

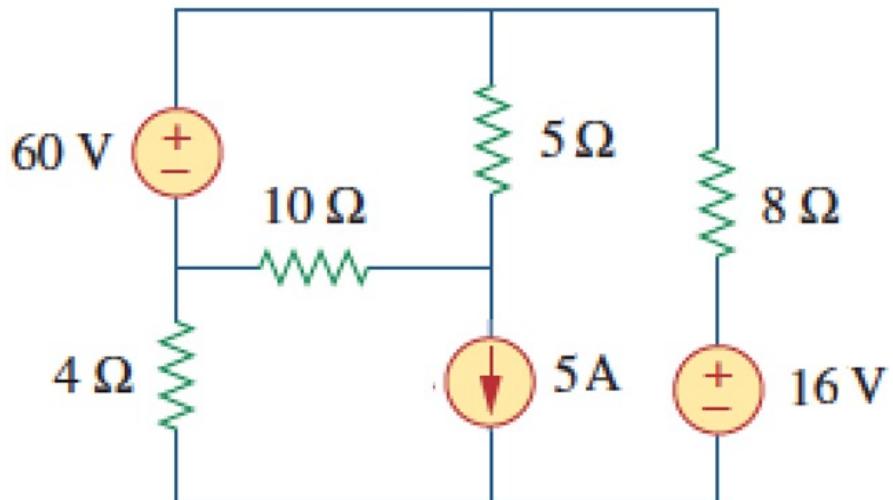
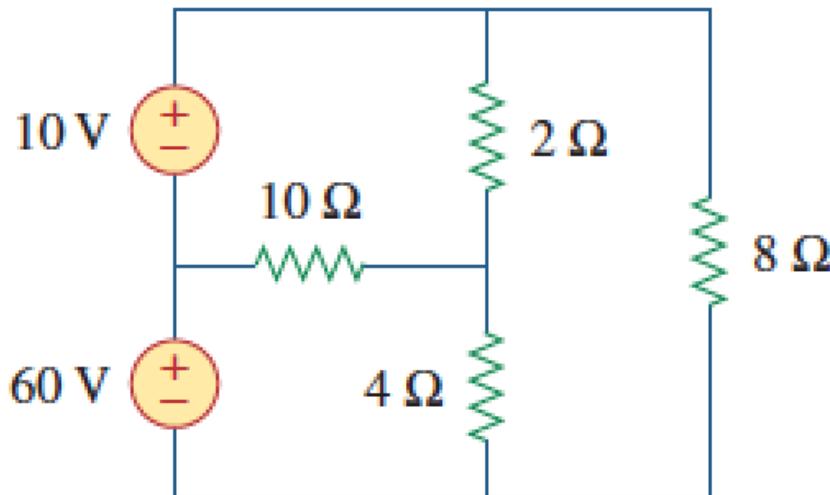
# Lecture 12

