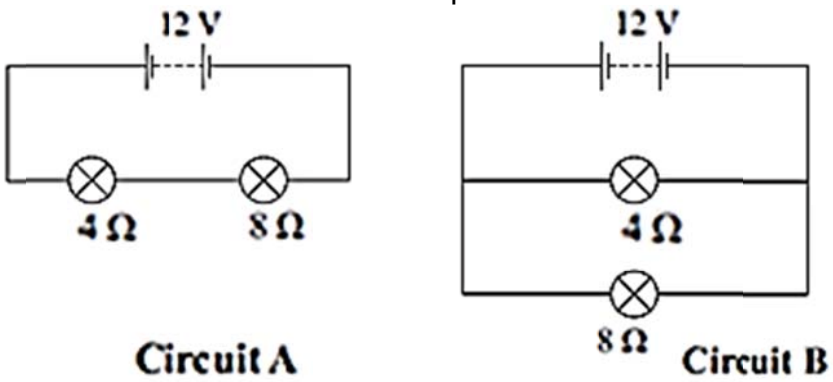
SCIENCE: PHYSICS 90191 ELECTRICITY: POWER

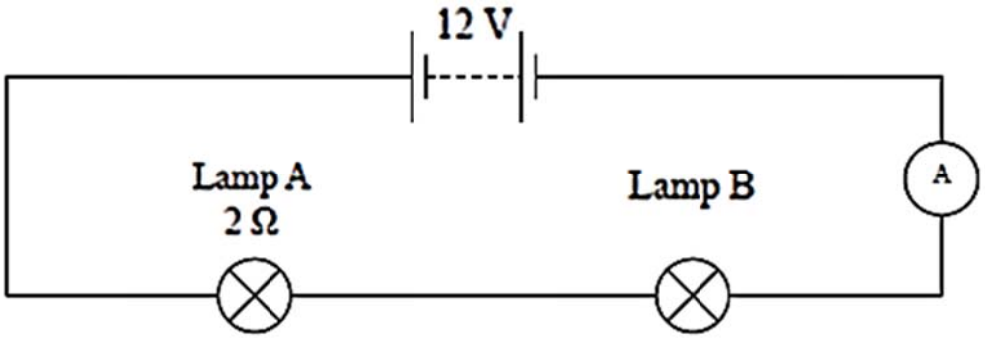
ELECTRICAL CIRCUITS (2009;1)

Study the following two circuits which contain two lamps of different resistance.



When observed, the brightness of the two lamps in each circuit is not the same. State in which circuit the 4 Ω lamp will be brightest, and justify your choice. In your answer you should explain the link between resistance, current, voltage and power output to brightness **and** compare, by calculation, the power output of the 4 Ω lamp in each circuit, giving the appropriate unit.

ELECTRICAL CIRCUITS (2008;1)

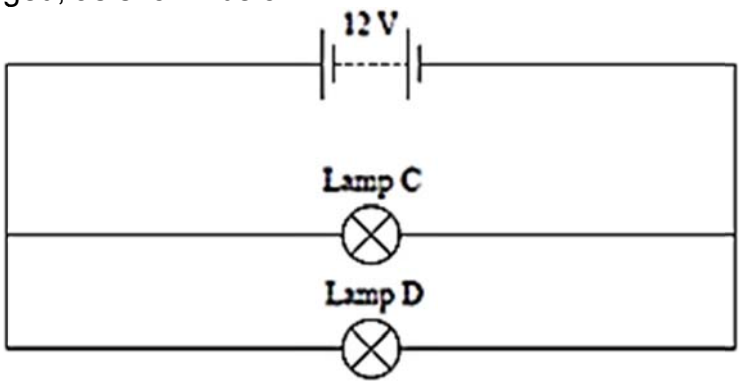


The circuit above contains two lamps which are not the same. The current was measured and found to be 2 A.

(a) Calculate the power output of lamp A in this circuit.

(b) Lamp B glows more brightly than lamp A. Discuss why lamp B is brighter than lamp A in terms of resistance, voltage, current, and power output.

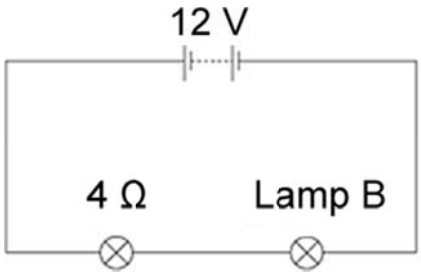
The circuit is then changed, as shown below.



(c) The power output of lamp C is 36 W in this circuit. Calculate the resistance of lamp C.

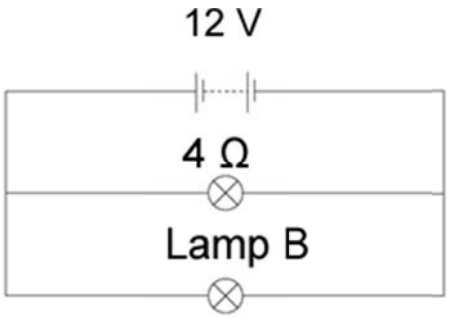
(d) If the circuit is left on for 30 seconds, calculate the amount of energy transformed into heat and light by lamp C.

