

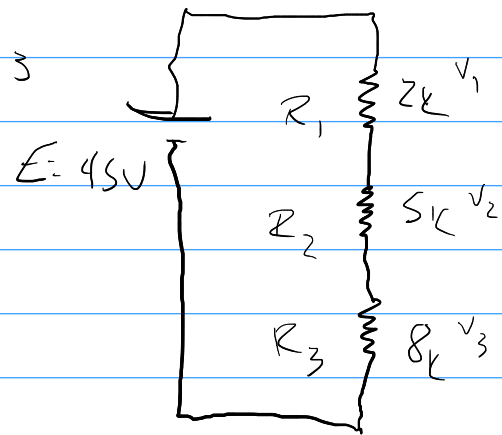
Example: find V_2 $\frac{1}{3}$ V_3

$$V_2 = \frac{R_2}{R_T} E$$

$$R_T = 2k + 5k + 8k = 15k$$

$$V_2 = \frac{5k}{15k} (45V) = 15V$$

$$V_3 = \frac{8k}{15k} (45V) = 24V$$

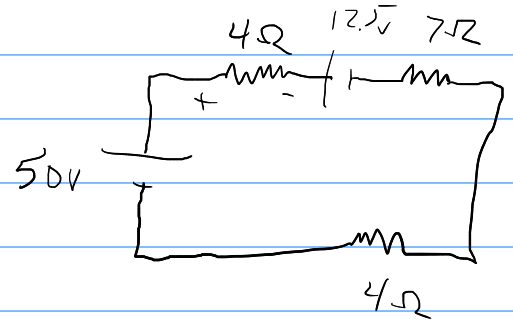


determine I

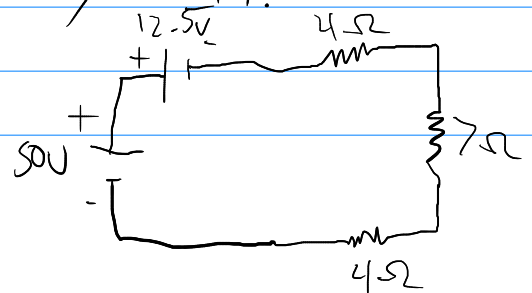
$$-50 + 4I + 12.5 + 7I + 4I$$

$$15I = 50 - 12.5$$

$$I = \frac{50 - 12.5}{15}$$



$$V_{7\Omega} = (7)(I) = (7)(2.5) = 17.5V$$



Example

Find V_a, V_b, V_c, V_d, V_e
 V_{ab}, V_{bc}, V_{ac}

$$V_a = 47V$$

$$-47 + 2kI + 3kI + 20 + 4kI = 0$$

$$9kI = 47 - 20 = 27 \quad I = \frac{27V}{9k} = 3mA$$

$$V_b = ? = 47 - 2kI = 47 - 2k(3mA) = 41V$$

$$V_c = V_b - 3kI = 41V - (3k \cdot 3mA) = 41 - 9 = 32V$$

$$V_d = V_c - 20 = 32V - 20 = 12V$$

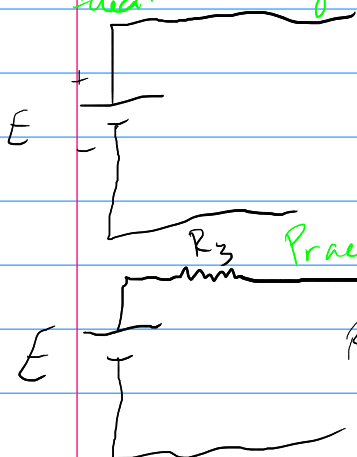
$$V_e = 0V$$

$$V_{ab} = V_a - V_b = 47V - 41V = 6V$$

$$V_{bc} = 41V - 32V = 9V$$

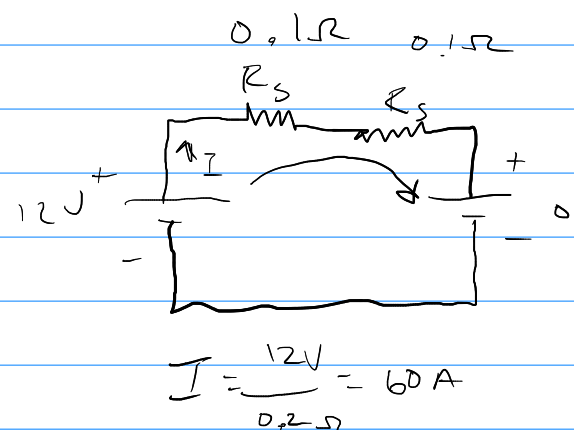
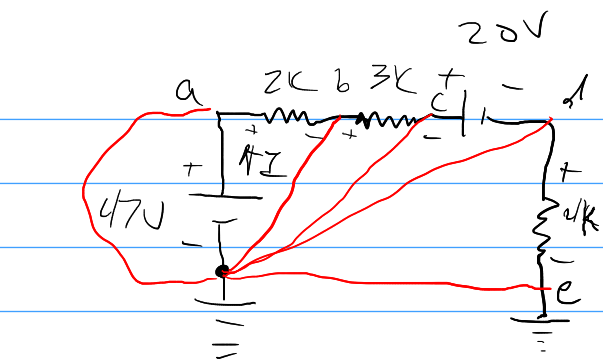
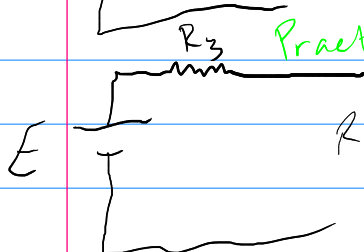
$$V_{ac} = V_a - V_c = 47V - 32V = 15V$$

Ideal voltage source



