**Solving a Series Circuit**
The goal of these problems is to identify the voltage, current, and resistance of each element of a series circuit.

| Series Circuit Rules: |
| --- |
| 1: For each element and the total circuit, the formula V = IR.
2: The *current* is the same for every element.
3: The *voltage* and *resistance* add up to the total for each circuit element. |

C.1 A 12-volt battery, a 2-ohm resistor, and a 4-ohm resistor in series.
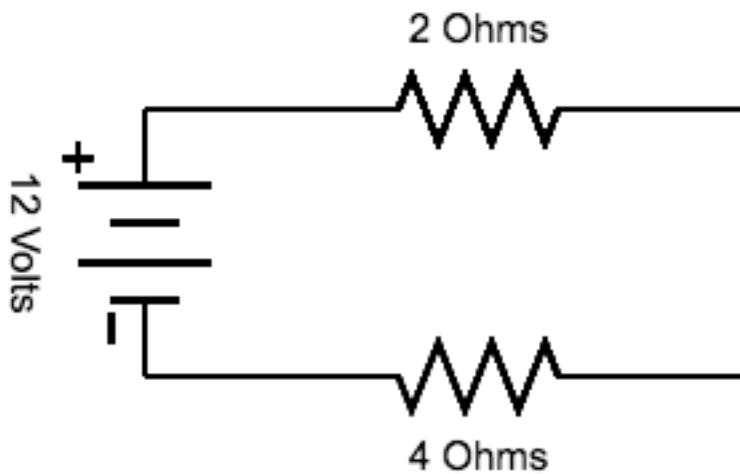
	Resistor 1	Resistor 2	Total Circuit
Voltage (V)			
Current (A)			
Resistance (Ω)			

Analyze Circuits 1

C.2 A 20-Volt battery, a 2-ohm resistor, and a 3-ohm resistor in series.

2 Ohms

20 Volts

3 Ohms
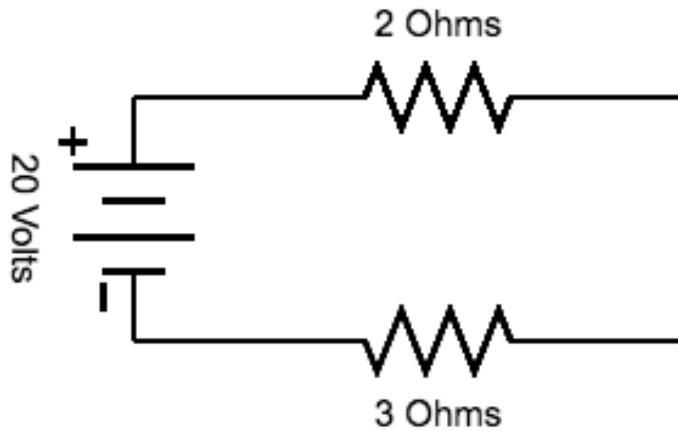
	Resistor 1	Resistor 2	Total Circuit
Voltage (V)			
Current (A)			
Resistance (Ω)			

C.3 A 30-volt battery, a 3-ohm resistor, and a 7-ohm resistor in series.
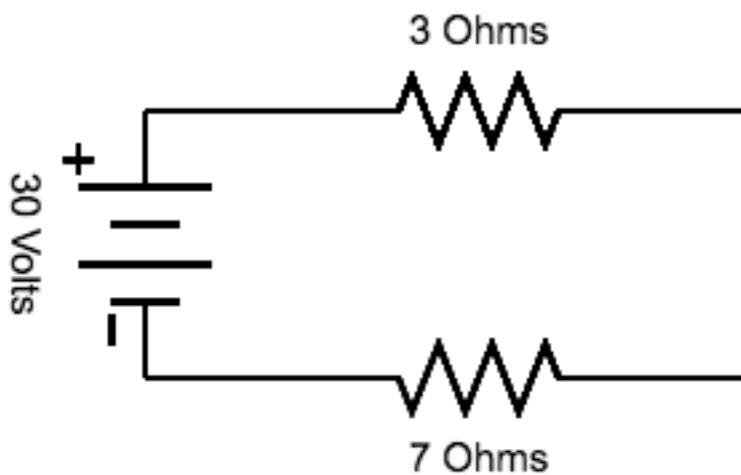
3 Ohms

