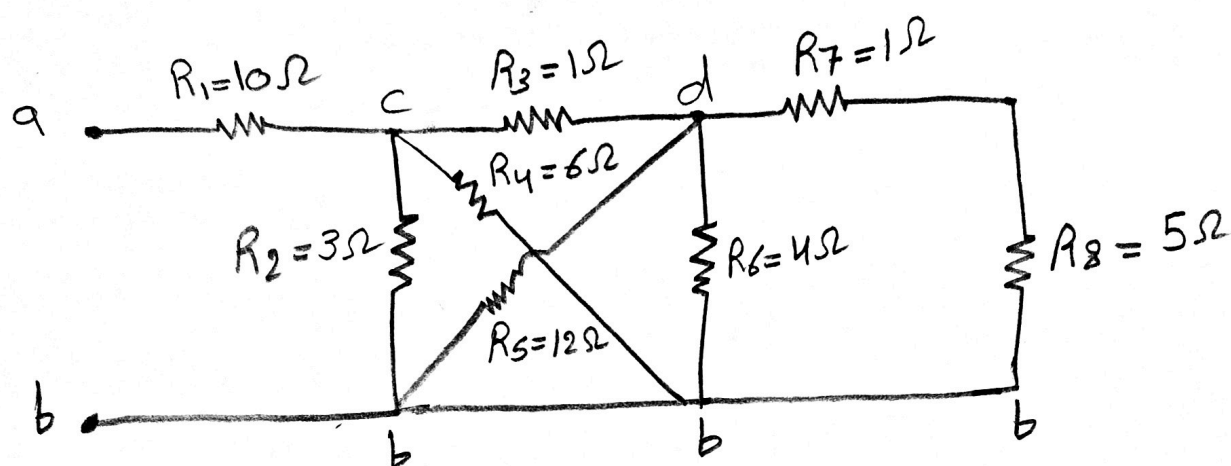
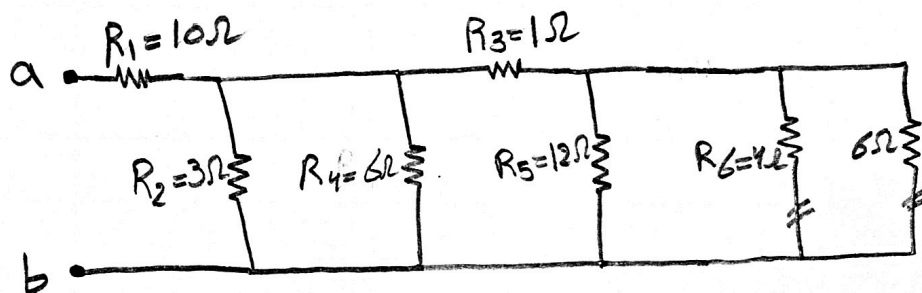


Example 1 calculate the equivalent resistance R_{ab} in the circuit shown.



Sol

$$\begin{aligned} R &= R_7 + R_8 \\ &= 1 + 5 \\ &= 6\Omega \end{aligned}$$



$$\begin{aligned} R &= R_6 \parallel R \\ &= \frac{4 * 6}{4 + 6} = 2.4\Omega \end{aligned}$$

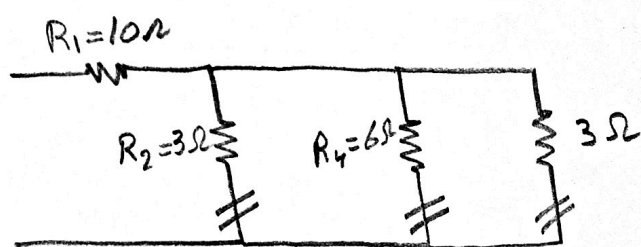
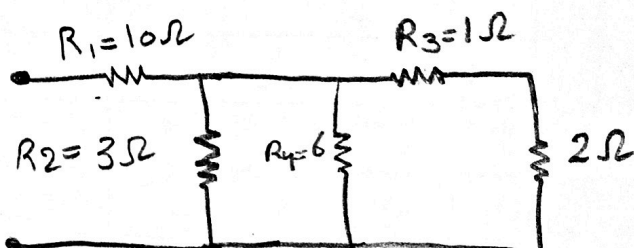
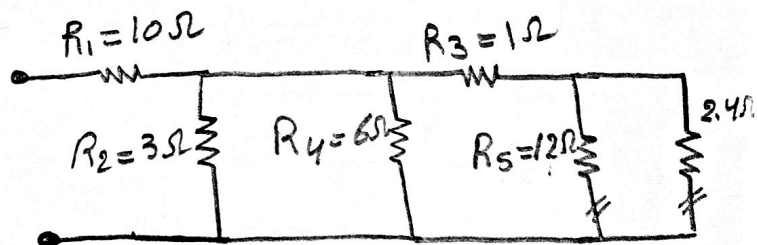
Now $R_5 \parallel 2.4\Omega$

