Motion Problems

Read from **Lesson 6** of the **1-D Kinematics** chapter at **The Physics Classroom**:

http://www.physicsclassroom.com/Class/1DKin/U1L6a.html
http://www.physicsclassroom.com/Class/1DKin/U1L6b.html
http://www.physicsclassroom.com/Class/1DKin/U1L6c.html
http://www.physicsclassroom.com/Class/1DKin/U1L6d.html

MOP Connection: None

Show your work on the following problems.

1. An airplane accelerates down a run-way at 3.20 m/s^2 for 32.8 s until is finally lifts off the ground. Determine the distance traveled before take-off.

2. A race car accelerates uniformly from 18.5 m/s to 46.1 m/s in 2.47 seconds. Determine the acceleration of the car and the distance traveled.

3. A feather is dropped on the moon from a height of 1.40 meters. The acceleration of gravity on the moon is 1.67 m/s^2. Determine the time for the feather to fall to the surface of the moon.

4. A bullet leaves a rifle with a muzzle velocity of 521 m/s. While accelerating through the barrel of the rifle, the bullet moves a distance of 0.840 m. Determine the acceleration of the bullet (assume a uniform acceleration).

5. An engineer is designing a runway for an airport. Several planes will use the runway and the engineer must design it so that it is long enough for the largest planes to become airborne before the runway ends. If the largest plane accelerates at 3.30 m/s^2 and has a takeoff speed of 88.0 m/s, then what is the minimum allowed length for the runway?

6. A student drives 4.8-km trip to school and averages a speed of 22.6 m/s. On the return trip home, the student travels with an average speed of 16.8 m/s over the same distance. What is the average speed (in m/s) of the student for the two-way trip? (Be careful.)

7. Rennata Gas is driving through town at 25.0 m/s and begins to accelerate at a constant rate of -1.0 m/s^2. Eventually Rennata comes to a complete stop. Represent Rennata's accelerated motion by sketching a velocity-time graph. Use kinematic equations to calculate the distance which Rennata travels while decelerating. Then use the velocity-time graph to determine this distance. **PSYW**

8. Otto Emissions is driving his car at 25.0 m/s. Otto accelerates at 2.0 m/s^2 for 5 seconds. Otto then maintains a constant velocity for 10 more seconds. Determine the distance Otto traveled during the entire 15 seconds. (Consider using a velocity-time graph.)

9. Chuck Wagon travels with a constant velocity of 0.5 mile/minute for 10 minutes. Chuck then decelerates at -.25 $mile/min^2$ for 2 minutes. Determine the total distance traveled by Chuck Wagon during the 12 minutes of motion. (Consider using a velocity-time graph.)