30 Volts

7 Ohms

	Resistor 1	Resistor 2	Total Circuit
Voltage (V)			
Current (A)			
Resistance (Ω)			

C.4 An 18-volt battery, a 1-ohm resistor, a 2-ohm resistor, and a 3-ohm resistor in series.
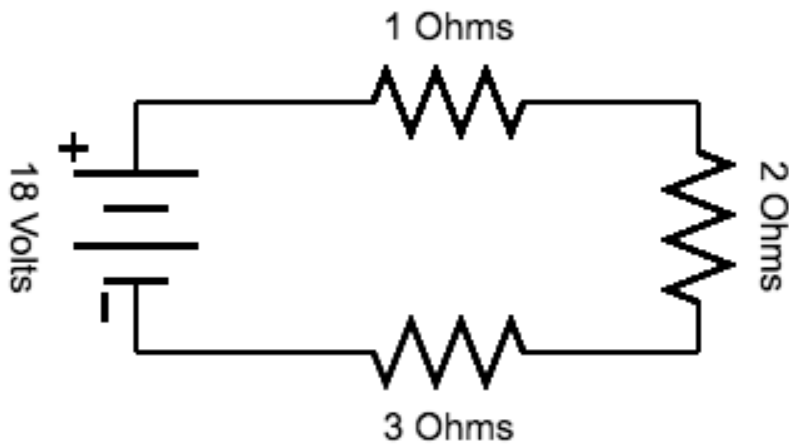
1 Ohms

18 Volts

2 Ohms

3 Ohms

	Resistor 1	Resistor 2	Resistor 3	Total Circuit
Voltage (V)				
Current (A)				
Resistance (Ω)				

C.5 A 21.23-volt battery, a 4.47-ohm resistor, and a 5.36-ohm resistor, and a 2.94-ohm resistor in series. [use a calculator for this problem, round each cell of the table to two decimal places]
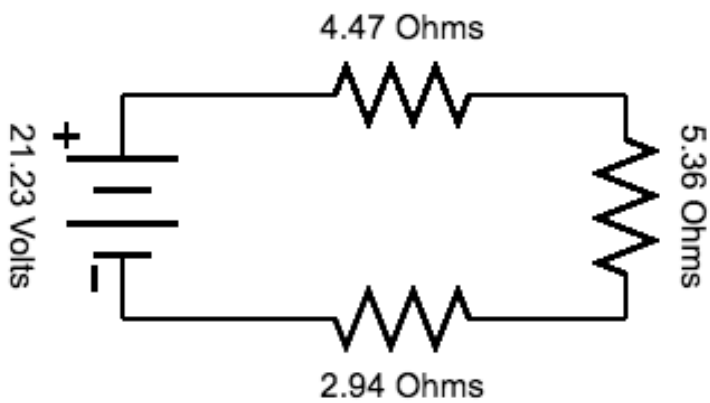
4.47 Ohms

21.23 Volts

5.36 Ohms

2.94 Ohms

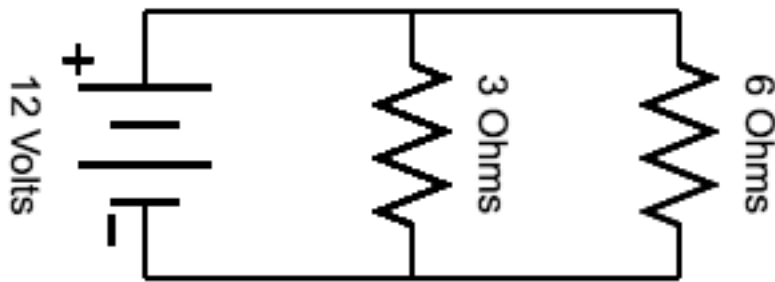|	Resistor 1	Resistor 2	Resistor 3	Total Circuit
Voltage (V)				
Current (A)				
Resistance (Ω)				

Solving Parallel circuit problems
 In a parallel circuit, the rules are slightly different.

Parallel Circuit Rules:

1: For each element and the total circuit, the formula $V = IR$.
2: The *voltage* is the same for every element.
3: The *current* adds up to the total for each circuit element.
4: The *resistance* DOES NOT add up to the total.

