1. Original circuit

R1
100 Ω

R3
100 Ω

VA
6 V

R2
200 Ω

VB
3 V

Consider only V$_A$

R1
100 Ω   V$_{XA}$ R3
100 Ω

VA
6 V

R2
200 Ω

$$\frac{6 - V_{XA}}{1\cancel{00}} = \frac{V_{XA}}{2\cancel{00}} + \frac{V_{XA}}{1\cancel{00}}$$

$$\frac{6 - V_{XA}}{1} = \frac{V_{XA}}{2} + \frac{V_{XA}}{1}$$

$$6 - V_{XA} = 0.5V_{XA} + V_{XA}$$

$$6 = 0.5V_{XA} + V_{XA} + V_{XA}$$

$$6 = 2.5V_{XA}$$

$$V_{XA} = \frac{6}{2.5} = 2.4\ V$$

R1
100 Ω   V$_{XA}$
2.4 V   R3
100 Ω

6   0

+ V$_{1A}$ −   + V$_{3A}$ −
4.4 V   2.4 V

VA
6 V

V$_{2A}$
2.4 V   R2
200 Ω

−

0

$I_{1A} = V_{1A}/R_1 = 3.6/100$ = 36 mA $I_{3A} = V_{3A}/R_3 = 2.4/100$ = 24 mA

R1
100 Ω   V$_{XA}$
2.4 V   R3
100 Ω

6

+ V$_{1A}$ −   + V$_{3A}$ −
3.6 V   2.4 V

VA
6 V

V$_{2A}$
2.4 V   R2
200 Ω $I_{2A} = V_{2A}/R_2$
= 2.4/200
= 12 mA

−

0   0

Consider only V$_B$

R1
100 Ω   V$_{XB}$ R3
100 Ω

R2
200 Ω

VB
3 V

$$\frac{3 - V_{XB}}{1\cancel{00}} = \frac{V_{XB}}{2\cancel{00}} + \frac{V_{XB}}{1\cancel{00}}$$

