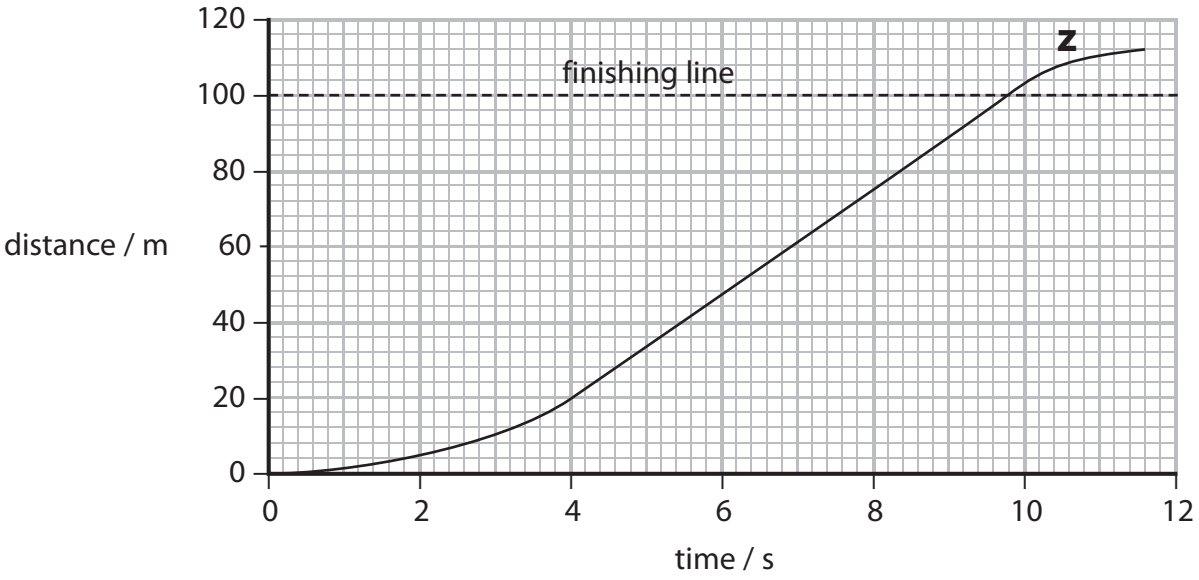
Answer ALL questions

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 ☒.

100 m race

1 The photograph shows the beginning of a 100 m race.

David wins the race.
The graph shows David's distance-time graph.



(a) Use the graph to find the distance David ran in the first 4 s.

(1)

distance in the first 4 s = ... m

(b) David runs 100 m in a time of 9.80 s.

Calculate his average speed.
State the unit.

(3)

average speed = ... unit .....

(c) Explain why David's average speed is less than his top speed.

(2)

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

(i) In the section of the graph marked **Z**, David is

(1)

☒ **A** running at constant speed

☒ **B** slowing down

☒ **C** speeding up

☒ **D** stopped

(ii) Velocity is

(1)

☒ **A** speed in a circle

☒ **B** the same as speed

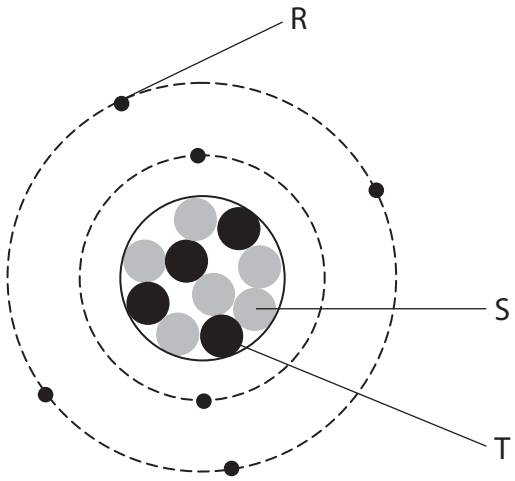
☒ **C** constant speed

☒ **D** speed in a stated direction

(Total for Question 1 = 8 marks)

Static electricity

2 (a) The diagram represents an atom.
The atom is neutral.



