

100-65

wt

A 13 16

B 4 2

C 2 1

F 1 1

## **Electricity**

**-1 coulomb =  $6.2 \times 10^{18}$  electrons**

## **Ohm's Law**

$$V = IR$$

**V:**

**voltage, potential difference, or emf** ( $\mathcal{E}$ )

**unit: volt**

$$v = j/c \quad (c = \text{coulomb})$$

**I:**

**current or amperage**

**unit: amp (ampere)  $A = c/\text{sec}$**

**conventional current: + to -**

**actual current: - to +**

**DC means direct current**

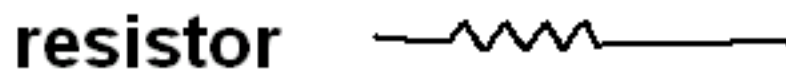
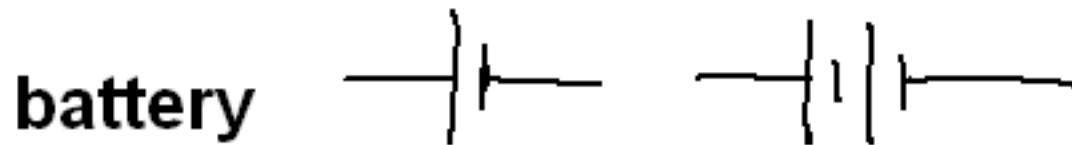
**R:**

resistance

unit: ohm  $\Omega$

So  $V = A \cdot \Omega$

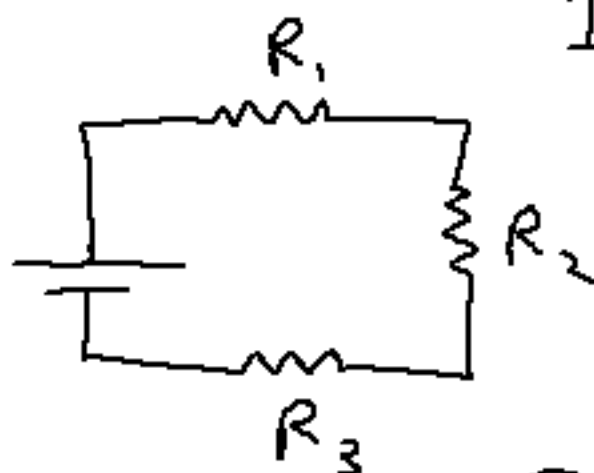
**Schematic diagram**



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**circuit - path through which charges (or current) can be conducted**  
**open vs closed**

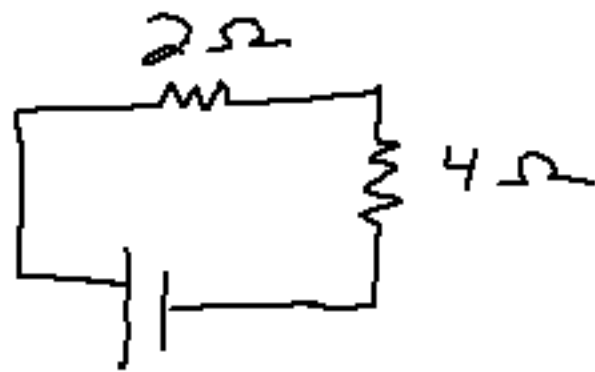
### **Series circuit**



$$I_1 = I_2 = I_3 \dots$$

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

Book:  $R_{eq}$  (equivalent resistance)



