Title: **Kirchhoff's Current Law** Worksheet: 9

Course: Electrical Applications Unit: Electrical Theory CLO: 3

Name ANSWER KEY Grade 70 pts 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.

**Theory**

Kirchhoff’s current law (KCL) states that the sum of the currents entering a node (point) must equal the sum of the currents leaving a node (point). Kirchhoff’s current law can be stated in the following equation.

Therefore, in the circuit below, the sum of the currents going into node “A” must equal the sum of the currents coming out of that same node. Below is the formula for both node “A” and   
node “B”.

Outs

Ins

**Circuit**

|  |  |
| --- | --- |
|  |  |

**Instructions**

Using Kirchhoff’s current law and the Ohms Wheel, determine the current values listed below.

**Circuit**

|  |  |
| --- | --- |
|  |  |

Where;

Complete the table below for the parameters listed above.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 |  | 45.455mA | 330Ω | 15V |
| R2 |  | 45.455mA | 330Ω | 15V |
| Total |  | 90.909mA | 165 Ω | 15V |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | **Node A** | Ins | Outs | | Current 1 | 90.909mA | 45.455mA | | Current 2 |  | 45.455mA | | Total | 90.909mA | 90.909mA | | |  |  |  | | --- | --- | --- | | **Node B** | Ins | Outs | | Current 1 | 45.455mA | 90.909mA | | Current 2 | 45.455mA |  | | Total | 90.909mA | 90.909mA | |

**Circuit**



Where;

Complete the table below for the parameters listed above.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 |  | 100mA | 120Ω | 12V |
| R2 |  | 46.154mA | 260Ω | 12V |
| R3 |  | 36.364mA | 330Ω | 12V |
| Total |  | 182.517mA | 65.747Ω | 12V |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| |  |  |  | | --- | --- | --- | | **Node A** | Ins | Outs | | Current 1 | 182.517mA | 100mA | | Current 2 |  | 46.154mA | | Current 3 |  | 36.364mA | | Total | 182.517mA | 182.517mA | | |  |  |  | | --- | --- | --- | | **Node B** | Ins | Outs | | Current 1 | 100mA | 182.517mA | | Current 2 | 46.154mA |  | | Current 3 | 36.364mA |  | | Total | 182.517mA | 182.517mA | |
|  |  |
| |  |  |  | | --- | --- | --- | | **Node C** | Ins | Outs | | Current 1 | 82.517mA | 46.154mA | | Current 2 |  | 36.364mA | | Current 3 |  |  | | Total | 82.517mA | 82.517mA | | |  |  |  | | --- | --- | --- | | **Node D** | Ins | Outs | | Current 1 | 46.154mA | 82.517mA | | Current 2 | 36.364mA |  | | Current 3 |  |  | | Total | 82.517mA | 82.517mA | |
|  |  |
| |  |  |  | | --- | --- | --- | | **Node E** | Ins | Outs | | Current 1 | 36.364mA | 36.364mA | | Current 2 |  |  | | Current 3 |  |  | | Total | 36.364mA | 36.364mA | | |  |  |  | | --- | --- | --- | | **Node F** | Ins | Outs | | Current 1 | 36.364mA | 36.364mA | | Current 2 |  |  | | Current 3 |  |  | | Total | 36.364mA | 36.364mA | |

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