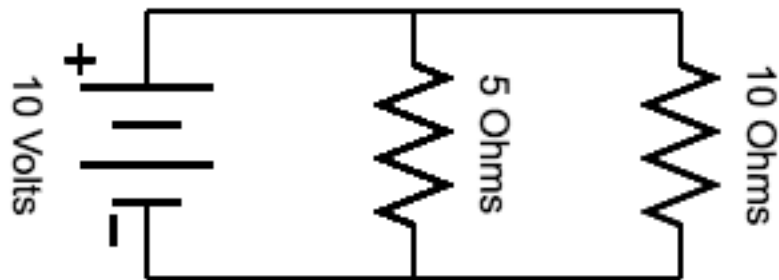**C.6.** A parallel circuit with a 12-Volt battery, a 3-Ohm resistor, and a 6-Ohm resistor:

	Resistor 1	Resistor 2	Total Circuit
Voltage (V)			
Current (A)			
Resistance (Ω)			

Analyze Circuits 1

C.7 a parallel circuit with a 10 Volt battery, a 5-Ohm resistor, and a 10-Ohm resistor:

	Resistor 1	Resistor 2	Total Circuit
Voltage (V)			
Current (A)			
Resistance (Ω)			

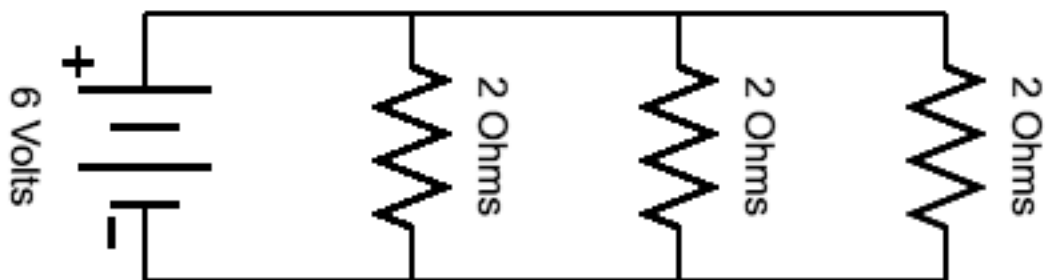**C.8** a parallel circuit with a 20 Volt battery, a 2 Ohm resistor, and a 4 Ohm resistor:
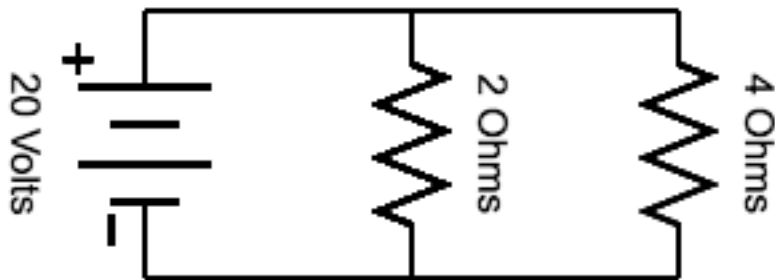
	Resistor 1	Resistor 2	Total Circuit
Voltage (V)			
Current (A)			
Resistance (Ω)			

C.9 A parallel circuit with a 6-volt battery and *three* 2-ohm resistors.

	Resistor 1	Resistor 2	Resistor 3	Total Circuit
Voltage (V)				
Current (A)				
Resistance (Ω)				

C.10 A parallel circuit with a 10.45-volt battery, a 3.45-ohm resistor, a 2.58-ohm resistor, and a 8.12-ohm resistor. [use a calculator, round the answers to two decimal places]
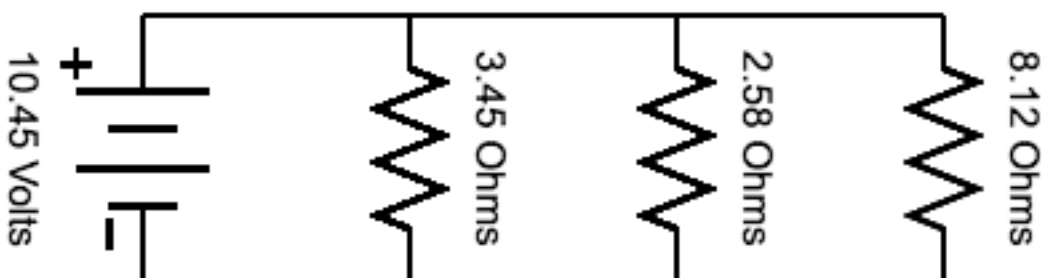
	Resistor 1	Resistor 2	Resistor 3	Total Circuit
Voltage (V)				
Current (A)				
Resistance (Ω)				

C.11 Which rule is the same for series and parallel circuits?

