V = voltage (units: volts, V) I = current (units: amps, A) R = resistance (units: ohms, Ω)

$$V = IR$$

Physics
Series & Parallel Circuits – Practice Problems

Name KEY
Date _____

Series Circuit Practice Problems

Remember…. 1) **Current is the Same** ($I_{total} = I_1 = I_2 = I_3$)
2) **Resistance is Added** ($R_{total} = R_1 + R_2 + R_3$)
3) voltage is Added $V_T = V_1 + V_2 + V_3$

1. A 47.0-Ω resistor and a 82.0-Ω resistor are connected in series and placed across a 45.0-V battery.
   a) What is the equivalent resistance of the circuit? R adds in series

$R_T = 47 + 82$
$R_T = 129\ \Omega$

Power → $P_1 = 5.72$ W
$P_2 = 9.99$ W
$P_T = 15.71$ W

   b) What is the value of the current in the circuit? current is same

$V = IR$
$45V = I \cdot 129\Omega$
$I = 0.349$ A

   c) What is the potential drop (**voltage**) across the 47.0-Ω resistor? across 82Ω current is same

$V_{47\Omega} = I R_{47\Omega}$
$V = 0.349 \cdot 47\Omega$
$V @ 47.0\Omega = 16.4$ V

$V = 0.349 \cdot 82\Omega$
$V = 28.6$ V

Drop = total V put in
45-V

2. Three resistors of 2 Ω, 5 Ω and 3 Ω are connected in series across a 5-V battery.
   a) What is the equivalent resistance of the circuit? R adds in series

$R_T = 2 + 5 + 3$
$R_T = 10\Omega$

Power → $P_1 = 0.5$ W
$P_2 = 0.75$ W
$P_3 = 1.25$ W
$P_T = 2.5$ W
flip

   b) What is the current through the resistors? current is same

$V = IR$
$5V = I \cdot 10\Omega$
$I = 0.5$ A

   c) What is the voltage drop (potential drop) across each resistor?

2Ω: $V = 0.5 \cdot 2\Omega = 1$ V
5Ω: $V = 0.5 \cdot 5\Omega = 2.5$ V
3Ω: $V = 3\Omega \cdot 0.5 = 1.5$ V

3. A 20.0-Ω resistor and a 30.0-Ω resistor are connected in series and placed across a 120-V potential difference.
   a) What is the current in the circuit?

$R_T = 20 + 30 = 50\Omega$
$120V = I \cdot 50\Omega$
$I = 2.4$ A

Power → $P_1 = 115.2$ W
$P_2 = 172.8$ W
$P_T = 288$ W

   b) What is the voltage drop (potential drop) across each resistor

20Ω: $V = 2.4\text{A} \cdot 20\Omega = 48$ V
30Ω: $V = 2.4 \cdot 30\Omega = 72$ V

Data tables & questions on the following page