AQA

GCSE SCIENCE
PHYSICS

F

Foundation 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	

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0 1   **Figure 1** shows the proportion of electricity generated in the UK from different energy sources in 2015.

Figure 1
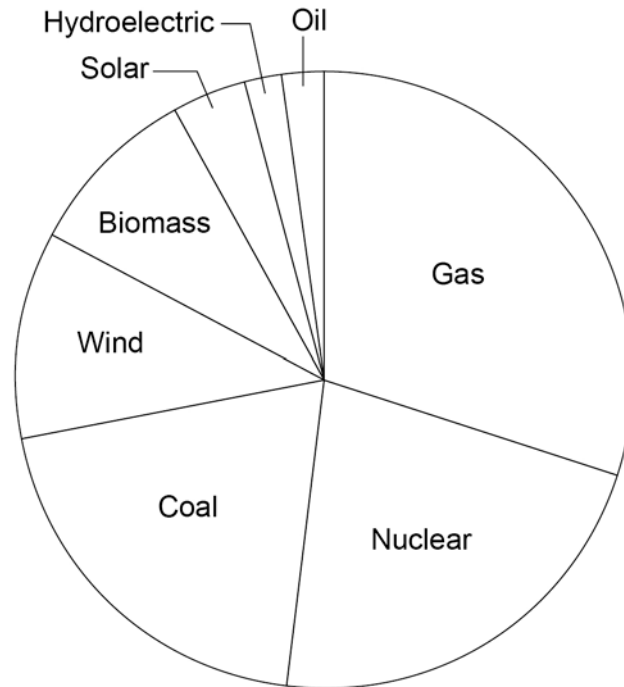
0 1 . 1   Name **two** renewable energy resources shown in **Figure 1**.

[2 marks]

1 _____

2 _____

| 0 | 1 | . | 2 | Burning fossil fuels releases carbon dioxide into the atmosphere.

What is an environmental impact of carbon dioxide?

[1 mark]

Tick **one** box.

Carbon dioxide causes global warming. ☐

Carbon dioxide causes visual pollution. ☐

Carbon dioxide destroys the ozone layer. ☐

Carbon dioxide is the main cause of acid rain. ☐

| 0 | 1 | . | 3 | Which statement about nuclear fuel is correct?

[1 mark]

Tick **one** box.

Does not produce greenhouse gases. ☐

Generates a small amount of electricity. ☐

It is not a reliable energy source. ☐

Produces no harmful waste materials. ☐

Question 1 continues on the next page

Turn over ▶

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0 1 . 4 Which statement about using wind turbines is correct?

[1 mark]

Tick **one** box.

They are a reliable energy source. ☐

They cause climate change. ☐

They cause visual pollution. ☐

They provide a constant supply of electricity. ☐

0 1 . 5 A wind turbine transfers 160 000 000 J of kinetic energy into 72 000 000 J of useful energy.

Calculate the efficiency of the wind turbine.

Use the equation:

$$efficiency = \frac{useful\ output\ energy\ transfer}{total\ input\ energy\ transfer}$$

[2 marks]

_____

_____

Efficiency = _____

7

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Turn over for the next question

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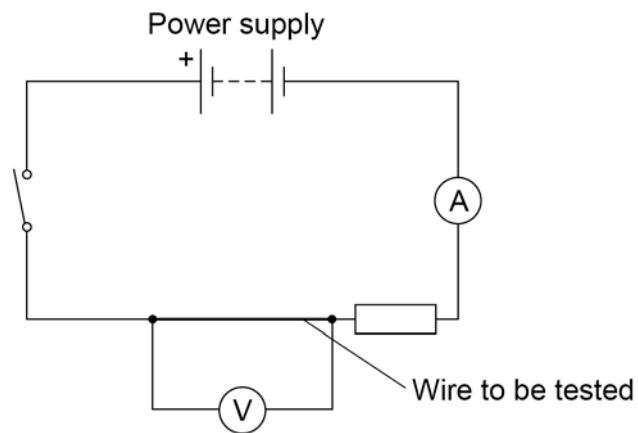ANSWER IN THE SPACES PROVIDED**

Turn over ▶

0 2 A student investigated how the resistance of a wire varies with the length of the wire.

Figure 2 shows the circuit diagram the student used to set up her apparatus.

Figure 2

0 2 . 1 The student measured:

- the current through the wire

- the potential difference across the wire.

Draw **one** line from each quantity to the meter used to record the readings.

[2 marks]

Quantity		Meter
		Ammeter
Current		Joulemeter
		Ohmmeter
Potential difference		Voltmeter

| 0 | 2 | . | 2 | Describe how the student could use the apparatus to investigate how the resistance of the wire varies with the length of the wire.