$$R_T = 6 \Omega$$

$$I = 2 A$$

$$12V$$

$$V = IR$$

$$12 = I(6)$$

$$I = 2$$

$$V_{\text{across } 4\Omega} = V = IR$$

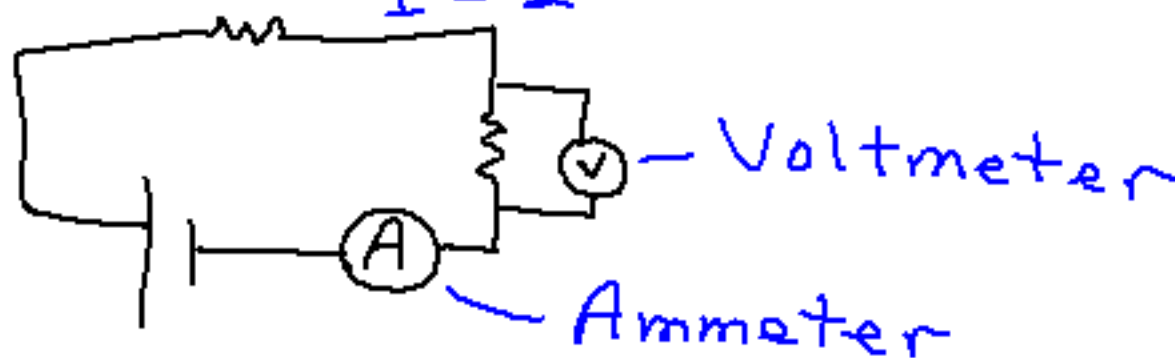
$$V = 2(4)$$

$$V = 8V$$

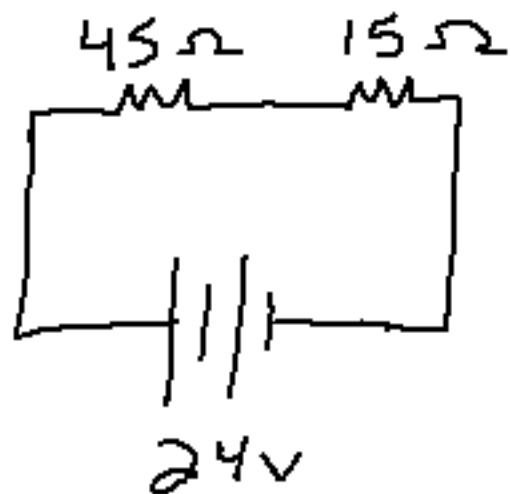
$$V_{\text{across } 2\Omega} = V = IR$$

$$V = (2)(2)$$

$$V = 4V$$



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$$R_T = 45 + 15 = 60 \Omega$$

$$I = .4 A$$

$$V \text{ across } 45 \Omega = 18 V$$

$$V \text{ across } 15 \Omega = 6 V$$

$$V = IR$$

$$24 = I 60$$

$$I = .4$$

$$V = .4(45) = 18$$

$$V = .4(15) = 6$$

# Parallel Circuit

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

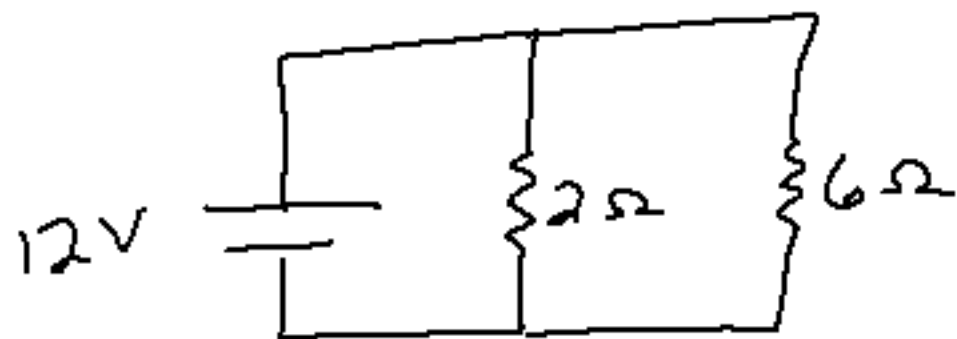
$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \dots$$

