

## Answer on Question #41987 - Physics - Mechanics | Kinematics | Dynamics

### Question.

An electric motor has a power rating of 1.5kW. If it operates at 65% efficiency, how much work can it do in one hour?

Given:

$N = 1.5 \text{ kW} = 1500 \text{ W}$  is a power of motor

$\eta = 0.65$  is an efficiency

$t = 1 \text{ h} = 3600 \text{ s}$  is a time of work

Find:

$A = ?$  is a work

### Solution.

Power is the rate of doing work. It is equivalent to an amount of energy consumed per unit time.

$$N = \frac{A}{t}$$

But in our case useful power is:

$$N_{eff} = N \cdot \eta$$

So, for our problem:

$$N_{eff} = N \cdot \eta = \frac{A}{t} \rightarrow A = N \cdot \eta \cdot t$$

Calculate:

$$A = N \cdot \eta \cdot t = 1500 \cdot 0.65 \cdot 3600 = 3510 \cdot 10^3 = 3.51 \cdot 10^6 \text{ J} = 3.51 \text{ MJ}$$

### Answer.

$$A = N \cdot \eta \cdot t = 3.51 \cdot 10^6 \text{ J} = 3.51 \text{ MJ}$$