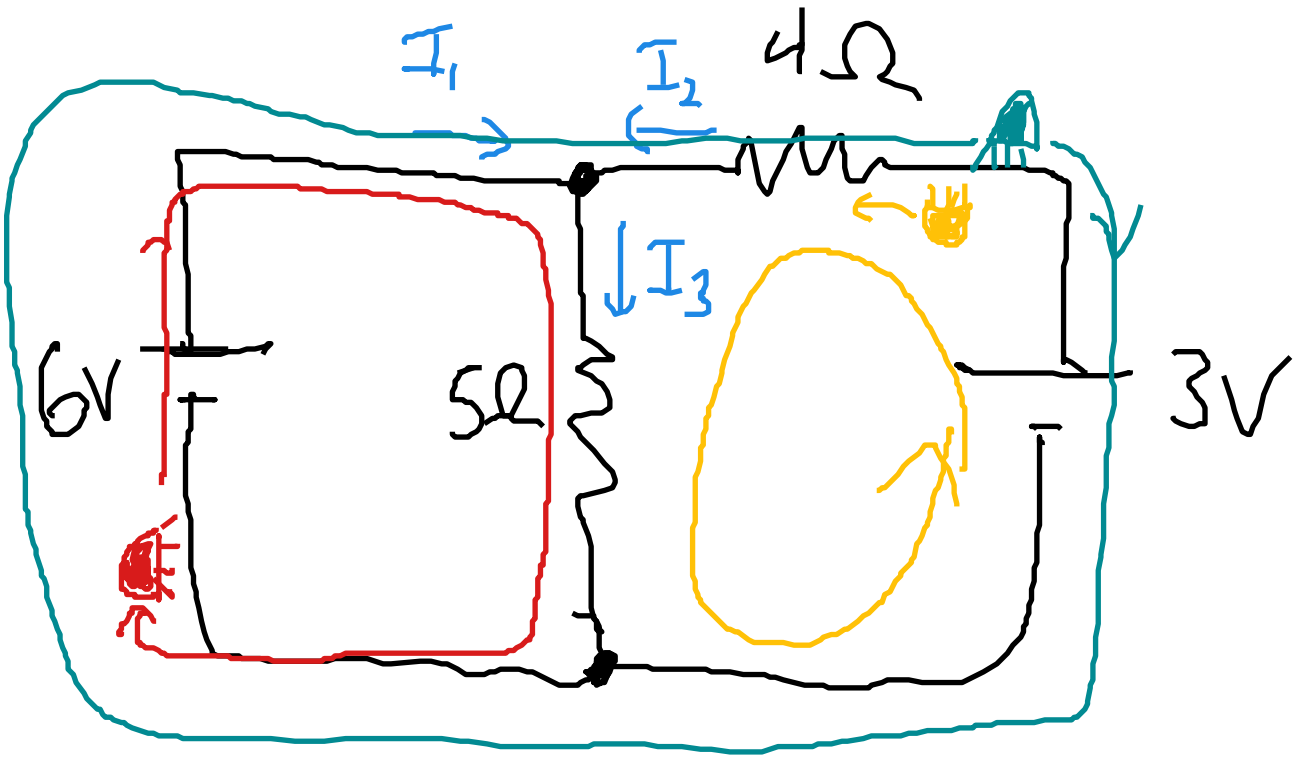


$$I_1 + I_2 = I_3$$

Junction Rule

$$6 - 5I_3 = 0$$

Loop Rules

$$-3 + 6 + 4I_2 = 0$$

$$-4I_2 - 5I_3 + 3 = 0$$

3 unknowns, I_1, I_2, I_3

→ need 3 equations

start with equations having only one variable

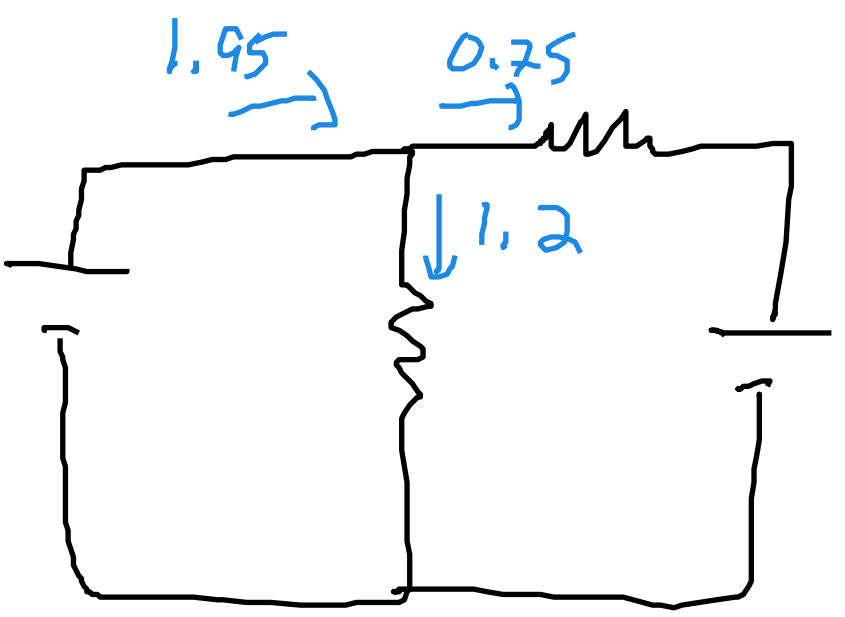
$6 - 5I_3 = 0 \rightarrow 5I_3 = 6 \rightarrow I_3 = 1.2A$

