Name: _____

SLOW MARBLE PROJECT

Materials: Shoe Box or Small/Medium Cereal Box
Construction Paper
Masking Tape

Objective:

You will create a marble track given specific materials. A marble will enter the box through a hole and travel along a track, before exiting the box at the end of the track. Your goal is to have the marble spend as long as possible traveling along the track, without stopping, before exiting the box. You will be graded on how long the marble stays in the box. Each box will get three trials to get your highest time. You must also complete the required information in this packet.

Marble Drop Time Trials DATE: _____

Planning

Planning Diagram: Diagram of plan before starting. Draw a sketch of your plan.

EXPLANATIONS – ANSWER IN COMPLETE SENTENCES!

Newton's Laws of Motion: Which of Newton's three laws of motion best describes the motion of the marble? Explain how you know.

Types of Motion: Which types of motion occur during the marble drop? Describe them. (Be specific in describing each type of motion and include at least 3 types – such as linear, circular, oscillating, etc.)

Forces:

1. Which specific types of forces are acting on the marble during the project (Include at least 3 types and be specific by describing how they affect the marble – such as gravity, friction, buoyancy, etc.)?

2. Are these forces contact or non-contact forces (out of the forces you mentioned above)? (Explain which types fit into the correct category and how you know).

3. Are balanced or unbalanced forces acting on the marble? (Explain how you know).

Results & Reflection

Diagram: Draw a diagram of the final construction once it is complete. Wait until after the marble drop trials to do this. (You may still make changes.)

Marble Drop Time Trials: Write about the three time trials. How did they go? Include specific times and details.

Difficulties/Changes of Construction: Explain any changes you made from your initial construction plan to the final construction of your track. Why did you make these changes? What difficulties did you encounter during the project? (Address each question below)

_____

_____

_____

_____

_____

_____

_____

_____

Success of Project: Did you feel successful with the results of this project? Explain why or why not.

_____

_____

_____

_____

MARBLE DROP DATA

Time Trial 1: _____ seconds

Time Trial 2: _____ seconds

Time Trial 3: _____ seconds

Longest Time: _____ seconds

Distance of Track: _____ meters

CALCULATIONS & MEASUREMENTS:

Distance of your Track: Measure the distance of your total track. You will need to add up all of the straight paths to find the total distance. Make sure your units are in **meters**. You will need this measurement to calculate the speed.

Distance =

Longest Time Trial: Record your longest time in the box below. Be sure to include your correct units. You will need this measurement to calculate the speed of your marble.

Longest Time =

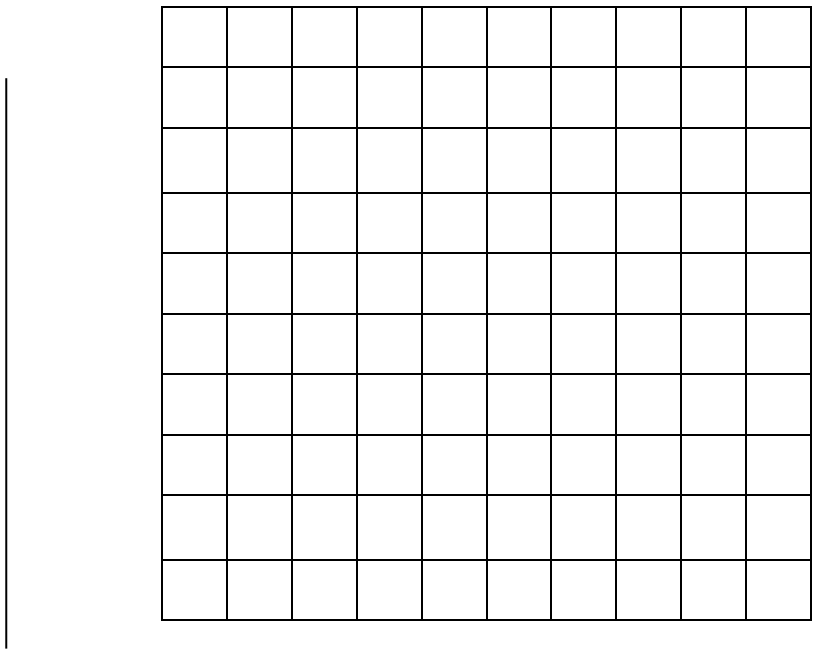
Speed of your marble: Calculate the speed of your marble for the longest trial. Write out speed equation and plug in the numbers for your longest trial. Include the correct units which should be **m/s**.

Speed =

AVERAGE SPEED GRAPH

Make an average speed graph of your data, with time and distance on your x and y axis. You will graph your longest time, which will be represented by one line. You will also graph the speed of 2 other groups' marbles. Use a ruler to make your lines straight and use a different color for each line. Fill in the key to color code the different lines.

Speed of Marbles		
Name of student/group	**Distance (m)**	**Time (s)**
Your Data (longest trial)		



Key

SLOW MARBLE PROJECT RUBRIC

Marble Drop

longest time _____

13 seconds & above	*3 extra credit points*
11.00-12.99	*2 extra credit points*
8.01-10.99	*1 extra credit point*

****

7-8 seconds	15 pts.
6-6.99	12 pts.
5-5.99	10 pts.
4-4.99	8 pts.
3-3.99	6 pts.
2-2.99	4 pts.
0-1.99	0 pts.

_____**/15**

Written Portion

Planning & Explanations

Diagram	_____/1
Newton's Laws of Motion	_____/2
Types of Motion	_____/2
Types of Forces	_____/2
Contact/Non-contact Forces	_____/1
Balanced/Unbalanced Forces	_____/1
Results & Reflection	_____/1
Marble Drop Time Trials	_____/1
Difficulties/Changes of Construction	_____/1
Success of Project	_____/1

Calculations/Measurements

Distance/Time	_____/1
Speed	_____/1
Data Table & Graph	_____/4

_____**/19**

Total _____**/34**