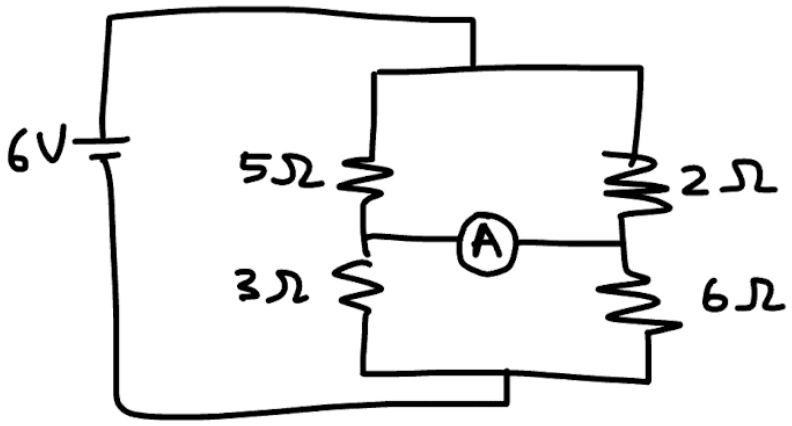
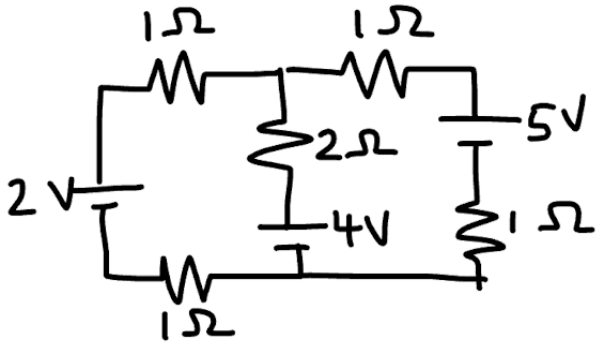
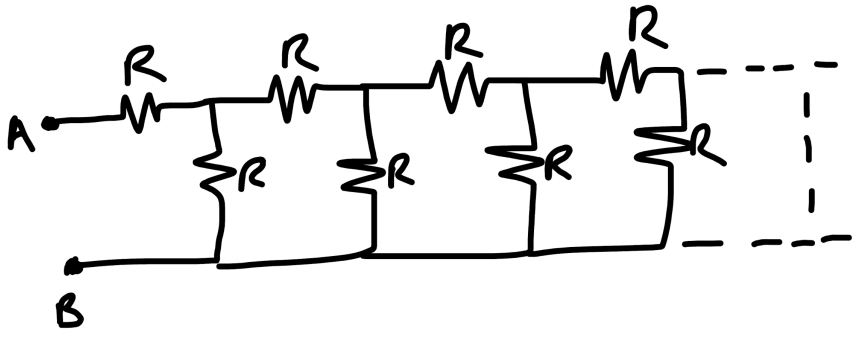
Determine the reading of the ammeter.



Determine the current in each branch of the circuit.



Determine the equivalent resistance between points *A* and *B* in terms of *R*.



Determine the reading of the ammeter.

