Power part 2 Worksheet

Miss Walrond

In lesson questions

Electrical Transfers

Describe the energy transfers and stores for a fan powered by the mains power supply.

Remember:

- Transfer
- Store
- Location

Hint: The final transfer is to a thermal store of the case and surroundings.

Power

1) Write the definition of power.
2) Copy the equation E = P × t
3) Define each of the symbols.
4) Give the units for each variable.

Worked example - Calculating energy transferred

	A torch has a power of 20 W and is switched on for 30 seconds. Calculate the energy transferred electrically?	A handheld fan has a power of 10 W and is switched on for 4 minutes. Calculate the energy transferred electrically?
Values		
Equation		
Substitute		
Rearrange		
Answer		
Units		

Independent Task - Calculating Electrical Energy

1. A light bulb with a power of 60 W is switched on for 12 seconds. Calculate the energy transferred.

2. A radio is turned on for 45 seconds. It has a power of 120 W. Calculate the energy transferred.

3. A washing machine has a power of 450 W and is switched on for 1 hour and 20 minutes. Calculate the energy transferred.

4. A computer is used for 2 hours. It has a power rating of 300 W. Calculate the energy transferred to 2 significant figures.

Worked example - Using E = Pt

	300 J of energy is transferred to a television that has a power rating of 120 W. How long is the television switched on for?	3 MJ of energy are transferred to a refrigerator. If the refrigerator is switched on for 1 hour. What is the power of the refrigerator?
Values		
Equation		
Substitute		
Rearrange		
Answer		
Units		

Independent Task - Using E = Pt

1. A light bulb transfers 180 J of energy. If the light bulb has a power rating of 60 W, how long is it switched on for?
2. 4 J of energy is transferred through a resistor. If the circuit is switched on for 10 seconds. What is the power of the resistor?
3. A curling wand transfers 45,000 J of energy. If it is switched on for 4 minutes. What is its power rating?
4. 5.5 kJ of energy is transferred through a torch in 70 seconds. What is the power of the torch?

E = Q × V

1. Write out the equation above.

2. Write down what the symbols E, V and Q represent.

3. Write down the units of measure used for E, V and Q.

Worked example - Calculating Energy Transferred

	How much energy is transferred if 12 C flows through a component when 2 V is applied across it?	3.6 kC of charge flows through a resistor with a potential difference of 2 V across it. How much energy is transferred?
Values **E**quation **S**ubstitute **R**earrange **A**nswer **U**nits		

Independent Task: Calculating Energy Transferred

1) A charge of 40 C flows through a heater operating at 12 V. How much energy does the heater transfer?

2) 3 C of charge flows through a filament lamp from a 6V battery. How much energy is transferred?

3) 0.1 kC of charge flows through a loudspeaker. If there is a potential difference of 100 V across the loudspeaker, calculate the energy transferred.

4) A thermistor has a potential difference of 1.5 V across it. If 4.2 µC flows through the lamp, how much energy is transferred?

Worked example - Using E = Q × V

	A charge of 40 C flows through a heater transfering 200 J of energy. What is the potential difference across the heater?	A lamp with a potential difference of 100 V across it, is switched on and it transfers 0.25 J of energy. Calculate the charge that flows through the lamp to 2 significant figures.
Values		
Equation		
Substitute		
Rearrange		
Answer		
Units		

Independent Task: Calculating Potential Difference Complete these calculations

1) What is the potential difference if 2 J of energy is transferred through a component when 0.2 C of charge flows?
2) What charge flows if 36 J of energy is transferred from a 12 V battery.
3) Calculate the potential difference if 4.5 kC of charge flows through a lamp transferring 900 J of energy. Give your answer to 2 significant figures.
4) 2.6 mJ of energy is transferred through a diode, with a potential difference of 2 V across it. How much charge flows?

Answers

Review - Electrical Transfers

Energy is transferred **electrically** from the mains power supply to the **kinetic store** of the **motor in the fan**.

Energy is then transferred by **heating** to the **thermal store** of the **case and surroundings.**

White desk fan on white table, Enrique Zafra, Pexels

Review: Power

1. Power is the rate of energy transfer.
2. $E = P \times t$
3. E = energy transferred, P = power and t = time
4. Units of E = joule, J, units of P = watt, W, units of t = second,s

Review - Independent Task - Calculating Electrical Energy

1. A light bulb with a power of 60 W is switched on for 12 seconds. Calculate the energy transferred. **720 J**

2. A radio is turned on for 45 seconds. It has a power of 120 W. Calculate the energy transferred. **5,400 J**

3. A computer is used for 2 hours. It has a power rating of 300 W. Calculate the energy transferred to 2 significant figures. **2,200,000 J or 2.2 MJ**

4. A washing machine has a power of 450 W and is switched on for 1 hour and 20 minutes. Calculate the energy transferred. **2,160,000 J or 2.16 MJ**

Review - Independent Task - Using E = Pt

1. A light bulb transfers 180 J of energy. If the light bulb has a power rating of 60 W, how long is it switched on for? **3 seconds**

2. 4 J of energy is transferred through a resistor. If the circuit is switched on for 10 seconds. What is the power of the resistor? **0.4 W**

3. A curling wand transfers 45,000 J of energy. If it is switched on for 4 minutes. What is its power rating? Give your answer to 2 significant figures. **190 W**

4. 5.5 kJ of energy is transferred through a torch in 70 seconds. What is the power of the torch? **78.5 W**

Review: E = Q × V

1. E = Q × V
2. E = energy transferred, Q = charge flow, and V = potential difference
3. Units of E = joule, J, units of Q = coulomb, C and units of V = volts, V

Review - Independent Task: Calculating Energy Transferred

1) A charge of 40 C flows through a heater operating at 12 V. How much energy does the heater transfer? **480 J**

2) 3 C of charge flows through a filament lamp from a 6V battery. How much energy is transferred? **18 J**

3) 0.1 kC of charge flows through a loudspeaker. If there is a potential difference of 100 V across the loudspeaker, calculate the energy transferred. **10,000 J**

4) A thermistor has a potential difference of 1.5 V across it. If 4.2 μC flows through the lamp, how much energy is transferred? **6.3 μJ or 6.3 × 10⁻⁶ J**

Independent Task: Calculating Potential Difference Complete these calculations

1) What is the potential difference if 2 J of energy is transferred through a component when 0.2 C of charge flows? **10 V**

2) What charge flows if 36 J of energy is transferred from a 12 V battery. **3 C**

3) Calculate the potential difference if 4.5 kC of charge flows through a lamp transferring 900 J of energy. **0.2 C**

4) 2.6 mJ of energy is transferred through a diode, with a potential difference of 2 V across it. How much charge flows? Give your answer to 2 significant figures. **0.0013 C**