SOLN

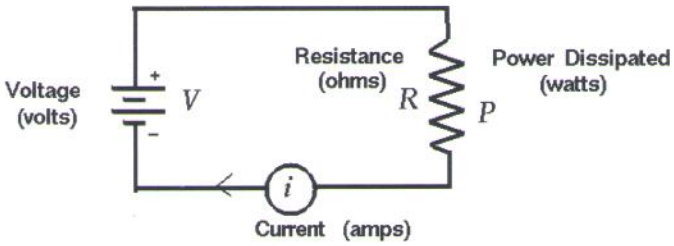
Linear Equation Applications

I. Ohm's Law $V = I \times R$ or $E = I \times R$

where: V= Voltage (volts) = E

I=Current (amps)

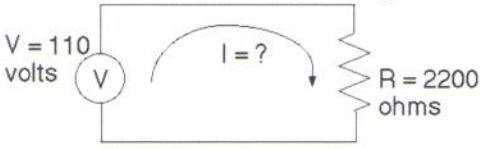
R=Resistance (ohms)



Electrical circuits are used throughout aerospace engineering, from flight control systems, to cockpit instrumentation, to engine control systems, to wind tunnel instrumentation and operation.

The most basic circuit involves a single resistor and a source of electric potential or voltage. Electrons flow through the circuit producing a current of electricity. The resistance, voltage, and current are related to one another by Ohm's law, as shown in the figure

1. A 110 volt wall outlet supplies power to a strobe light with a resistance of 2200 ohms. How much current is flowing through the strobe light? Include units in your answer.



$V = I \cdot R$

$\frac{110 \text{ volt}}{2200 \text{ ohms}} = \frac{I \cdot 2200 \text{ ohms}}{2200 \text{ ohms}}$ $I = .05$ amps

2. A nine volt battery supplies power to a cordless curling iron with a resistance of 18 ohms. How much current is flowing through the curling iron? Include units.

$V = I \cdot R$

$9 \text{ volt} = I(18\,\Omega)$

$I = \frac{9 \text{ volt}}{18\,\Omega} = 0.5$ amps

II. Flow Rate $V = Qt$

where V = volume [gallons]

Q = flow rate [gallons/min]

t = time [minutes]

3. It takes 3 minutes to fill a 5 gallon bucket. What is the flow rate in gallons/min (gpm)? Round answer to the nearest hundredth.

$V = Q \cdot t$

$5 \text{ gal} = Q(3 \text{ min})$

$Q = \frac{5 \text{ gal}}{3 \text{ min}} = 1.67 \text{ gal/min}$

Source http://www.grc.nasa.gov/WWW/k-12/airplane/ohms.html

III. Density $m = \rho V$

Where m = mass [lb]

ρ = density [lb/gallon]

V = volume [gallons]

4. A 0.5 gallon liquid sample has a mass of 4 pounds. What is its density? Round to the nearest lb/gal.

$m = \rho \cdot V$

$\frac{4\,lb}{0.5\,gal} = \frac{\rho \cdot (0.5\,gal)}{0.5\,gal}$

$16\ lb/gal = \rho$

Source http://www.grc.nasa.gov/WWW/k-12/airplane/ohms.html