Draw **one** straight line from each letter in the boxes to the particle.

(2)

letter	particle
R	proton
S	neutron
T	electron

(b) A boy combs his hair using a plastic comb.
His hair becomes positively charged.

(i) Explain what happens to the boy's hair when it becomes positively charged.

(2)

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.....

.....

.....

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

His plastic comb also becomes charged.
If a copper comb was used, it would not become charged.

This is because the copper is

(1)

☒ **A** an insulator

☒ **B** a conductor

☒ **C** magnetic

☒ **D** non-magnetic

(iii) The boy puts his charged comb near some small pieces of paper.

Explain what happens.

(3)

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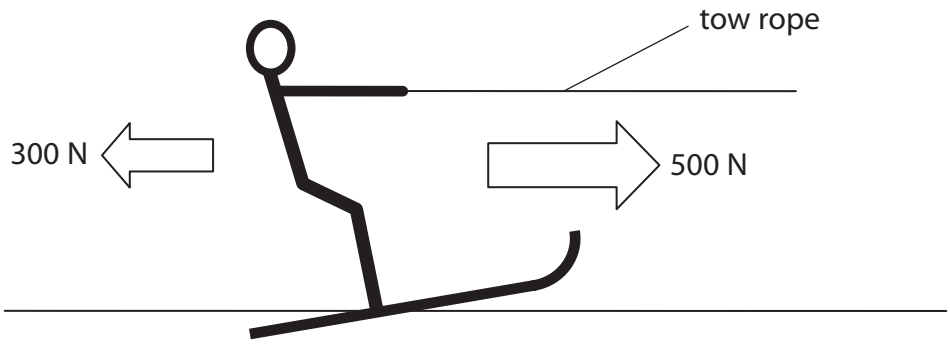
(Total for Question 2 = 8 marks)

Water skiing

3 The photograph shows a water skier being pulled along by a boat.

(a) The diagram shows the horizontal forces acting on the water skier.



(i) The 500 N force is the force that the boat tow rope is exerting on the water skier.

Suggest what causes the 300 N force.

(1)

.....

(ii) Calculate the resultant of these two forces.

(2)

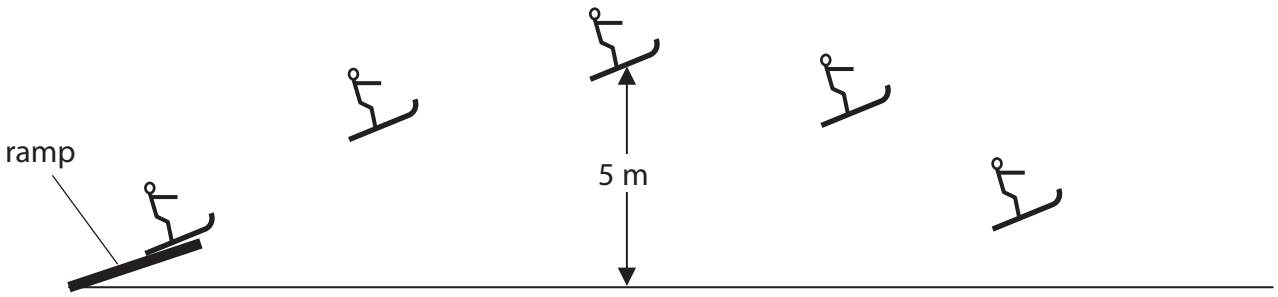
resultant force = ... N

(iii) State the direction of the resultant of these two forces.

(1)

.....

(b) The diagram shows the water skier using a ramp to perform a jump.
During the jump, she gains gravitational potential energy.



