

Please write clearly in block capitals.

Centre number

--	--	--	--	--

Candidate number

--	--	--	--

Surname

Forename(s)

Candidate signature

GCSE SCIENCE PHYSICS

H

Higher Tier

End of Year 10 test 2018

Time allowed: 1 hour

Materials

For this paper you must have:

- a ruler
- a scientific calculator
- the Physics Equations Sheet.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

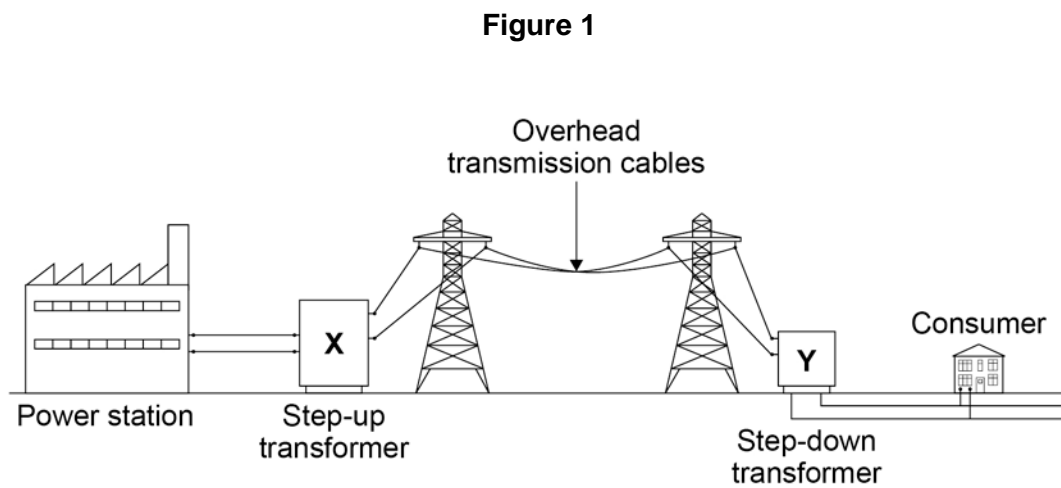
Information

- The maximum mark for this paper is 60.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

0 1

Figure 1 shows the main features of the National Grid.



0 1

1

Energy is transferred to consumers by the National Grid using an alternating potential difference.

What is meant by **alternating potential difference**?

[1 mark]

0 1

2

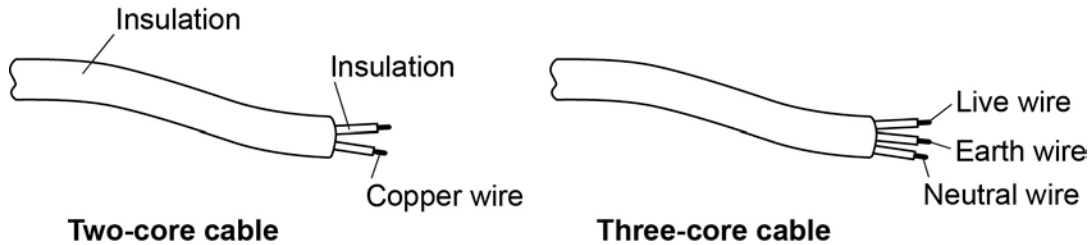
Explain why the National Grid uses step-up and step-down transformers.

[4 marks]

A clothes iron is a domestic appliance that is connected to the mains by a three-core cable.

Figure 2 shows a two-core cable and a three-core cable.

Figure 2



0 1 . 3

The different wires in each cable are covered with different colours of plastic insulation.

The live wire is covered in brown plastic insulation.

Why is it important that the live wire is always covered in the same colour of plastic insulation?

[1 mark]

0 1 . 4

Explain why a clothes iron with a metal base must be connected to the mains by a three-core cable.

[2 marks]

Question 1 continues on the next page

Turn over ►

When the clothes iron is switched on the potential difference between the live wire and the neutral wire is 230 V.

0 1 . **5** Write down the equation that links current, potential difference and power.