$$R = \frac{12 * 2.4}{12 + 2.4} = 2\Omega$$

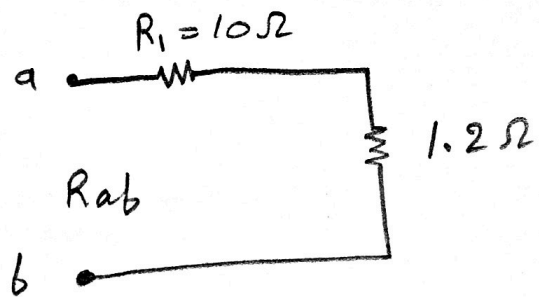
$$R_3 + 2 \Rightarrow 1 + 2 = 3\Omega$$

again $R_2 \parallel R_4 \parallel 3\Omega$

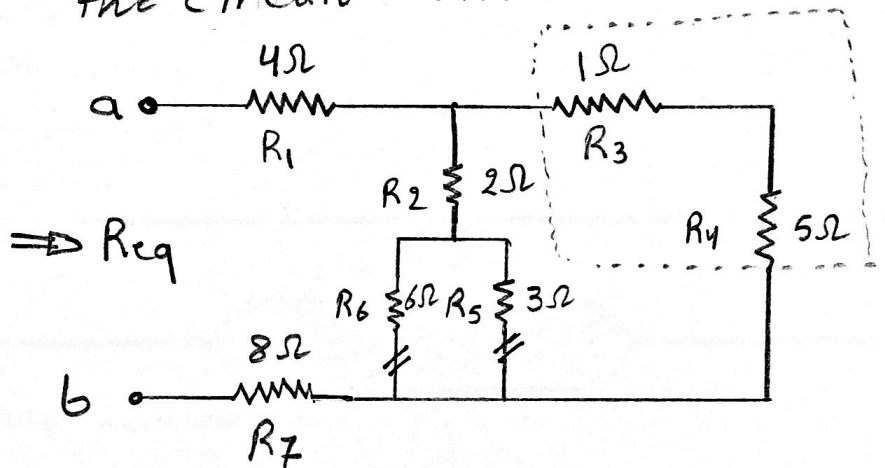
$$R = \frac{3 * 6 * 3}{18 + 9 + 18} = 1.2\Omega$$



$$\begin{aligned}\therefore R_{ab} &= R_1 + 1.2 \\ &= 10 + 1.2 \\ &= 11.2 \Omega\end{aligned}$$



Example 2 Calculate the equivalent resistance R_{eq} in the circuit shown.



SOL

$$\begin{aligned}R_6 \parallel R_5 &= \frac{R_6 R_5}{R_6 + R_5} \\ &= \frac{6 \times 3}{6 + 3} = 2 \Omega\end{aligned}$$

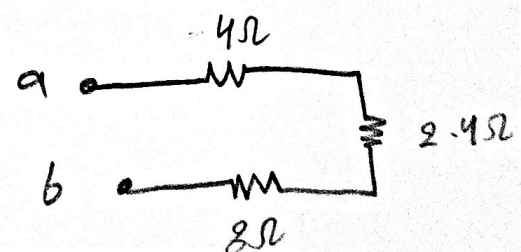
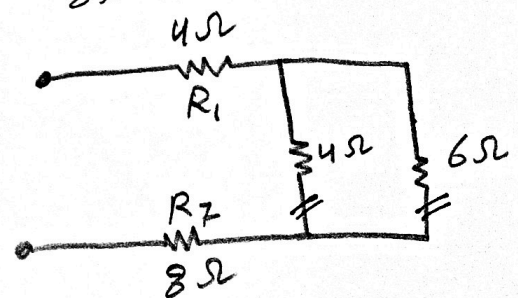
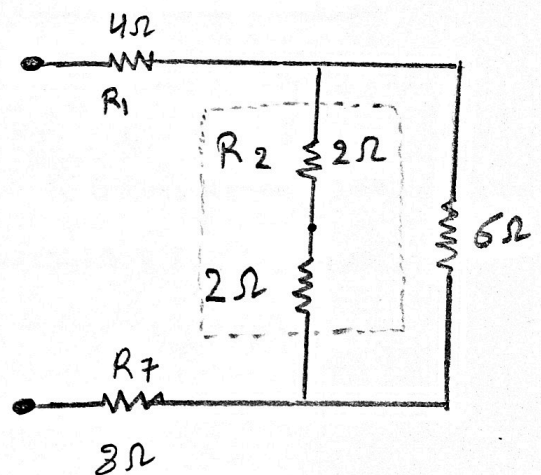
$$\therefore R_2 + 2 \Omega = 2 + 2 = 4 \Omega$$

