2.3 Falling Objects

Objectives

- **Relate** the motion of a freely falling body to motion with constant acceleration.
- **Calculate** displacement, velocity, and time at various points in the motion of a freely falling object.
- **Compare** the motions of different objects in free fall.

Free Fall

- **Free fall** is the motion of a body when only the force due to gravity is acting on the body.
- The acceleration on an object in free fall is called the **acceleration due to gravity,** or **free-fall acceleration.**
- Free-fall acceleration is denoted with the symbols $\boldsymbol{a_g}$ (generally) or $\boldsymbol{g}$ (on Earth's surface).

Free Fall Acceleration

- Free-fall acceleration is the same for all objects, regardless of mass.
- This book will use the value ***g* = -9.81 m/s^2**.
- Free-fall acceleration on Earth's surface is –9.81 m/s^2 at **all points** in the object's motion.
- Consider a ball thrown up into the air.
  - **Moving upward:** velocity is decreasing, acceleration is – 9.81 m/s^2
  - **Top of path:** velocity is zero, acceleration is –9.81 m/s^2
  - **Moving downward:** velocity is increasing, acceleration is – 9.81 m/s^2

Practice Problems

- A brick falls from the top of a building and smashes on the ground. If the building is 250 meters tall, what is the final velocity the instant before it strikes the ground?

- How long did it take the brick to hit the ground?

Figure 3.3

- Page 57
- What is this showing?
- Could this graph be a representation of Fig 3.2? Why or why not.

Quick Lab

- Page 58 – Rxn time

Assignments

- Q: 1, 2, 4, 5
- Supp Prob F

Take It Further

- Get into small groups and read "Take it Further"
- You will have to explain this to the class and Mr. Gunkelman.

EOCQ

- 2,4-7,9-16,20,21,24,28,30,39