

Work and Power

- ❑ Work: object moved in direction of force
- ❑ Is studying work in science?
- ❑ Is running with a suitcase work on the suitcase
- ❑ NO! (self check p. 479)

Calculating Work

- ❑ $W = F \times d$
- ❑ W measured in joules
- ❑ Force measured in Newtons
- ❑ Distance measured in meters (SI)
- ❑ Mathbreak p. 480

Power

- ❑ Rate of work
- ❑ How fast work is done
- ❑ $P = W/t$
- ❑ Power measured in watts
- ❑ Quicklab p. 481 More Power to You
- ❑ Section Review p. 481

Machines

- ❑ Make work easier
- ❑ Change size, distance or direction of Force
- ❑ Input force = work done on machine
- ❑ Output force = work done by machine on object

Machines do not increase work

- ❑ Output work cannot be greater than input work
- ❑ Make work EASIER by changing size, distance, or direction of input force
- ❑ See p. 484, 485

Mechanical Advantage

- ❑ Tells how many times machines multiply force
- ❑ $MA = \frac{\text{output force}}{\text{input force}}$
- ❑ Mathbreak p. 486

Mechanical Efficiency

- ❑ Tells you what percentage of work input gets converted to work output
- ❑ Never 100%
- ❑ Decreasing Friction increases ME
- ❑ $ME = \frac{\text{Work output}}{\text{Work input}} \times 100$
- ❑ Sec. Review p. 487

Types of Machines

- ❑ Six simple machines
- ❑ 1: Lever
- ❑ Bar pivoting in fulcrum (fixed point)
- ❑ 1st class: fulcrum between input force and load (forces in different directions) p. 488

2nd class lever

- ❑ Load is between fulcrum and input force
- ❑ Doesn't change force direction
- ❑ Ex: wheel barrel, bottle opener

3rd Class lever

- ❑ Input force is between fulcrum and load
- ❑ No change in force direction
- ❑ Ex. Hammer, bat
- ❑ See examples p. 489

Inclined Planes

- ❑ Straight, slanted surface like a ramp
- ❑ Decreases forces, increases distance
- ❑ The longer it is compared to its height, the greater the MA

Wedges

- ❑ Moveable double inclined plane
- ❑ Allows force to be applied over increased distance
- ❑ Ex: knife or hatchet blades

Screws

- ❑ Inlined plane wrapped around a spiral
- ❑ Increases distance
- ❑ Wheel and Axle: two circular objects of different sizes:

Pulleys

- ❑ Grooved wheels with rope or cable
- ❑ Fixed pulleys: changes direction of force
- ❑ Moveable pulleys: Doesn't change direction: decreases input force by increasing distance.

Block and Tackle

- ❑ Fixed and moveable pulleys working in one system.
- ❑ Compound machines: two or more simple machines
- ❑ What are some examples?