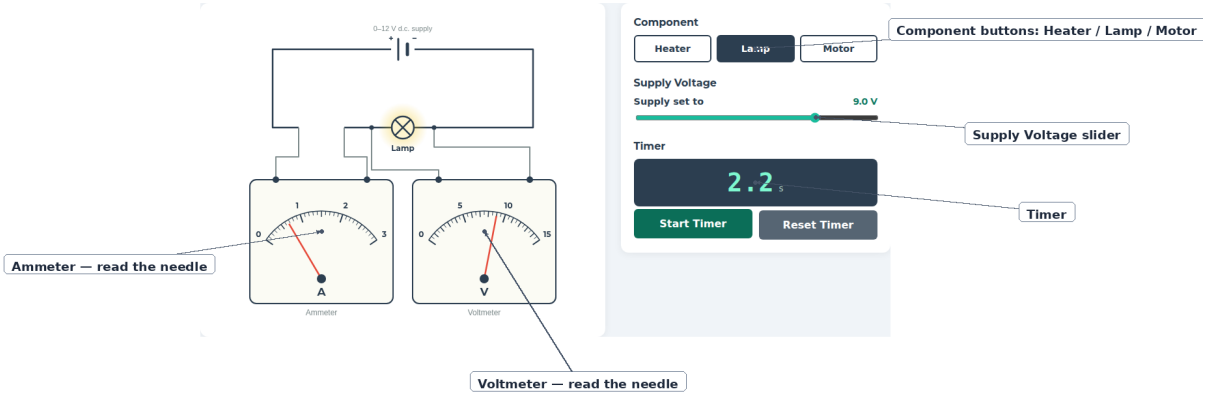
Energy and Power in Circuits

Voltage, Current, Time and Energy Transfer

Aim:

You are investigating what determines how much energy a component transfers.



Prediction:

The heater runs for 30 seconds, then for about twice as long, with the supply voltage unchanged. Do you predict the energy transferred will be roughly the same, roughly double, or something else?

Prediction: .....

Test it in the sim.

Method:

1. Select the Heater and set the Supply Voltage slider to 12.0 V. Read the voltmeter and the ammeter.
2. Click Start Timer, let it run for about 30 seconds, then click it again to stop. Record the component, voltage, current and time in your results table.
3. Click Reset Timer and repeat, this time letting the timer run for about twice as long.
4. Set the Supply Voltage slider to 6.0 V, read the meters, and time another 30-second run. Record everything in your table.
5. Repeat step 4 with the Supply Voltage slider set to 9.0 V.
6. Set the Supply Voltage slider to 12.0 V. For the Heater, then the Lamp, then the Motor, read the meters and time a 60-second run for each, recording every row.
7. For every row in your table, calculate the power and energy transferred and add them to your table.

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Results:

Component	Voltage V (V)	Current I (A)	Time t (s)	Power (W)	Energy (J)

Analysis:

Compare your two heater rows from steps 2 and 3. When the time roughly doubled, what happened to the energy transferred?

Look at your heater rows at 6.0 V, 9.0 V and 12.0 V. As the voltage goes up, what happens to the current — and what happens to the power?

Rank the heater, lamp and motor by power, then by energy transferred in their 60-second runs. Using your table, explain how a component’s energy transfer is connected to its power and to the time it runs for.

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