Physics
Acceleration Practice Problems

Name: _____ **Block:** _____ **Date:** _____

1. As a roller coaster starts down a hill, its speed is 10.0 m/s. After 3.0 seconds its speed is 32.0 m/s at the bottom of the hill. What is the roller coaster's average acceleration?

2. A car's speed changes from rest to 60.0 m/s 15 seconds later. Calculate the car's average acceleration.

3. One jet plane is flying east at 880.0 km/hr, and another airplane is traveling north at 880.0 km/hr. Do they have the same speeds? Do they have the same velocities? Explain.

4. The original speed of a satellite is 10,000.0 m/s. After one minute, it is 50,000.0 m/s. What is the satellite's average acceleration?

5. A cyclist increases his speed from 5.0 m/s to 15 m/s in 4.0 s. What is his average acceleration?

6. A jet plane changes its speed from rest to 750.0 km/hr in 2.2 minutes. What is its average acceleration in 1) km/hr/min and in 2) m/s^2?

7. A runner increases her speed from 0.52 m/s to 0.78 m/s in 0.50 s. What is her average acceleration?

8. A driver entering the outskirts of a city takes her foot off the accelerator so that her car slows down form 90.0 km/hr to 50.0 km/hr in 10.0 seconds. Find her car's average acceleration.

9. A driver rolls a ball up a hill giving it a velocity of 4.5 m/s. Five seconds later, the ball is rolling down the hill with a velocity of – 1.5 m/s. What is the ball's average acceleration?

10. Find the uniform acceleration that causes a car's velocity to change from 32.0 m/s to 96.0 m/s in an 8.0 second period.

11. Determine the displacement of a plane that is uniformly accelerated from 66.0 m/s to 88.0 m/s in 12.0 s.

12. A supersonic jet that is flying at 145.0 m/s is accelerated uniformly at the rate of 23.1 m/s for 20.0 s.

    a. What is its final speed?

    b. The speed of the sound in air is 331 m/s. How many times the speed of the sound is the plane's final speed?

13. An engineer must design a runway to accommodate airplanes that must reach a ground speed of 61.0 m/s before they can take off. These planes are capable of being accelerated uniformly at the rate of 2.5 m/s^2.

    a. How long will it take the planes to reach take off speed?

    b. What must be the minimum length of the runway?

14. Determine the final speed of a proton that has an initial velocity of 2.35×10^{5} m/s and then is accelerated uniformly in an electric field at the rate of -1.10×10^{12} m/s^2 for 1.50×10^{-7} s.