now $4 \Omega \parallel 6 \Omega$

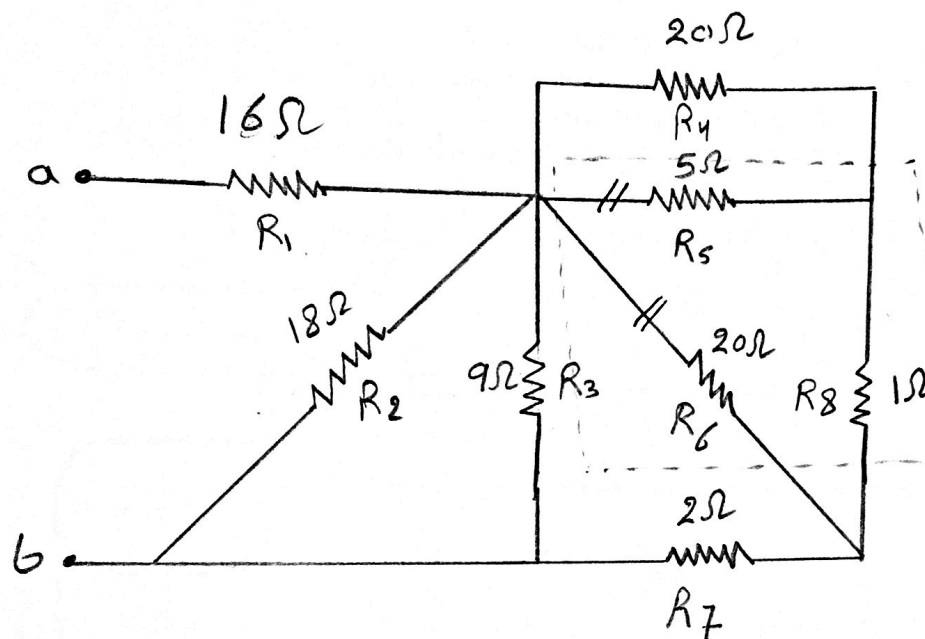
$$R = \frac{4 \times 6}{4 + 6} = 2.4 \Omega$$

$$\begin{aligned}R_{eq} = R_{ab} &= 4 + 8 + 2.4 \\ &= 14.4 \Omega\end{aligned}$$

$$\therefore R_3 \sim R_4 = 1 + 5 = 6 \Omega$$



Example 3: Calculate the equivalent resistance R_{ab} in the circuit shown.



Sol

$$R_5 \parallel R_6 \Rightarrow R = \frac{5 * 20}{5 + 20} = 4\Omega$$

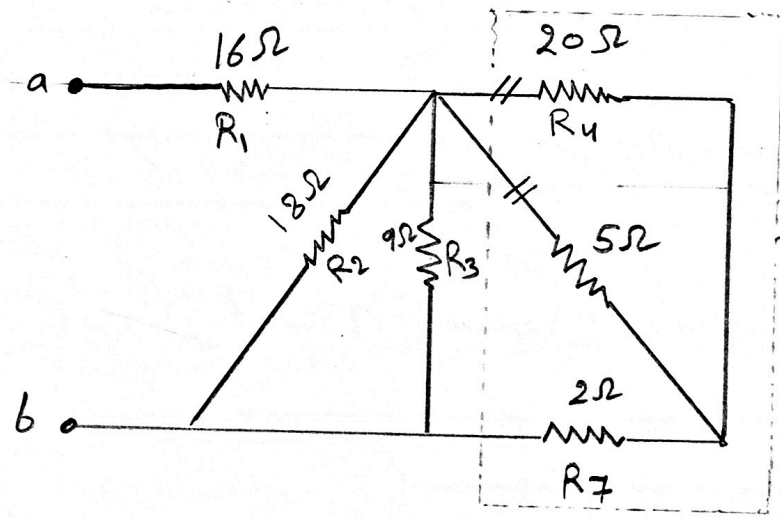
$$R_8 + 4\Omega \Rightarrow 1 + 4\Omega = 5\Omega$$

