Physics Name:_____

Series

$R_{eq} = R_1 + R_2 + R_3$

$V_{tot} = V_1 + V_2 + V_3$

$I_{tot} = I_1 = I_2 = I_3$

Both

$P = IV \qquad I_{tot} = \frac{V_{tot}}{R_{tot}}$

$V = IR \qquad I = \frac{Q}{t}$

$P_{tot} = P_1 + P_2 + P_3$

Parallel

$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

$I_{tot} = I_1 + I_2 + I_3$

$V_{tot} = V_1 = V_2 = V_3$

Part I. Ohm's Law/Power Review

For each table of values listed, determine the unknowns using Ohm's Law and Power Equation.

Voltage	Current	Resistance	Power
10 V	2A		
		25 Ω	100 W
	100 mA	50 kΩ	
200 mV		180 Ω	
	250 μA		200 mW
20 V			150 mW
	3A		1 mW
12 V	15 A		
		200 kΩ	300 mW

Remember

(kilo) k = $x10^3$

(milli) m = $x10^{-3}$

(micro) μ = $x10^{-6}$

1) As voltage increases with resistance held constant, current _____

2) As Current increases with voltage held constant, power _____

3) As Power increases with voltage held constant, resistance _____

4) As Resistance decreases with current held constant, voltage _____

5) As current increases with resistance held constant, power _____

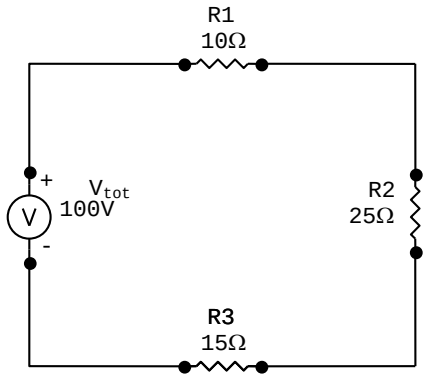
6) As power increases, heat dissipation _____

Part II: Series vs. Parallel Circuits

Series	Parallel
7) The most important identifying feature of a series circuit is that:	11) The most important identifying feature of a parallel circuit is that:
8) The rule for current in a series circuit is that:	12) The rule for current in a parallel circuit is that:
9) The rule for voltage in a series circuit is that:	13) The rule for voltage in a parallel circuit is that:
10) The rule for resistance in a series circuit is that:	14) The rule for resistance in a parallel circuit is that:

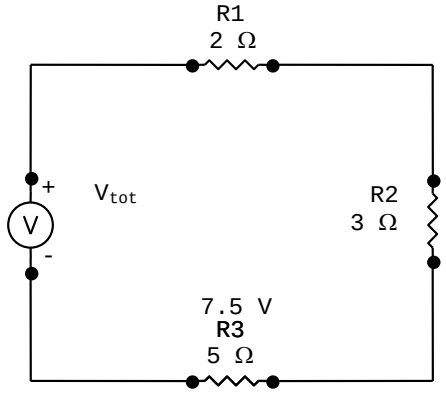
Part III: Series Circuit Problems (kilo) k = $x10^3$ (milli) m = $x10^{-3}$ (micro) μ = $x10^{-6}$

15)

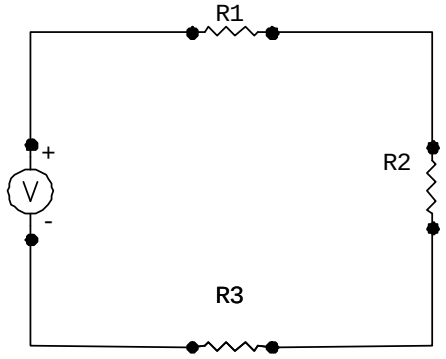


	V	I	R	P
R1			10 Ω	
R2			25 Ω	
R3			15 Ω	
TOTAL	100 V			

16)



	V	I	R	P
R1			2 Ω	
R2			3 Ω	
R3	7.5 V		5 Ω	
TOTAL				



For each of the values requested, indicate if the value will *INCREASE*, *DECREASE*, or *REMAIN THE SAME*.

HINT: Some of these are easy, some of them are very tricky. Substituting values into the circuit may aid you in solving the problems!

You may use these symbols to indicate your answer:

↑ **INCREASE**

↓ **DECREASE**

↔ **REMAIN THE SAME**

17) If the value of R_1 *increases*, what will the following do?

I_{tot}	V_{R1}	V_{R2}	V_{tot}

18) If the power supply voltage *increases*, what will the following do?

I_{tot}	V_{R1}	V_{R2}	R_3

19) If R_3 *opens*, what will the following do?

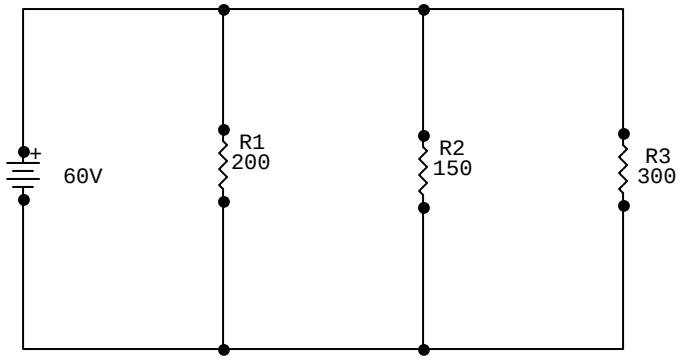
V_{tot}	I_{tot}	R_{tot}	V_{R2}

20) If R_2 *shorts*, what will the following do?