[1 mark]

0 1 . **6** The current in the live wire is 9.0 A.

Calculate the power of the clothes iron.

[2 marks]

Power = _____ W

11

Turn over for the next question

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

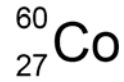
Turn over ►

0 2

Cobalt-60 is a radioactive isotope used to treat cancer.

0 2**1**

An atom of cobalt-60 can be represented as:



How many protons and neutrons are there in the nucleus of a cobalt-60 atom?

[2 marks]

Number of protons = _____

Number of neutrons = _____

0 2**2**

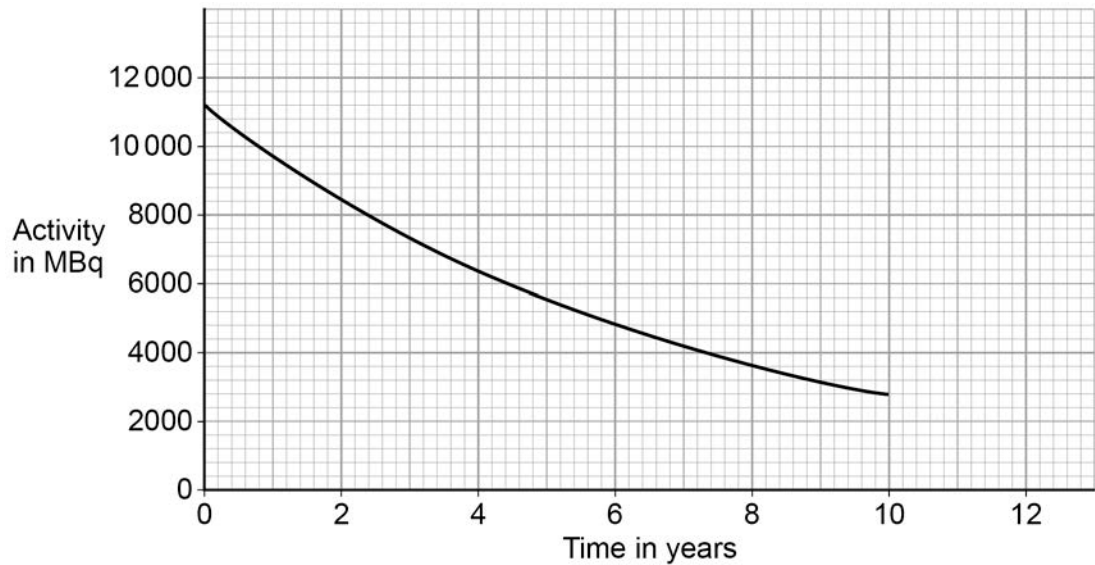
Atoms of cobalt-60 contain protons, neutrons and one other type of particle.

Name the other type of atomic particle in an atom of cobalt-60.

[1 mark]

0 2 . 3 Figure 3 shows how the activity of a sample of cobalt-60 changes with time.

Figure 3



Determine the half-life of cobalt-60.

Show your working on **Figure 3**.

[2 marks]

Half-life = _____ years

0 2 . 4 Samples of cobalt-60 are used in schools to demonstrate radioactive decay.

Suggest **two** safety precautions that should be used in schools when using radioactive sources.

[2 marks]

1 _____

2 _____

Turn over ►

0 3

A powerlifter raises a bar from the floor to above his head.

Look at **Figure 4**.

Figure 4



0 3

. 1

Write down the equation that links power, time taken and work done.

[1 mark]

0 3

. 2

To lift the bar, the powerlifter does 3.9 kJ of work in 3.0 s.

Calculate the power.

[3 marks]

Power = _____ W

0 3

. 3

Explain the effect reducing the time taken to lift the bar would have on the power.

[2 marks]

0 3 . **4** Write down the equation that links gravitational field strength, gravitational potential energy, height and mass.

[1 mark]

0 3 . **5** The bar has a mass of 180 kg.

The powerlifter raises the bar 2.1 m.

Gravitational field strength = 9.8 N/kg

Calculate the increase in the gravitational potential energy store of the bar.