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

The unit of gravitational potential energy is

(1)

☒ **A** A

☒ **B** J

☒ **C** N

☒ **D** W

(ii) The mass of the water skier is 54 kg.
At the top of the jump, she is 5 m above the water level.

Calculate the amount of gravitational potential energy she gains in rising 5 m.
Gravitational field strength = 10 N/kg

(2)

gain in gravitational potential energy = ...

(iii) When the water skier reaches the top of the ramp, she lets go of the rope.

Describe the energy changes that happen between the skier leaving the ramp and reaching the top of the jump.

(2)

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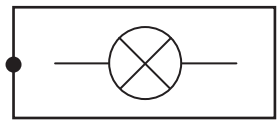
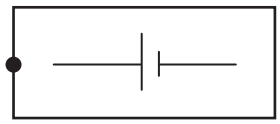
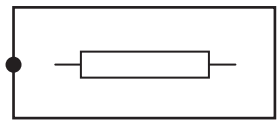
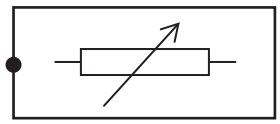
(Total for Question 3 = 9 marks)

Circuits

4 (a) (i) Draw **one** straight line from each name to its circuit symbol.

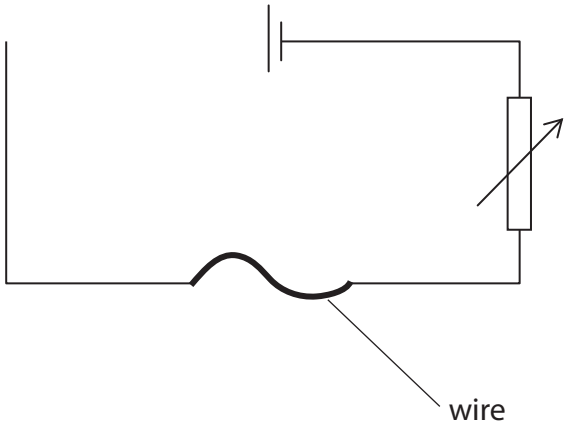
(2)

name	circuit symbol
lamp	
fixed resistor	
	
	

(ii) The diagram shows an incomplete circuit for measuring the resistance of a length of wire.

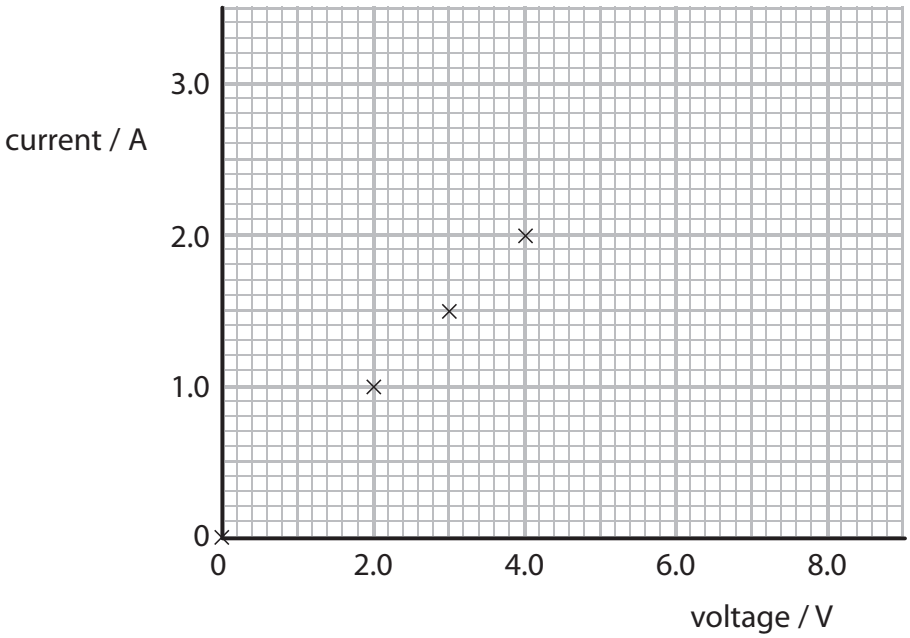
Complete the diagram to show how an ammeter, —(A)—, and a voltmeter, —(V)—, should be connected in the circuit.