$-\underbrace{3+6}_{3} + 4I_2 = 0 \rightarrow 4I_2 = -3$

$I_2 = -0.75A$

$I_1 + I_2 = I_3 \rightarrow I_1 - 0.75 = 1.2$

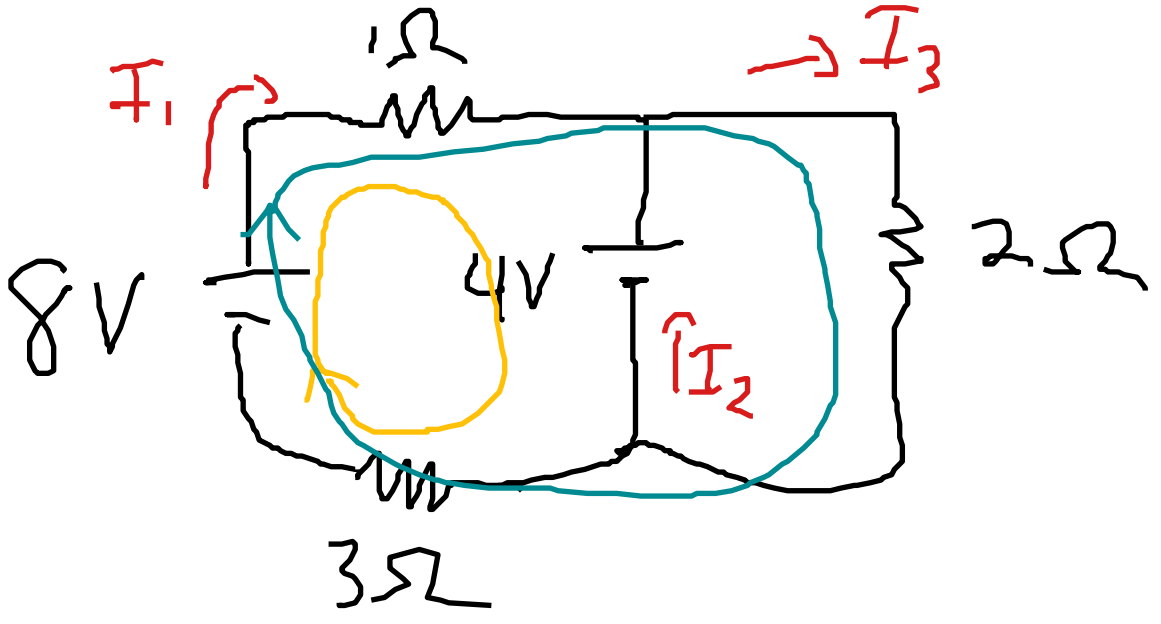
$I_1 = 1.2 + 0.75 = 1.95A$



Redraw with correct currents

If you wish —

double-check junction rule



I_1

I_2

I_3

$$I_1 = I_2 + I_3$$

$$8 - 1I_1 * 4 - I_2 - 3I_1 = 0$$

$$8 - 1I_1 - 2I_2 = 0$$

$\times 3$

$-3I_1$

Real equations

③ $I_1 + I_2 = I_3$

$8 - 1I_1 - 4 - 3I_1 = 0$ ← start here

② $8 - 1I_1 - 2I_3 - 3I_1 = 0$

$4 - 4I_1 = 0 \rightarrow I_1 = 1A$