Give your answer to 2 significant figures.

[3 marks]

Increase in gravitational potential energy store = _____ J

0 3 . **6** The powerlifter then drops the bar to the floor.

What is the maximum increase in the kinetic energy store of the bar?

[1 mark]

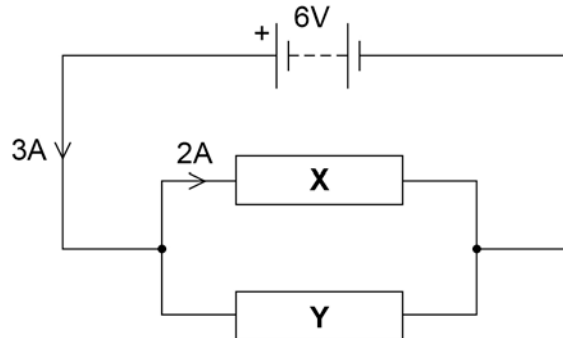
Maximum increase in kinetic energy store = _____ J

11

Turn over for the next question

Turn over ►

0 4

Look at **Figure 5**.The circuit has two resistors, **X** and **Y**.**Figure 5**

0 4

. 1

What is the potential difference across resistor **X**?**[1 mark]**Tick **one** box.2 V 3 V 6 V 12 V

0 4

. 2

Determine which resistor, **X** or **Y**, will have the highest resistance.Use the values of current shown in **Figure 5**.**[2 marks]**

0 4 . **3** Another resistor is added in parallel to **X** and **Y**.

What will happen to the total resistance of the circuit?

[1 mark]

0 4 . **4** The three resistors are then arranged in series.

What will happen to the potential difference across resistor **X**?

[1 mark]

0 4 . **5** How will the total resistance of the series circuit compare to the total resistance of the parallel circuit?

[1 mark]

Turn over for the next question

6

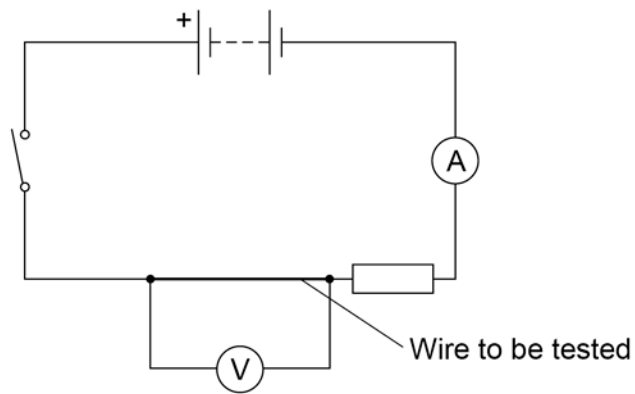
Turn over ►

0 5

A student investigated how the resistance of a wire varies with its length.

Figure 6 shows the circuit diagram the student used to set up her apparatus.

Figure 6

**0 5****. 1**

The student switched the power supply off between each set of readings.

Explain why this should be done.

[2 marks]

The student tested different lengths of wire.

For each length of wire, the student measured:

- the current through the wire
- the potential difference across the wire.

Table 1 shows the student's results.

Table 1

Length of wire in cm	Current in milliamperes	Potential difference in volts	Resistance in ohms
10.0	64	0.10	1.6
20.0	34	0.11	3.2
30.0	25	0.12	4.8
40.0	19	0.12	X
50.0	16	0.13	8.1
60.0	14	0.13	9.3

0 5 . **2** Calculate resistance **X**.

