

## Electrical Power and Energy

### Power

- Calculate the power of the following devices
  - a light bulb which takes a current of 0.25 A from a 220 V supply
  - an electric motor which takes 4.5 A from a 220 V supply.
- Two electric heaters have the following figures written on them

heater 1	220 V	1.5 kW
heater 2	110 V	2.2 kW

  - Calculate the current which will flow in heater 1 (when working normally).
  - Calculate the current which will flow in heater 2 (when working normally).
  - Which of the two heaters has the lower resistance to the flow of electric current?
- An electric motor is connected to a supply and a current of 0.4 A flows. The power of the motor is 0.8 kW. What is the voltage of the supply?
- A motor has a power of 0.5 kW when connected to a supply of 250 V. if the same motor is connected to a supply of 500 V, its power will be
  - 0.25 kW
  - 0.5 kW
  - 1 kW
  - 2 kW

Say which answer you think is correct, and give a brief explanation.

### Energy

- Calculate the number of Joules of energy converted in the following situations.
  - A 60 W light bulb switched on for 2 minutes.
  - A 1 kW heater switched on for 8 seconds.
- Find the number of Joules (J) in one kilowatt-hour (kWh).
- Calculate the number of kWh of energy converted in the following situations.
  - A 150 W bulb switched on for 8 hours.
  - A heater which takes a current of 4 A from a 220 V supply and is switched on for 6 hours.
- A fluorescent light of power 60 W gives out *more light* in one second than an "ordinary" 60 W light bulb. Explain why this is so.

## Paying for Electrical Energy

To answer the following questions, assume that the cost of 1 kWh of electrical energy is 0.6 F (0.6 / 6.55 €).

9. Calculate the cost of using the following devices for 8 hours.
  - a) A 40 W light bulb.
  - b) A 3 kW heater.
10. Calculate how much you would have to pay to have a 60 W bulb switched on continuously for one month (30 days).
11. A heater of power 3 kW is used to heat a room which is *not* well insulated against heat loss. When the insulation is improved, it is found that a 1 kW heater is enough to keep the room at the same temperature. Calculate the cost of the *energy wasted* in 3 months (90 days) before the insulation was improved. (Assume that the heater is switched on for 6 hours each day.)
12. Given that most of the fluorescent lights in the school have a power of 60 W each, estimate the cost of the energy wasted in one (school) year by leaving the lights switched on in rooms which are not occupied.