Task Title: Series and Parallel Circuits

OALCF Cover Sheet – Practitioner Copy

Learner Name: _____

Date Started: _____

Date Completed: _____

Successful Completion: Yes ☐ No ☐

Goal Path: Employment ☐ Apprenticeship ☐

Secondary School ☐ Post Secondary ☐ Independence ☐

Task Description: The learner will interpret diagrams of circuits and make calculations.

Note: This task assumes some prior knowledge of circuitry and calculations used in electrical work.

Main Competency/Task Group/Level Indicator:

- Find and Use Information/Interpret documents/A2.2
- Understand and Use Numbers/Use measures/C3.3

Materials Required:

- Pen/pencil and paper and/or digital device
- Calculator or digital device with calculator function

Learner Information

Electricians need to accurately interpret diagrams of series and parallel circuits.

Scan the "Definitions" "Formulas", and "Circuits".

Definitions

Series circuits are continuous as a circle. The electricity moves along a continuous path.

Parallel circuits contain more than one path. Branches of the circuit run parallel to each other.

See the Circuits diagram for pictures of Series and Parallel circuits.

Supply Voltage is the amount of power provided for the circuit (e.g. 24 volts). The Total Voltage in a circuit is the sum of the voltages at each resistor in a circuit and is the same value as the Supply Voltage.

Formulas

I = E/R where I = current (amps), E = power (volts) and R = resistance (ohms)

Ω = ohms; you will see this symbol on the series and parallel circuits on the Circuits document.

To calculate total resistance in a series circuit, add all the resistance values:

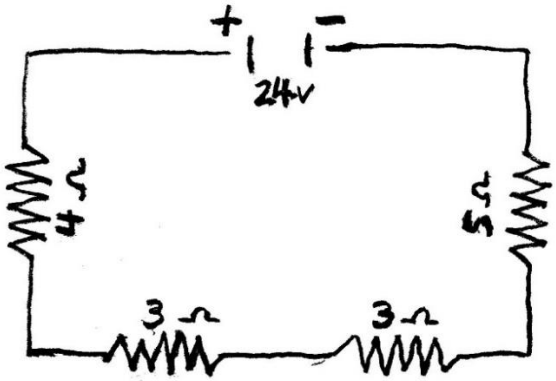
Total $R = R_1 + R_2 + R_3 + ... + R_n$

In a parallel circuit, the current depends on the resistance of the branch. To calculate total current in a parallel circuit, you first have to calculate the current for each branch:

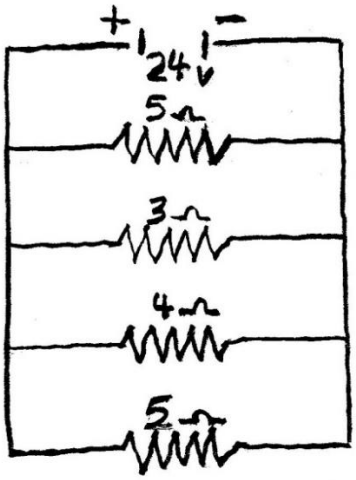
$I_1 = E/R + I_2 = E/R + I_3 = E/R ... I_n = E/R$

The total current is the sum of all the branch amounts.

CIRCUITS



SERIES



PARALLEL

Work Sheet

Task 1: Use the Series circuit to complete these tasks.

a) Calculate the total resistance (ohms) of the circuit.

Answer:

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b) Calculate the current (amps) of the circuit.

Answer:

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c) Calculate the voltage (volts) at each resistor if I = E/R, then E = I x R.

Answer:

Task 2: Use the Parallel circuit on the Circuits diagram to complete these tasks.

a) Calculate the current (amps) for each branch.

Answer:

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b) Calculate the total current (amps) in the circuit.

Answer:

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c) Calculate the total resistance (ohms) in the circuit.

Answer:

Task 3: Open a web browser on the computer. Search for advantages of using a series circuit. List at least two reasons.

Answer:

Answers

Task 1: Use the Series circuit to complete these tasks.

a) Calculate the total resistance (ohms) of the circuit.

Answer:

Total R = $R_1 + R_2 + R_3 + ... + R_n$
Total R = 5 + 3 + 3 + 4
Total R = 15 ohms

b) Calculate the current (amps) of the circuit.

Answer:

I = E/R
I = 24/15
I = 1.6 amps

c) Calculate the voltage (volts) at each resistor if I = E/R, then E = I x R.

Answer:

I = E/R
I = 24/15
I = 1.6 amps

E = I x R (for each resistor)

If the learner did not get 1.6 amps for b), make sure to see if they used their answer for b) within these formulas.

E_1 = 1.6 x 5 E_2 = 1.6 x 3 E_3 = 1.6 x 3 E_4 = 1.6 x 4
E_1 = 8 volts
E_2 = 4.8 volts
E_3 = 4.8 volts
E_4 = 6.4 volts

Task 2: Use the Parallel circuit on the Circuits diagram to complete these tasks.

a) Calculate the current (amps) for each branch.

Answer:

$I_1 = E/R + I_2 = E/R + I_3 = E/R + \ldots I_n = E/R$

$I_1 = 24 / 5 + I_2 = 24 / 3 + I_3 = 24 / 4 + I_4 = 24 / 5$

$I_1 = 4.8$ amps + $I_2 = 8$ amps + $I_3 = 6$ amps + $I_4 = 4.8$ amps

b) Calculate the total current (amps) in the circuit.

Answer:

Total $I = I_1 + I_2 + I_3 + I_4$

Total $I = 4.8 + 8 + 6 + 4.8$

Total $I = 23.6$ amps

c) Calculate the total resistance (ohms) in the circuit.

Answer:

$R = E/I$

$R = 24 / 23.6$

$R = 1.02$ ohms. Answer is rounded up to 2 decimals

Task 3: Open a web browser on the computer. Search for advantages of using a series circuit. List at least two reasons.

Answers will vary but may include:

- One switch can control all the resistors
- Uses less wire than a parallel circuit
- Easy to add more power sources to increase voltage to resistors
- The current across all resistors is the same

Performance Descriptors

Levels	Performance Descriptors	Needs Work	Completes task with support from practitioner	Completes task independently
A2.2	performs limited searches using one or two search criteria			
	locates information in simple graphs and maps			
	uses layout to locate information			
	makes connections between parts of documents			
	makes low-level inferences			
C3.3	calculates using numbers expressed as whole numbers, fractions, decimals, percentages, and integers			
	manages unfamiliar elements (e.g. context, content) to complete tasks			
	interprets and represents measurements taken with specialized tools (e.g. calipers, multimeters)			

Levels	Performance Descriptors	Needs Work	Completes task with support from practitioner	Completes task independently
	chooses and performs required operations; makes inferences to identify required operations			
	interprets, represents, and converts measures using whole numbers, decimals, percentages, ratios, and fractions			
	selects appropriate steps to solutions from among options			
	uses strategies to check accuracy (e.g. estimating, using a calculator, repeating a calculation, using the reverse operation)			

This task: Was successfully completed ☐ Needs to be tried again ☐

Learner Comments:

Instructor (print): _____

Learner (print): _____