

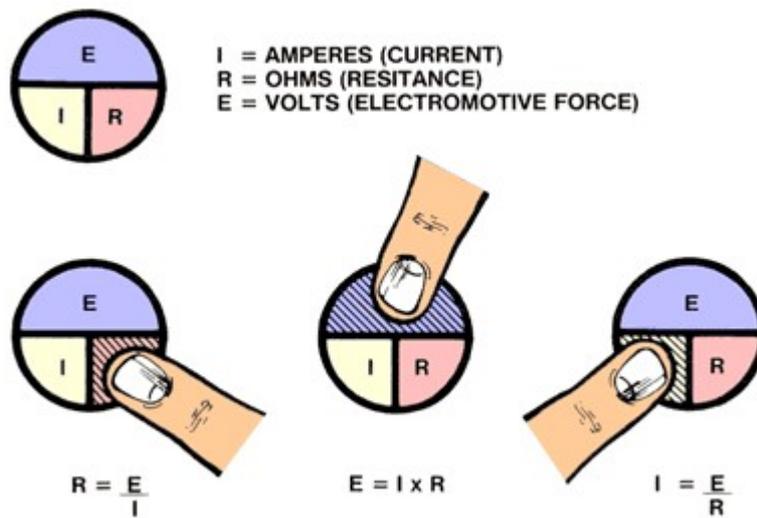
Ohm's Law

Ohm's Law relates voltage, resistance and current. Ohm's Law in three forms is given below:

Voltage	Current	Resistance
$E = R \times I$	$I = \frac{E}{R}$	$R = \frac{E}{I}$

These are all the same formula with simple algebraic manipulation. E is the voltage in volts, R is the resistance in ohms and I is the current in amperes.

For those that are not at ease with algebraic manipulation, there is a graphic form shown below called Ohm's Circle.



You draw a circle and divide it in half and the bottom half in half again. Then you label the circle as shown. To remember what symbol goes where some people use the mnemonic of “The Eagle flies over the Indian and the Rabbit.” Now suppose that you want to find the resistance given the voltage and the current. You cover over the R with your finger and see that $R = \frac{E}{I}$. You can use this approach to find all three forms of Ohm's Law.

Questions

T5D01 (B)

What formula is used to calculate current in a circuit?

- A. Current (I) equals voltage (E) multiplied by resistance (R)
- B. Current (I) equals voltage (E) divided by resistance (R)
- C. Current (I) equals voltage (E) added to resistance (R)
- D. Current (I) equals voltage (E) minus resistance (R)

Using Ohm's circle and cover over the current (I). The result is $I = \frac{E}{R}$. In words that is “Current

(I) equals voltage (E) divided by resistance (R)". B is the correct answer.

T5D02 (A)

What formula is used to calculate voltage in a circuit?

- A. Voltage (E) equals current (I) multiplied by resistance (R)
- B. Voltage (E) equals current (I) divided by resistance (R)
- C. Voltage (E) equals current (I) added to resistance (R)
- D. Voltage (E) equals current (I) minus resistance (R)

Using Ohm's circle and cover over the voltage (E). The result is $E=I \times R$. In words that is "Voltage (E) equals current (I) multiplied by resistance (R)". A is the correct answer.

T5D03 (B)

What formula is used to calculate resistance in a circuit?

- A. Resistance (R) equals voltage (E) multiplied by current (I)
- B. Resistance (R) equals voltage (E) divided by current (I)
- C. Resistance (R) equals voltage (E) added to current (I)
- D. Resistance (R) equals voltage (E) minus current (I)

Using Ohm's circle and cover over the resistance (R). The result is $R=\frac{E}{I}$. In words that is "Resistance (R) equals voltage (E) divided by current (I)". B is the correct answer.

T5D04 (B)

What is the resistance of a circuit in which a current of 3 amperes flows through a resistor connected to 90 volts?

- A. 3 ohms
- B. 30 ohms
- C. 93 ohms
- D. 270 ohms

We must identify the unknown. The unknown is the resistance in ohms. Note all answers are in ohms. Cover over the R on Ohms circle and we obtain $R=\frac{E}{I}=\frac{90}{3}=30$ ohms. Therefore B is the correct answer.

T5D05 (C)

What is the resistance in a circuit for which the applied voltage is 12 volts and the current flow is 1.5 amperes?

- A. 18 ohms
- B. 0.125 ohms
- C. 8 ohms
- D. 13.5 ohms

We must identify the unknown. The unknown is the resistance in ohms. Note all answers are in ohms. Cover over the R on Ohms circle and we obtain $R=\frac{E}{I}=\frac{12}{1.5}=8$ ohms. Therefore C is the correct answer.

T5D06 (A)

What is the resistance of a circuit that draws 4 amperes from a 12-volt source?

- A. 3 ohms
- B. 16 ohms
- C. 48 ohms
- D. 8 Ohms

We must identify the unknown. The unknown is the resistance in ohms. Note all answers are in ohms. Cover over the R on Ohms circle and we obtain $R = \frac{E}{I} = \frac{12}{4} = 3$ ohms. Therefore A is the correct answer.

T5D07 (D)

What is the current flow in a circuit with an applied voltage of 120 volts and a resistance of 80 ohms?

- A. 9600 amperes
- B. 200 amperes
- C. 0.667 amperes
- D. 1.5 amperes

We must identify the unknown. The unknown is the current in amperes. Note all answers are in amperes. Cover over the I on Ohms circle and we obtain $I = \frac{E}{R} = \frac{120}{80} = 1.5$ amperes. Therefore D is the correct answer.

T5D08 (C)

What is the current flowing through a 100-ohm resistor connected across 200 volts?

