OHM'S LAW

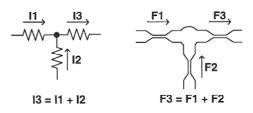# $V = IR$

JUST REMEMBER: MORE **VOLTAGE** = MORE **CURRENT**. THINK OF THE FLUID ANALOGY. IF YOU INCREASE THE PRESSURE YOU WILL HAVE MORE LIQUID FLOWING. NO PRESSURE = NO FLOW. INCREASING ELECTRICAL RESISTANCE IS SIMILAR TO RESTRICTING FLOW WITH A SMALLER PIPE: THERE WILL BE LESS FLOW.

THE CURRENT WILL FLOW FROM A HIGH VOLTAGE TO A LOW VOLTAGE JUST AS A FLUID WILL FLOW FROM A HIGH PRESSURE TO A LOW PRESSURE.
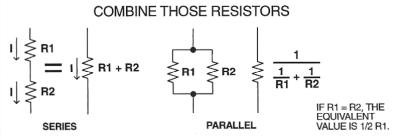
IT ALL ADDS UP.

WHENEVER YOU SEE ADJACENT DEVICES JUST ADD UP THE VOLTAGES ACROSS EACH PART. IF THE DEVICES ARE IN A LOOP SO YOU FINISH WERE YOU STARTED, ALL THE VOLTAGES SHOULD ADD UP TO 0.

$V4 = V1 + V2 + V3$ $P4 = P1 + P2 + P3$ $-V4 + V1 + V2 + V3 = 0$

WHAT GOES IN MUST COME OUT.

$I3 = I1 + I2$ $F3 = F1 + F2$

WHENEVER YOU SEE A NODE (2 OR MORE DEVICES CONNECTED TOGETHER) YOU CAN DERIVE AN EQUATION TO RELATE THE CURRENTS OR FLOWS.

COMBINE THOSE RESISTORS

$I \downarrow R1$, $I \downarrow R2$ = $I \downarrow R1 + R2$ **SERIES**

$R1 \parallel R2$ = $\dfrac{1}{\dfrac{1}{R1} + \dfrac{1}{R2}}$ **PARALLEL**

IF $R1 = R2$, THE EQUIVALENT VALUE IS $\frac{1}{2} R1$.

BECAUSE IT ALL ADDS UP AND WHAT GOES IN MUST COME OUT CICUIT EVALUATION CAN BE SIMPLIFIED BY IDENTIFYING HOW COMPONENTS CAN BE GROUPED. **SERIES** RESISTORS ADD UP **PARALLEL** RESISTORS ARE COMBINED AS RECIPROCALS.
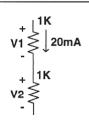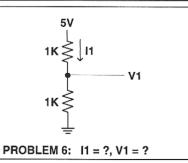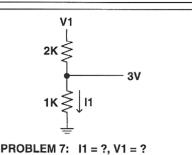
WHEN EVALUATING CIRCUITS, TRY TO SOLVE THE PROBLEM STEP BY STEP. TRY TO DETERMINE VALUES THAT ARE OBVIOUS WITH **OHM'S LAW** ($V=IR$). THEN TRY GROUPING COMPONENTS AND REAPPLYING OHM'S LAW. YOU SHOULD BE ABLE TO PIECE TOGETHER THE BASIC RELATIONSHIPS TO SOLVE THE PROBLEM OR TO DERIVE AN EQUATION RELATING MULTIPLE VARIABLES.

BELOW ARE SOME PROBLEMS THAT DEMONSTRATE THESE RULES. FOR EACH CIRCUIT, DETERMINE THE UNKNOWN VALUES IN THE ORDER LISTED. START WITH PROBLEM 1 AND PROCEED IN ORDER.

PROBLEM 1: V1 = ?

PROBLEM 2: V1 = ?

PROBLEM 3: I1 = ?

PROBLEM 4: I1 = ?, I2 = ?

PROBLEM 5: V1 = ?, V2 = ?

PROBLEM 6: I1 = ?, V1 = ?

PROBLEM 7: I1 = ?, V1 = ?

PROBLEM 8: I1 = ?, V1 = ?, I2 = ?

PROBLEM 9: I1 = ?, V1 = ?

PROBLEM 10: I1 = ?, V1 = ?, I2 = ?, I3 = ?, V2 = ?, V3 = ?
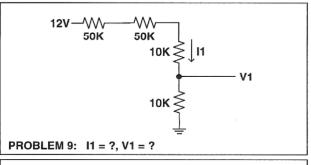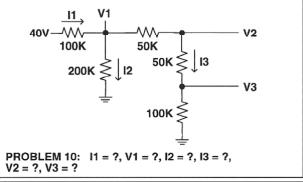
REMEMBER AND APPLY THE BASICS TO PROBLEMS YOU ENCOUNTER. OFTEN CIRCUITS MAY GET CONFUSING IF ONE DOESN'T BREAK IT DOWN INTO ITS COMPONENTS AND DOESN'T IDENTIFY THESE BASIC PRINCIPLES.

1: V1=20V   2: V1=4V   3: I1=-4mA   4: I1=-4mA, I2=1mA   5: V1=20V, V2=20V   6: I1=2.5mA, V1=2.5V   7: I1=3mA, V1=9V   8: I1=2mA, V1=4V, I2=1mA

9: I1=0.1mA, V1=1V   10: I1=0.2mA, V1=20V, I2=0.1mA, I3=0.1mA, V2=15V, V3=10V