Free Fall

1

Falling Objects

- **Gravity acts on all falling objects.**
- **Gravity is not dependent on mass.**
- **When an object is dropped, its initial velocity is 0 m/s.**
- **Down is considered to be in the negative direction. Up is positive.**
- **When an object is thrown down, its initial velocity will be negative.**
- **When an object is falling downward, its displacement will be negative.**
- **Acceleration due to gravity is -9.80 m/s^2**
- **Gravity varies slightly with on the surface of the Earth, but we use the average of –9.80 m/s^2.**
- **Whenever an object is dropped on Earth, we can use –9.80 m/s^2 as the acceleration for that object.**

2

The Equations

- **When acceleration is constant, we can find other information about the object's motion using the following equations:**

$$v = v_o + at \qquad v^2 = v_0^2 + 2a\Delta x$$

$$\Delta x = v_o t + \frac{1}{2} a t^2$$

3

Practice Problem #1

- **A rock is dropped from the edge of a bridge 42 m above a river. How long will it take the rock to hit the river?**

V	
V_o	
a	
t	
Δx	

4

Practice Problem #2

- **You throw a stone down with a velocity of 18.0 m/s from bridge. When it hits the ground it is traveling at a speed of 43.6 m/s.**
  - **What is the height of the bridge?**
  - **How long does it take to hit the ground?**

V	
V_o	
a	
t	
Δx	

5

Practice Problem #3

- **A student drops a ball from the top the school. It takes 1.75 seconds to hit the ground.**
  - **What is the velocity of the ball just before it hits the ground?**
  - **What is the height of the school?**

V	
V_o	
a	
t	
Δx	

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