Conclusions:

1. What effect does distance have on the speed of a moving object?

2. What effect does time have on the speed of a moving object?

3. What was the independent variable in this experiment? Why?

4. What was the dependent variable in this experiment? Why?

5. What are the controlled variables (constants) in this experiment?

6. Why did we use a line graph to display the data?

7. How does this activity relate to Newton's 1st Law of Motion (Law of Inertia)?

Marble Motion (2nd Law of Motion)

Background Information:

Isaac Newton's 2nd law of motion, also called the Law of Acceleration, states that the acceleration of an object is proportional (similar) to the force that's applied to it, and inversely proportional (opposite) to the mass of the object. In other words, if the force remains constant (the same) as the mass of an object increases, its acceleration will decrease and vice versa. Force is calculated by multiplying mass times acceleration or $F = m \times a$

Materials: ping pong ball, small marble, golf ball, softball, straw, and tray with raised side to capture moving balls

Procedure:

1. Set ball over marked area of the tray and apply force by blowing through a straw on the ball to reach the other side of the tray with the raised side. Record the acceleration rate on the table as slow, medium, or fast by placing a check on which applies.
2. Apply **the same force** (blow with the same force) on the next ball and record your observation.
3. Repeat the same procedure with the other balls and record your observations.

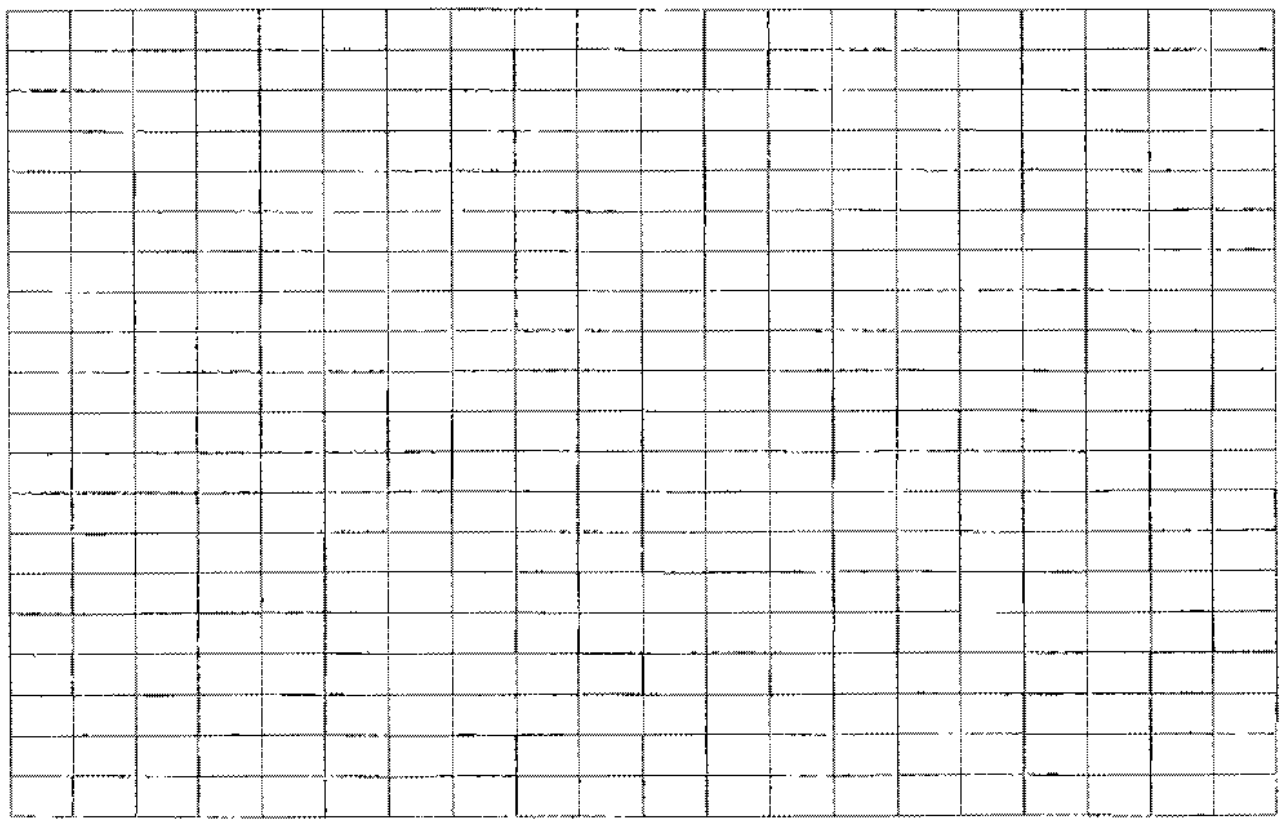
Data:

Balls and their weights in grams (g)	Acceleration Rate of the Balls		
	Slow speed	Medium speed	Fast speed
Ping Pong g			
Marble g			
Golf ball g			
Softball g			

Data Analysis:

Make a bar graph to show the relationship between the weight of the balls and the acceleration rate. Put the weight of the balls on the x-axis and the acceleration rate on the y-axis (slow, medium, fast). Mark slow, medium, and fast rates at equal distances on the graph.

Title: _____



Conclusions:

1. What was the independent variable in this experiment? Why?

2. What was the dependent variable in this experiment? Why?

3. What are the controlled variables (constants) in this experiment?

4. Why did we use a bar graph to display the data?

5. How does this activity relate to Newton's 2st Law of Motion (Law of Acceleration)?

Balloon Rockets (3rd Law of Motion)

Background Information:

A rocket's movement depends on Newton's third law of motion, also termed Law of Action/Reaction, which states that for every action there is an equal and opposite reaction. When a rocket blows out ga: in one direction (action force), the rocket is pushed in the opposite direction (reaction force). In other words, when there is a force on one thing in one direction, another force is acting on something else in another direction. The gas pushes against the rocket and the rocket pushes back just as hard against th gas.

Materials: fishing string stretched across a room, straw, medium size balloon, and tape.

Procedure:

1. Blow up a balloon, but do not tie it.
2. Surround a long piece of scotch tape around one straw located on the fishing line and attach to one end of the inflated balloon. Add tape around the other straw and tape it to the other end c the balloon in order to secure the inflated balloon to the hanging string.
3. Slide the balloon-straw system down at equal distances to your other classmates.
4. Release the balloon. Record your observations.
5. Obtain same balloon and blow it up half-way and repeat steps 2-4.