$8 - 4I_1 - 2I_3 = 0$

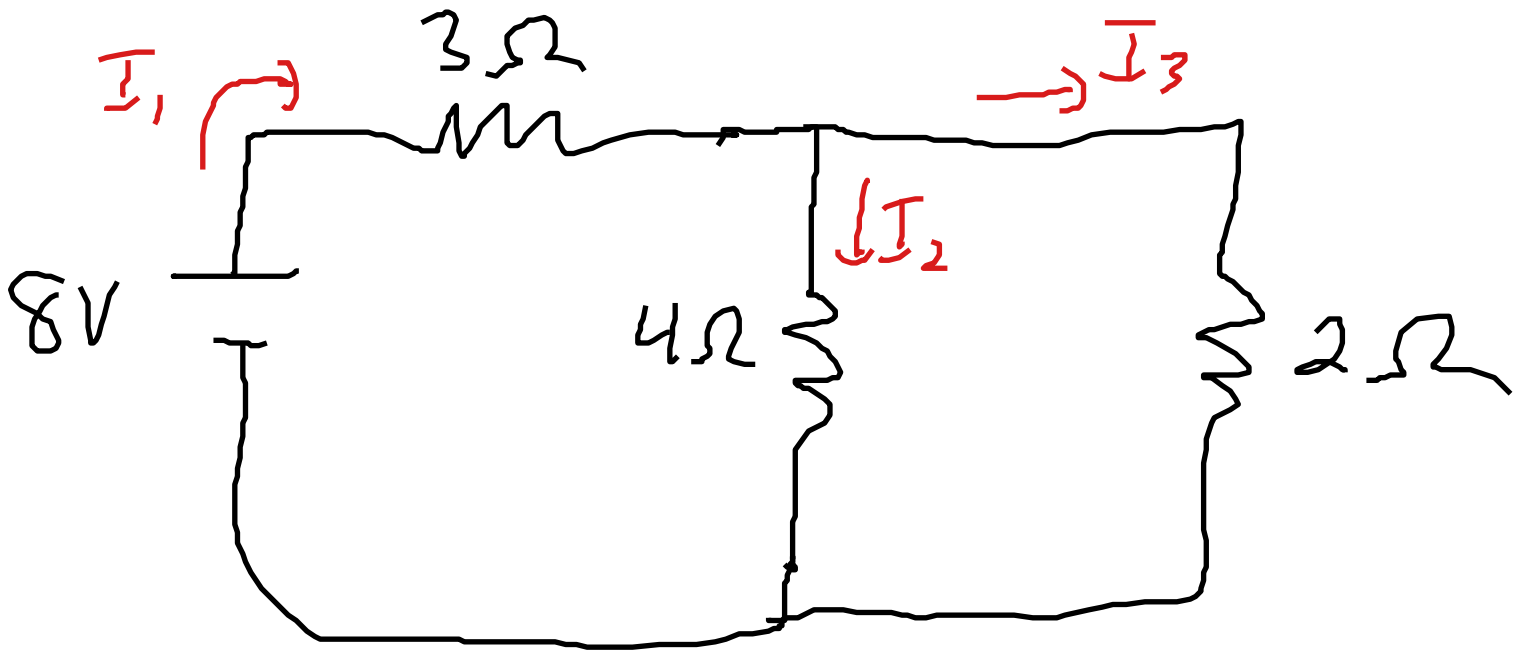
$8 - 4(1) = 2I_3$

$4 = 2I_3 \rightarrow I_3 = 2A$

$$I_1 + I_2 = I_3$$

$$1 + I_2 = 2$$

$$\rightarrow I_2 = 1A$$



$$I_1 = I_2 + I_3$$

$$8 - 3I_1 - 4I_2 = 0$$

$$-4I_2 + 2I_3 = 0$$

$$8 - 3I_1 - 2I_3 = 0$$

Solve simultaneously (see video)

$$-4I_2 + 2I_3 = 0$$

$$2I_3 = 4I_2$$

$$\frac{I_3}{I_2} = \frac{4\Omega}{2\Omega} \rightarrow I_3 = 2I_2$$

path with half the resistance gets twice the current

"path of least resistance"