## Node Analysis – 5 of 7

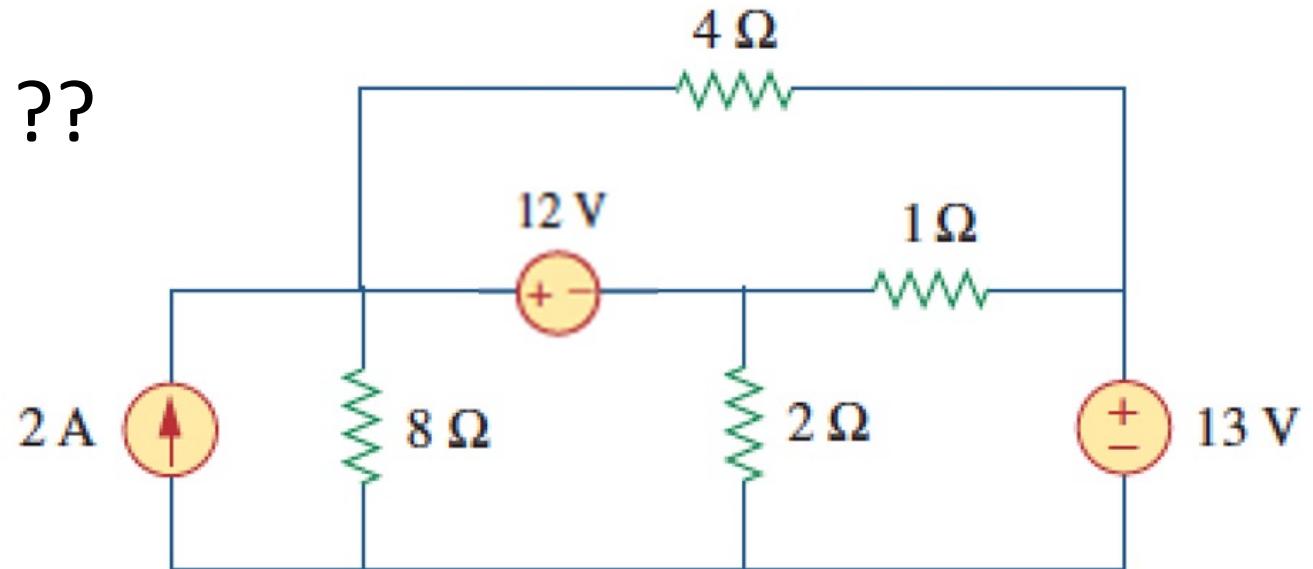
supernodes

# Extension #4 – multiple V-only branches

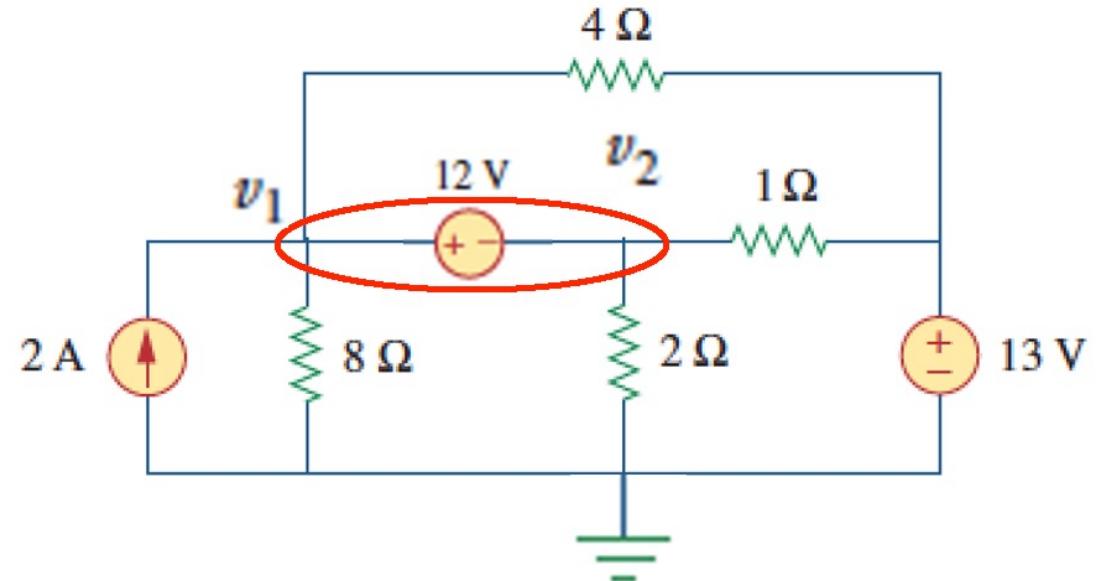
- There might be an obvious solution



