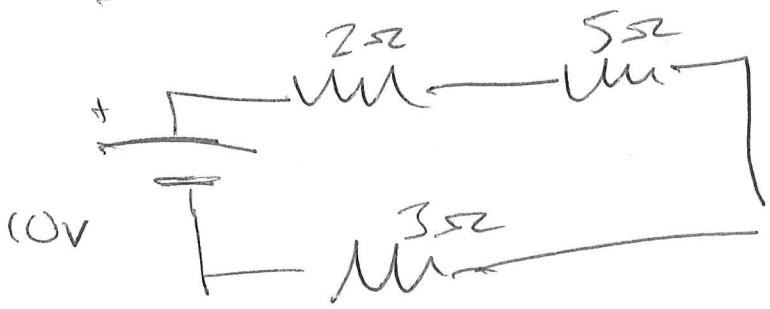
Solutions: Circuit practice worksheet



- Determine current, I, through the battery.
- Determine the voltage across the 3Ω resister.

Step 1: Determine the total resistance of the circuit. note: these resistors are connected in series.

$$R_{net} = R_1 + R_2 + R_3$$

$$R_{net} = 2\Omega + 5\Omega + 3\Omega = 10\Omega$$

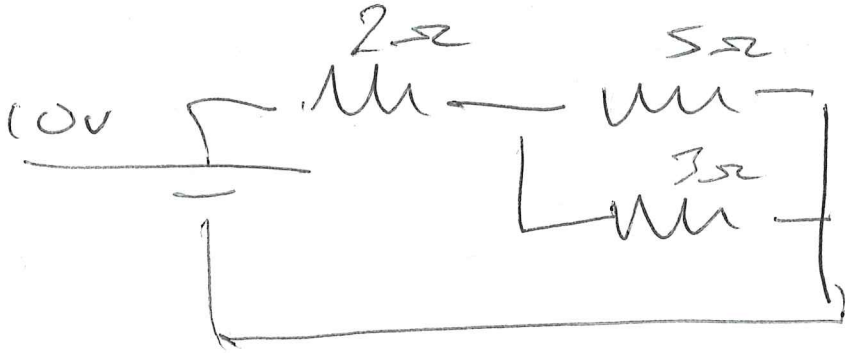
Step 2: use the total, system resistance to calculate the total, system current.

$$V = IR \qquad \frac{V}{R} = I \qquad \boxed{\frac{10v}{10\Omega} = 1\,amp} = \text{Answer \#1}$$

Step 3: use that current to determine voltage across 3Ω resistor

$$V = IR$$

$$V = (1\,amp)(3\Omega) = 3\,volts$$



- Determine voltage across 2Ω resistor.
- Determine current through the 3Ω r.

(1) Determine total resistance of circuit. note: 5Ω + 3Ω resistors are in parallel.

$$\frac{1}{R_{net}} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$$

$$\frac{1}{R_{net}} = \frac{1}{5} + \frac{1}{3} = \frac{3}{15} + \frac{5}{15} = \frac{8}{15} = \frac{1}{R_{net}}$$

$$\therefore R_{net} = \frac{15}{8} = 1.87\Omega$$

this combination of resistors acts like a single, 1.87Ω resistor

$2\Omega + 1.87\Omega = 3.87\Omega$ total

(2) Determine total current.

