

# The Science Behind the Ramp



**M5-34**  
**Mrs. Munoz's 5th Period**

**Pictures from Bing**



# Question and Rationale

- My question is, “If I changed the material covering the declining ramp, could I improve the speed at which the marble reaches the bottom of the ramp?”
- It will help roller coaster engineers to know what materials produce what speed to make the ride more enjoyable.

# Hypothesis

- If the wooden ramp is covered with aluminum, then the marble will reach the bottom of the ramp the fastest, because the aluminum is the smoothest and will create the least amount of friction.

- Picture from Bing



# Variables

- **Independent Variable:** the material of (or covering) the ramp.
- **Dependent Variable:** the speed at which the marble reaches the bottom of the ramp

# Materials Needed

- 12' Regular Strength Publix Brand Aluminum Foil
- Wooden Ramp 4 meters long
- Styrofoam Half-pipe 4 meters
- One Marble
- Scissors
- Wall to Brace Ramp
- Masking Tape
- Stopwatch
- Measuring Tape
- Ladder
- Iron Nails 1 inch

# Procedure

1. Place 4 m wooden ramp against the side of a wall to a height of 2.13 m measured with measuring tape and secure the ramp.
2. Start first trial with wooden ramp uncovered. Place marble at top of ramp and time how fast the marble travels to the bottom of the ramp with the stopwatch. Repeat this step for a total of 20 trials.
3. Record Data
4. Secure Styrofoam Half-pipe on top of the ramp with masking tape.
5. Place marble at top of ramp and time how fast the marble travels to the bottom of the ramp with the stopwatch. Repeat this step for a total of 20 trials.
6. Record Data
7. Remove Half-pipe and secure 4 meter long piece of aluminum foil to cover ramp and sides.
8. Place marble at top of ramp and time how fast the marble travels to the bottom of the ramp with the stopwatch. Repeat this step for a total of 20 trials.
9. Record Data

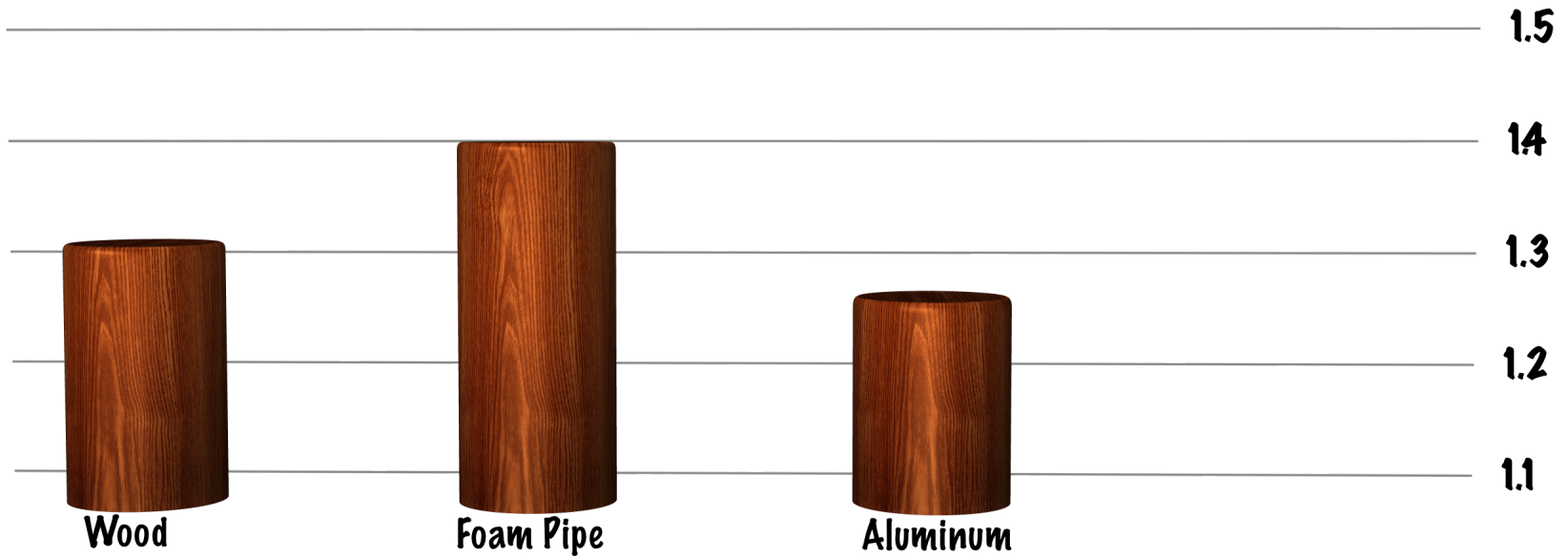
# Photographs

Photograph(s) Taken By: Jennifer Kelsey (Mom)



# Graph

■ Average Speed of marble (seconds)





# Data Chart

## Time in Seconds for Marble to reach bottom of Ramp

<i><b>Trials</b></i>	<i><b>Wood</b></i>	<i><b>Foam Pipe</b></i>	<i><b>Aluminum</b></i>
1	1.36	1.3	1.17
2	1.24	1.28	1.3
3	1.31	1.45	1.11
4	1.27	1.51	1.28
5	1.24	1.39	1.25
6	1.38	1.4	1.18
7	1.31	1.34	1.31
8	1.37	1.38	1.32
9	1.28	1.34	1.33
10	1.34	1.37	1.25
11	1.31	1.4	1.28
12	1.28	1.42	1.27
13	1.28	1.4	1.27
14	1.38	1.42	1.28
15	1.23	1.41	1.38
16	1.28	1.33	1.33
17	1.38	1.49	1.23
18	1.39	1.43	1.32
19	1.38	1.46	1.24
20	1.31	1.44	1.34

# Results

The marble went down the aluminum- covered ramp with the fastest average of speed which was 1.272 seconds. The other sets were a little bit slower on average. The wind's speed and direction might've affected my data because I was performing this experiment outside.

# Conclusion

In conclusion, yes, my hypothesis was supported. Again, my hypothesis states, "If the wooden ramp is covered with aluminum, then the marble will reach the bottom of the ramp the fastest, because the aluminum is the smoothest and will create the least amount of friction." Since my data proves this is true due to the research and experimenting I have performed, it will help roller coaster engineers to know what materials produce what speed to make the ride enjoyable, hence, my rationale fulfilled. In future experiments, I would like to focus on the gravity involved.

# Bibliography

- **Goodstein, Madeline. Science Fair Success Using Newtons Laws of Motion. Enslow Publishing, 2002.**
- **Figorito, Marcus. Friction and gravity Snowboarding Science. The Rosen Publishing Group, 2009.**