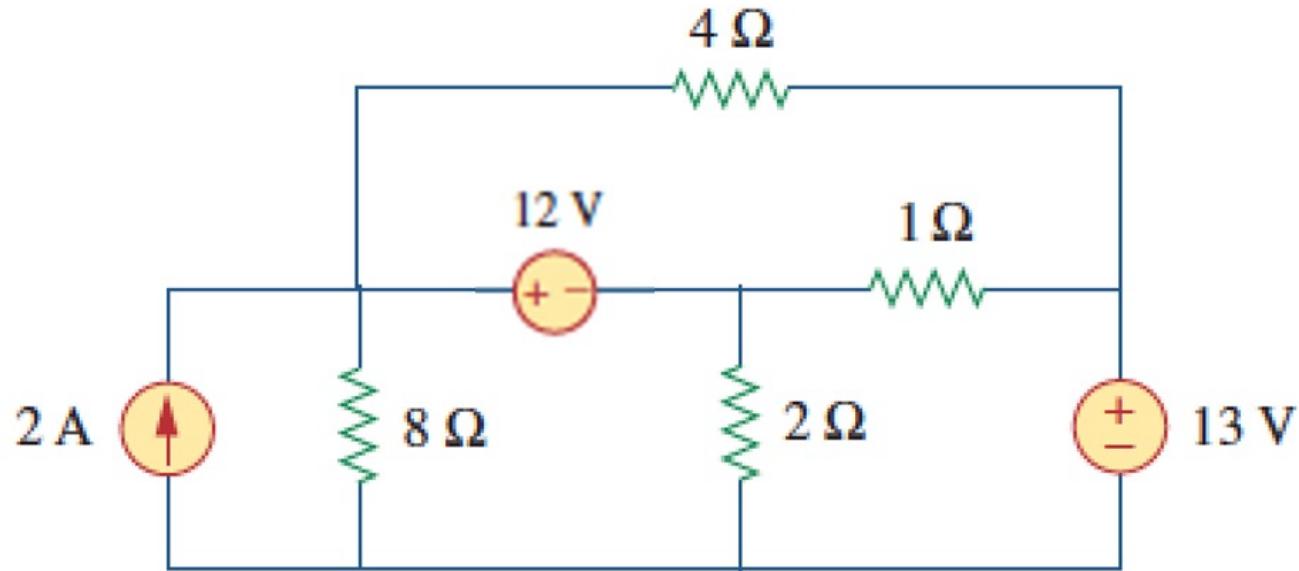
But sometimes ??

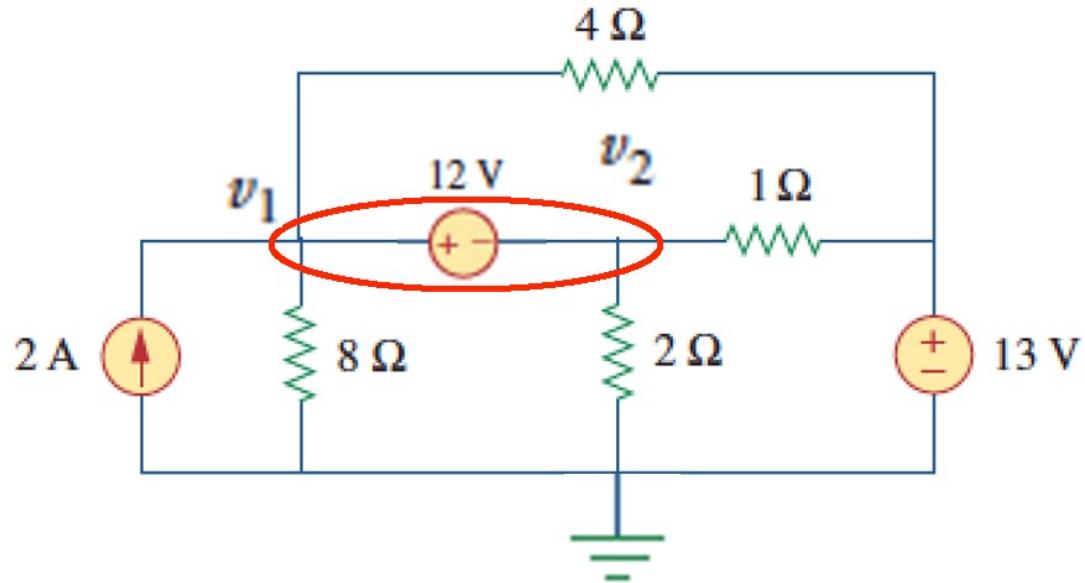


- Define a “supernode” (a cutset)
- Apply KCL on it
- Relate the voltages across it