**Total R is more than the largest R is a series circuit.**

ex:  $R_1 = 3\Omega$ ,  $R_2 = 4\Omega$ ,  $R_3 = 5\Omega$   
 $R_T = 12\Omega$

**Total R is less than the smallest R is a parallel circuit!**

$R_1 = 3\Omega$ ,  $R_2 = 4\Omega$ ,  $R_3 = 5\Omega$   
 $R_T = 1.28\Omega$



$$R_T = 1.5\Omega \quad \frac{1}{R_T} = \frac{1}{2} + \frac{1}{6}$$

$$I_T = 8A$$

$$V = IR$$

$$12 = I(1.5)$$

$$I = 8$$

$$V \text{ across } 2\Omega = 12V$$

$$V \text{ across } 6\Omega = 12V$$

$$I \text{ thru } 2\Omega = 6A$$

$$I \text{ thru } 6\Omega = 2A$$

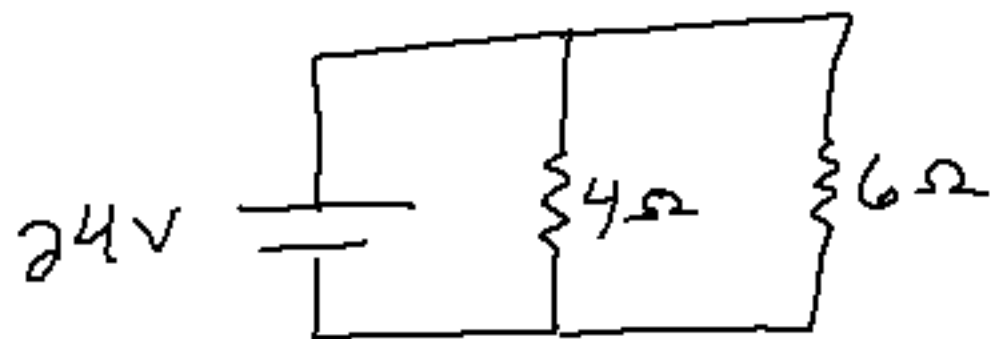
$$V = IR$$

$$12 = I \cdot 2$$

$$6 = I$$

$$12 = I \cdot 6$$

$$2 = I$$



$$R_T = 2.4 \Omega$$

$$I_T = 10 \text{ A}$$

$$V_{\text{across } 4\Omega} = 24 \text{ V}$$

$$V_{\text{across } 6\Omega} = 24 \text{ V}$$

$$I_{\text{thru } 4\Omega} = 6 \text{ A}$$

$$I_{\text{thru } 6\Omega} = 4 \text{ A}$$

$$24 = I \cdot 2.4$$

$$I = 10$$

$$24 = I \cdot 4$$

$$I = 6$$

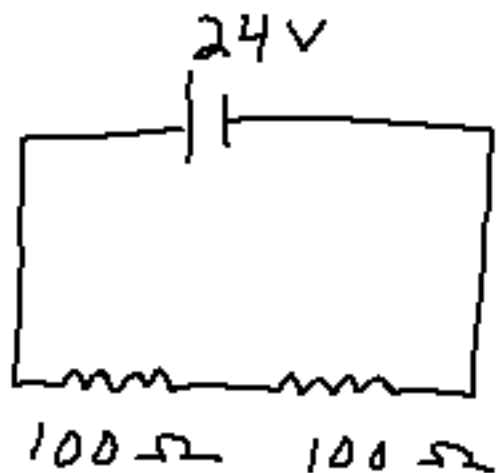
$$24 = I \cdot 6$$

$$I = 4$$

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$$V = I, R$$
$$24 = I, 100$$
$$I_1 = .24$$



$$R_T = 200\Omega$$

$$R_T = 50\Omega$$

$$I_1 = .24 A$$

$$I_2 = .24 A$$

Total

$$24 = I 50$$

$$I_T = .48$$

$$I = .12 A$$

$$24 = I 200$$

$$I = .12$$

p547 #9

$680\ \Omega$ ,  $940\ \Omega$ ,  $1200\ \Omega$

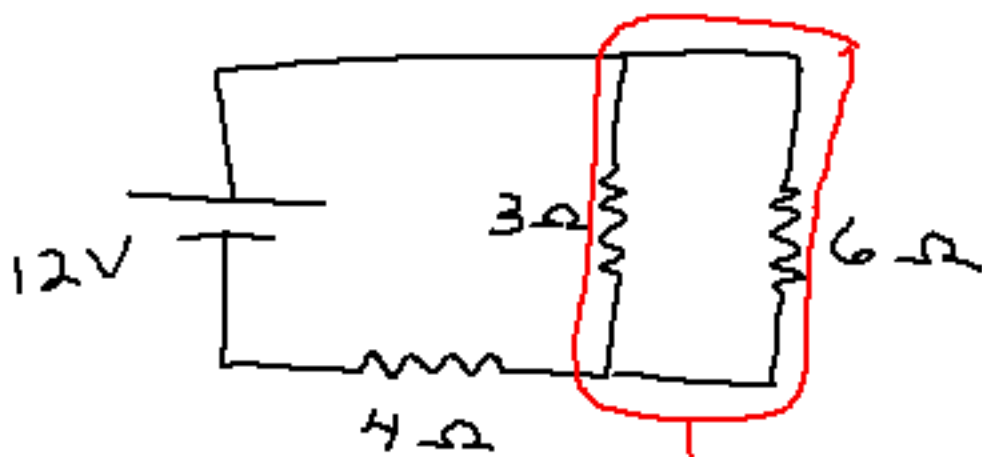
a) max R

$$\text{Series: } R_T = 680 + 940 + 1200 \\ = 2820\ \Omega$$

b) min R

$$\text{parallel: } \frac{1}{R_T} = \frac{1}{680} + \frac{1}{940} + \frac{1}{1200} \\ R_T = 297\ \Omega$$

# Combination



$$\frac{1}{R} = \frac{1}{3} + \frac{1}{6}$$

$$R = 2$$

$$R_T = 6\Omega$$

$$12 = I \cdot 6$$

$$2A = I_T$$

$$R_T = 6\Omega$$

	$I$	$V$
$4\Omega$ :	2	$V = IR$ $= (2)(4)$ $= 8V$

$3\Omega$ :	1.33A	4V
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$6\Omega$ :	.667A	4V
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$$V = IR$$

$$4 = I \cdot 3$$

$$I = 1.33A$$

$$V = IR$$

$$4 = I \cdot 6$$

$$I = .667$$

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# 5, 7, 8

have a good  
week end.