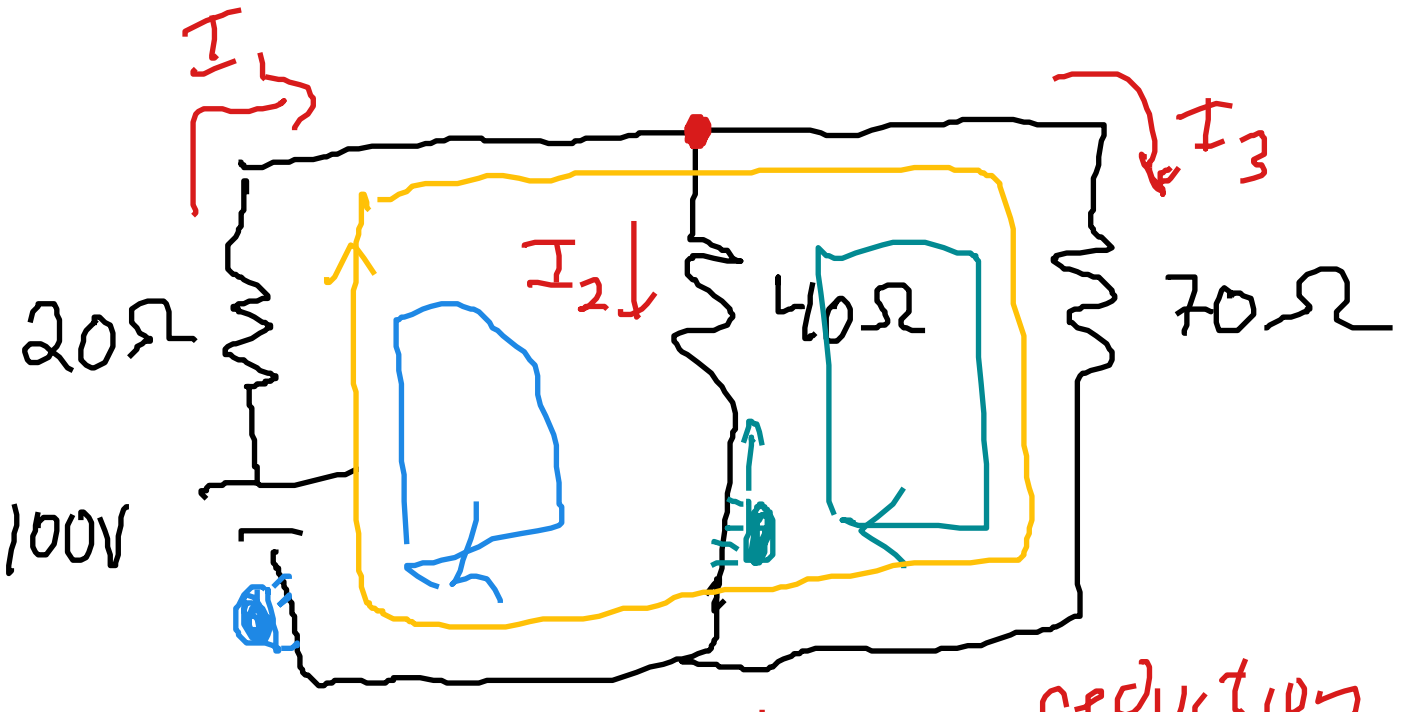


resistance reduction

$I_1 = 2.2A$ $I_2 = 1.4A$ $I_3 = 0.8A$

Junction Rule

$$I_1 = I_2 + I_3$$

Loop Rule

$$+100 - 20I_1 - 40I_2 = 0$$

$$+100 - 20I_1 - 70I_3 = 0$$

$$+40I_2 - 70I_3 = 0$$

$$40 I_2 = 70 I_3$$

bigger — smaller

$$\frac{I_2}{I_3} = \frac{70}{40}$$

$$I_2 = \frac{7}{4} I_3 = 1.75 I_3$$

Choose one variable (I_3) & write all other variables in terms of it

$$I_1 = I_2 + I_3$$

$$= \frac{7}{4} I_3 + I_3$$

$$= \frac{11}{4} I_3 = 2.75 I_3$$

- Solve for that variable