## Example (details on next slide)





Relate nodes:

$$v_2 = v_1 - 12$$

Node equation:

$$\frac{v_1}{8} - 2 + \frac{v_1 - 13}{4} + \frac{v_2 - 13}{1} + \frac{v_2}{2} = 0$$

$$3v_1 + 12(v_1 - 12) = 146$$

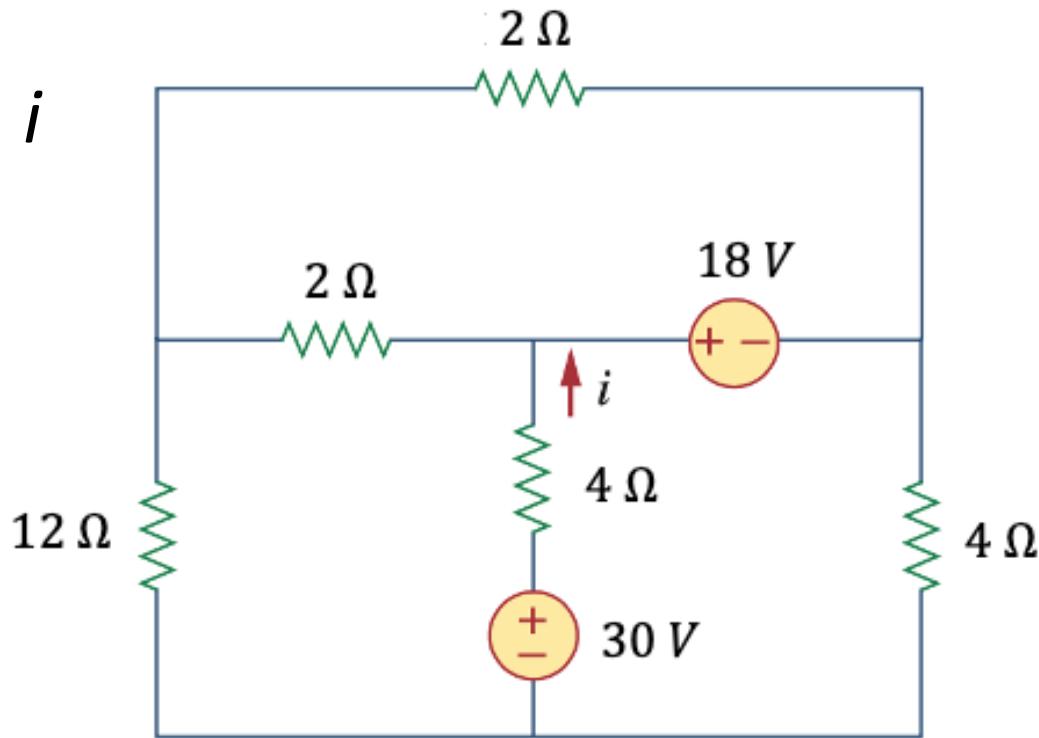
$$3v_1 + 12v_2 = 146$$

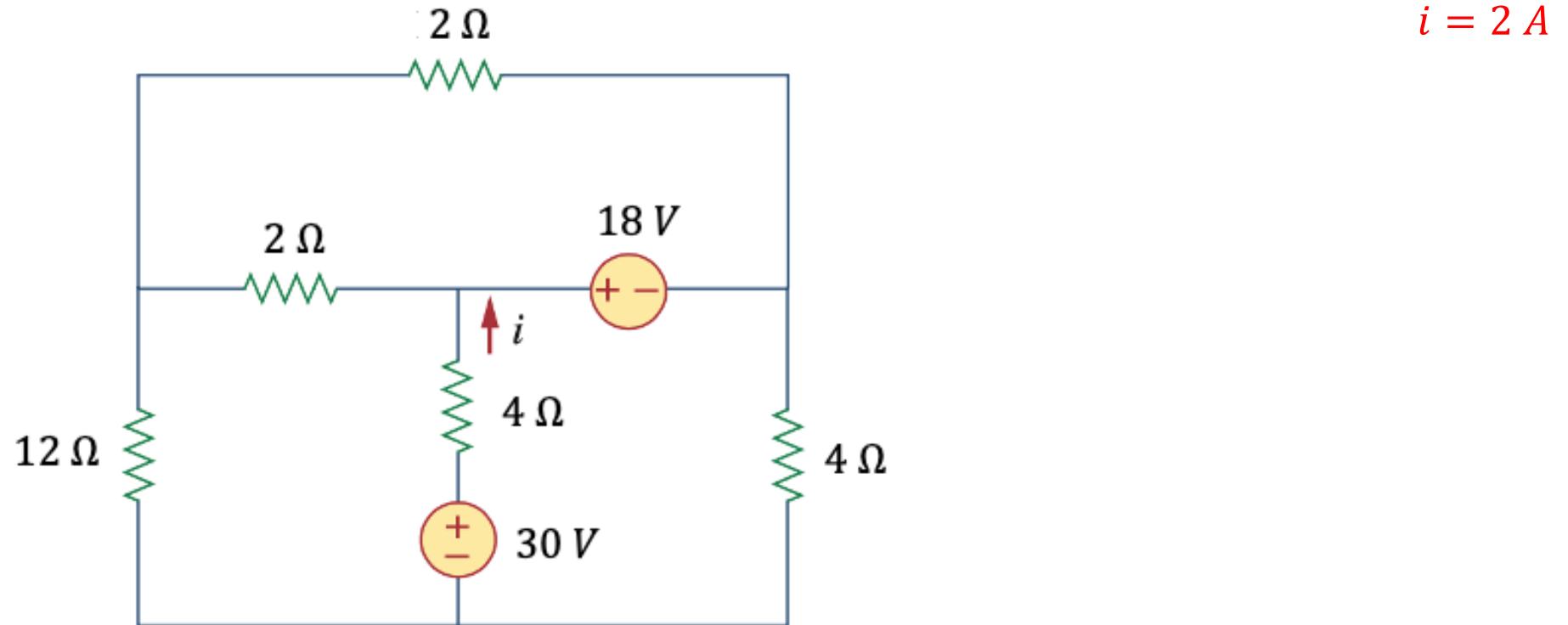
$$15v_1 = 290$$

$$v_1 = 19\frac{1}{3}$$

$$v_2 = 7\frac{1}{3}$$

