Conceptual Physics Review (Chapters 1&2)

Chapter 1

- Describe what is meant by the scientific method.
- Describe why physics is considered the most basic science.
- Describe what is meant by a scientific fact.
- Describe how science and technology differ.

Chapter 2

- Define speed, velocity, and acceleration and be able to give examples of units for each.
- Describe the difference between speed and velocity.
- Describe the difference between instantaneous speed and average speed. Which one is shown on your car's speedometer? Which one is used in calculating distance traveled over a period of time?
- Describe what is meant by free fall. What affects a freely falling object?
- Be familiar with the relationships between the acceleration, velocity, and distance fallen for a freely falling object. What equations are useful when calculating these quantities?
- Be familiar with the graphs of velocity vs. time and distance vs. time for moving objects traveling at constant acceleration, and for objects traveling at constant velocity.

Sample Calculations

1. The car I rented in Europe last summer went very fast. At one point I was going 100 kilometers per hour!!!!! Was I speeding according to the California highway system's posted speed limit of 65 miles per hour? (Hint: convert 100km/hr to miles per hour)

2. My friend and I decide to race down a straight stretch of road. We both get in our cars and start from rest. I hold the steering wheel steady, slam on the gas, and my speedometer shows an increase in speed of 10mph every second.

a) What is my acceleration?

b) If I maintain that constant acceleration, how fast will I be going at the end of 10 seconds?

c) How far have I traveled in those 10 seconds?

3. Tiffany, who is opening a new Broadway show, has some limo trouble in the city. With only 8.0 minutes until curtain time, she hails a cab and they speed off to the theater down a 1000.0-m-long one-way street at a speed of 25 m/s. At the end of the street the cab driver waits at a traffic light for 1.5 min and then turns north onto a 1700.0-m-long traffic-filled avenue on which he is able to travel a speed of only 10.0 m/s. Finally, this brings them to the theater.

a) Does Tiffany arrive before the theater lights dim? (Show your work)

b) Draw a distance vs. time graph of the situation. Label your axes with words, units, and a numbered scale.

4. Grace is driving her sports car at 30 m/s when a ball rolls out into the street in front of her. She slams on the brakes and comes to a stop in 3.0 s. What was the acceleration of Grace's car? (Use a positive sign if she is speeding up, and a negative sign if she is slowing down)

5. A torpedo fired from a submerged submarine is propelled through the water with a constant speed of 20.00 m/s and explodes upon impact with a target 2000.0 m away.
a) How long does it take the torpedo to reach its target?

b) If the sound of the impact is heard by the people inside the submarine 101.4 s after the torpedo was fired, what is the speed of sound in water?

6. King Kong carries Fay Wray up the Umpire State Building in New Fork City. At the top of the skyscraper, Fay Wray's shoe falls from her foot. It hits the ground 15 seconds later.

a) How fast is the shoe going the instant before it hits the ground?

b) How tall is the Umpire State Building?

7. The Steamboat Geyser in Jellystone National Park is capable of shooting its hot water up from the ground with a speed of 50 m/s. How high can the geyser shoot?

8. At Six Flags Great Adventure Amusement Park in New Jersey, a popular ride known as "Free Fall" carries passengers up to a height of 33.5 m and drops them to the ground inside a small cage. How fast are the passengers going at the bottom of this exhilarating journey?

9. A pop fly is hit straight up at an initial speed of 40 m/s.
a) How long is it in the air if it is caught at the same height that it was hit from?

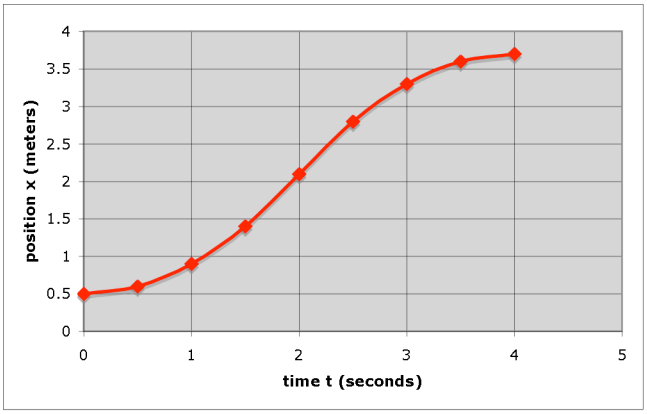
b) How high is it 2 seconds after it is hit?

c) How high does it go?

d) What is its velocity 6 seconds after it was hit?

e) How high above its starting point is it 6 seconds after it was hit?

10. Write a description of an object whose motion is represented by the following graph. Be sure to give a chronological description, starting with what is happening at time = 0. Use appropriate physics vocabulary such as velocity and acceleration.



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