$$\frac{3 - V_{XB}}{1} = \frac{V_{XB}}{2} + \frac{V_{XB}}{1}$$

$$3 - V_{XB} = 0.5V_{XB} + V_{XB}$$

$$3 = 0.5V_{XB} + V_{XB} + V_{XB}$$

$$3 = 2.5V_{XA}$$

$$V_{XB} = \frac{3}{2.5} = 1.2\ V$$

R1
100 Ω   V$_{XB}$
1.2 V   R3
100 Ω

0   3

− V$_{1B}$ +   − V$_{3B}$ +
1.2 V   1.8 V

V$_{2B}$
1.2 V   R2
200 Ω

−

0   0

$I_{1B} = V_{1B}/R_1 = 1.2/100$ = 12 mA $I_{3B} = V_{3B}/R_3 = 1.8/100$ = 18 mA

R1
100 Ω   V$_{XB}$
1.2 V   R3
100 Ω

0   3

− V$_{1B}$ +   − V$_{3B}$ +
1.2 V   1.8 V

V$_{2B}$
1.2 V   R2
200 Ω $I_{2B} = V_{2B}/R_2$
= 1.2/200
= 6 mA   VB
3 V

−

0   0

Combined voltage

Combined current

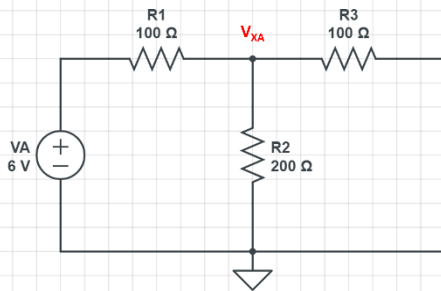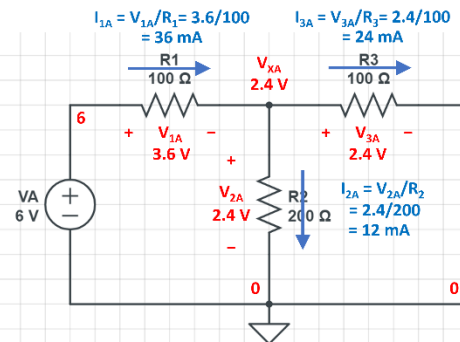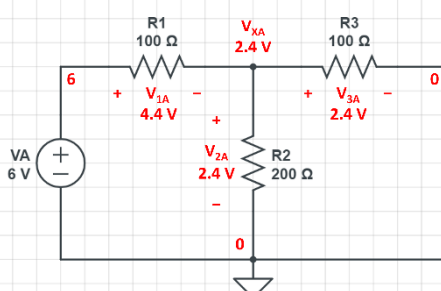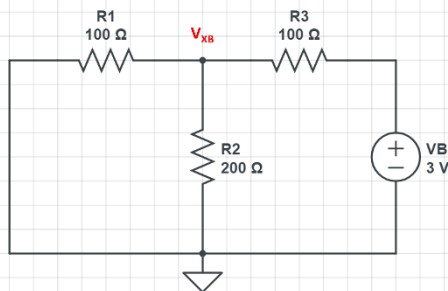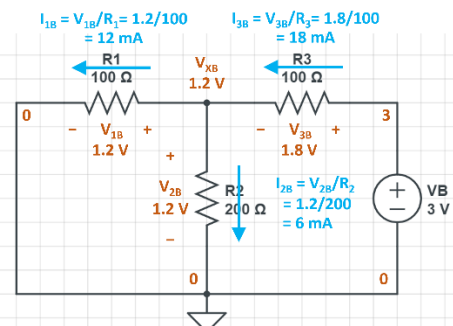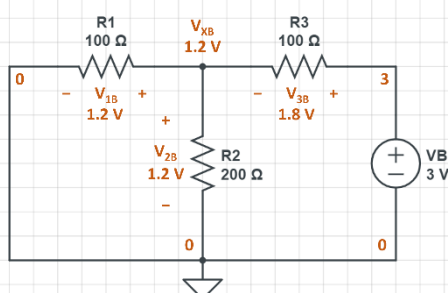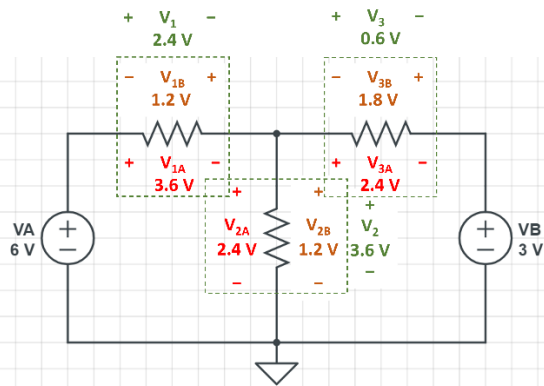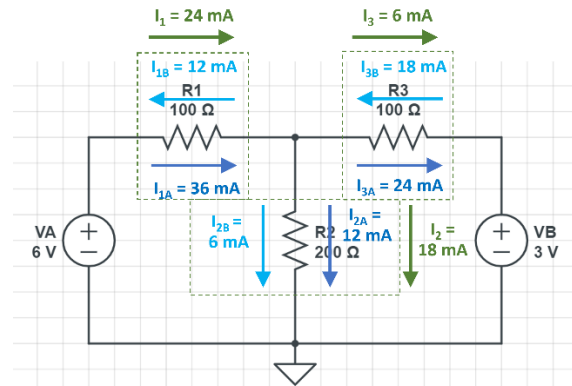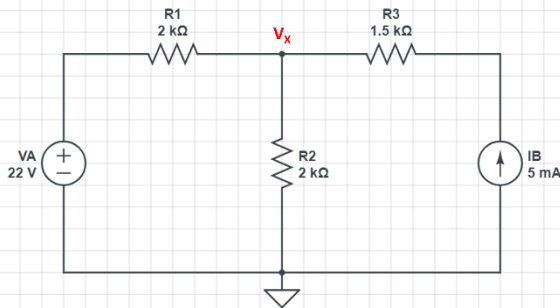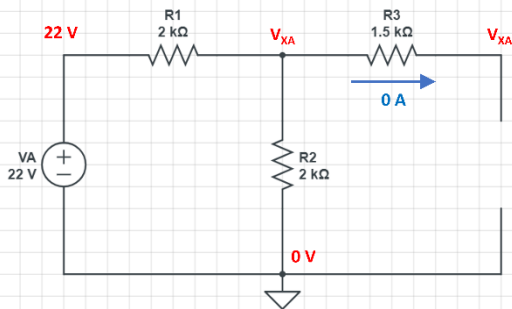## 2. Original circuit