[4 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

| 0 | 2 | . | 3 | For a length of wire:

- the current is 0.25 A

- the potential difference is 1.20 V.

Calculate the resistance of this length of wire.

Use the equation:

$$\text{resistance} = \frac{\text{potential difference}}{\text{current}}$$
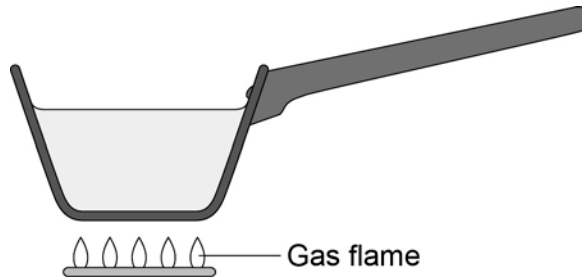
[2 marks]

_____

_____

Resistance = _____ Ω

8

Turn over ▶

| 0 | 3 | | **Figure 3** shows a pan of water being heated on a gas flame.

Figure 3

Gas flame

| 0 | 3 | . | 1 | Heating the water raises the temperature of the water.

Explain why the temperature of the water increases.

[1 mark]

_____

_____

| 0 | 3 | . | 2 | Calculate the change in thermal energy of the water when the temperature of the water increases by 80 °C.

The mass of water = 0.40 kg

The specific heat capacity of water = 4200 J/kg °C

Use the Physics Equations Sheet.

[2 marks]

_____

_____

_____

Change in thermal energy = _____ J

0 3 . 3 Give the reason why some of the energy transferred by the gas flame in **Figure 3** does not heat the water.

[1 mark]

_____

_____

0 3 . 4 The liquid water is heated until it changes state.

What name is given to this change of state?
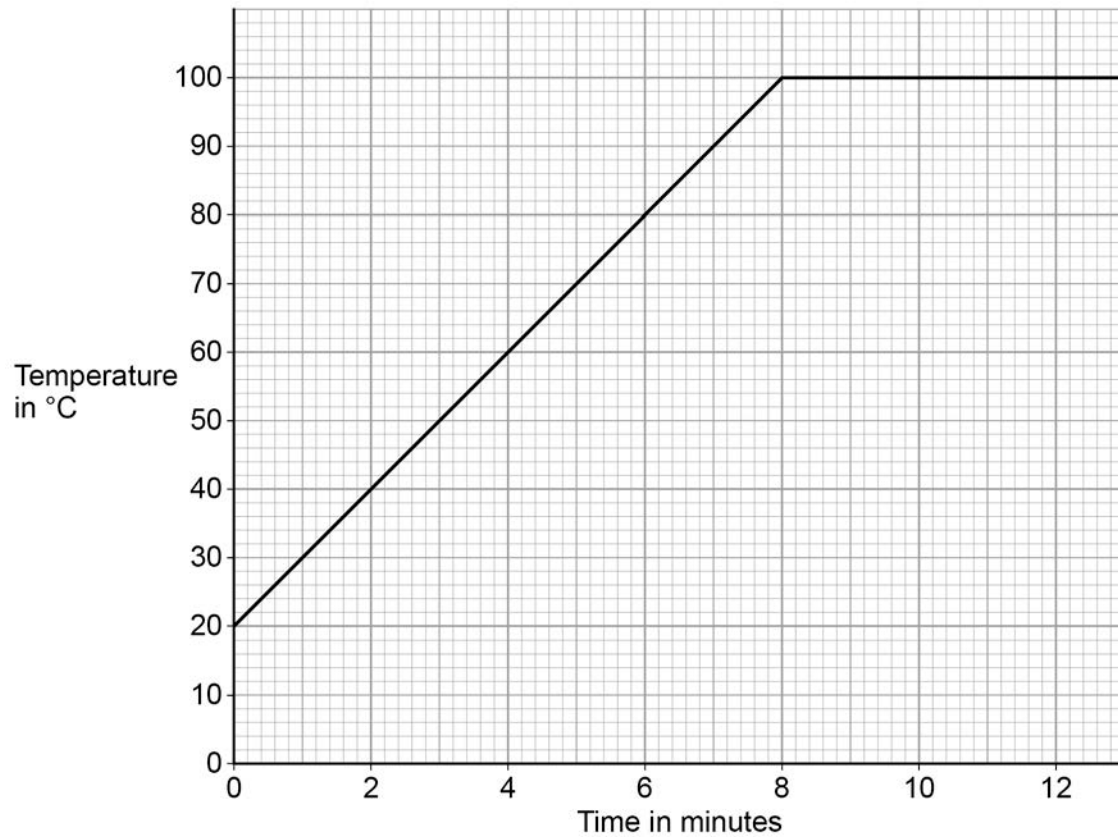
[1 mark]

Tick **one** box.