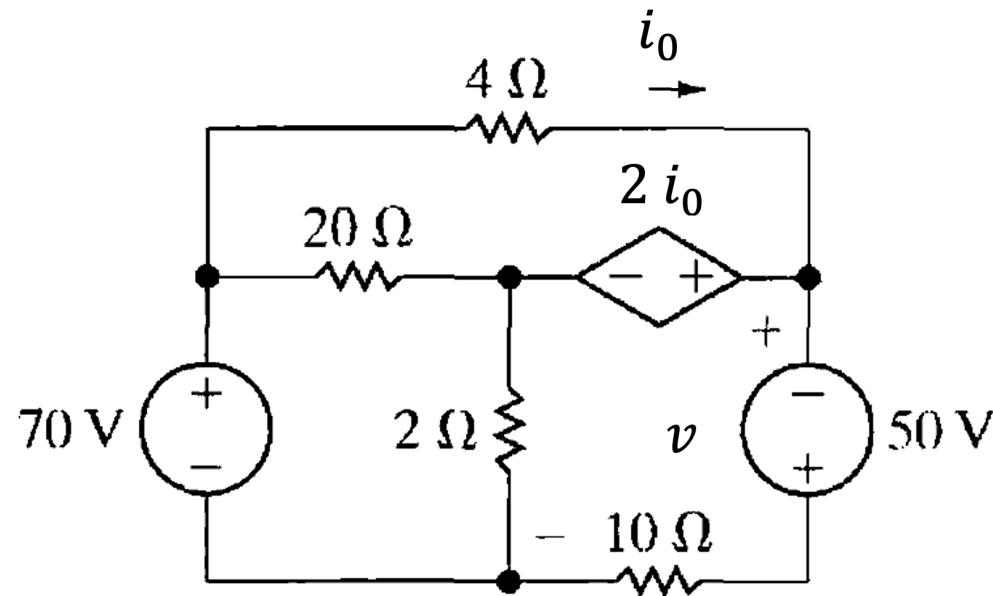
**Example:** find  $i$



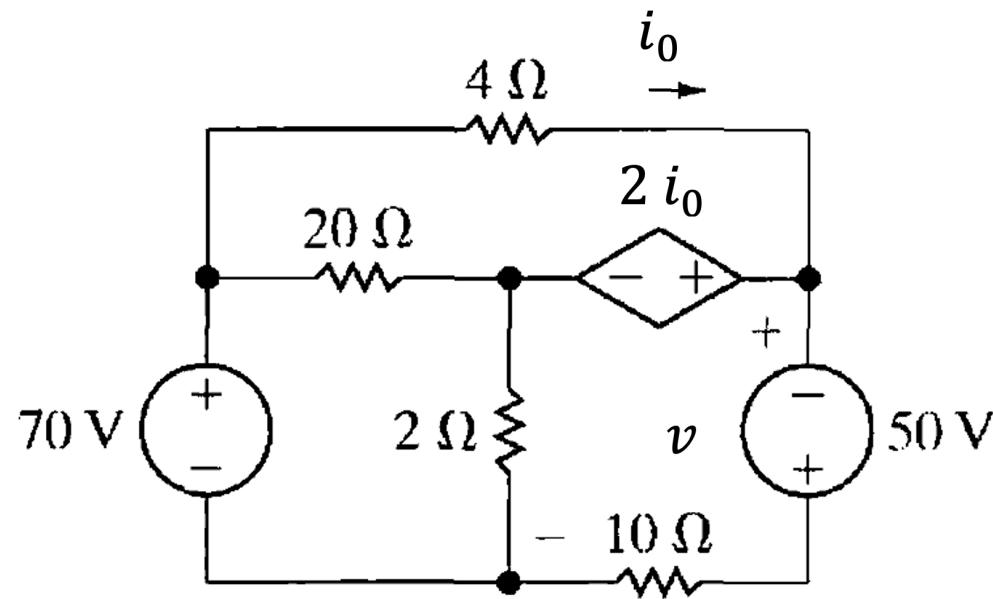


$$i = 2\ A$$

**Example:** find  $v$

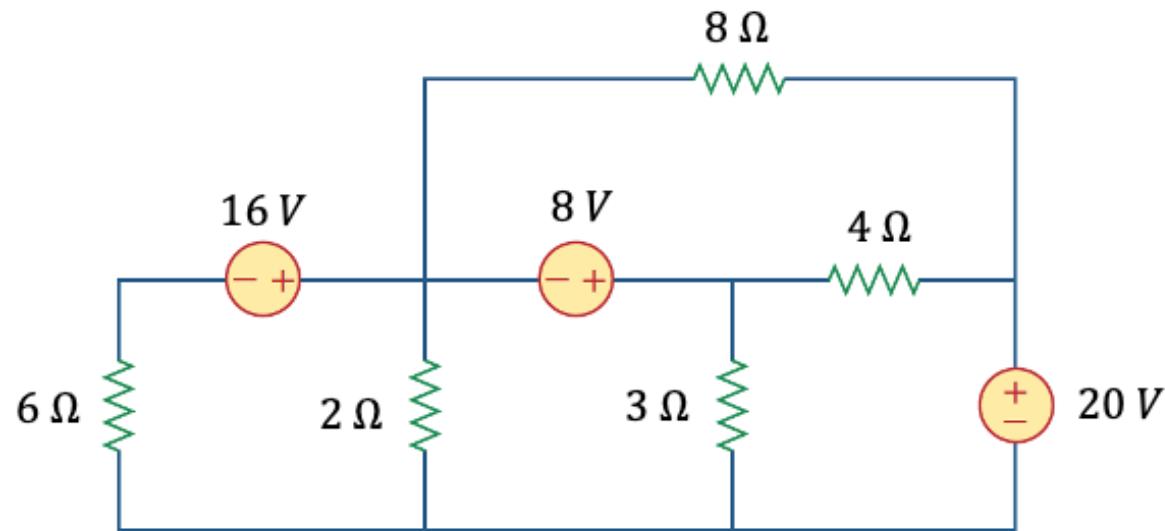


$$v = 30 \text{ V}$$



