Electrical Power - part 1 Worksheet

Miss Walrond

Q1.

Look at the table about electrical heaters.

Appliance	Voltage in volts	Current in amps	Power rating
Water heater	230	15	
Room heater	230	8	
Fish tank heater	10	20	

Which heater has the highest power rating?

Use calculations to find out the answer and complete the sentences below.

The appliance with the highest power rating is ………………………………… .

The highest power rating is ………………………………… .

The unit for power is ………………………………… .   **[4]**

OCR, Gateway Physics A, Paper B751/01, June 2014.

Answers

Q1. Answers

1. (highest power) water heater.   **1**

   3450   **2**

   W or Watt   **1**

If 3450 answer incorrect allow 1 mark for 230 × 15 or any other correctly worked out power in the table.

In lesson questions

P = IV

Write out the equation P = IV.

Define each symbol and write the units of measure for each variable.

Worked example - Calculating electrical power

	A current of 4 A flows through a heater operating at 230 V. Calculate the power of the heater.	A current of 60 mA flows through a lamp operating at 50 V. Calculate the power of the lamp.
Values		
Equation		
Substitute		
Rearrange		
Answer		
Units		

Independent Task- Calculating electrical power

1. A current of 10A flows through a 6V torch, what is the power rating of the torch?
2. A 9V battery produces a current of 5.5A. How much power is transferred?
3. A motor has a potential difference of 12kV across it and a current of 1.2 A. Calculate the power of the motor.
4. An LED has a current of 8mA through it and a potential difference of 2 V across it. What is the power rating of the LED?

Worked example - Using P=IV

	A 60 W bulb requires a current of 3 A to make it work. Calculate the potential difference across the bulb.	A 100 W bulb has a potential difference of 12 V across it. What current flows through the lamp?
Values		
Equation		
Substitute		
Rearrange		
Answer		
Units		

Independent Task - Using P=IV

1. A 45W torch requires a potential difference of 9V to make it work. Calculate the current flowing through the torch.
2. A TV has a power rating of 130 W and operates at 230 V. What current flows through it?
3. A microwave has a power rating of 800W and operates at 230V. Calculate the current flowing through the microwave. Give your answer to 2 significant figures
4. A loudspeaker has a current of 19mA flowing through it and it has a power rating of 40W. What potential difference is across the loudspeaker?

P = I²R

Write out the equation $P = I^2R$.

Define each symbol and write the units of measure for each variable.

Worked example - Calculating electrical power 2

	A drill has a current of 12 A flowing through it and a resistance of 9 Ω. Calculate the power of the drill.	A laptop has a current of 250 mA flowing through it and a resistance of 200 Ω. Calculate the power of the laptop.
Values		
Equation		
Substitute		
Rearrange		
Answer		
Units		

Independent Task - Calculating Electrical Power 2

1. A washing machine has a current of 12 A flowing through it and a resistance of 3 Ω. Calculate the power of the washing machine.

2. A refrigerator has a current of 12 A flowing through it and a resistance of 14 Ω. Calculate the power rating of the refrigerator to 2 sf.

3. A calculator has a current of 133 μA flowing through it and a resistance of 11,300 Ω. Calculate the power of the calculator.

4. A gaming console has a current of 0.37 A flowing through it and a resistance of 620 Ω. Calculate the power of the gaming console.

Worked example - Using P = I²R

	A laptop charger has a resistance of 5 Ω and a power of 65 W. Calculate the current flowing through the charger. Give your answer to 3 significant figures.	A camera has a power rating of 2.45 W and a resistance of 5.3 Ω. Calculate the current flowing through the camera. Give your answer to 2 significant figures.
Values		
Equation		
Substitute		
Rearrange		
Answer		
Units		

Independent Task - Using P = I²R

1. A dishwasher has a power rating of 950 W and has a resistance of 45 Ω. Calculate the current flowing through the dishwasher.

2. A camera has a power rating of 2.45W and a resistance of 5.3Ω. Calculate the current flowing through the camera. Give your answer to 2 significant figures.

3. A printer has a power rating of 10W and has a resistance of 48Ω. Calculate the current flowing through the printer. Give your answer to 2 significant figures.

4. A pair of hair straighteners has a power rating of 1,500 W. A current of 2.1 A flows through the straighteners. What is their resistance?

5. An electric shave has a power rating of 15 W. If the current through the shaver is 50mA. What is the resistance of the shaver?

Answers

Review - P = IV

P = I × V

Power = current × potential difference, where P = power, I = current and V = potential difference.

Units of measure:
Power - **watts, W**
Current - **amps, A**
Potential difference - **volts, V**

Review: Independent Task- Calculating electrical power

1. A current of 10A flows through a 6V torch, what is the power rating of the torch? **60 W**

2. A 9V battery produces a current of 5.5A. How much power is transferred? **49.5 W**

3. A motor has a potential difference of 12kV across it and a current of 1.2 A. Calculate the power of the motor? **14,400 W**

4. An LED has a current of 8mA through it and a potential difference of 2 V across it. What is the power rating of the LED? **0.016 W**

Review: Independent Task - Using P=IV

1. A 45W torch requires a potential difference of 9V to make it work. Calculate the current flowing through the torch. **5 A**

2. A TV has a power rating of 130 W and operates at 230 V. What current flows through it? **0.57 A**

3. A microwave has a power rating of 800W and operates at 230V. Calculate the current flowing through the microwave. Give your answer to 2 significant figures **3.5 A**

4. A loudspeaker has a current of 19mA flowing through it and it has a power rating of 4W. What potential difference is across the loudspeaker? **210 V**

Review: P= I^{2}R

P = I^2 × R

Power = (current)^2 × Resistance

Units of measure:
Power - **watts, W**
Current - **amps, A**
Resistance - **ohms, Ω**

Review: Independent Task - Calculating Electrical Power 2

1. A washing machine has a current of 12 A flowing through it and a resistance of 3 Ω. Calculate the power of the washing machine. **432 W**

2. A refrigerator has a current of 12 A flowing through it and a resistance of 14Ω. Calculate the power rating of the refrigerator to 2 sf. **2000 W**

3. A calculator has a current of 133 µA flowing through it and a resistance of 11,300 Ω. Calculate the power of the calculator. **0.00020 W**

4. A gaming console has a current of 0.37 A flowing through it and a resistance of 620 Ω. Calculate the power of the gaming console. **85 W**

Independent Task - Using P = I²R

1. A dishwasher has a power rating of 950 W and has a resistance of 45 Ω. Calculate the current flowing through the dishwasher. **4.59 A**

2. A camera has a power rating of 2.45 W and a resistance of 5.3 Ω. Calculate the current flowing through the camera. Give your answer to 2 significant figures. **0.68 A**

3. A printer has a power rating of 10W and has a resistance of 48Ω. Calculate the current flowing through the printer. Give your answer to 2 significant figures. **0.46 A**

4. A pair of hair straighteners has a power rating of 1,500 W. A current of 2.1 A flows through the straighteners. What is their resistance? **340 Ω**

5. An electric shave has a power rating of 15 W. If the current through the shaver is 50mA. What is the resistance of the shaver? **6000 Ω**