(2)



(b) A student sets up a circuit to find the resistance of a piece of wire.
She measured current and voltage at different voltage settings.

She plotted a graph of her results.



(i) Draw the line of best fit for these four points.

(1)

(ii) She then took an extra reading and found that a voltage of 7.0 V gave a current of 3.0 A.

Plot this point on the graph.

(1)

(iii) She decides to take an additional reading.
This is to help her reach a conclusion about the way current changes with voltage.

Explain which additional reading she could take.

(2)

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.....

.....

(iv) $R = \frac{V}{I}$

Calculate the resistance of the piece of wire when the current is 1.5 A.

(3)

resistance = ... Ω

(Total for Question 4 = 11 marks)

Nuclear reactions

5 (a) The nucleus of an atom of cobalt-60 can be represented by the symbol

$$^{60}_{27}Co$$

(i) Use numbers from the box to complete the following sentences.

(2)

27	33	60	87

The number of protons in an atom of cobalt-60 is .....

The number of neutrons in an atom of cobalt-60 is .....

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

Atoms are neutral. An atom can become an ion by losing

(1)

☒ **A** an electron

☒ **B** a neutron

☒ **C** a gamma ray

☒ **D** an X-ray

(iii) Cobalt-60 is radioactive.
It emits beta radiation and gamma radiation.

Describe the differences between beta radiation and gamma radiation.

(3)

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*(b) Fission and fusion are two different types of nuclear reaction.

Describe the similarities and differences between nuclear fission reactions and nuclear fusion reactions.

(6)

(Total for Question 5 = 12 marks)

Radioactivity – natural and useful

6 (a) (i) One source of background radiation is radon gas.

State another source of background radiation.

(1)

.....

(ii) Which of these two statements about background radiation are correct?

1 Radon gas from nuclear power stations is the main cause of background radiation.

2 Background radiation can be detected during radioactive experiments.

(1)

☒ **A** statement 1 only

☒ **B** statement 2 only

☒ **C** both statement 1 and statement 2

☒ **D** neither statement 1 nor statement 2

(iii) Background radiation from radon gas is different from place to place in the UK.

Explain these differences in background radiation.

(2)

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(b) Scientists have changed their ideas about the hazards from radioactive sources.

Describe how their ideas have changed since radioactivity was first discovered.

(2)

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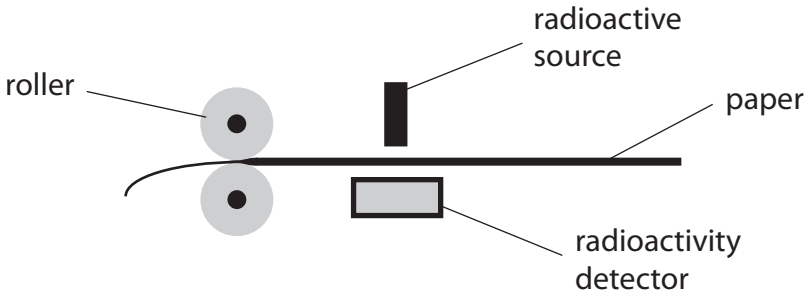
*(c) The diagram shows how rollers can change the thickness of paper in a factory.
A thickness gauge controls the rollers.
The thickness gauge contains a radioactive source and a detector.
If the paper is too thick, the reading on the detector goes down.
This causes the rollers to be pushed closer together.



The radioactive source used must be chosen carefully to be effective and used in a way that is not a hazard to workers.

Discuss the factors to consider when choosing and using this radioactive source.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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