$$100 - 20\left(\frac{11}{4} I_3\right) - 40\left(\frac{7}{4} I_3\right) = 0$$

$$100 - 55I_3 - 70I_3 = 0$$

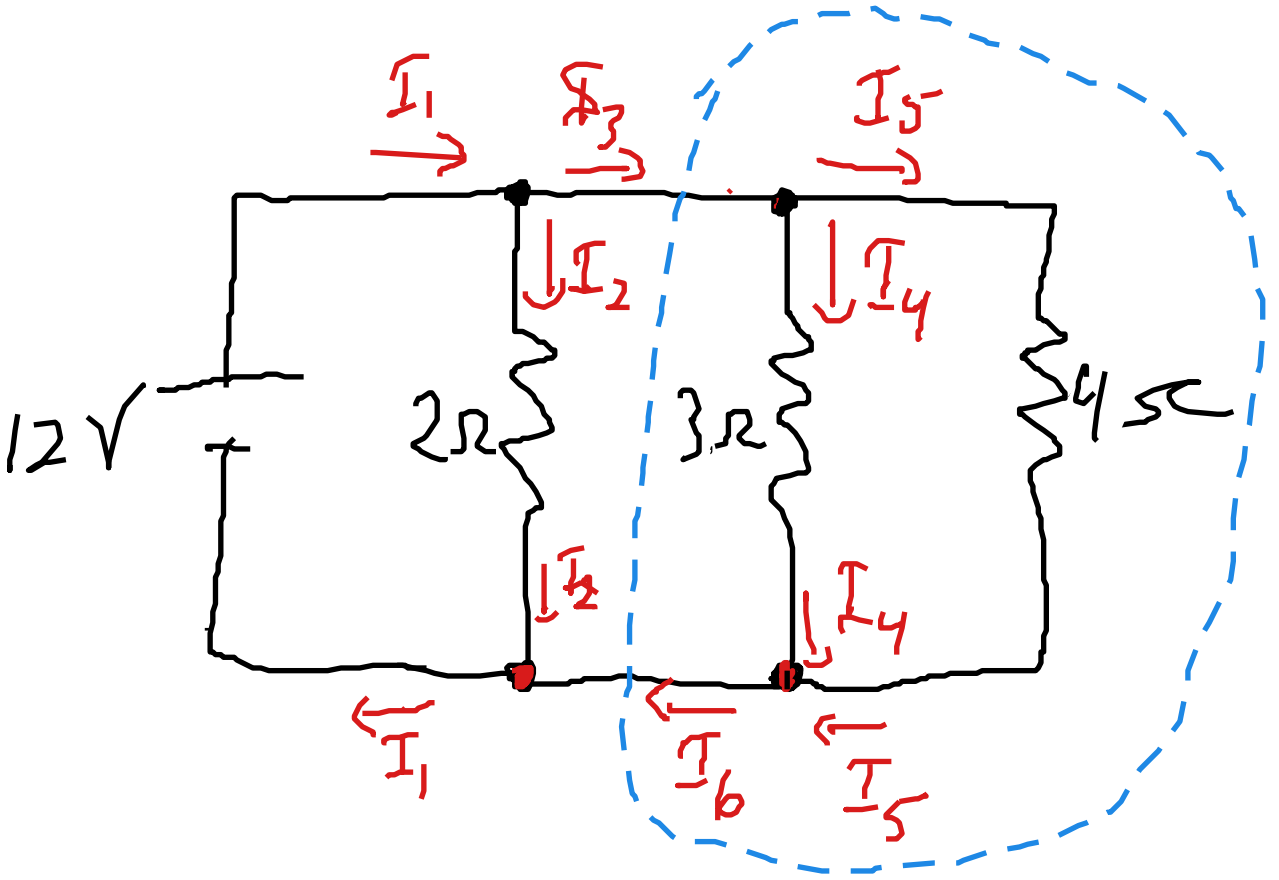
$$100 = 125I_3$$

$$I_3 = \frac{100}{125} = \frac{4}{5}A = 0.8A$$

- Solve for other variables

$$I_1 = \frac{11}{4}\left(\frac{4}{5}A\right) = \frac{11}{5}A = 2.2A$$

$$I_2 = \frac{7}{4}\left(\frac{4}{5}A\right) = \frac{7}{5}A = 1.4A$$



Current only changes when it passes through a junction

Each junction should have a different label for all of its wires

(Yes, $I_3 = I_6$ if you can see that go ahead You are clever)