C.12 Which rules are different for series and parallel circuits?

Solving circuit problems with power

New Rule:
In both series and parallel circuits, the formula $P = IV$ applies for each element.

C.13 A *series* circuit has a 50-volt battery, a 10-ohm resistor, and a 15-ohm resistor.
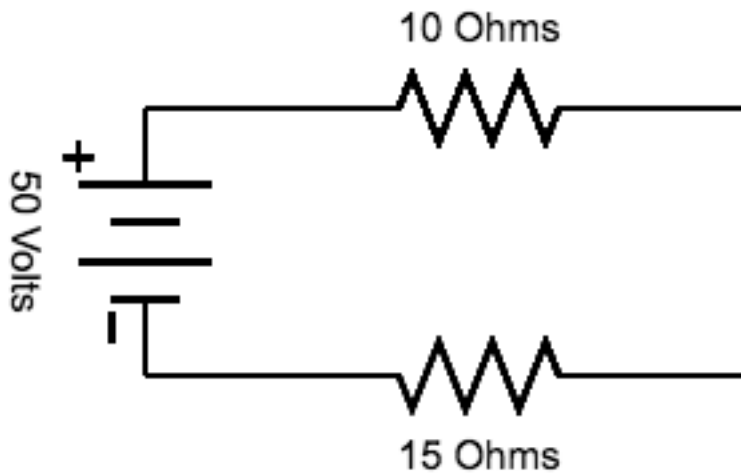
	Resistor 1	Resistor 2	Total Circuit
Voltage (V)			
Current (A)			
Resistance (Ω)			
Power (W)			

Analyze Circuits 1

C.14 A *series* circuit has a 12-volt battery, and four-ohm resistor, and a six-ohm resistor.

4 Ohms

12 Volts

6 Ohms
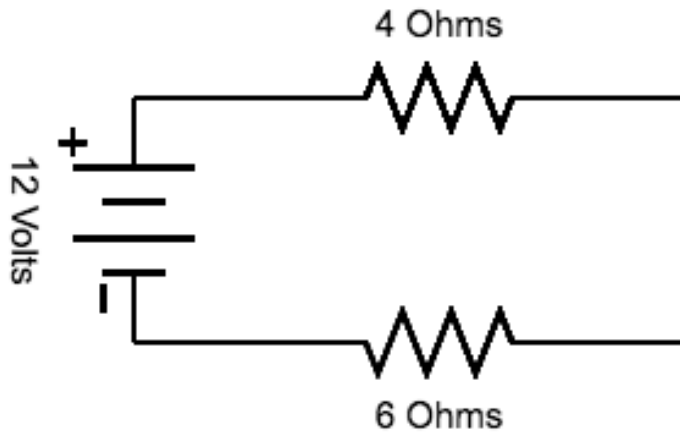
	Resistor 1	Resistor 2	Total Circuit
Voltage (V)			
Current (A)			
Resistance (Ω)			
Power (W)			

C.15 A *parallel* circuit has a 15-volt battery, a 3-ohm resistor and a 5-ohm resistor.
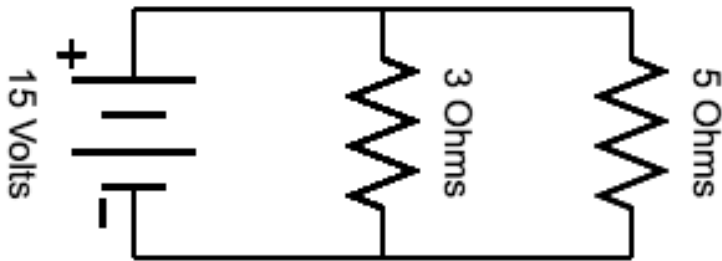
15 Volts

3 Ohms

5 Ohms

	Resistor 1	Resistor 2	Total Circuit
Voltage (V)			
Current (A)			
Resistance (Ω)			
Power (W)			

