Circuit Notes Part 2

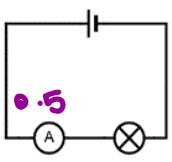
Series circuits

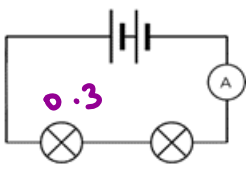
A series circuit has _____1_____ pathway(s). This means current must go through _____all_____ resistors. Since they are going through all resistors there is _____high_____ resistance. Since there is high resistance there will be _____low_____ current intensity. If you add another resistor to the circuit the resistance of the circuit _____increases_____ which will cause the current intensity to _____decrease_____.

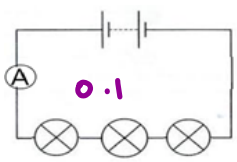
Therefore, current intensity and resistance have an _____inverse_____ relationship.

If you increase the power supply voltage, the resistance will _____stay the same_____, but the current intensity will _____decrease_____.

Resistors _____do not_____ effect voltage coming from the power supply and the voltage from the power supply _____does not_____affect resistors in the circuit.

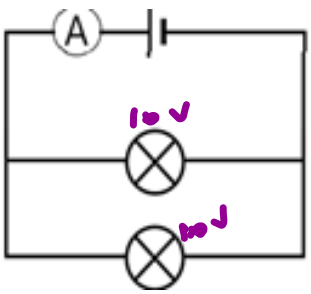


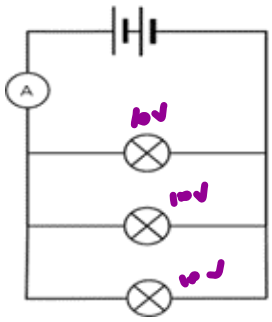




Parallel circuit

A parallel circuit has _multiple_ pathway(s). This means current will be _shared_ amongst the resistors. Since current is not going through each resistor, the resistance of the circuit is _low_. Since the resistance is low, the current intensity of the circuit will be _high_. Current intensity and resistance still have an _inverse_ relationship. As you add light bulbs, the brightness _stays the same_ because each light bulb is getting the total voltage.





To summarize:

Series circuit = 1 pathway = high resistance = low current intensity

Parallel circuit = 2 pathways = low resistance = high current intensity

Power and Energy Formulas

What will occur to power and energy results if voltage from the power supply is kept constant and the same resistors are used in a series vs a parallel circuit?

The series circuit will have a lower power and energy then the parallel circuit because the current intensity value will be lower since there is a higher resistance.

Understanding values: using two 50 Ω resistors and PS set to 4 V.

	Resistance (Ω)	Current intensity (A)	Voltage (V)
Series	100	.04	4
Parallel	25	.16	4

P: IV E: Pt

Power series	Power parallel	Energy series	Energy parallel
.4x4 = 1.6 W	.16x4 = .64 W	.4x4x1 sec = 1.6 J	.16x4x1 = .64 J

Recap:

series = high resistance= low CI = low power and energy

parallel = low resistance = high CI = high power and energy

Past exam questions

1. Jeremy assembled an electrical circuit using a 6 V battery and a resistor. He measured a current intensity of 0.05 A in this circuit.

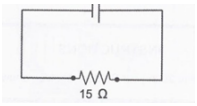
a- What is the resistance of this circuit?

$R = \frac{V}{I} \quad \frac{6}{0.05} = 120\ \Omega$

b- If the 6 V battery is replaced with a battery with a greater potential difference (voltage), and the same resistor is used, what will happen to the electric current intensity in this circuit?

1- The electric current intensity will increase
2- The electric current intensity will decrease
3- The electric current intensity will remain the same

2. The following circuit has a power source and a resistor.



Which of the following correctly describes a consequence of a change made to one of the components of this circuit?

1) The potential difference across the terminals of the resistor will increase if a 10 Ω resistor is used instead.
2) The current intensity of the circuit will increase if a 10 Ω resistor is used instead.
3) The resistance will remain the same even if the potential difference across the terminals of the source is increased.
4) The current intensity of the circuit will remain the same even if the potential difference across the terminals of the power source is increased without changing the resistor.
5) The current intensity of the circuit will increase if the potential difference across the terminals of the power source is increased without changing the resistor.

A) 2 and 3
C) 2, 3 and 5
B) 1 and 3
D) 1, 3 and 5

3. A student takes two 15 Ω resistors and places them is a series. He sets the power supply to 20 V and takes the current intensity measurement from the power source. He then uses the same resistors and places them in a parallel. If he keeps the voltage still at 20V, what should happen to the current intensity value when he measures it from the power source

A) The current intensity value will increase because there is more resistance in a parallel circuit.
B) The current intensity value will increase because there is less resistance in a parallel circuit.
C) The current intensity value will decrease because there is more resistance in a parallel circuit.
D) The current intensity value will decrease because there is less resistance in a parallel circuit.