

# Autumn Term

## P5 Electricity in the home

### Aiming for Grade 8



OLD BUCKENHAM  
HIGH SCHOOL

*Achieving excellence together*

## Extended Homework Assignment

Name: \_\_\_\_\_

Set: \_\_\_\_\_

### Instructions

A printed copy should be handed into your teacher.

The knowledge required to complete this assignment will be supported in class in lessons of the half term.

## Task

### Electrical safety

Write a leaflet about electrical safety for primary school students. The leaflet should include information about the devices you have learnt about which:

- a protect appliances
- b protect people.

### Appliances, cost, and efficiency

**A** In the table below is a list of some of the electrical appliances that you might find in a home, along with their power ratings. All these appliances plug into the mains electricity. Complete the table to work out the resistance of each appliance, the current flowing through each appliance, and the fuse that you would expect to find in each plug (available fuses are 3A, 5A, and 13A). You may want to research other devices and add them to your table.

Appliance	Power	Resistance in $\Omega$	Current in A	Fuse rating in A
low-energy light bulb	11 W			
hair drier	1.5 kW			
iron	1.1 kW			
kettle	2 kW			
laptop	40 W			
microwave oven	800 W			
oven	3.5 kW			
TV	100 W			
vacuum cleaner	500 W			
washing machine	500 W			

**B** Estimate the amount of time that you might typically use each appliance in a year, and the number of kWh you would 'save' if each appliance was 10% more efficient. Display your results in a suitable table.

## Questions

### Electrical safety

1 Compare a fuse and an earth wire.

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(3 marks)

2 Explain why electricians use wires of different thickness depending on the power of an appliance.

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(4 marks)

3 Suggest and explain why most ovens of power greater than 3 kW do not come with a plug attached to them, but a wire that is connected directly to your house wiring circuit.

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(2 marks)

4 a Compare direct and alternating current.

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(1 mark)

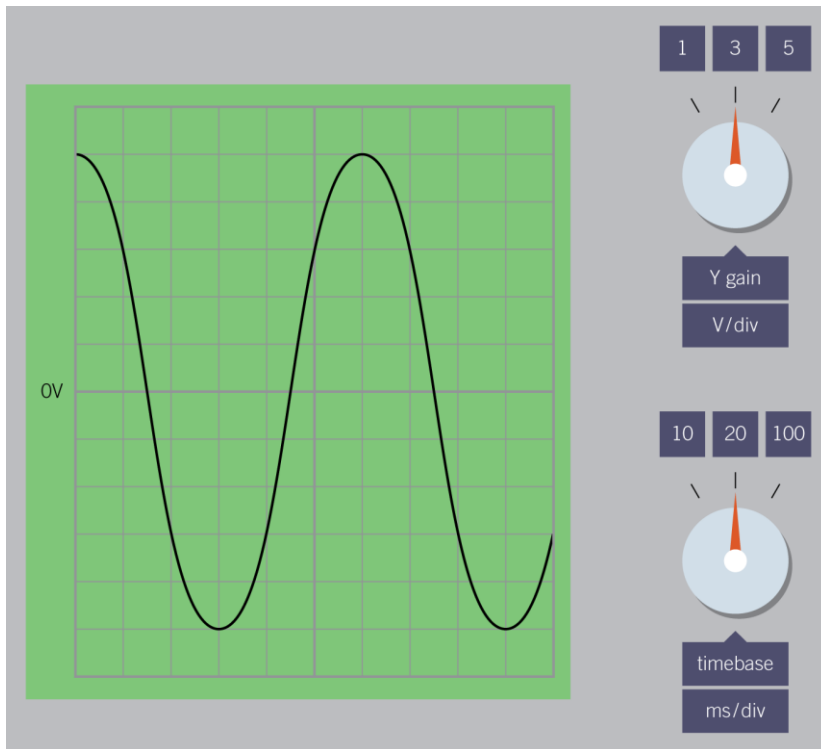
b Use the diagram to calculate the peak potential difference. Show your method.

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(3 marks)



c Use the same diagram to calculate the frequency of the alternating current. Show your method.

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(5 marks)

**Power and resistance**

5 Explain in terms of electrons what happens when you heat water with the metal element of a kettle.

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(4 marks)

6 Explain how two lamps can work from the same potential difference but not be the same brightness.

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(4 marks)

7 Complete the table with the values of p.d. and resistance. Try to fill in as much as you can without using your calculator.

(4 marks)

Current	Resistance	p.d. in V	Power in W
1 A	1 Ω		
	0.1 Ω	0.2	
100 mA		1.0	
	1 kΩ		9000

8 One equation for power is:

$$\text{power } P \text{ (W)} = (\text{current } I \text{ (A)})^2 \times \text{resistance } R \text{ (}\Omega\text{)}$$

Use the method that you used to fill in the first row of the table to explain why.

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(2 marks)

9 Explain the link between power, current, p.d., and the energy transferred by each charge flowing in a circuit.

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(4 marks)

**Appliances, cost, and efficiency**

10 Describe one way that energy is wasted in an electric motor, but is not the case for a car engine.

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(1 mark)

11 Suggest and explain why more efficient electrical appliances might not be cheaper to buy.

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(2 marks)

**12 a** Use the table from Part 3 of the Task to work out the most expensive and least expensive appliance to run annually.

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*(2 marks)*

**b** Work out the cost of running each of those appliances if one unit costs 11p.

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*(2 marks)*

**c** Explain why electricity companies charge per kWh and not per joule.

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*(1 mark)*