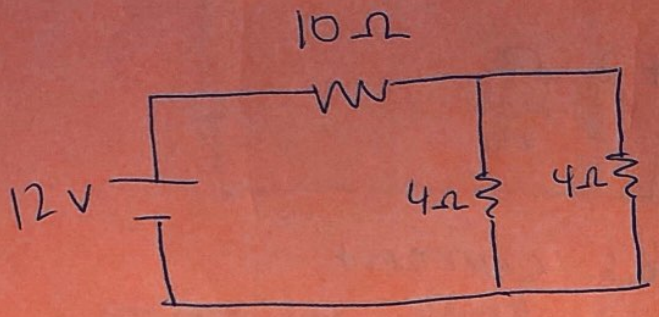
Combination Circuits:

Rules

In a loop: Voltage in equals voltage out.

At a junction: current in equals current out.



10 Ω is in series

4 Ω + 4 Ω are in parallel

Step 1: Solve for the equivalent resistance of the parallel circuit

"Collapse the parallel circuit"

$$\frac{1}{R_E} = \frac{1}{R_1} + \frac{1}{R_2}$$

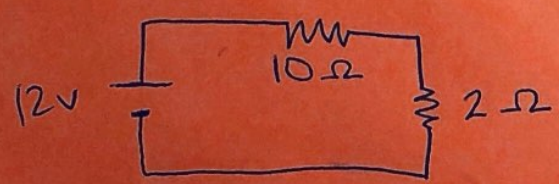
$$\frac{1}{R_E} = \frac{1}{4} + \frac{1}{4}$$

$$\frac{1}{R_E} = .5$$

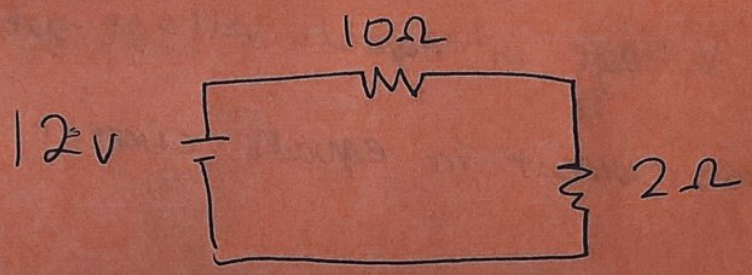
$$R_E = \frac{1}{.5}$$

$$R_E = 2\ \Omega$$

Step 2: Redraw circuit



Step 3: solve for total resistance (series)



$R_T = 10\Omega + 2\Omega$

$\boxed{R_T = 12\Omega}$

Step 4: Solve for total current

$V = IR$

$\frac{12V}{12} = \frac{I(12\Omega)}{12}$

$\boxed{1A = I}$

Step 5: solve for voltage drop at each resistor

At 10Ω resistor

$V = IR$

$V = (1A)(10\Omega)$

$\boxed{V = 10V}$

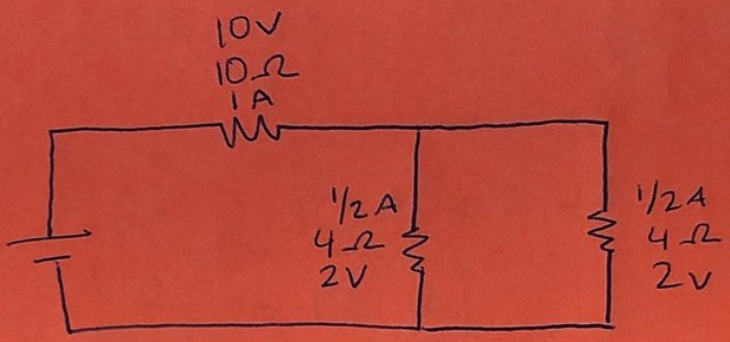
At 2Ω resistor

$V = IR$

$V = (1A)(2\Omega)$

$\boxed{V = 2V}$

Step 6: Go back to original circuit and solve for current and voltage at each resistor.



✱ Remember that current is constant in a series circuit and voltage is constant in a parallel circuit.

I = current

Series

Parallel

voltage