now

$$20\Omega \parallel 5\Omega$$

$$R = \frac{20 * 5}{20 + 5} = 4\Omega$$

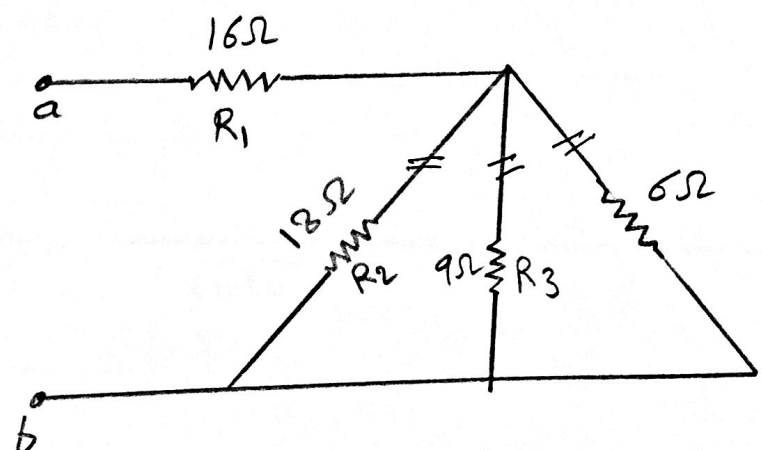
$$\therefore 4\Omega + 2\Omega = 6\Omega$$



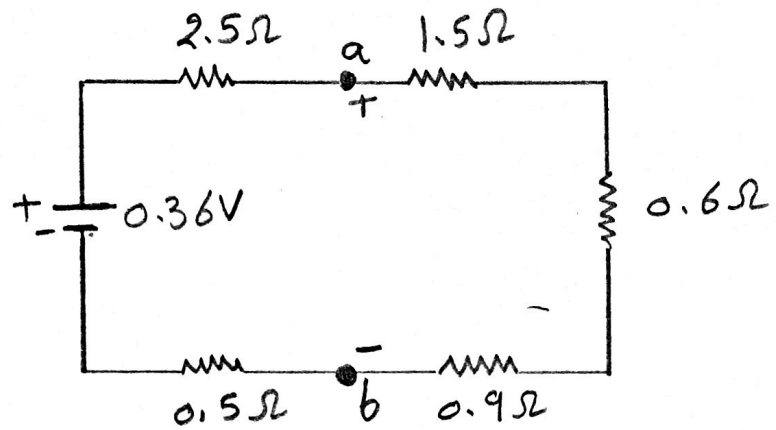
$$18\Omega \parallel 9\Omega \parallel 6\Omega$$

$$R = \frac{18 * 9 * 6}{18 * 9 + 18 * 6 + 9 * 6} = 3\Omega$$

$$R_{ab} = 3\Omega + 16\Omega = 19\Omega$$



Example 4 :: By using the voltage divider rule, find V_{ab}

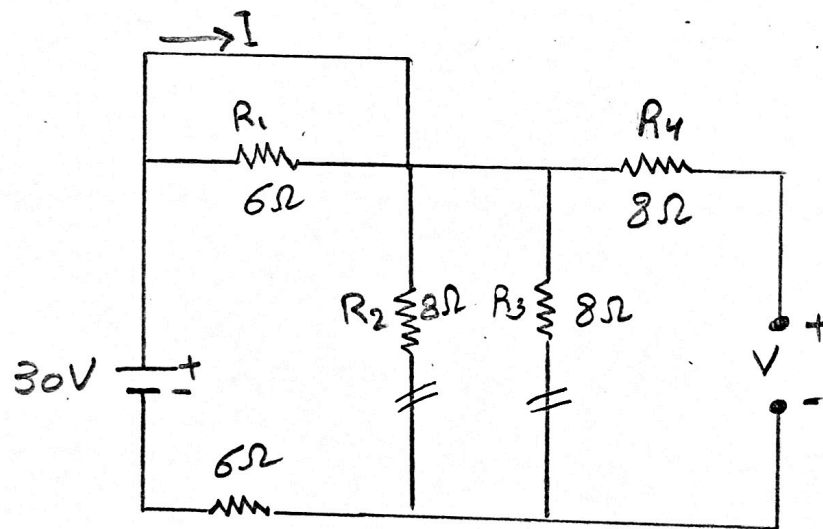


Sol

$$V_{ab} = \frac{E R_{ab}}{R_T}$$

$$= \frac{0.36 \times (1.5 + 0.6 + 0.9)}{2.5 + 1.5 + 0.6 + 0.9 + 0.5} = 0.18 \text{ V}$$

Example 5 :: For the circuit shown, calculate I .



Sol

- Because of the short circuit ($R_1 = 6\Omega$) is cancelled.
- Because of the open circuit, the current through $R_4 = 0$

$$R_T = (R_2 \parallel R_3) + R_5$$

$$= \frac{8 \times 8}{8 + 8} + 6 = 10 \Omega$$

$$I = \frac{E}{R_T} = \frac{30}{10} = 3 \text{ A}$$