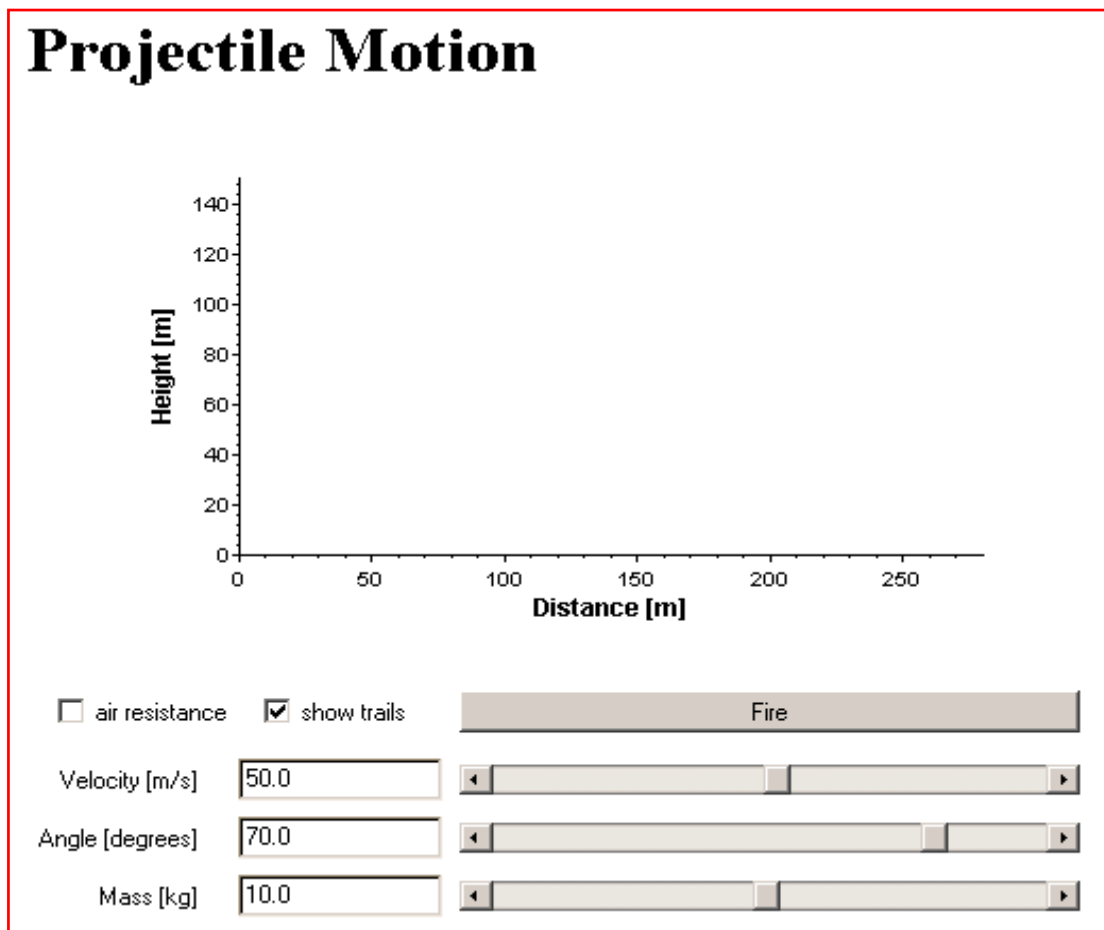




Section A: First, let's review the Metric System, and expand your horizons. You are all familiar with the prefixes milli, deci, centi and kilo. However, there are a lot more prefixes out there. Search through [this web site](#) to find out what a yotta and a yocto is. Write down your answer here:

- 1. yotta _____
- 2. yocto _____

Section B: Projectile motion is the motion associated with an object flying through the air (that is a simple definition). You will be loading a java applet that simulates projectile motion. When the applet is first loaded, it should look like this:

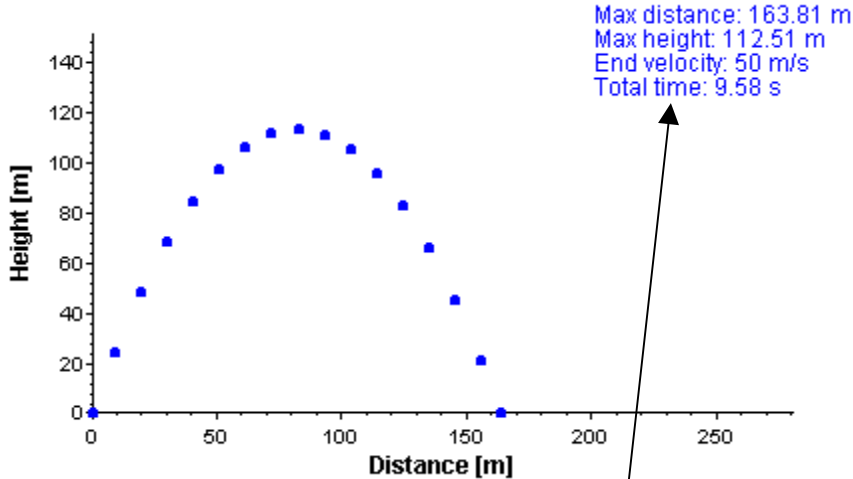


[Click here to load the applet.](#)



Start with the velocity set at 50.0 m/s, the launch angle at 70.0 degrees, and the mass at 10.0kg. Make sure the air resistance box is unchecked. The show trails box should be checked.

Click the **Fire** button to launch.




Notice the path taken by the projectile. Projectile motion will **always** be curved due to the force of gravity. Data appears for each launch in the upper right hand corner. Using that data, answer the following questions:

- How far did the projectile travel horizontally? _____
- What was the maximum height reached? _____
- What can you state concerning the starting speed with the ending speed of the object? _____

Next, adjust the launch angle until you find the angle which yields the greatest horizontal distance. Do not adjust the velocity or mass.

4. Angle for largest horizontal distance? _____

If you want to clear the launch trails, hit the Refresh key  in your browser or hit the F5 key.

Adjust the launch angle for the maximum height.

5. Angle for maximum height? _____



Set your velocity at 40 m/s, and the launch angle at 30 degrees. Adjusting the mass of the projectile, determine what effect the mass of the projectile in a vacuum has on the horizontal and vertical distance traveled.

6. What effect does mass have on the horizontal and vertical distance of a projectile when there is no air resistance? _____

Next, check the **Air resistance** box. Determine if changing the mass affects the horizontal or vertical distances traveled.

7. What effect does mass have on the horizontal and vertical distance of a projectile when there is air resistance? _____

SECTION C:

Next, you will be running an applet that puts you high atop a mountain. Your job is to....
 Find out the speed it would take to hit the target labeled 'F'.
 Find out the minimum velocity to make the cannonball go all the way around the Earth and hit you on the mountain (you will hear an "OW!" if you hit yourself).
 Make sure to find the minimum speed to accomplish this.

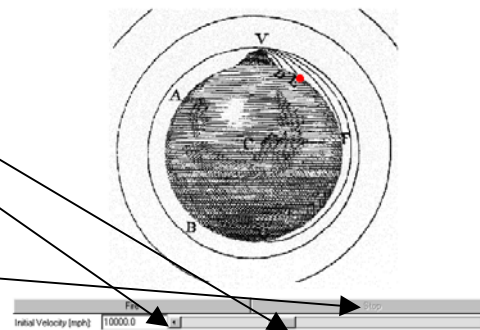
This applet may take a few minutes to load. You may have to click on **Load Applet** to load it.

To adjust the speed of your cannon, use the scroll bar and arrow buttons.

To fire the cannon, click here.

If you use too fast a speed, and your projectile goes in orbit, click here to stop.

[Click here to begin...](#)



1. Speed to hit Target F _____ mph

2. Minimum Speed required to go around the earth _____ mph

RHP 9th Grade Physical Science

12 Projectile Motion

Name: *Type your name here*



Section D: This last part will compare the force of gravity at three different locations; our moon, Mars and Earth. You will be using an internet site to help you calculate the rate of speed of objects on each of these three locations.

When you go to the site, read the Procedure section for instructions on how to use it (steps 1-4).

Select the Moon (if it is not already selected) and drop the ball. Record the time it takes to travel the 6.0 m in the table below. Calculate the average speed of the ball using the formula $s = d/t$. Record your answer in the table. Do the same for the Earth and Mars.

Next, assuming the Earth has a gravity of 1.0, calculate the gravity on the moon and Mars (using the average speed as a comparison). Report your answer as a decimal number (.45 for example).

(2 sig figs for each answer!!!)

[Click here to drop!](#)

Drop Zone	Moon	Earth	Mars
0-6 m drop time			
Average speed			
Gravity		1.0	

1. Gravity of Moon _____

2. Gravity of Mars _____

Turn this in for credit. Make sure your name is on it!