Title: **More Series Circuits** Worksheet: 6

Course: Electrical Applications Unit: Electrical Theory CLO: 3

Name ANSWER KEY Grade \_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall calculate power, current, resistance and voltage for each resistor in a series circuit.
2. Student shall distinguish the principle that a series circuit only contains one current.
3. Student shall formulate that a series circuit is a voltage divider.

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Worksheet. Grading shall be based on an answer key.

**Circuit**

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| --- | --- |
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**Instructions**

Using the Ohms Wheel, solve for total current, voltage drop and power dissipated by each resistor. All answers will be in engineering units M, k, m, and μ. Display at least 1 whole number and not more than 3 whole numbers to the left of the decimal, and round off to 3 decimal places to the right of the decimal.

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| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 13.75W | 125mA | 880Ω | 110V |
| R2 | 187.5mW | 125mA | 12Ω | 1.5V |
| Total | 13.938W | 125mA | 892Ω | 111.5V |

**Circuit**

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Complete the table below for the parameters listed within the table.

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| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 17.444mW | 8.805mA | 225Ω | 1.981V |
| R2 | 174.439mW | 8.805mA | 2.25kΩ | 19.811V |
| R3 | 116.293mW | 8.805mA | 1.5kΩ | 13.208V |
| Total | 308.176mW | 8.805mA | 3.975kΩ | 35V |

Complete the table below for the parameters listed within the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 66.5W | 55mA | 22kΩ | 1.210kV |
| R2 | 27.225W | 55mA | 9kΩ | 495V |
| R3 | 196.625W | 55mA | 65kΩ | 3.575kV |
| Total | 290.4W | 55mA | 96kΩ | 5.280kV |

Complete the table below for the parameters listed within the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 1.308W | 22mA | 2.7kΩ | 59.4V |
| R2 | 1.936W | 22mA | 4kΩ | 88V |
| R3 | 7.986W | 22mA | 16.5kΩ | 363V |
| Total | 11.229W | 22mA | 23.2kΩ | 510.4V |

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Complete the table below for the parameters listed within the table.

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| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 185mW | 5.073mA | 7.189kΩ | 36.468V |
| R2 | 175mW | 5.073mA | 6.8kΩ | 34.496V |
| R3 | 75mW | 5.073mA | 2.914kΩ | 14.784V |
| Total | 435mW | 5.073mA | 16.903kΩ | 85.748V |

Complete the table below for the parameters listed within the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 292.118mW | 18.257mA | 876.356Ω | 16V |
| R2 | 250mW | 18.257mA | 750Ω | 13.693V |
| R3 | 547.723mW | 18.257mA | 1.643kΩ | 30V |
| Total | 1.090W | 18.257mA | 3.270kΩ | 59.693V |

Complete the table below for the parameters listed within the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 40mW | 20mA | 100Ω | 2V |
| R2 | 80mW | 20mA | 200Ω | 4V |
| R3 | 120mW | 20mA | 300Ω | 6V |
| Total | 240mW | 20mA | 600Ω | 12V |

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1. List the characteristics of a series circuit.

*One current through all components. It’s a voltage divider.*

1. Define an “open” and its effects on a series circuit.

*A “break” in the circuit that causes the circuit current to go to 0. Measuring voltage across the “break” will result in source voltage value.*

1. Define a “shorted component” and its effects on a series in a circuit.

*Gives a current path that has very little resistance around a component.*

Referring to the schematic above, if R1 was increased, what would happen to the following items within the circuit:

1. Total circuit current?
   1. Go up
   2. Go down
   3. Stay the same
2. Total circuit resistance?
   1. Go up
   2. Go down
   3. Stay the same
3. Voltage drop across R2?
   1. Go up
   2. Go down
   3. Stay the same

Referring to the schematic above, if the value of R3 was decreased, what would happen to the following items within the circuit:

1. Total circuit current?
   1. Go up
   2. Go down
   3. Stay the same
2. Voltage drop across R1?
   1. Go up
   2. Go down
   3. Stay the same