V_{tot}	I_{tot}	R_{tot}	V_{R2}

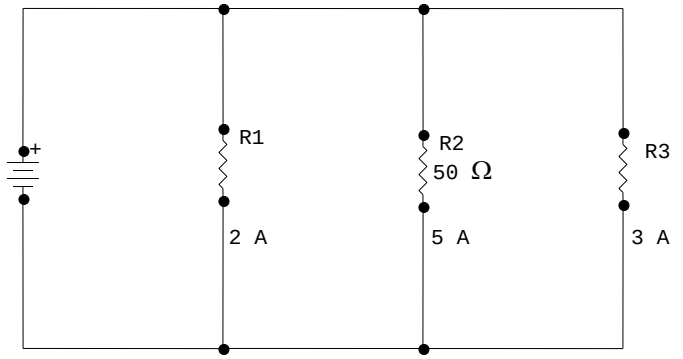
Part IV: Parallel Circuit Problems (kilo) k = $x10^3$ (milli) m = $x10^{-3}$ (micro) μ = $x10^{-6}$

21)



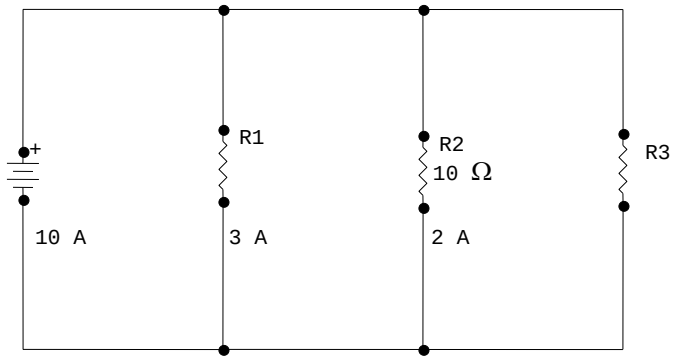
	V	I	R	P
R1			200 Ω	
R2			150 Ω	
R3			300 Ω	
TOTAL	60 V			

22)

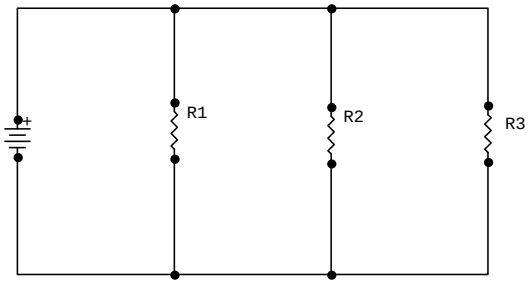


	V	I	R	P
R1		2 A		
R2		5 A	50 Ω	
R3		3 A		
TOTAL				

23)



	V	I	R	P
R1		3 A		
R2		2 A	10 Ω	
R3				
TOTAL		10 A		



For each of the values requested, indicate if the value will *INCREASE*, *DECREASE*, or *REMAIN THE SAME*.

HINT: Some of these are easy, some of them are very tricky. Substituting values into the circuit may aid you in solving the problems!

You may use these symbols to indicate your answer:

↑ **INCREASE**

↓ **DECREASE**

↔ **REMAIN THE SAME**

24) If the value of R_1 *increases*, what will the following do?

I_{tot}	V_{R1}	V_{R2}	V_t

25) If the power supply voltage *increases*, what will the following do?

I_{tot}	V_{R1}	V_{R2}	R_3

26) If R_3 *opens*, what will the following do?

V_{tot}	I_{tot}	R_{tot}	V_{R2}

27) If R_2 *shorts*, what will the following do?

V_{tot}	I_{tot}	R_{tot}	V_{R2}

Part V: Series & Parallel Circuit Problems

Instructions: 1) Draw the schematic diagram. 2) Solve. 3) Show your work.

28) Calculate the total resistance for a 650 ohm, a 350 ohm, and a 1000 ohm resistor connected in series.

29) Calculate the total resistance for ten 120 ohm resistors in series.

30) A string of fifty 15 ohm Christmas tree lights are connected in series. One burns out, they all burn out. Calculate the total resistance.

31) Calculate the total resistance for two 180 ohm resistors connected in parallel.

32) A 10 ohm, 20 ohm, and 100 ohm resistors are connected in parallel. Calculate the total resistance.

33) A string of fifty 15 ohm Christmas tree light are connected in parallel. One burns out, the rest will stay lit. Calculate the total resistance.

34) Two 100 ohm resistors are connected in series and they are connected to a 1.5 V battery. What is the total current flowing in the circuit?

35) Those fifty 15 ohm, series connected Christmas tree lights, calculate the total current in the circuit if they are connected to a 115 V source.

36) Those fifty 15 ohm parallel connected Christmas tree lights. Calculate the total current in the circuit if they are connected to a 115 V source.

37) Three 1.2 ohm lamps are connected in series and connected to a 3 volt battery. Calculate the total current in the circuit.

38) Three identical lamps are connected in series to each other and then connected to a 6 V battery. What is the voltage drop across each lamp?