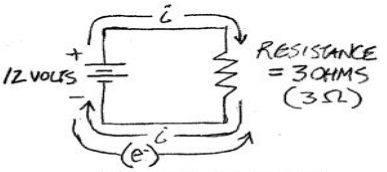
CR2 Q: IF YOU DOUBLE THE BATTERY VOLTAGE IN THE CIRCUIT BELOW WHAT EFFECT WILL THIS HAVE ON THE CURRENT? WHAT IF YOU DOUBLE THE RESISTANCE INSTEAD?

HW4-7

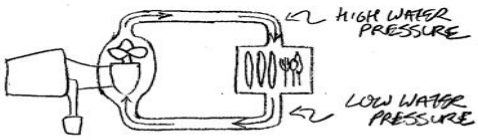
AGENDA

HOMEMADE DISHWASHER
CURRENT
RESISTANCE
OHM'S LAW



1 COULOMB OF CHARGE
1 AMP (1 COULOMB/SEC)
BATTERY
VOLTAGE
WIRE

RESISTANCE IMPEDES CURRENT FLOW RELEASING ENERGY



1 LITER OF WATER
1 LITER/SEC
PUMP
WATER PRESSURE (HEIGHT)
PIPE

(LIKE DISHES IMPEDE WATER FLOW)

RESISTANCE DEPENDS ON...
- LENGTH OF WIRE – LONGER ⇒ MORE RESISTANCE
- THICKNESS OF WIRE – THIN ⇒ MORE RESISTANCE (LIKE PINCHING A HOSE)
- WHAT WIRE IS MADE OF – GOLD ⇒ LOW RESISTANCE TUNGSTEN ⇒ HIGH RESISTANCE

(AQ) DOUBLING VOLTAGE ⇒ DOUBLES CURRENT
DOUBLING RESISTANCE ⇒ CUTS CURRENT IN HALF

GEORGE OHM'S LAW (1789-1854):

(ELECTRIC POTENTIAL) = (CURRENT)(RESISTANCE) $V = iR$ $1\,\text{VOLT} = (1\,\text{AMP})(1\,\text{OHM})$

$R = \frac{V}{i}$ $1\,\text{OHM}(1\Omega) \equiv \frac{1\,\text{VOLT}}{1\,\text{AMP}}$

$i = \frac{V}{R}$ $1\,\text{AMP} = \frac{1\,\text{VOLT}}{1\,\text{OHM}}$

(EX) HOW MUCH CURRENT IS FLOWING THROUGH THE BATTERY IN THE (AQ)?

$V = iR$ $i = \frac{V}{R} = \left(\frac{12\,\text{VOLTS}}{3\,\Omega}\right)\left(\frac{(1\,\text{AMP})(1\,\Omega)}{1\,\text{VOLT}}\right) = \boxed{4\,\text{AMPS}}$

IF THE RESISTOR IS REPLACED WITH A LIGHTBULB AND THE CURRENT BECOMES 250 mA (MILLIAMPS) WHAT IS THE LIGHTBULB'S RESISTANCE?

$V = iR$ $R = \frac{V}{i} = \frac{12\,\text{VOLTS}}{250\,\text{mA}}\left(\frac{1000\,\text{mA}}{1\,\text{AMP}}\right)\left(\frac{(1\,\text{AMP})(1\,\Omega)}{1\,\text{VOLT}}\right) = \boxed{48\,\Omega}$