Work and Power

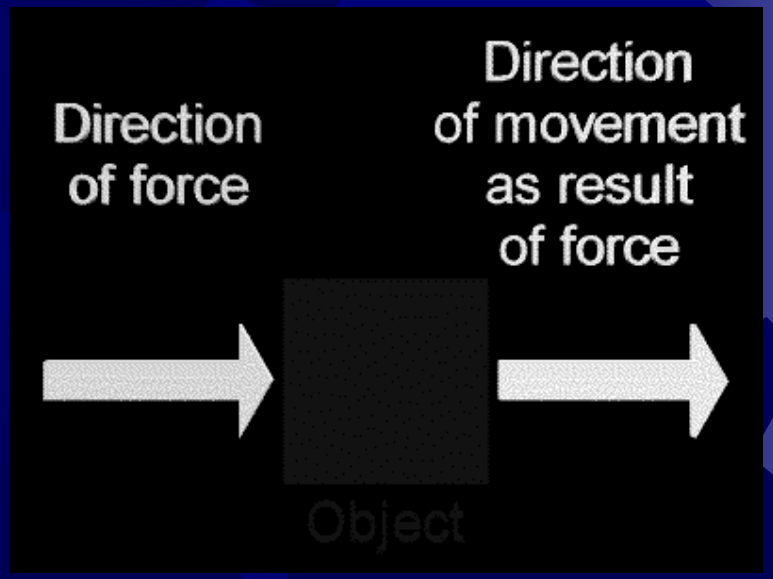
Chapter 8, Section 1

Essential Questions

- How do you know when work is being done on an object?
- How can you calculate the amount of work being done?
- What is the difference between work and power?

What is Work?

- Work is done when force causes an object to move in the same direction as that force.
- Force and direction must be the same!



What is Work?

- Work is the product of force and distance.
- Work = Force x Distance or W = Fd
- Work takes kinetic energy – that means the object must be moving.

Work Requires Motion

- If there is no motion, there is no work.

Work Depends on Direction

- Any component of force that does not act in the direction of motion does no work on an object.
- Motion and force must be in the same direction!!

Calculating Work

- Work = Force x Distance

  or W = F x d

- Units for Work
- Work is measured in Joules
- 1 Joule = 1 Newton x 1 meter

  J = N x m

What is Power?

- Power is the rate of doing work.
- Doing work at a faster rate requires more power.
- To increase power, you increase the amount of work done in a given time, or you can do a given amount of work in less time.

Calculating Power

- Power = $\frac{\text{Work}}{\text{Time}}$ or $\frac{\text{Force x distance}}{\text{Time}}$

$$P = \frac{W}{T}$$

Horse Power

- Named by James Watt. He was trying to find a way to compare how much power his steam engine produced, compared to a known unit. At the time people used horses.
- The unit of power is, therefore, known as the watt.
- 1 watt = 1 Joule per second