

Forces of Nature



A Comprehensive Study
of Motion using the

Rollercoasters

The community of Britton will have a new swimming pool in the spring of 2003. The second phase of the project is to develop the park in the surrounding area. Your job, as aspiring engineers, is to create a roller coaster for the park. You will build a roller coaster, create a narrative to describe your roller coaster, and present your overall project to a team of engineers. The best design will be chosen. May the best coaster win!!!

Timeline

The following are the due dates for each segment of the project.

Feb. 19 – Start date of project

March 3 – Model of final coaster made out of pipe cleaners due.

March 5 & 7 – Individual descriptions of the motion of your roller coaster.

March 12 – Rough Draft of Narrative Due

March 14 – End of 9 Weeks

You will be graded on

- a. Participation
- b. Pipe Cleaner Model

- c. Individual Description of Motion
- d. Narrative Rough Draft

March 19 – Project Presentations

You will be graded on

- a. Finished model
- b. Narrative
- c. Presentation

Requirements for Scale Model

Your model must include all of the following.

1. **Three** unique elements of design. (loop-dee-loop, spirals, etc)
2. The model must be to scale
3. You need a moving part. (car, marble, etc)
4. Free standing
5. The moving part has to stay on the track.

Requirements for the Narrative

1. Description of your roller coaster. Why did you choose this design?
2. Explanation of the physics involved in all major components of the ride. You need to include (but are not limited to) the following physics principles:
 - a. Newton's Laws
 - b. Friction
 - c. Components of Force
 - d. Momentum and its conservation
 - e. Motion on an Incline
 - f. Work and Power
 - g. Kinetic and Potential Energy
 - h. Centripetal force (if applicable)
3. Calculations of each of the above criteria.

4. What variables did you manipulate to make your roller coaster the best it could be? How did you manipulate these variables?
5. Calculate the g's for each element of your ride.

Requirements of the Presentation

1. Sell your roller coaster as the best attraction.
2. Describe your coaster using all of physics criteria above.
3. Partners must participate equally.
4. Information is accurate and substantiated by your narrative.
5. Visual aids should be used for appropriate emphasis.
6. The panel will have the chance to ask you questions about your design.

Britton/Hecla

Narrative

Name: _____

Teacher: Mrs. Henschel

Date : _____

Title of Work: _____

	Criteria				Points
	1	2	3	4	
Description: Criteria met and creativity is shown.	1, 2, 3	4, 5, 6	7, 8, 9	10	_____
Explanations of motion: All components are discussed accurately.	1, 2, 3	4, 5, 6,	7, 8, 9,	10	_____
Calculations of Motion: All calculations are performed correctly.	1, 2, 3,	4, 5, 6,	7, 8, 9	10	_____
Variables: Thorough discussion of manipulation of variables is present.	1, 2, 3,	4, 5, 6,	7, 8, 9,	10	_____
Writing Skills: Organization, Sentence Structure, and grammar are correct.	1, 2, 3,	4, 5, 6,	7, 8, 9	10	_____
				Total---->	_____

Teacher Comments:

Britton/Hecla
Scale Model

Name: _____

Teacher: Mrs. Henschel

Date : _____

Title of Work: _____

	Criteria				Points
	1	2	3	4	
Workability: The ride is realistic. Marble stays on the track.	1, 2, 3	4, 5, 6	7, 8, 9	10	_____
Well-crafted: Model has eye appeal and is sturdy.	1, 2, 3	4, 5, 6,	7, 8, 9,	10	_____
Collaborative: Evidence that all group members have contributed to the design and construction.	1, 2, 3,	4, 5, 6,	7, 8, 9	10	_____
Enterprising: Design has audience appeal and creative designs.	1, 2, 3,	4, 5, 6,	7, 8, 9,	10	_____
Meets criteria: All areas of criteria are met.	1, 2, 3,	4, 5, 6,	7, 8, 9	10	_____
				Total---->	_____

Teacher Comments:

Britton/Hecla
Presentation

Name: _____

Teacher: Mrs. Henschel

Date : _____

Title of Work: _____

	Criteria				Points
	1	2	3	4	
Persuasive: Group members truly sold their design.	1, 2, 3	4, 5, 6	7, 8, 9	10	___
Explanations of motion: All components are discussed accurately.	1, 2, 3	4, 5, 6,	7, 8, 9,	10	___
Visual Aids: Effectively and appropriately used.	1, 2, 3,	4, 5, 6,	7, 8, 9	10	___
Overall Performance: Partners participate equally, coherent and polished presentation.	1, 2, 3,	4, 5, 6,	7, 8, 9,	10	___
Q & A: Questions are answered accurately, efficiently. Equal participation.	1, 2, 3,	4, 5, 6,	7, 8, 9	10	___
				Total---->	___

Teacher Comments: