

5.3

Conservation of NRG

Objectives

- **Identify** situations in which conservation of mechanical energy is valid.
- **Recognize** the forms that conserved energy can take.
- **Solve** problems using conservation of mechanical energy.

Mechanical NRG

- **Mechanical NRG** is the sum of KE and all forms of PE

$$ME = KE + PE$$

- ME is conserved, it just transforms NRG “types”

$$ME_i = ME_f$$

(In the absence of friction)

ME "lost"

- When friction is brought in... ME seems to be lost
 - This is because the NRG is converted into NRG that is hard to determine
 - Heat
 - Sound
 - Etc.
- NRG is still conserved, it just seems lost

ME Equations

$$ME = KE + PE$$

$$ME_i = ME_f$$

$$KE_i + PE_i = KE_f + PE_f$$

$$\frac{1}{2}mv^2 + mgh = \frac{1}{2}mv^2 + mgh$$

May substitute or add EPE

$$\frac{1}{2}mv^2 + mgh = \frac{1}{2}mv^2 + mgh$$

Starting from rest, a girl slides down a frictionless slide. If the slide is 3 meters tall and she has a mass of 25 kg, what is her speed at the bottom of the slide?

Givens:
 $g = 9.8 \text{ m/s}^2$
 $m = 25 \text{ kg}$
 $h = 3 \text{ m}$
 $v = \underline{\hspace{2cm}}$

$$\frac{1}{2}mv^2 + mgh = \frac{1}{2}mv^2 + mgh$$

A bird is flying with a speed of 18 m/s over the ground when it drops a 2 kg fish. What is the speed of the fish when it strikes the ground if the bird was 5.4 meters above the ground?

- Givens
- h = 5.4 m
- m = 2 kg
- g = 9.8 m/s²
- v_i = 18 m/s
- v_f = _____

Assignment

- Q: 2,3
- Pack 5.3
- SP - D