Practical voltage source

R_3 is very small



$$I = \frac{12V}{0.2\Omega} = 60A$$

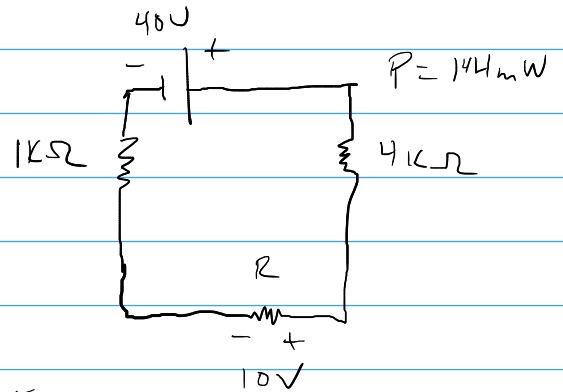
Example: Determine I of the unknown quantities

$$P = I^2 R$$

$$I^2 = \frac{P}{R} \quad I = \sqrt{\frac{P}{R}}$$

$$I = \frac{\sqrt{\frac{144 \text{ mW}}{4 \text{ k}}}}{1} = \frac{\sqrt{\frac{144 \cdot 10^{-3}}{4(10^3)}}}{1} = \frac{36(10)^{-6}}{1} = 6 \text{ mA}$$

$$R = \frac{V}{I} = \frac{10}{6 \text{ mA}} = 1.67 \text{ k}\Omega$$



Example: find all unknown

$$P_3 = I^2 R_3$$

$$I^2 = \frac{P_3}{R_3} = \frac{4}{1} = 4$$

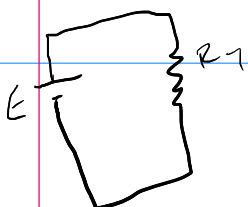
$$I = 2 \text{ A}$$

$$P_1 = I^2 R_1$$

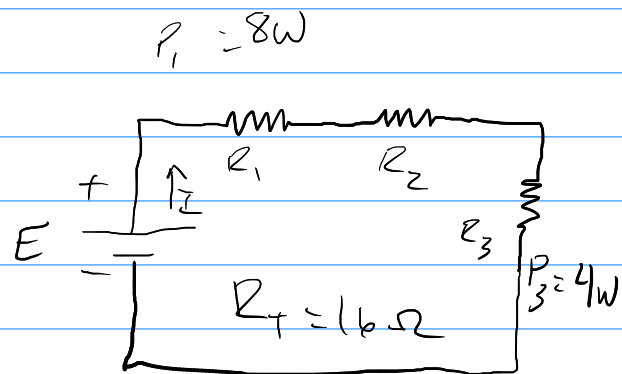
$$R_1 = \frac{P_1}{I^2} = \frac{8}{4} = 2 \Omega$$

$$R_T = R_1 + R_2 + R_3$$

$$R_2 = R_T - R_1 - R_3 = 16 - 2 - 1 = 13 \Omega$$



$$E = I \cdot R_T = (2)(16) = 32 \text{ V}$$



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b)

$$R_T = R + R + 2R + 3R + 4R = 11R$$

$$V_R = \frac{R}{R_T} V_S$$

$$8 = \frac{R}{11R} V_S$$

$$V_S = 88V$$

$$V_{2R} = \frac{2R}{11R} 88V = 16V$$

