Combined Science - Physics - Key Stage 4 - Electricity

Multi-Step Calculations Worksheet

Miss Walrond

Practice questions.

1. (a). The potential difference across a lamp is 12 V. If the resistance of the lamp is 16 Ω, what is the power of the lamp?

   (b). Calculate the charge that flows through the lamp if it is switched on for 3 minutes.

2. A current of 2.15 A flows through a stereo with a power rating of 600 W. If 5.6 C of charge flows through the stereo, calculate the energy transferred. Give your answer to 2 significant figures.

Practice questions.

3. (a). A handheld electric fan has a current of 87 mA flowing through it. If it is turned on for 30 seconds, and transfers 52 J, what is the potential difference across the fan.

(b). What is the resistance of the fan?

4. A current of 2 A flows through a treadmill with a power rating of 0.55 kW. If 4 C of charge flows through the heating element, calculate the energy transferred.

Answers

Practice questions.

1. (a). $V = IR$, $12 = I \times 16$, $I = 0.75$ A
   $P = IV$, $P = 0.75 \times 12 = 9$ W

   (b). $Q = It$, $Q = 0.75 \times (3 \times 60) = 135$ C

2. $P = IV$, $600 = 2.15 \times V$, $V = 279$ V
   $E = QV$, $E = 5.6 \times 279$, $E = 1563$ J
   $E = 1600$ J to 2 sf

Practice questions.

3. (a). 87mA = 0.087 A

Q = It, Q = 0.087 ×30, Q = 2.61 C

E = QV, 52 = 2.61 × V, V = 19.9 V

(b). V = IR, 19.9 = 0.087 × R, R = 229 Ω

4. 0.55 kW = 550 W

P = IV, 550 = 2 × V, V = 275 V

E = QV, E = 4 × 275, E = 1,100 J

In lesson questions



A worked example

The potential difference across a bulb is 5 V and the current through the bulb is 3 A. In one minute, how much energy will be transferred by charge passing through the bulb? **[5]**

Energy = ... J

- **$P = I \times V$**
- **$P = I^2 \times R$**
- **$E = P \times t$**
- **$E = Q \times V$**

Another worked example

The mains electricity supply transfers 18000000 J of energy to a house in 2 hours. Calculate the average current drawn.

[5]

Current = ... A

Independent Task - Multi-step Calculations

Power

1. A drill requires 230 V and is used for 15 minutes. The current that runs through the drill is 12 A. How much energy does the drill use?
2. A microwave oven has a power rating of 800 W. If the microwave heats soup for 5 minutes, and is plugged into the mains power supply, how much charge flows through the microwave oven in this time?
3. A laptop uses 720,000J when used for 2 hours. It has a current of 15 A. What potential difference is needed for the laptop to work? Give your answer to 2 significant figures

A worked example

The potential difference across a lamp is 6 V. If the resistance of the lamp is 15 Ω, calculate the power of the lamp. **[5]**

Power = ... W

Another worked example - method 1

A current of 500 mA flows through a kettle with a power rating of 30 W. If 4 C of charge flows through the heating element, calculate the energy transferred. **[5]**

Energy transferred = ... J

Another worked example - method 2

A current of 500 mA flows through a kettle with a power rating of 30 W. If 4 C of charge flows through the heating element, calculate the energy transferred. **[5]**

Energy transferred = ... J

Independent Task - Multi-step Calculations

1. A potential difference of 9V causes a current of 5A to flow through a lamp. If the bulb is switched on for 40 seconds, how much energy is used?
2. A toastie-maker works using the mains power supply. If it has a resistance of 192 Ω, calculate the power rating of the toastie-maker. Give your answer to 3 significant figures.
3. A desk lamp has a potential difference of 16 V, and a charge of 1.8 C flows through it. If it is left on for 3 minutes. What is the resistance of the desk lamp?

Answers



Review: Independent Task - Multi-step Calculations Power

1. A drill requires 230 V and is used for 15 minutes. The current that runs through the drill is 12 A. How much energy does the drill use? **2,484,000 J**
2. A microwave oven has a power rating of 800 W. If the microwave heats soup for 5 minutes, and is plugged into the mains power supply, how much charge flows through the microwave oven in this time? **1043.5 C**
3. A laptop uses 720, 000J when used for 2 hours. It has a current of 15 A. What potential difference is needed for the laptop to work? Give your answer to 2 significant figures. **6.7 V**

Independent Task - Multi-step Calculations

1. A potential difference of 9V causes a current of 5A to flow through a lamp. If the bulb is switched on for 40 seconds, how much energy is used? **1800 J**
2. A toastie-maker works using the mains power supply. If it has a resistance of 192 Ω, calculate the power rating of the toastie-maker. Give your answer to 3 significant figures. **276 W**
3. A desk lamp has a potential difference of 16 V, and a charge of 1.8 C flows through it. If it is left on for 3 minutes. What is the resistance of the desk lamp? **1600 Ω**