1. Complete the following sentences (*larger/smaller*):

a) The larger the resistance (at equal voltage), the ..... the electric current.

b) The larger the voltage (at equal resistance), the ..... the electric current.

c) The smaller the resistance (at equal voltage), the ..... the electric current.

d) The smaller the voltage (at equal resistance), the ..... the electric current.

2. Calculate the missing quantities. Don't forget to write down the formula you used for your calculation.

	voltage	current	resistance	charge	time
a)		2.00 A	12.0 Ω		2.00 min
b)	150 V	6.00 A			80.0 s
c)	220 V		200 Ω		5.00 s
d)		10.0 A	600 Ω	25.0 C	
e)	4.00 V			300 C	1.00 min
f)		20.0 mA	225 Ω	1'728 C	

3. Two voltage sources are talking about themselves. Complete the sentences:

a) Battery: «I am a voltage source for .....(*direct/alternating*) current. I push the electrons..... (*back and forth*/*always in the same direction*). My positive and my negative pole ..... (*remain in the same place/change places all the time*).»

b) Power outlet: «I am a voltage source for .....(*direct/alternating*) current. I push the electrons..... (*back and forth*/*always in the same direction*). My positive and my negative pole ..... (*remain in the same place/change places all the time*).»

4. A current of a magnitude of 0.100 A is flowing through a resistor at a voltage of 40.0 V for 1.00 min.

a) What is the magnitude of the electric resistance?
b) Calculate the amount of charge that passed through the resistor.
c) How much work did the voltage source perform on the charge?

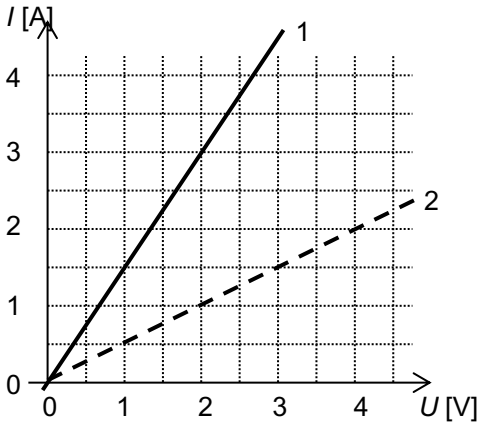
5. Depicted to the right you can see a graph describing how the electric current depends on the voltage in two different wires of constantan.

a) Which one of the wires shows more resistance: 1 or 2?

b) How much voltage is needed for a current of 3.0 A to flow in wire 1?

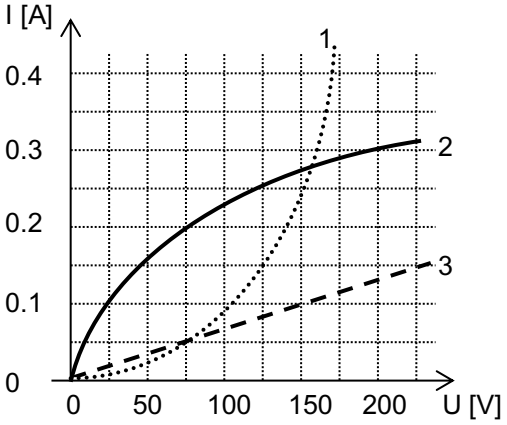
c) How much current flows in wire 2 at a voltage of 13.0 V?

d) Depict the graph of wire 3 (constantan) with a resistance of R = 1.0 Ω.



6. A flashlight operates at a voltage of 4.5 V and its light bulb has a resistance of 90.0 Ω. How long does it take for 10'000 electrons to flow through a cross section area in the wire of the light bulb?

7. Here are the current-voltage characteristics of three electric conductors. (A current-voltage characteristic is a graph showing how the current through a wire depends on the voltage applied across it).



a) In which ones of the wires is the electrical resistance a constant?

b) How does the resistance change in the other wires? Does it increase or decrease with increasing voltage?

c) What materials could 1, 2 and 3 be?

d) Calculate the electrical resistance of each of the three conductors at 75 V, 125 V and at 0.10 A.

Solutions:

2. a) 24 V, 240 C b) 25 Ω, 480 C c) 1.1 A, 5.5 C d) 6.0 kV, 2.5 s e) 5.0 A, 0.80 Ω f) 4.5 V, 1 day
4. a) 400 Ω b) 6.00 C c) 240 J
5. b) 2.0 V c) 6.5 A
6. $3.2 \cdot 10^{-14}$ s
7. d)

	75 V	125 V	0.10 A
1:	1500 Ω	833 Ω	1000 Ω
2.	375 Ω	500 Ω	250 Ω
3:	1500 Ω	1500 Ω	1500 Ω