1. 2 Ω resistor, a 10 Ω resistor, and a 15 Ω resistor are connected in parallel. This parallel combination is in series with a 6 Ω resistor and also in series with an 8 Ω resistor. Calculate the total resistance, the circuit current, the current through each resistor, and the voltage drop across each resistor. A 36 V battery is used. Answer: 18 Ω; 2 A; 12 V, 8 V, 16 V; 2 A; 0.67 A, 0.80 A, 0.53 A

2. A 7 Ω resistor is in parallel with a 3 Ω resistor. This parallel combination is in series with a 5.4 Ω resistor. A 30 V battery is used. What is the equivalent resistance of the entire circuit? What is the total current? Ans: 7.5 Ω; 4 A

3. A 7 Ω, a 1 Ω, and a 10 Ω resistor are in series. This series combination is then in parallel with a 6 Ω resistor. The combination of the four resistors is then in series with a 10.3 Ω resistor. A 20 V battery is used. What is the equivalent resistance of the entire circuit? What is the total current? What is the voltage drop across the 6 Ω resistor? What is the current through the 1 Ω resistor? Ans: 14.8 W; 1.35 A; 6.1 V; 0.34 A
A series circuit consists of a battery of negligible internal resistance, a variable resistor, and an electric motor of negligible resistance. The current in the circuit is 2 amperes when the resistance in the circuit is adjusted to 15 ohms. Under these conditions the motor lifts a 1-kilogram mass vertically at a constant speed of 1.5 meters per second.

a. Determine the electrical power that is
   i. dissipated in the resistor

   ii. used by the motor in lifting the mass

   iii. supplied by the battery

b. Determine the potential difference across
   i. the resistor

   ii. the motor

   iii. the battery

The resistor is now adjusted until the mass rises vertically at a constant speed of 3 meters per second. The voltage drop across the motor is proportional to the speed of the motor, and the current remains constant.

c. Determine the voltage drop across the motor.

   

d. Determine the new resistance in the circuit.

   