ELECTRICITY (2007;3)
Study the circuit diagram below which uses a 12V battery. The two lamps are NOT identical.



(a) When an ammeter is placed in this circuit a reading of 1.2 A is recorded. The voltage across the 4 Ω lamp is 4.8 V. Calculate the power output of the 4 Ω lamp.
(b) In terms of energy, explain what the power output in (b) means.
(c) Describe how the brightness of lamp B compares with the 4 Ω lamp.

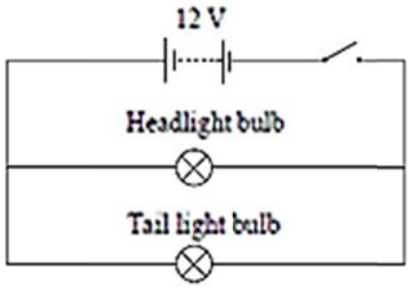
The circuit is now altered so that the same lamps are in parallel, as shown below.



(d) State which lamp will be brighter, the 4 Ω or lamp B, and discuss the reasons for this lamp being brighter. You should consider current, resistance and power output.

TEO'S MOTORBIKE LIGHTS (2006;3)

Teo has bought a second-hand motorbike. The circuit diagram below represents the lighting circuit for the motorbike.

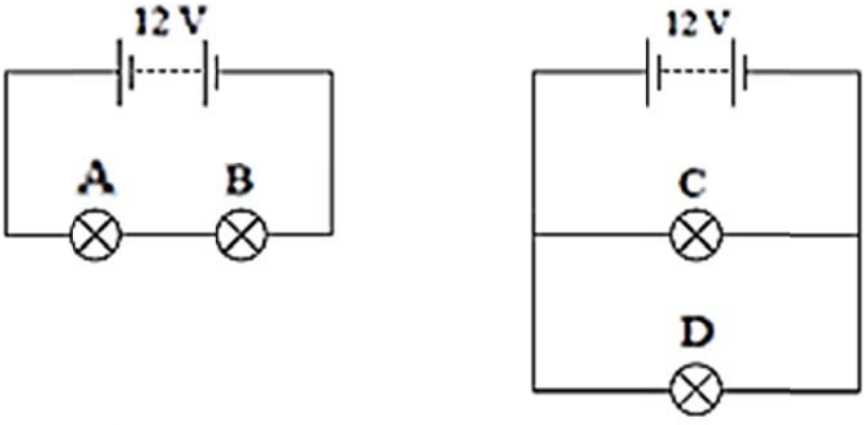


(a) A current of 0.5 A was measured through the tail light bulb. Using P = I V calculate the power output of the tail light.

Teo discovers that the headlight bulb is broken.Teo finds a spare bulb marked 12 V, 30 W, in his garage. Teo also finds a 12 V, 45 W headlight bulb. He tries both bulbs and notices that the 45 W bulb is brighter.
(b) Discuss how the higher wattage bulb would produce a greater brightness. Consider the electrical properties of the bulb as well as the effect on the circuit.
(c) Calculate the amount of energy used by the 45 W bulb when it is turned on for 120 seconds.

DC ELECTRICITY (2005;3)

Refer to the following electrical circuits. All light bulbs are identical.



Circuit A Circuit B

(a) The resistance of each bulb is 15 Ω. Calculate the power output of bulb A.
(b) The current is measured in bulb C's branch of the circuit and found to be 0.8 A. If bulb C is left on for 10 minutes, calculate the amount of energy used by the bulb in this time.

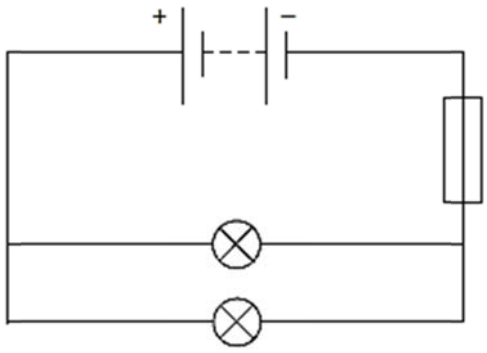
ELECTRICITY (2004;1)

Marty is the coach of the local women's cricket team. Marty decides to rewire the lights on the team's trailer. He knows that the lights need to be wired in parallel and connects them to a 12 V battery. Marty can only find two different bulbs, a 6 W bulb and a 12 W bulb. He connects these two bulbs into the trailer circuit. One shines more brightly than the other.

(a) Explain why the 12 W bulb shines more brightly than the 6 W one.
(b) Calculate the current passing through the 6 W bulb. Include an appropriate unit.

LIGHTS (2003;1)

The lighting circuit below has a power supply of 12 V. Each lamp is rated at 30 W.



Use the formula P= IV to calculate the current flowing through one of the lamps.