

## Work & Power

### How the world works....

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#### 1) WORK

- a) Work is done when a force causes an object to move in the direction that the force is applied.
- b) If there is no movement, there is no work
  - i) Two things must happen for work to be done.
    - (1) A force must be applied to an object
    - (2) The object must move in the same direction as the force.

#### c) Joules

- i) Work is measured in Joules.
- ii) Rule for Work
- iii) Work (Joules) = Force (Newtons) X Distance(meters)

$$W = F \cdot d$$

*Example to calculate Work*

*Question: A weightlifter raises weights of 2000 Newtons from the floor to a height of 2 meters. How much work has been done?*

*Answer:*

$$W = F \cdot d$$

$$W = 2000 \cdot 2$$

$$W = 4000 \text{ Joules}$$

#### 2) Energy

- a) Energy - ability to cause change; can change the speed, direction, shape, or temperature of an object

#### 3) Power

- a) Power is the rate at which work is done. Power is measured in Watts.
  - i) Rule for Power
  - ii) Power (Watts) = Work (Joules) / Time (seconds)

$$P = W / T$$

*Example of calculating Power*

*Question: A weightlifter lifted 2000 Newtons to a height of 2 meters. This 4000 Joules of work. What is the power output if this was done in 2 seconds?*

*Answer:*

$$P = W / T$$

$$P = 4000 / 2$$

$$P = 2000 \text{ Watts}$$

#### 4) What is purpose of a machine?

- a) To make work easier.