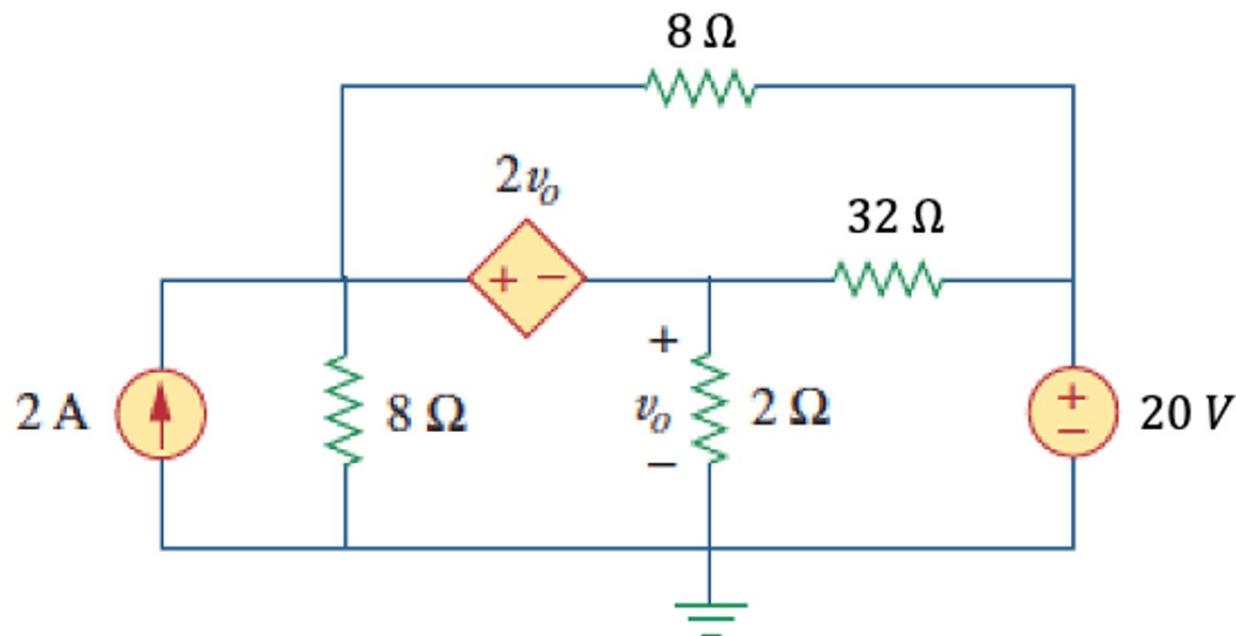
48 W

**Practice problem:** find the power of the  $3 \Omega$  resistor



$v_0 =$

Practice problem: find  $v_o$



$v_0 =$

Practice problem : find  $v_o$

