TwoThirtyVolts ...and all things electrical

Student sheet: Electric Current – The light output from a light bulb.

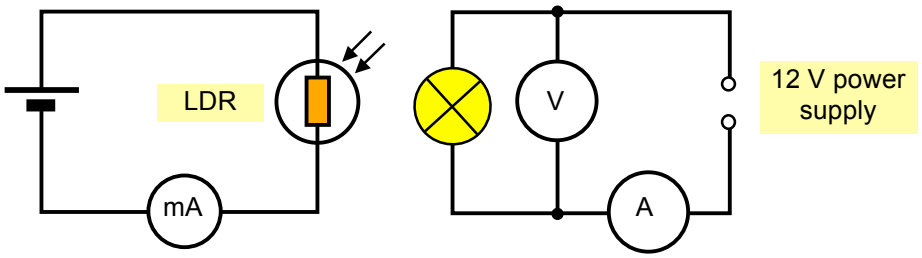
Objectives:

By the end of the session you will understand the relationship between the output of light from a light bulb and the electrical power used by a light bulb.

Resources required:

A 12V 24W bulb, a variable voltage 12V dc power supply, leads, a light dependent resistor (LDR) such as an ORP12, milliammeter, voltmeter, ammeter and a battery pack (12 V).

Activity:



1. Set up the two circuits shown in the diagram, one for the light bulb and one for the LDR.
2. Switch on the power supply and adjust the output until it is about 24W. This might be a voltage of 12V and a current of 2 A.
3. Now move the LDR towards the bulb until the milliammeter reads the biggest current that it can (do not let it touch the bulb).
4. Record the current in the bulb, the voltage across it and the current in the milliammeter.
5. Now alter the power supply so that the bulb is a little dimmer, take another set of readings. Repeat this for two more power supply settings. Record your results in the worksheet.
6. Plot a graph of the current on the milliammeter against the electrical power of the bulb.

Further work:

1. Use your apparatus to investigate how the distance from the light bulb affects the light falling on the LDR.
2. Use your apparatus to compare the light outputs from two different light bulbs both running at 24W.
3. Find out something about the regulations about how much light is needed in different parts of public buildings.

Linked Resources

www.twothirtyvolts.org :
Electric Current 11-14 Student Revision Notes
Electric Current 11-14 Additional Worksheet
Electric Current 11-14 Revision Quiz

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Worksheet: Electric Current – The light output from a light bulb.

Measurements to make:

Current in the light bulb	(I_B) =	A
Voltage across the light bulb	(V) =	V
Current in the milliammeter	(I_R) =	mA
Electrical power of light bulb	(VI_B)=	W

Plot a graph of the current ion the milliammeter against the electrical power of the bulb.

Questions:

1. What can you say about how the output of the light bulb changes with the electrical power input?

2. What have you assumed about the LDR?

3. How much effect do you think other lights in the room had on the results?

4. How would you improve the experiment?

Further work:

1. Use your apparatus to investigate how the distance from the light bulb affects the light falling on the LDR.

2. Use your apparatus to compare the light outputs from two different light bulbs both running at 24W.

3. Find out something about the regulations about how much light is needed in different parts of public buildings.