Boiling ☐

Condensing ☐

Freezing ☐

Melting ☐

Question 3 continues on the next page

Turn over ▶

Figure 4 shows how the temperature of water in the pan changed with time.

Figure 4

0 3 . 5 Determine the temperature increase per minute during the first 8 minutes.

[1 mark]

Temperature increase per minute = _____ °C

0 3 . 6 Energy was supplied at a constant rate to the water by the gas flame.

Explain why the line on the graph in **Figure 4** changes shape after 8 minutes.

[2 marks]

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0 3 . 7 The gas flame can be turned up so that it supplies energy at a greater rate.

Draw a line on **Figure 4** to show how the temperature of the water would change if the energy is supplied at a greater rate.
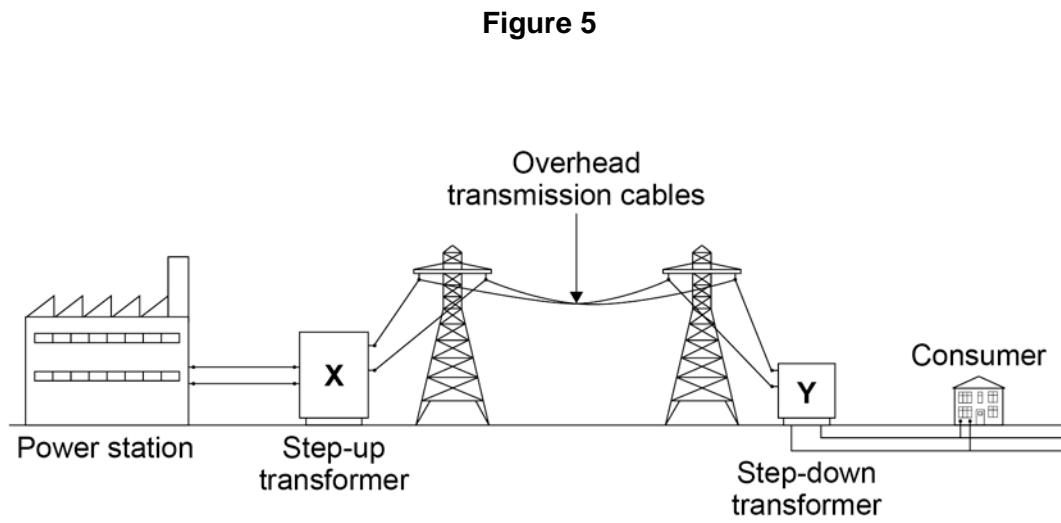
[2 marks]

10

Turn over for the next question

Turn over ▶

0 4 | **Figure 5** shows the main features of the National Grid.

Figure 5

0 4 . 1 Energy is transferred to consumers by the National Grid using an alternating potential difference.

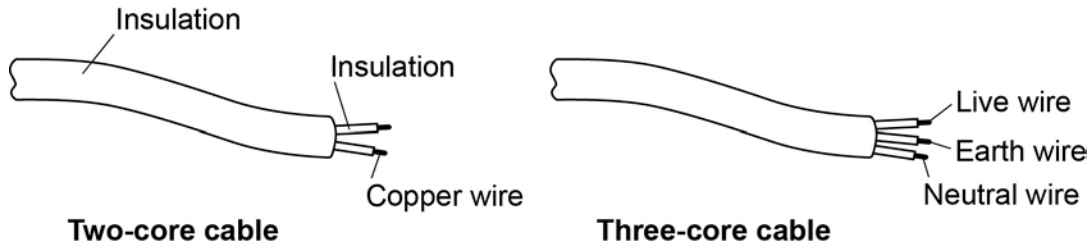What is meant by **alternating potential difference**?

[1 mark]

_____

_____

_____

0 4 . 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 6 shows a two-core cable and a three-core cable.

Figure 6

| 0 | 4 | . | 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 | 4 | . | 4 | Explain why a clothes iron with a metal base must be connected to the mains by a three-core cable.

[2 marks]

_____

_____

_____

_____

Question 4 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 4 . 5 Write down the equation that links current, potential difference and power.

[1 mark]

_____

0 4 . 6 The current in the live wire is 9.0 A.

Calculate the power of the clothes iron.

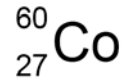**[2 marks]**

_____

_____

Power = _____ W

11

Turn over for the next question

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ANSWER IN THE SPACES PROVIDED**

Turn over ►

0 5 | Cobalt-60 is a radioactive isotope used to treat cancer.