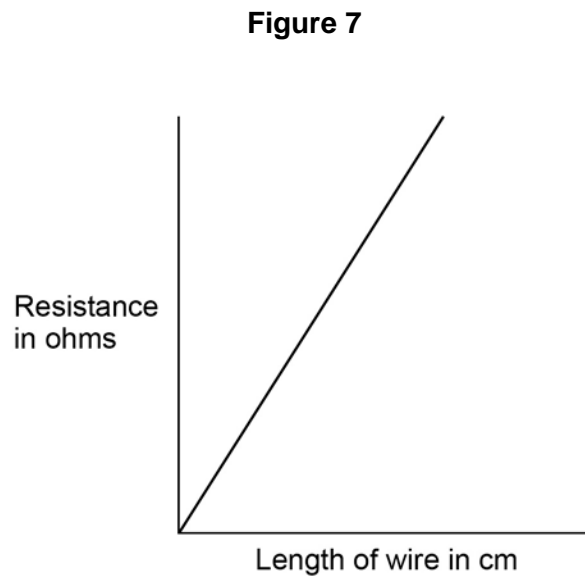
[4 marks]

Resistance = _____ Ω

Question 5 continues on the next page

Turn over ►

0 5 . 3 Figure 7 shows a sketch graph of the results.



The resistance of the wire is directly proportional to the length.

How does the graph show this?

[1 mark]

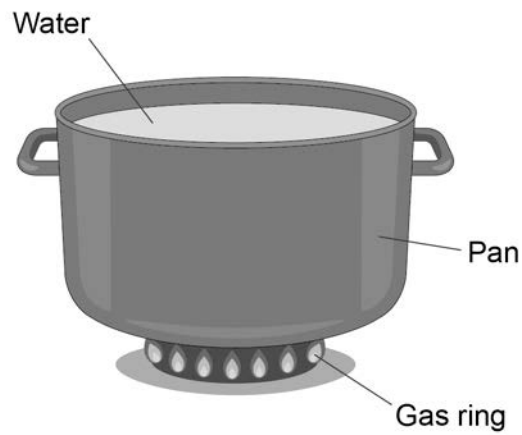
7

Turn over for the next question

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

Turn over ►

0 6

Figure 8 shows a pan of water on a gas ring.**Figure 8**

0 6

. 1 What is meant by the **internal energy** of the water?**[1 mark]**

0 6 . **2** The energy transferred to the water is 300 kJ.

The temperature of the water increased from 20 °C to 100 °C.

Specific heat capacity of water = 4200 J/kg °C.

Calculate the mass of water in the pan.

Use the Physics Equations Sheet.

[4 marks]

Mass of water = _____ kg

0 6 . **3** The gas ring transfers energy to the water.

Explain why the temperature remains constant at boiling point when the internal energy is increasing.

[3 marks]

Turn over for the next question

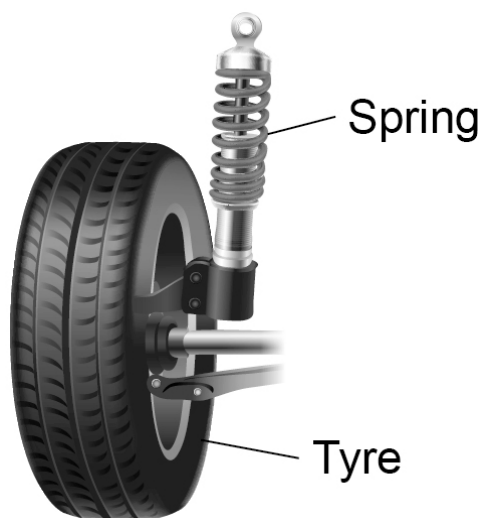
8

Turn over ►

0 7

Figure 9 shows a car tyre and part of the suspension system in a car.

Figure 9



The tyre and spring help to reduce the effect of driving over any holes in the road surface.

0 7

. 1

The tyre is filled with air.

The air particles in the tyre move faster after the car has been driven.

Explain why the pressure in the tyre is different after the car has been driven.

[2 marks]

0 7 . 2 When a car hits a hole in the road, the spring shown in **Figure 9** compresses by 20 mm.

The spring constant = 90 kN/m.

Calculate the energy stored in the spring by this compression.

[4 marks]

Energy stored = _____ J

0 7 . 3 After being compressed the spring returns to its original length.

Describe the changes in energy stored as the car drives over the hole in the road.

[4 marks]

10

END OF QUESTIONS

There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

Copyright Information

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team, AQA, Stag Hill House, Guildford, GU2 7XJ.

Copyright © 2018 AQA and its licensors. All rights reserved.