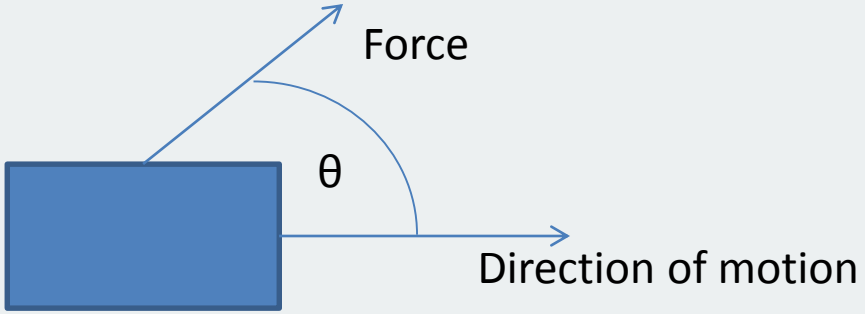
BBMerlion

Energy, Work, and Power

Pasha Laksamana Putra

Work

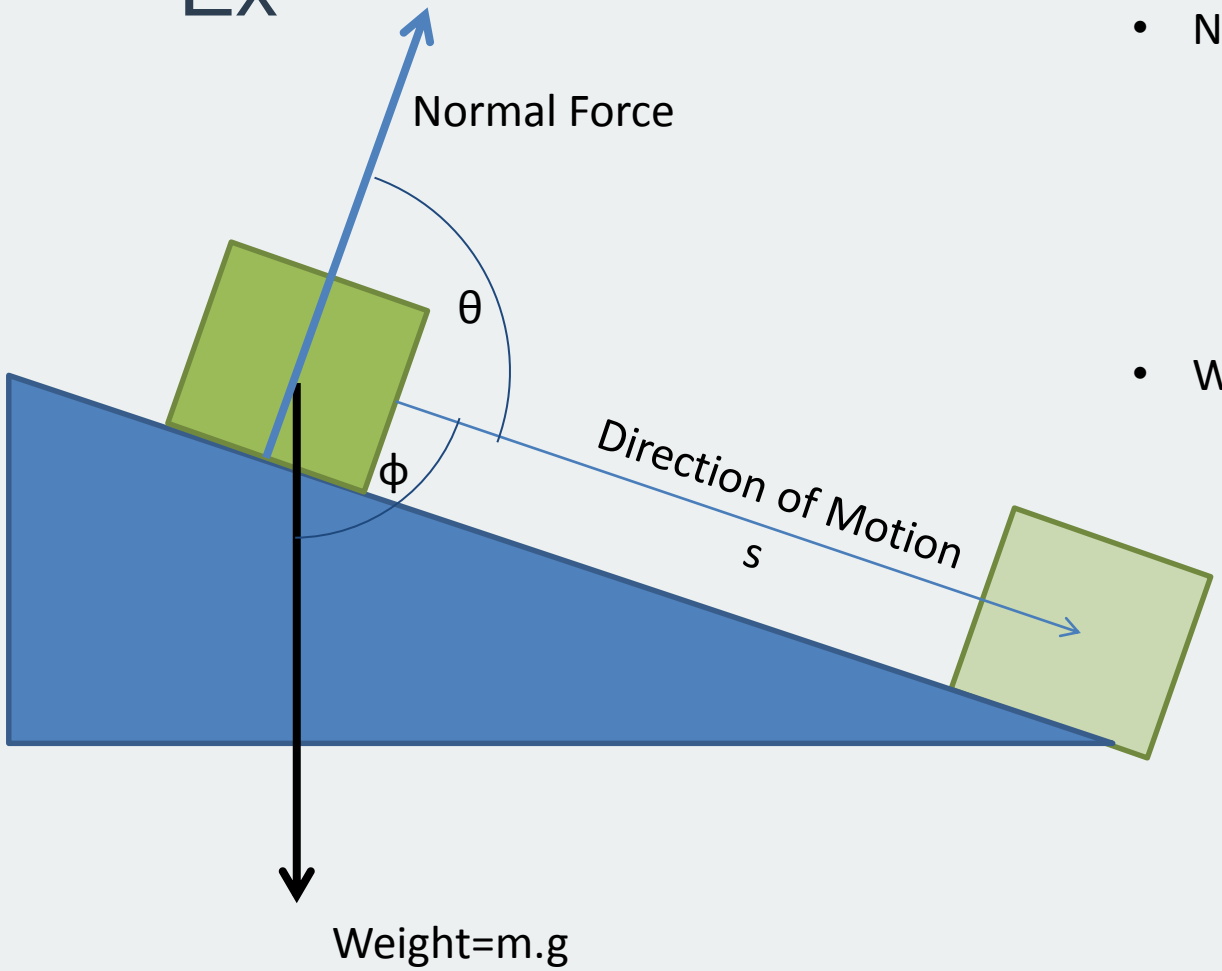
- Work is defined as:
  W=F.s
  F: Force
  s: object displacement



If direction of force is not parallel with the direction of motion. We need to project the force along the direction of motion.
W=(Fcosθ).s

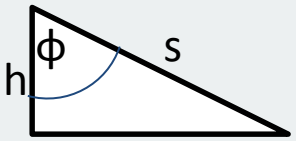
Work

- Ex



Work done by

- Normal Force:
  - As Normal Force is acting perpendicular with the direction of motion. Hence θ=90̊
  - **W=Fcos90̊ .s=0**
- Weight:
  - Weight is creating ϕ degree with direction of motion.
  - **W=Fcosϕ.s**
  - **W=m.g.s.cos** ϕ



✓ *s.cos φ=h*

- **W=m.g.h(Familiar?)**

Energy

- Every object in universe has an Energy value for their certain state.
- If there's an increase of energy of an object, hence there must be "Work" done to the object

- **Mechanical Energy**
- Summation of Potential Energy and Kinetic Energy
- Recall the previous statement. If there's no work done to the object, object's Mechanical Energy is constant. Hence, Mechanical Energy is conserved

KE+PE=ME=*constant*

Energy

- **Potential Energy**
- The energy which a body possesses due to its position or to the arrangement of its component parts.
  - Gravitational potential energy=mgh
  - Spring potential energy= $\frac{1}{2}kx^2$

- **Kinetic Energy**
- The energy that body have when it has certain amount of velocity
  - Kinetic energy= $\frac{1}{2}mv^2$

Power

- By definition, Power is the rate of work done to the body or work done over time taken.

$$Power = \frac{Work\ Done}{Time\ Taken}$$

$$P = \frac{dW}{dt}$$

$$P = \frac{d(F.s)}{dt}$$

For constant Force

$$P = F\frac{ds}{dt}$$

$$P = F.v$$