$$V = IR, \quad \frac{V}{R} = I = \frac{10V}{3.87\Omega} = 2.58 \text{ amps}$$

(3) Determine voltage drop across 2Ω resistor

$$V = IR, \quad V = (2.58a)(2\Omega) = 5.16 \text{ volts}$$

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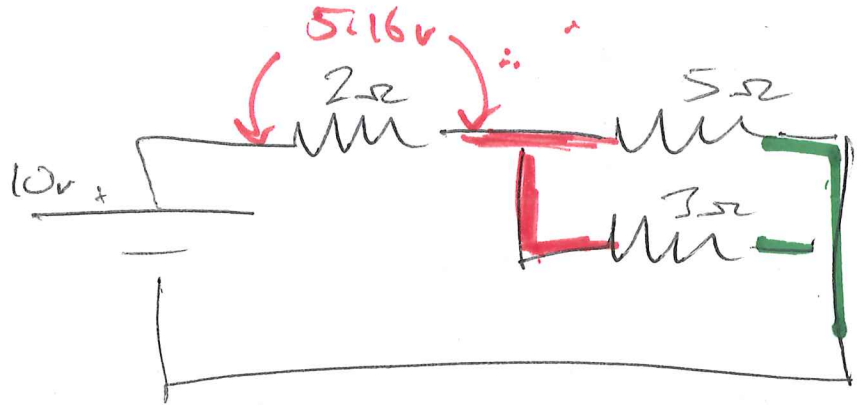
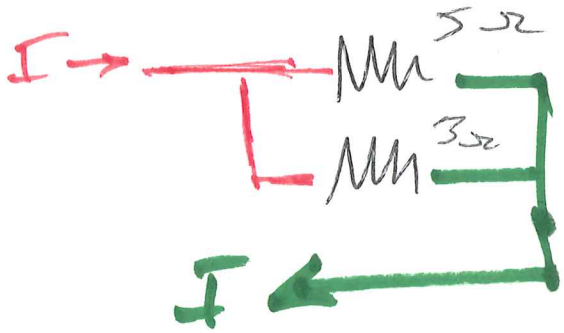


- note: since the voltage drops by 5.16 volts across the 2Ω resistor, the voltage must drop by 4.84 volts across the next two resistors in parallel

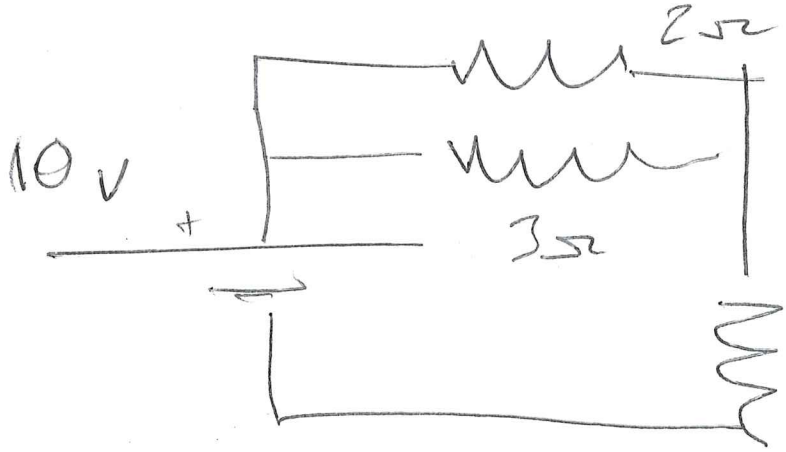


$\therefore V = IR$

$\frac{V}{R} = I \quad \therefore \frac{4.84\,v}{3\Omega} = 1.61\ \text{amps}$

Current through 3Ω

Done :)



Determine voltage across 5Ω resistor

Step 1: Determine resistance of entire circuit.
- first, determine resistance of the 2Ω + 3Ω in parallel.

$\frac{1}{2} + \frac{1}{3} = \frac{1}{R_{net}} = \frac{3}{6} + \frac{2}{6} = \boxed{\frac{5}{6} = \frac{1}{R_{net}}}$

now add $5\Omega + 1.2\Omega = \boxed{6.2\Omega}$ ∴ $R_{net} = \frac{6}{5} = 1.2\Omega$

total R =

Step 2
now: Determine total current in circuit

$V = IR \therefore \frac{V}{R} = I \therefore \frac{10\,v}{6.2\Omega} = 1.6$ amps

Step 3: to determine voltage across the 5Ω resistor.

$V = IR \therefore V = (1.6\,a)(5\Omega) = \boxed{8.06 \text{ volts}}$

done