

Övning 1 HE1027 – Intro to EI, Series-parallel connection

1. Hur stor laddning har ett föremål som har ett elektronunderskott på stycken 4600 elektroner?

Calculate amount of charge represented by 4600 electrons?

$$4600/6,24 \cdot 10^{-18} = 7,369 \cdot 10^{-16} \text{ C}$$

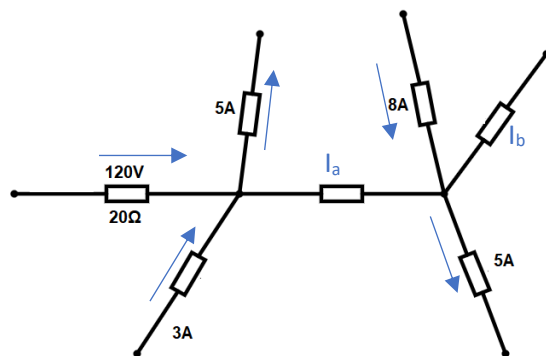
2. Genom en ledare flyter en elektrisk ström på 7,4 A. Beräkna hur stor nettoladdning som transporteras genom ett tvärsnitt på ledaren under tiden 20 sek.

A current of 7,4 A flows through a conductor. Calculate how much charge passes through this conductor in 20 s.

$$q = it = 20 \cdot 7,4 = 148 \text{ C}$$

3. Beräkna strömmen I_a och I_b (storlek och riktning).

Calculate current I_a and I_b and their directions.

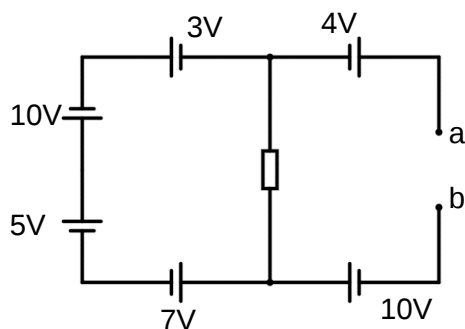


$$I_a = 120/20 + 3 - 5 = 6 + 3 - 5 = 4 \text{ A (towards 8A and 5A)}$$

$$I_b = 8 + 4 - 5 = 7 \text{ A (away from } I_a)$$

4. Bestäm spänningen V_{ab} .

Find V_{ab} .



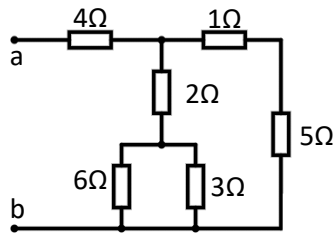
$$V_R = 10 + 3 + 7 - 5 = 15 \text{ V (top is negative, bottom is positive)}$$

$$V_{ab} = 10 - 15 + 4 = -1 \text{ V (top is negative, bottom is positive)}$$

5. Bestäm resistansen R_{ab} .

Find resistance R_{ab} .

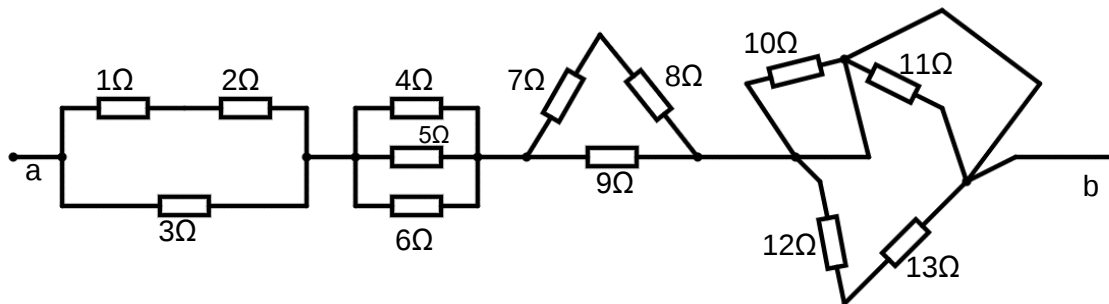
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$$R = 4 + (2 + 6 // 3) // (1 + 5) = 4 + (2 + 2) // 6 = 4 + 2,4 = 6,4 \Omega$$

6. Bestäm resistansen R_{ab} .

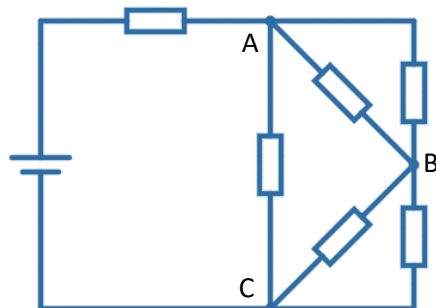
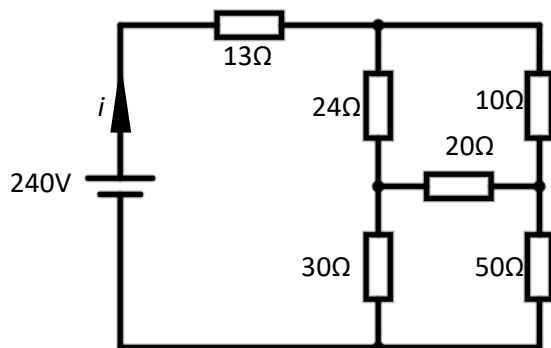
Find resistance R_{ab} .



$$R_{total} = (1+2) // 3 + 4 // 5 // 6 + (7+8) // 9 = 1,5 + 1,621 + 5,625 = 8,746 \Omega$$

7. Bestäm strömmen i .

Find current i .



$$R_{AC} = 24 * 30 * (1/24 + 1/30 + 1/20) = 90 \Omega$$

$$R_{AB} = 24 * 20 * (1/24 + 1/30 + 1/20) = 60 \Omega$$

$$R_{CB} = 30 * 20 * (1/24 + 1/30 + 1/20) = 75 \Omega$$

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$$R_{Total} = 13 + AC // (AB // 10 + CB // 50) = 13 + 90 // (60 // 10 + 75 // 50) = 13 + 90 // (8.571 + 30) = 13 + 27 = 40 \Omega$$

$$I_{Total} = 240 / 40 = 6A$$