Efficiency

Machines transform one energy type into another. Unfortunately no machine is 100% efficient - there is always some wasted energy. This is most often in the form of heat and sound.

If a machine only wastes a small amount of energy we would say it is an efficient machine.

To calculate efficiency you need to know the total input energy (how much you put in) and the total useful energy.

$$\text{Efficiency} = \frac{\text{useful energy}}{\text{input energy}}$$

Example: A filament lamp is supplied with 100J of electrical energy. It gives out 15J of light energy. What is it's efficiency?

$$\text{Efficiency} = \frac{\text{useful energy}}{\text{input energy}}$$

$$= \frac{15\text{J}}{100\text{J}} = 0.15 \text{ efficient}$$

$$= 0.15$$

Often you will be asked to give efficiency as a percentage. To do this you just need to multiply your answer by 100!

$$\text{Percentage efficiency} = \left(\frac{\text{useful energy}}{\text{input energy}}\right) \times 100$$