EXPERIMENT : No. 7 Verification of Superposition

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Principle

Q) Verify superposition principle by applying it in the circuit to find current through ~~Resistor~~ Resistor 'R'

→ The original circuit has 3 components.

1> 4V voltage source (current source)
2> 6A current source &
3> 2A current source

At first lets keep only 4V voltage source active

Thus,

finding net current by finding net resistance

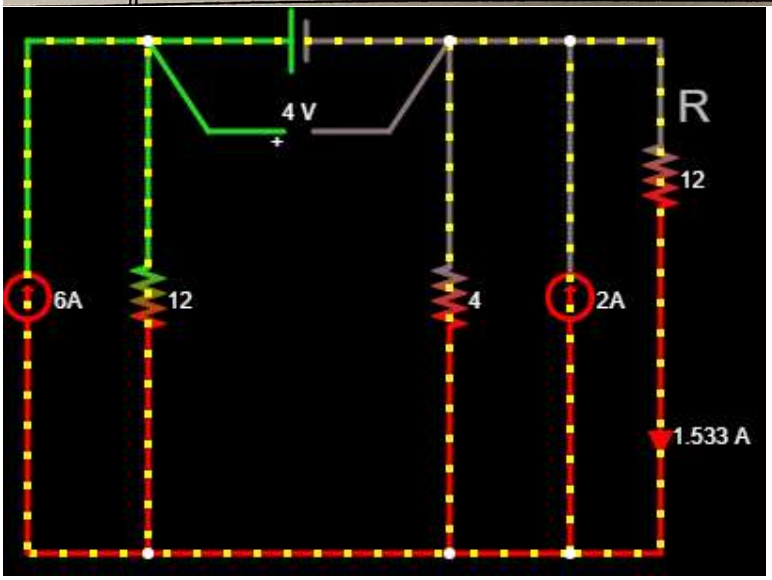
$$R_{net} = 12 + \frac{12 \times 4}{12+4}$$

$$= 12 + 3$$

$$R_{net} = 15\ \Omega$$

$$V = IR$$

$$I = \frac{4}{15} = 0.267\ A$$



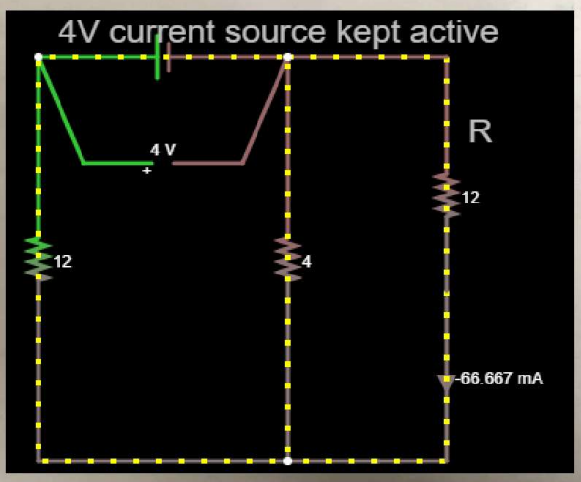
applying current division to find current through 'R'

$$I'_R = \frac{0.267 \times 4}{16\ 4}$$

$$= \frac{0.267}{4}$$

$$I'_R = \cancel{006}\ 0.067\ A$$

$$I'_R = 67\ mA\ (upward)$$



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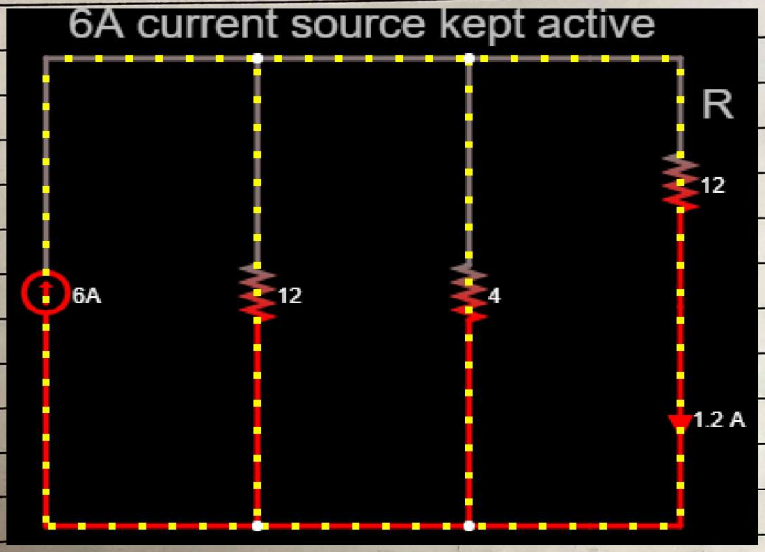
Now, keeping the 6A current source active

$$I_R'' = \frac{\frac{12\times4}{16}\times 6}{12+\frac{12\times4}{16}}$$

$$I_R'' = \frac{3\times6}{15}$$

$$I_R'' = 1.2\,A \quad (\text{downwards})$$

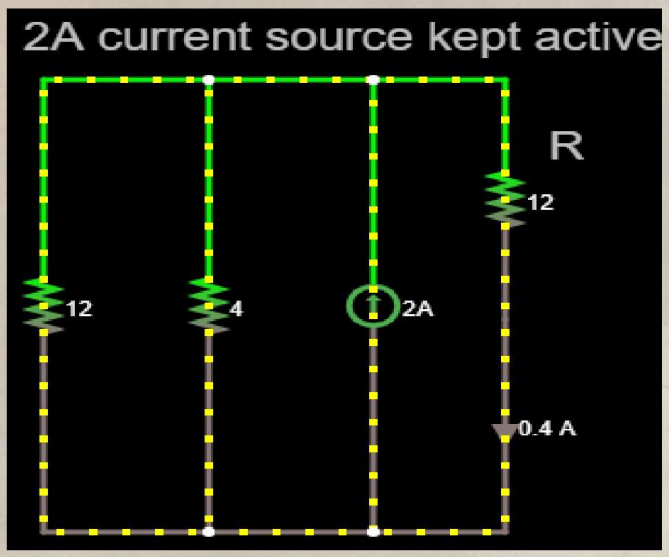


Now keeping the 2A current source active.

$$I_R''' = \frac{3 \times 2}{3+12}$$

$$= \frac{6}{15}$$

$$I_R''' = 0.4A \text{ Cupwards}$$



$$I_R = I_R' + I_R'' + I_R'''$$

$$= 0.4 + 1.2 - 0.067 \quad \text{(Consider upwards as negative)}$$

$$\boxed{I_R = 1.533\ A}$$

* We see that this value of I_R matches with simulation. Thus Superposition principle is verified.