C.16 A *parallel* circuit has a 30-volt battery, a 15-ohm resistor and a 25-ohm resistor.
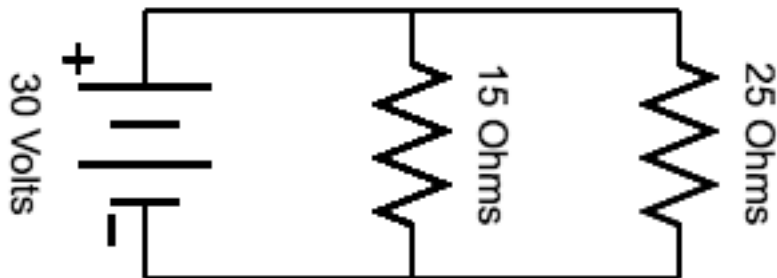
	Resistor 1	Resistor 2	Total Circuit
Voltage (V)			
Current (A)			
Resistance (Ω)			
Power (W)			

Analyze Circuits 1

Answers:

C.1

	Resistor 1	Resistor 2	Total Circuit
Voltage (V)	4	8	12
Current (A)	2	2	2
Resistance (Ω)	2	4	6

C.2

	Resistor 1	Resistor 2	Total Circuit
Voltage (V)	8	12	20
Current (A)	4	4	4
Resistance (Ω)	2	3	5

C.3

	Resistor 1	Resistor 2	Total Circuit
Voltage (V)	9	21	30
Current (A)	3	3	3
Resistance (Ω)	3	7	10

C.4

	Resistor 1	Resistor 2	Resistor 3	Total Circuit
Voltage (V)	3	6	9	18
Current (A)	3	3	3	3
Resistance (Ω)	1	2	3	6

Analyze Circuits 1

C.5

	Resistor 1	Resistor 2	Resistor 3	Total Circuit
Voltage (V)	7.43	8.91	4.89	21.23
Current (A)	1.66	1.66	1.66	1.66
Resistance (Ω)	4.47	5.36	2.94	12.77

Results are rounded to 3 significant figures.

C.6

	Resistor 1	Resistor 2	Total Circuit
Voltage (V)	12	12	12
Current (A)	4	2	6
Resistance (Ω)	3	6	2

C.7

	Resistor 1	Resistor 2	Total Circuit
Voltage (V)	10	10	10
Current (A)	2	1	3
Resistance (Ω)	5	10	3.33

C.8

	Resistor 1	Resistor 2	Total Circuit
Voltage (V)	20	20	20
Current (A)	10	5	15
Resistance (Ω)	2	4	1.33

C.9

	Resistor 1	Resistor 2	Resistor 3	Total Circuit
Voltage (V)	6	6	6	6
Current (A)	3	3	3	9
Resistance (Ω)	2	2	2	0.667

C.10

	Resistor 1	Resistor 2	Resistor 3	Total Circuit
Voltage (V)	10.45	10.45	10.45	10.45
Current (A)	3.03	4.05	1.29	8.37
Resistance (Ω)	3.45	2.58	8.12	1.25

All results are rounded to three significant figures.

C.11 Ohm's Law applies to both series and parallel circuits.

C.12 In a series circuit, voltage adds and current is constant.
In a parallel circuit, current adds, and voltage is constant
In a series circuit, resistance adds up, while it does not in a parallel circuit.

C.13

	Resistor 1	Resistor 2	Total Circuit
Voltage (V)	20	30	50
Current (A)	2	2	2
Resistance (Ω)	10	15	25
Power (W)	40	60	100

C.14

	Resistor 1	Resistor 2	Total Circuit
Voltage (V)	4.8	7.2	12
Current (A)	1.2	1.2	1.2
Resistance (Ω)	4	6	10
Power (W)	5.76	8.64	14.4

C.15

	Resistor 1	Resistor 2	Total Circuit
Voltage (V)	15	15	15
Current (A)	5	3	8
Resistance (Ω)	3	5	1.875
Power (W)	75	45	120

C.16

	Resistor 1	Resistor 2	Total Circuit
Voltage (V)	30	30	30
Current (A)	2	1.2	3.2
Resistance (Ω)	15	25	9.375
Power (W)	60	36	96