Consider only V$_A$
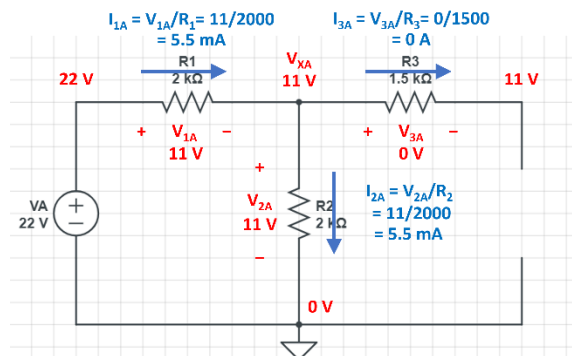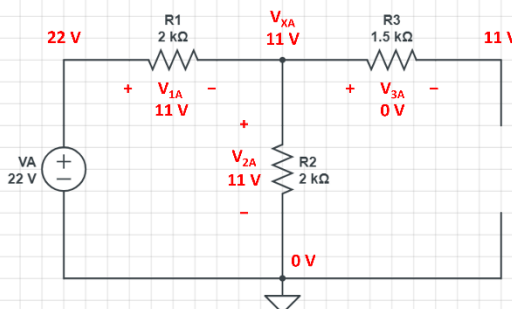

$$\frac{22 - V_{XA}}{2k} = \frac{V_{XA}}{2k} + 0$$

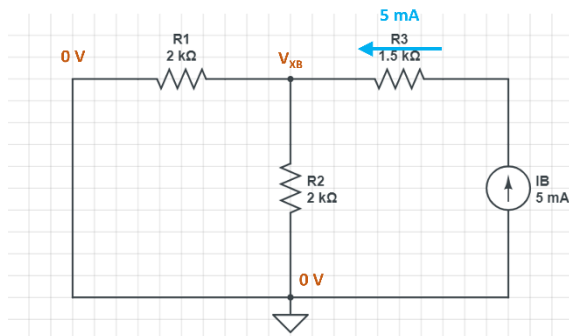$$\frac{22 - V_{XA}}{2} = \frac{V_{XA}}{2}$$

$$11 - 0.5V_{XA} = 0.5V_{XA}$$

$$11 = 0.5V_{XA} + 0.5V_{XA}$$

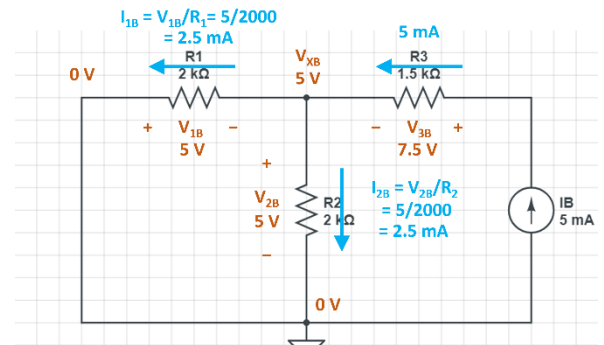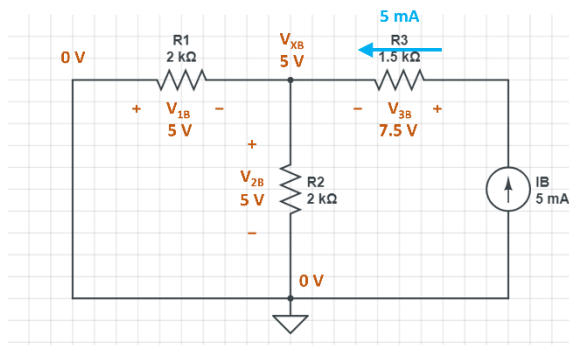$$11 = 1V_{XA}$$

