## Science Research Question

**Does the mass of a marble rolled down a ramp affect how far the a plastic cup will move when hit by the marble?**

## Independent Variable

I am changing the mass of the marble

by using one marble that is 10 grams and 1

marble that is 25 grams.

## Dependent Variable

The dependent variable is the distance the

plastic cup moves when the marble hits it. This will be measured in cm.

## Materials List *(Detailed)*

1 marble (10 grams) 1 marble (25 grams) ,

1 16 oz. plastic cup, 1 ruler (30 cm)

1 tape measure, 1 piece of tape 10 cm long

Same ramp (25 cm tall)

## Set-Up Conditions

***(What conditions should be kept constant?)***

The marbles are both made of glass.

Same size cup, same way of measuring the

Distance the marble traveled, same ramp height
Placing the cup at the same starting point

Same ramp platform that holds the ruler(ramp)

## Directions

***(List exactly what you did in each step of your experiment)***

***1. Gather the materials identified on the Materials list***
***2. Place the ramp on the floor.***
***3.Measure 30 cm from the ramp and put a 10 cm piece of tape on the floor to mark the starting location of the cup for each trial.***
***4. Place the cup at the starting location with the opening of the cup facing ramp***
***5. Place one end of the ruler at the top of the ramp so that the length of the ruler points to the cup.***
***6. Place the marble (10 grams) at the top of the ramp on the ruler.***
***7. Release the marble to go down the ramp(ruler) towards the cup.***
***8. Measure the distance the cup moved when the marble rolled inside it. The measurement should be taken from the end of the piece of tape to the where The cup moved measuring the part of the cup that is closest to the ramp.***
***9. Measure this distance in cm and then record this on the Data Collection chart.***
***10 Repeat Steps 1-9 nine more times.***
***11. Repeat Steps 1-9—ten times using the larger marble (25 grams)***
***12. Add the distances from trials 1—10 for each of the marbles.***
***13. Find the average of each marble total distances.Record on Data Collection.***
***14. complete graph, results and explanation based on data.***

## Predictions

***(Increase, Decrease, No Affect)***

1. Increasing the mass of the marble will increase the distance the plastic
cup will move.

2. Increasing the mass of the marble will decrease the distance the plastic cup will move.

3. Increasing the mass of the marble will not effect the distance the plastic cup will move.
I think that increasing the mass of the marble will increase the distance the plastic cup will move.

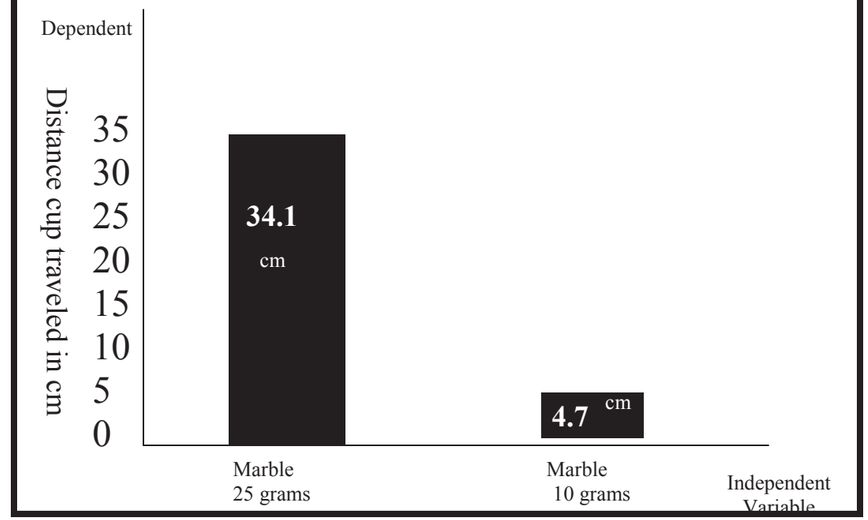
## Real World Uses Relating to Research

This information may be useful for construction workers when they are building things. Although it seems alittle different, but if there were two construction workers and one of them weighed more than the other, it seems the one that weighed more may be able to push something farther. Another thought I had was in the game of tug of war, if they had the same number of people on each side but the mass or weight of the people on one side was greater, they should win the tug of war.

## Data Collection *(metric measurement)*

| Item(s) Tested | Trials (Increasing the number of trials will provide more valid data) | | | | | | | | | | mean avg. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| Marble 10 grams | 2cm | 8 cm | 5 cm | 4 cm | 4 cm | 5 cm | 6 cm | 5 cm | 4 cm | 4 cm | 4.7 cm |
| Marble 25 grams | 40 cm | 36 cm | 40 cm | 31 cm | 38 cm | 40 cm | 41 cm | 40 cm | 36 cm | 37 cm | 34.1 cm |

**Graph:** ***Should reflect mean average of trials***




## Results

***(Looking at your data and graph, describe your results using mathematical language)***

**The marble that was 25 grams moved the plastic cup an average of 34.1 cm. The average**
**Distance was calculated from the 10 trials from the data collection. The marble that was 10 grams moved the plastic cup an average of 4.7 cm. This average distance was calculated from the 10 trials in the data collection table. The marble with the larger mass (25 grams) moved the cup more than the marble with the small er mass (10 grams). The increase in average distance on how far the cup moved using the greater mass marble was 29.4 cm.**

## Explanation

***(Write an explanation that reflects your predictions and data in your experiment)***

**I made three predictions, but identified which one I thought was best. I thought the marble with the greater mass would move the cup farther. The data that I collected supports this.**
**In the future I would like to see if the height of the ramp affects the distance A marble could move the cup.**