① $I_T = I_1 + I_2$

② $I_2 = I_A + I_4$

③ $I_1 + I_A = I_3$

④ $I_3 + I_4 = I_T$

⑤ $V_T = V_1 + V_3$

$6 = 5I_1 + 3I_3$

⑥ $V_T = V_1 + V_4$

$6 = 5I_1 + 6I_4$

⑦ $V_T = V_2 + V_3$

$6 = 2I_2 + 3I_3$

⑧ $V_T = V_2 + V_4$

$6 = 2I_2 + 6I_4$

$6 = 5I_1 + 3I_3$ ⑤

$-(6 = 5I_1 + 6I_4)$ ⑥

$0 = 3I_3 - 6I_4$

$I_3 = 2I_4$

$6 = 5I_1 + 3I_3$ ⑤

$-(6 = 2I_2 + 3I_3)$ ⑦

$0 = 5I_1 - 2I_2$

$I_2 = \frac{5}{2} I_1$

④ $I_3 + I_4 = I_T$

$(2I_4) + I_4 = I_T$

$3I_4 = I_T$

$I_4 = \frac{1}{3} I_T$

① $I_T = I_1 + I_2$

$I_T = I_1 + (\frac{5}{2} I_1)$

$I_T = \frac{7}{2} I_1$

$I_1 = \frac{2}{7} I_T$

⑥ $6 = 5I_1 + 6I_4$

$6 = 5\left(\frac{2}{7}I_T\right) + 6\left(\frac{1}{3}I_T\right)$

$6 = \frac{10}{7}I_T + 2I_T$

$6 = \frac{24}{7}I_T$

$I_T = \frac{7}{4}\ A$

$I_4 = \frac{1}{3}I_T = \frac{7}{12}\ A$

$I_1 = \frac{2}{7}I_T = \frac{1}{2}\ A$

$I_2 = \frac{5}{2}I_T = \frac{5}{4}\ A$

$I_3 = 2I_4 = \frac{7}{6}\ A$

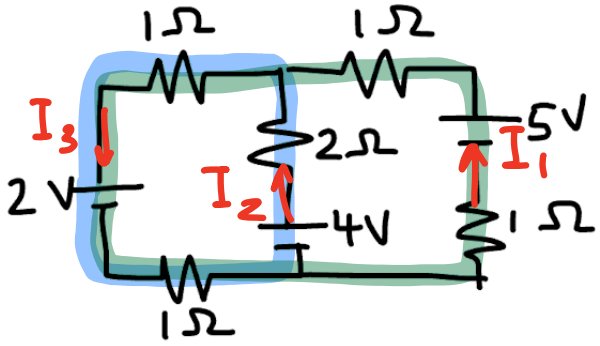
② $I_2 = I_A + I_4$

$I_A = I_2 - I_4$

$= \frac{5}{4} - \frac{7}{12}$

$= \boxed{\frac{2}{3}\ A}$

Determine the current in each branch of the circuit.



① $I_1 + I_2 = I_3$

② $5 - 1I_1 - 1I_3 - 2 - 1I_3 - 1I_1 = 0$

$3 - 2I_1 - 2I_3 = 0$

③ $4 - 2I_2 - 1I_3 - 2 - 1I_3 = 0$

$2 - 2I_2 - 2I_3 = 0$

① $I_1 + I_2 = I_3$

$I_1 = I_3 - I_2$ (A)

② $3 - 2I_1 - 2I_3 = 0$

$3 - 2(I_3 - I_2) - 2I_3 = 0$

$3 + 2I_2 - 4I_3 = 0$ (B)

$$\begin{array}{r} 3 + 2I_2 - 4I_3 = 0 \quad (B) \\ +\ (2 - 2I_2 - 2I_3 = 0) \quad (3) \\ \hline 5 \qquad -6I_3 = 0 \end{array}$$

$$\boxed{I_3 = \frac{5}{6}\ A}$$

③ $2 - 2I_2 - 2I_3 = 0$

$2 - 2I_2 - 2\left(\frac{5}{6}\right) = 0$

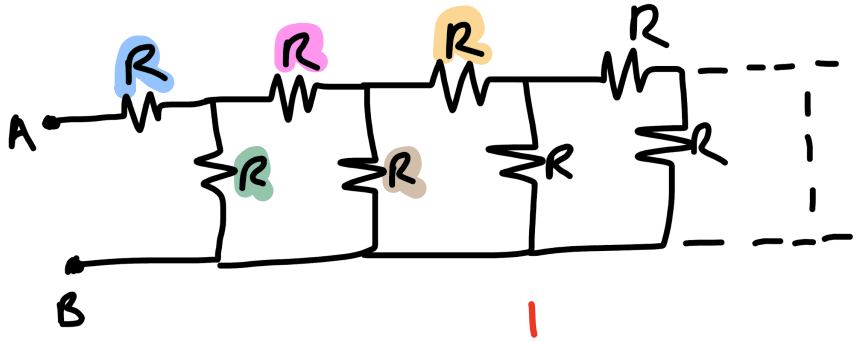
$$\boxed{I_2 = \frac{1}{6}\ A}$$

(A) $I_1 = I_3 - I_2$

$I_1 = \frac{5}{6} - \frac{1}{6}$

$$\boxed{I_1 = \frac{4}{6}\ A}$$

Determine the equivalent resistance between points *A* and *B* in terms of *R*.



$$R_{eq} = R + \cfrac{1}{\frac{1}{R} + \cfrac{1}{R + \cfrac{1}{\frac{1}{R} + \frac{1}{R + \dots}}}}$$

$$= R + \cfrac{1}{\frac{1}{R} + \frac{1}{R_{eq}}}$$

$$= R + \cfrac{1}{\frac{R_{eq} + R}{R R_{eq}}}$$

$$= R + \frac{R R_{eq}}{R_{eq} + R}$$

$$R_{eq}^2 + \cancel{R R_{eq}} = R R_{eq} + R^2 + \cancel{R R_{eq}}$$

$$R_{eq}^2 - R R_{eq} - R^2 = 0 \qquad a = 1,\ b = -R,\ c = -R^2$$

$$R_{eq} = \frac{-(-R) \pm \sqrt{(-R)^2 - 4(1)(-R^2)}}{2(1)}$$

$$= \frac{R \pm \sqrt{5R^2}}{2} = \frac{R \pm \sqrt{5}R}{2} = \boxed{\frac{1+\sqrt{5}}{2} R}$$

$R_{eq} > 0 \rightarrow$ REJECT NEGATIVE SOLUTION