$$V_{XA} = 11 \text{ V}$$

Consider only I_B

$$\frac{5}{1\cancel{000}} = \frac{V_{XB} - 0}{2\cancel{000}} + \frac{V_{XB} - 0}{2\cancel{000}}$$
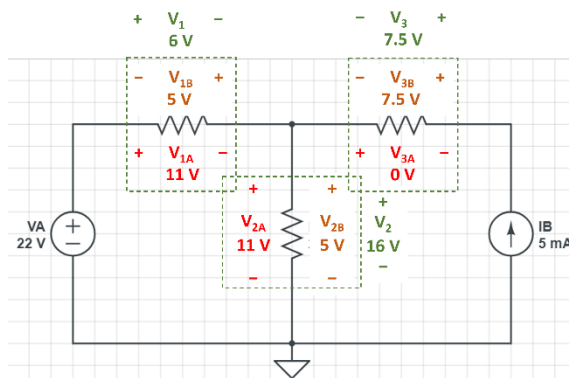
$$\frac{5}{1} = \frac{V_{XB} - 0}{2} + \frac{V_{XB} - 0}{2}$$

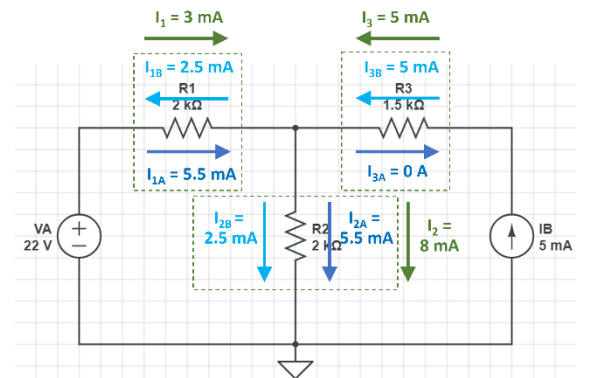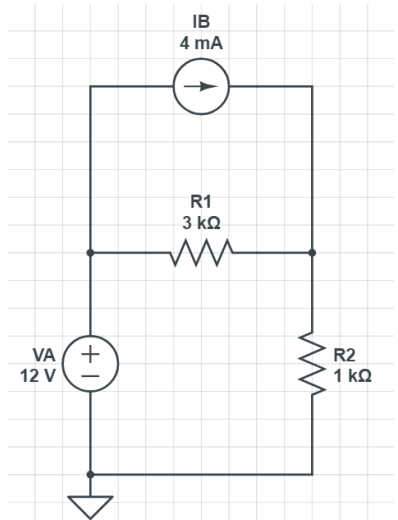$$5 = 0.5V_{XB} + 0.5V_{XB}$$

$$5 = 1V_{XB}$$

$$V_{XB} = 5 \text{ V}$$

Combined voltage

Combined current

3. Original circuit
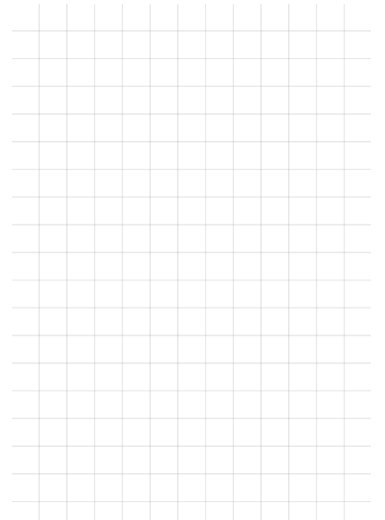
Consider only V_A

Find V_XA
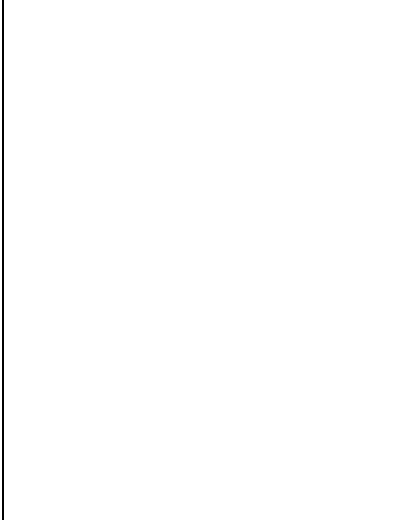
Specify V₁ₐ and V₂ₐ on the circuit

Specify I₁ₐ and I₂ₐ on the circuit

Consider only Iв

Find Vхв

Specify V₁в and V₂в on the circuit

Specify I₁в and I₂в on the circuit

Combined voltage

Combined current