0 5 . **1** | An atom of cobalt-60 can be represented as:

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

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

[2 marks]

Number of protons = _____
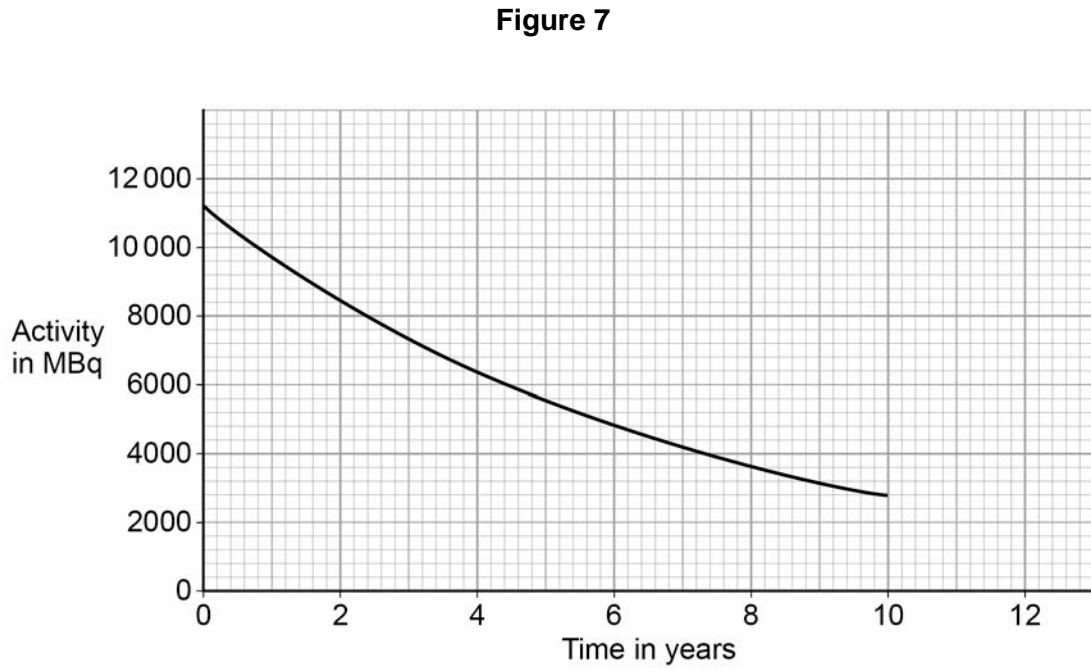
Number of neutrons = _____

0 5 . **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 5 . 3 **Figure 7** shows how the activity of a sample of cobalt-60 changes with time.

Figure 7

Determine the half-life of cobalt-60.

Show your working on **Figure 7**.

[2 marks]

Half-life = _____ years

0 5 . 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 _____

_____

7

Turn over ▶

0 6 A powerlifter raises a bar from the floor to above his head.

Look at **Figure 8**.

Figure 8

0 6 . 1 Write down the equation that links power, time taken and work done.

[1 mark]

_____

0 6 . 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 6 . 3 Explain the effect reducing the time taken to lift the bar would have on the power.

[2 marks]

_____

_____

_____

_____

0 6 . 4 Write down the equation that links gravitational field strength, gravitational potential energy, height and mass.

[1 mark]

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

What is the maximum increase in the kinetic energy store of the bar?
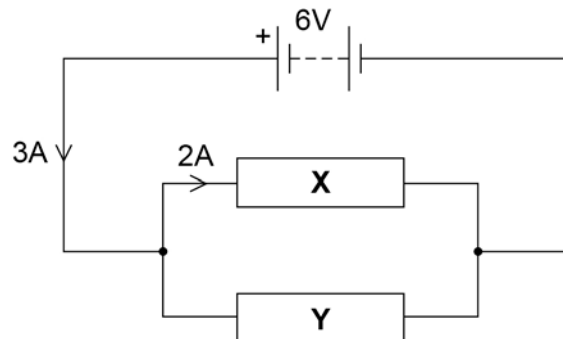
[1 mark]

Maximum increase in kinetic energy store = _____ J

11

Turn over for the next question

Turn over ▶

0 7 Look at **Figure 9**.

The circuit has two resistors, **X** and **Y**.

Figure 9

0 7 . 1 What is the potential difference across resistor **X**?

[1 mark]

Tick **one** box.

2 V ☐

3 V ☐

6 V ☐

12 V ☐

0 7 . 2 Determine which resistor, **X** or **Y**, will have the highest resistance.

Use the values of current shown in **Figure 9**.

[2 marks]

_____

_____

_____

_____

0 7 . 3 Another resistor is added in parallel to **X** and **Y**.

What will happen to the total resistance of the circuit?

[1 mark]

_____

0 7 . 4 The three resistors are then arranged in series.

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

[1 mark]

_____

0 7 . 5 How will the total resistance of the series circuit compare to the total resistance of the parallel circuit?

[1 mark]

_____

6

END OF QUESTIONS

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