- A. 20,000 amperes
- B. 0.5 amperes
- C. 2 amperes
- D. 100 amperes

We must identify the unknown. The unknown is the current in amperes. Note all answers are in amperes. Cover over the I on Ohms circle and we obtain $I = \frac{E}{R} = \frac{200}{100} = 2$ amperes. Therefore C is the correct answer.

T5D09 (C)

What is the current flowing through a 24-ohm resistor connected across 240 volts?

- A. 24,000 amperes
- B. 0.1 amperes
- C. 10 amperes
- D. 216 amperes

We must identify the unknown. The unknown is the current in amperes. Note all answers are in amperes. Cover over the I on Ohms circle and we obtain $I = \frac{E}{R} = \frac{240}{24} = 10$ amperes. Therefore

C is the correct answer.

T5D10 (A)

What is the voltage across a 2-ohm resistor if a current of 0.5 amperes flows through it?

- A. 1 volt
- B. 0.25 volts
- C. 2.5 volts
- D. 1.5 volts

We must identify the unknown. The unknown is the voltage in volts. Note all answers are in volts. Cover over the E on Ohms circle and we obtain $E = I \times R = 0.5 \times 2 = 1$ volt. Therefore A is the correct answer.

T5D11 (B)

What is the voltage across a 10-ohm resistor if a current of 1 ampere flows through it?

- A. 1 volt
- B. 10 volts
- C. 11 volts
- D. 9 volts

We must identify the unknown. The unknown is the voltage in volts. Note all answers are in volts. Cover over the E on Ohms circle and we obtain $E = I \times R = 1 \times 10 = 10$ volts. Therefore B is the correct answer.

T5D12 (D)

What is the voltage across a 10-ohm resistor if a current of 2 amperes flows through it?

- A. 8 volts
- B. 0.2 volts
- C. 12 volts
- D. 20 volts

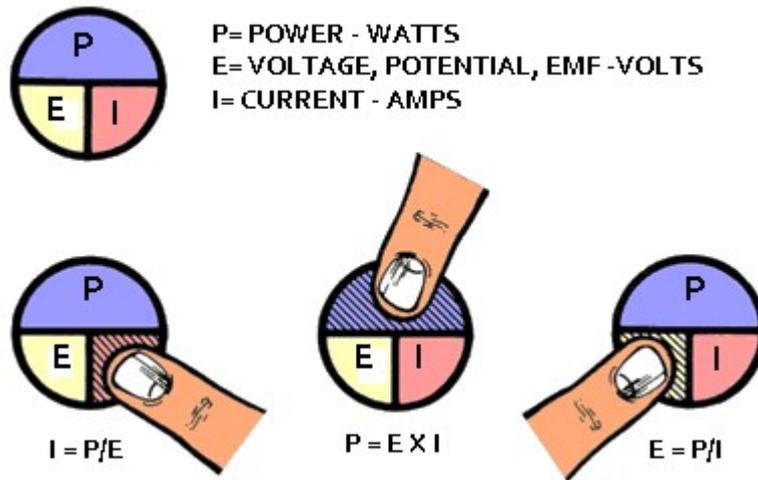
We must identify the unknown. The unknown is the voltage in volts. Note all answers are in volts. Cover over the E on Ohms circle and we obtain $E = I \times R = 2 \times 10 = 20$ volts. Therefore D is the correct answer.

Power Law

Power Law allows one to relate power in watts to current in amps and voltage in volts. That relationship is: $P = I \times E$. Again

Power	Voltage	Resistance
$P = E \times I$	$E = \frac{P}{I}$	$I = \frac{P}{E}$

In a manner similar to the Ohm's circle there is a Power or Joule's circle as shown below:



The mnemonic that people use is "PIE is round.". Label the top of the half circle with P and the bottom quarters circles with I and E. Again cover up the unknown with your finger and the rest of the circle reveals the equation top use.

Questions

T5C08 (A)

What is the formula used to calculate electrical power in a DC circuit?

- A. Power (P) equals voltage (E) multiplied by current (I)
- B. Power (P) equals voltage (E) divided by current (I)
- C. Power (P) equals voltage (E) minus current (I)
- D. Power (P) equals voltage (E) plus current (I)

Using the Power of Joule's circle cover over the P and we see $P = E \times I$. In words that is "Power (P) equals voltage (E) multiplied by current (I)". The answer is A.

T5C09 (A)

How much power is being used in a circuit when the applied voltage is 13.8 volts DC and the current is 10 amperes?

- A. 138 watts
- B. 0.7 watts
- C. 23.8 watts
- D. 3.8 watts

We must identify the unknown which is the power in watts. Note that all possible answers are in watts. Using the Power of Joule's circle cover over the P and we see $P = E \times I = 13.8 \times 10 = 138$ watts. The correct answer is A.

T5C10 (B)

How much power is being used in a circuit when the applied voltage is 12 volts DC and the current is 2.5 amperes?

- A. 4.8 watts
- B. 30 watts
- C. 14.5 watts
- D. 0.208 watts

We must identify the unknown which is the power in watts. Note that all possible answers are in watts. Using the Power of Joule's circle cover over the P and we see $P = E \times I = 12 \times 2.5 = 30$ watts. The correct answer is B.

T5C11 (B)

How many amperes are flowing in a circuit when the applied voltage is 12 volts DC and the load is 120 watts?

- A. 0.1 amperes
- B. 10 amperes
- C. 12 amperes
- D. 132 amperes

We must identify the unknown which is the current in amperes. Note that all possible answers are in amperes. Using the Power of Joule's circle cover over the I and we see $I = \frac{P}{E} = 120 \div 12 = 10$ amperes. The correct answer is B.