Six Unknowns need six equations

- Look for simple loops (only one resistor)

$12 - 2I_2 = 0$

$12 = 2I_2 \Rightarrow I_2 = 6$

$12 - 3I_4 = 0$ $\quad$ $12 - 4I_5 = 0$

$I_4 = 4A$ $\quad$ $I_5 = 3A$

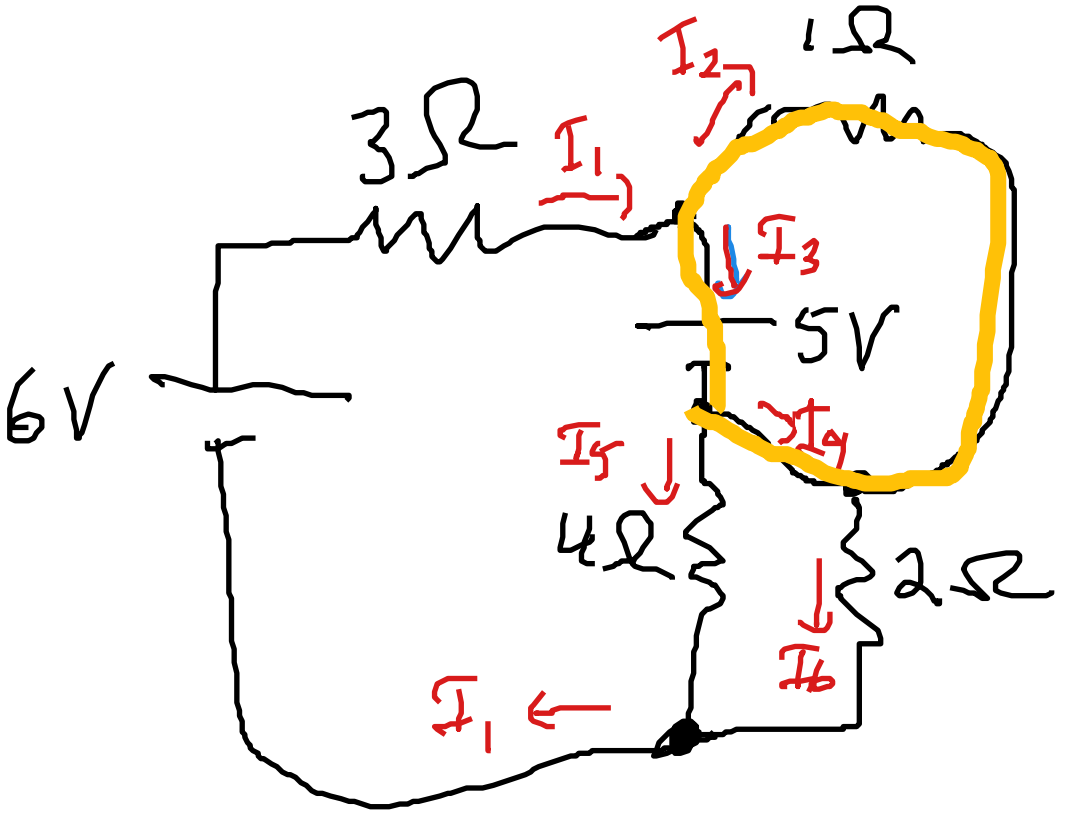
- Currents without resistors must be solved with a junction rule.

$I_3 = I_4 + I_5 = 4A + 3A = 7A$

$I_4 + I_5 = I_6 = 4 + 3 = 7A$

$$I_1 = I_2 + I_3$$

$$= 6 + 7 = 13A$$



Ideal batteries will accept reverse current (recharging)

How many currents are in this circuit? 6

Are there any simple loops? (only one resistor)

$\sum - 1I_2 = 0 \rightarrow I_2 = 5A$