

## 2 Basic Circuits and Circuit Laws

1.

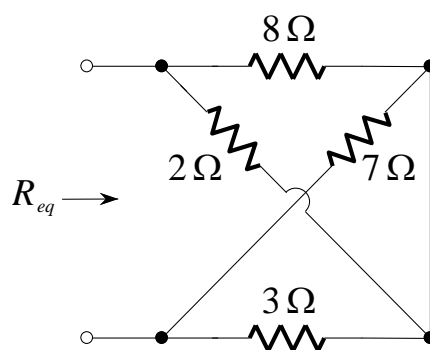
The current through a given circuit element is given by  $i(t) = 2e^{-t}$  A. Graph the current and find the net charge that passes through the element in the interval from  $t = 0$  to  $t = \infty$ .

2.

Compute the resistance of a copper wire having a diameter of 1.5 mm and a length of 5 m, given  $\rho_{\text{copper}} = 1.7 \times 10^{-8} \Omega \cdot \text{m}$ .

3.

Find  $R_{eq}$  for the network shown below:



4.

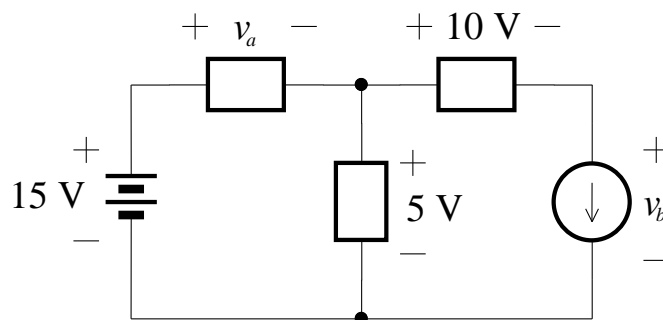
Carefully define or explain each of the following terms in your own words giving units where appropriate:

- a) Electrical current
- b) Voltage
- c) Direct current
- d) Alternating current

## 2.2

5.

With the circuit shown below, find the voltages  $v_a$  and  $v_b$ .



6.

Given that  $i_A = 1\text{ A}$ ,  $i_B = -5\text{ A}$ ,  $i_D = 3\text{ A}$ , and  $i_H = 2\text{ A}$ , determine the values of the other unknown currents shown in the circuit below:

