% Efficiency = $\frac{\text{Output}}{\text{Input}} \times 100$

Energy Efficiency Worksheet

1. A computer that is 87% efficient consumes 375 kWh of energy. How much useful energy does it provide?

$87\% = \frac{x}{375} \times 100 = 326.25 \text{ kWh}$

2. A television that is 83% efficient provides 4 600 J of useful energy. How much energy does it consume?

$83\% = \frac{4600}{x} \times 100 = 5542 \text{ J}$

3. An oven consumes 425 kWh of energy in order to provide 386 kWh of useful energy. What is its percent efficiency?

$x = \frac{386}{425} \times 100$

91%

4. The table below has three different hairdryer models. Which is most energy efficient?

	Model A	Model B	Model C
Useful energy	450 kWh	700 kWh	600 kWh
Energy consumed	520 kWh	770 kWh	630 kWh

$x = \frac{450}{520} \times 100 = 87\%$ $x = \frac{700}{770} \times 100 = 91\%$ $x = \frac{600}{630} \times 100 = 95\%$

5. Which choice below completes the following statement correctly? When a hair dryer is used ...

A) All the electrical energy is transformed into thermal energy
B) The amount of thermal energy produced is greater than the amount of electrical energy used
C) All the electrical energy is transformed into other forms of energy
D) A portion of the thermal energy disappears completely as the energy transformations occur.

6. A technician examines different electrical devices to determine the one that is the most energy efficient. While conducting a test, he notes that one of these devices consumes 550 000 J of energy and loses 315 000 J at the same time. What is the energy efficiency of this device?

A) 42.7% B) 57.2% C) 68.1% D) 174.6%

$$x = \frac{550000 - 315000}{550000} \times 100$$

7. Your heating system is 45 percent energy efficient.

A) What amount of energy would it consume to transform 9000 kWh into useful thermal energy for heating the house during the winter?

9000 kWh

$$45\% = \frac{9000}{x} \times 100 = 20\,000 \text{ kWh}$$

B) Changing the insulation would increase your house to 85 percent energy efficient. The cost to change the insulation is 3000$. The cost of heating is 7 cents/ kWh. How many years will it take to recover your investment?

$$85 = \frac{9000}{x} \times 100$$

$x = 10588 \text{ kWh} \times 0.07 = \$741.16$ cost for one year

$20\,000 \times 0.07 = \$1400$

$\$1400 - 741.16 = \$656.82$ savings each yr.

$\$3000 \div 656.82 = 4.5$ yrs

8. 30 Joules of energy enter a light bulb. 20 joules of energy are transformed into light, how much energy is dissipated as heat?

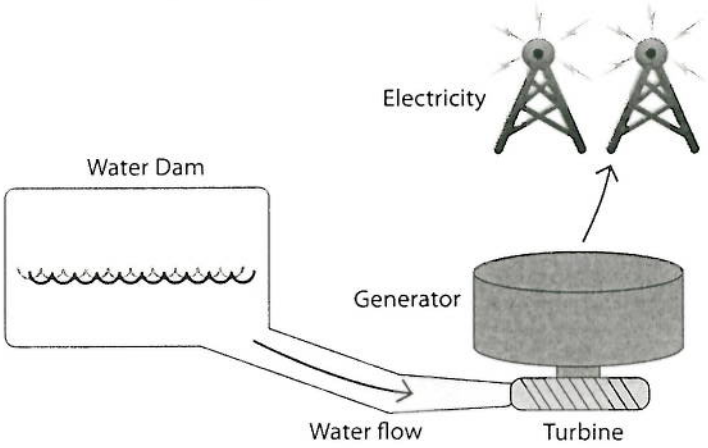
A) 6.7 joules B) 10 joules C) 13 joules D) 100 joules

9. An electrician installs patio lights in a back yard. Which of the following will increase the efficiency of the wiring system to the back yard?

1- Bury the extension cord deep underground.
2- Use a shorter extension cord.
3- Use a longer extension cord.
4- Use compact fluorescent patio lights

A) 1 and 2 B) 1 and 3 C) 2 and 4 D) 3 and 4

10. A simple diagram of a Hydro-Electric System is shown below



Friction !!

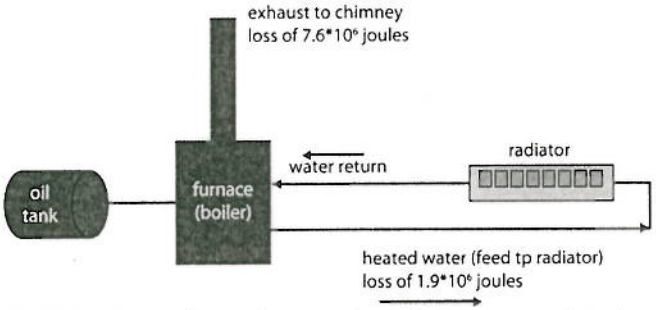
Much is lost in heat.

Describe why all the energy from the water flowing into the turbine is not transformed into electrical energy.

11. Some homes are still heated by hot water boiler furnaces. The components of the system are an oil tank, a furnace, water pipes and radiators.

The furnace burns the oil from the storage tank. The heat released is used to heat water which is then pumped to radiators throughout the house. A diagram is shown below.

Furnace System



If all the heat from the combustion was used to heat the water, the system would be 100% efficient. However, some heat is lost in the furnace exhaust and some is lost from the pipes delivering the water to the radiators.

One litre of oil delivers 38 000 kJ of energy. 7 600 kJ are lost to the exhaust, and 1 900 kJ are lost in transporting the hot water to the radiators. Determine the efficiency of this heating system.

$$x = \frac{28500}{38000} \times 100$$

$$x = 75\%$$

38 000 kJ
− 7600
30 400
− 1 900
28 500 kJ

~~coffesh~~

coffeeshop.