**Kinematics Practice Problems**

1. You want to throw a ball [straight up](http://www.uwgb.edu/fenclh/problems/kinematics/2/#popup5) into the air so that it [reaches a height of 3.3 m](http://www.uwgb.edu/fenclh/problems/kinematics/2/#popup3) above the ground.
   1. If the ball leaves your hand at a height of [1.2 m](http://www.uwgb.edu/fenclh/problems/kinematics/2/#popup2) above the ground, how fast do you need to throw it?
   2. How long does it take the ball to [hit the ground](http://www.uwgb.edu/fenclh/problems/kinematics/2/#popup4)? You may ignore any effects of air resistance throughout this problem.
2. A proton is travelling in a cyclotron at a velocity of . It strikes a gold nucleus and comes to a full stop within the nucleus in .
   1. What was the acceleration of the proton?
   2. What was the displacement of the proton once it hit the nucleus of the formerly gold atom?
3. A bridge crosses a valley that is 152m deep at its lowest point. A baby is punted off the bridge. It takes 12.4s for it to reach the bottom of the valley. What was the initial velocity of the baby?
4. A car drives in a straight line at a constant speed of 60 miles per hour for 5 seconds. Find its acceleration.

1. A car is driven along a straight track at 22 m/s. The child controlling the car then activates the turbo mode so that, 0.3 seconds later, the car's speed is 52.5 m/s. Find its average acceleration.

1. Shortly after, the car in the previous example exits turbo mode (into a wall), slowing from 52.5 m/s to 0 m/s in 1.2 seconds. Find the car's average acceleration over this interval.
2. A particle moves along the x-axis with an initial velocity of 4 m/s and constant acceleration. After 3 seconds, its velocity is 14 m/s. How far did it travel during this interval

1. A car is initially moving at 10 m/s and accelerates at a constant rate of 2 m/s2 for 4 seconds, in a straight line. How far did the car travel during this time?

1. A rock is dropped from a cliff that is 80 m above the ground. If the rock hits the ground with a velocity of 40 m/s, what acceleration did it undergo?
2. A block is dropped 80 meters from a cliff. How long does it take to reach the ground?

1. A ball is thrown straight up with an initial speed of 20 m/s. How high will the ball travel?

1. One second after being thrown straight down, a rock is falling at 20 m/s. How fast will it be falling 2 seconds later?

1. An object is thrown straight upward with an initial speed of 8 m/s and strikes the ground 3 seconds later. What height was the object thrown from?