

# Chapter 23 Series and Parallel Circuits

Series Circuit: Only one path for current

Parallel Circuit: more than 1 path for current

[http://www.autoshop101.com/trainmodules/elec\\_circuits/circ101.html](http://www.autoshop101.com/trainmodules/elec_circuits/circ101.html)

## Series Circuit: Only one path for current

Conservation of energy:

$$V_T = V_1 + V_2 + V_3 + \dots$$

Conservation of charge:

$$I_T = I_1 = I_2 = I_3 = \dots$$

$$R_T = R_1 + R_2 + R_3 + \dots$$

A 10 volt power supply is wired to two resistors each of 50 ohms which are wired in series.

What is the voltage across each resistor?

What is the current through each resistor?

What is the total current in the circuit?

What is the total resistance of the circuit?

Page 622 #10

A series circuit is made up of a 12.0 volt battery and three resistors. The voltage across one resistor is 1.2 volts. The voltage across the second resistor is 3.33 volts. What is the voltage across the third resistor?

#8

Holiday lights often are connected in series and use special lamps that short out when the voltage across the lamp increases to the line voltage. Explain why. Also explain why these lights might blow their fuse after many bulbs have failed.

Page 623 #11

A  $22\ \Omega$  resistor and a  $33\ \Omega$  resistor are connected in series and placed across a  $120\ \text{V}$  potential difference.

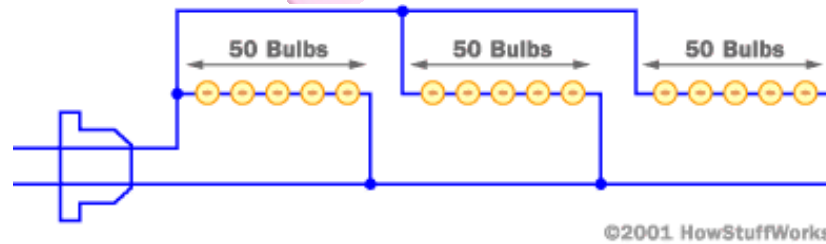
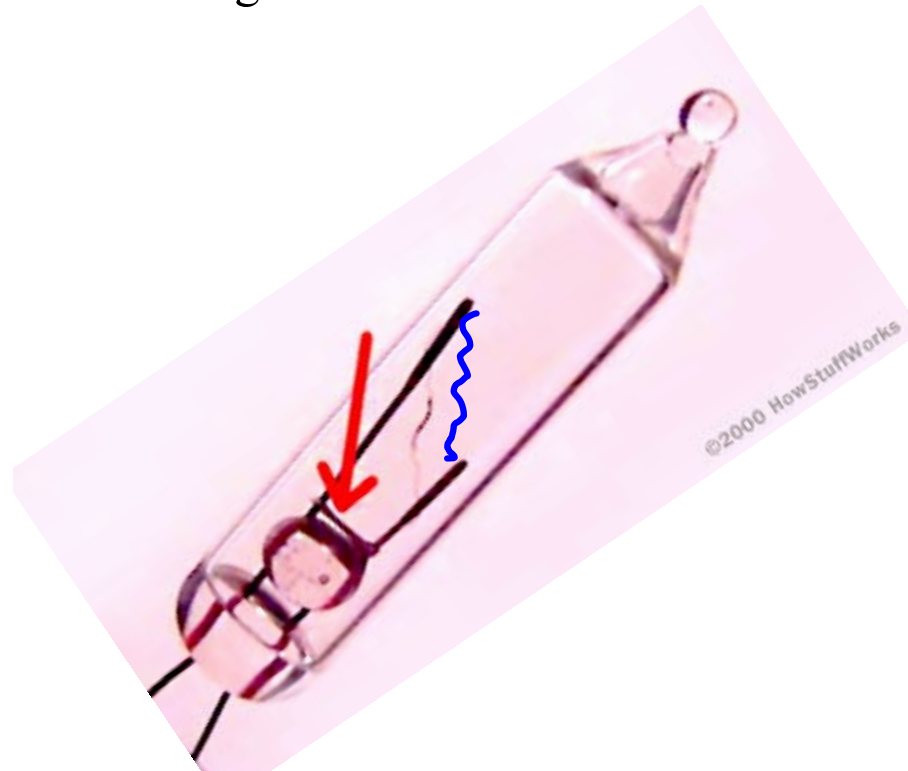
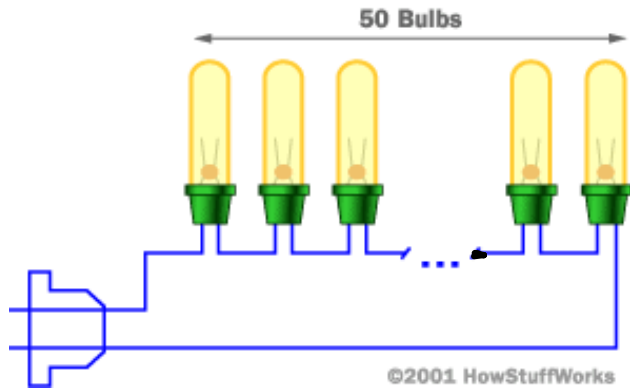
- a) What is the equivalent resistance of the circuit?
- b) What is the current in the circuit?
- c) What is the voltage drop across each resistor?
- d) What is the voltage drop across both resistors together?

Page 623 # 14

Select a resistor to be used as part of a voltage divider along with a  $1.2 \text{ k}\Omega$  resistor. The drop across the  $1.2 \text{ k}\Omega$  resistor is to be 2.2 volts when the supply is 12 V

<http://home.howstuffworks.com/christmas-lights2.htm>

### Bulbs wired in series



Parallel Circuits have more than 1 path for current

Conservation of energy

$$V_T = V_1 = V_2 = V_3 = \dots$$

Conservation of charge

$$I_T = I_1 + I_2 + I_3 + \dots$$

$$1/R_T = 1/R_1 + 1/R_2 + 1/R_3$$



Three resistors are wired in parallel to a 12.0 volt source. The resistances are  $R_1=24$  ohms,  $R_2=24$  ohms and  $R_3=12$  ohms.

Find (A) Total resistance, (B) Voltage across each bulb (C) Total current (D) Current through each bulb