IT'S A WILD RIDE!

Roller Coaster Red Book

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Introduction

Get ready for a thrilling ride of adventure in your classes as we explore the underpinnings of roller coasters. This unit will provide a real-world application of how you use math, science, and language arts skills to deepen your understanding of how things operate in the real world.

You are given the task to design the ultimate ride for the Canyon Coaster Amusement Park. The park needs to increase attendance or it will go bankrupt. It needs a ride that will attract students like you, thereby increasing profits.

Continue reading for a complete description of your task.

Requirements of the Project

You will work in a group to complete the following components of your project. Each of you will be assigned a specific job. It is your responsibility to complete the task for that job, making sure it supports the other job roles. Each group must produce a presentation to deliver to a committee from the Canyon Coaster Amusement Park.

The presentation must include the following:

- Blueprint of the design
- Artistic rendition of the ride
- Research that will persuade the committee to purchase your design
- Technical report highlighting the specific aspects of the ride

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Overview of Job Roles
You will be assigned a grade based on your chosen job. Although this is a group project, you will receive a grade for your work only. You may also earn bonus points based on how well your piece fits together with the other members of the group and how well you work together.

Architect Responsibilities
• Prepare blueprint showing two views
  - Establish scale
  - Draw side view and top view of roller coaster
• Label measurements for speed, distance, and time
• Create a realistic rendition of roller coaster including:
  - Outside environment, Theme
  - Type of land it sets on and where
• Graph motion
• Calculate slope of first drop
• Find the angle of descent for the first drop
• Construct maquette (preliminary model)
• Complete regular journal entries:
  - Sketches, Pictures, Daily Log
• Show evidence of descriptive writing

Engineer Responsibilities
• Prepare technical report to include:
  - Car and track design description
  - Research on design elements and materials
  - Mathematical configurations
  - Safety measures - forces
• Correspond with an outside source through e-mail

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• Construct maquette (preliminary model)
• Complete regular journal entries:
  - Sketches
  - Pictures
  - Daily log
• Show evidence of technical writing skills

Researcher Responsibilities
• Conduct and document Internet research
• Prepare creative research approach to include in the group presentation
  - For example, a magazine or a newspaper
• Complete regular journal entries:
  - Sketches - Pictures - Daily log
• Show evidence of research and writing skills

Public Relations Director Responsibilities
• Determine presentation format of group:
  - Video, brochure, or multimedia presentation
• Design and coordinate presentation to include:
  - Safety measures
  - Unique features
  - Materials used and coaster specs
  - Car design
  - Some information from each of the other jobs
• Complete regular journal entries:
  - Sketches
  - Pictures
  - Daily log
• Show evidence of persuasive writing skills

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Job Roles Work Schedule

	Architects *Math Class*	Engineers *Science Class*
1st Block	**Blueprint**: - Establish scale - Draw continuous side view - Draw top view	**Maquette**: - Label potential and kinetic energy - Determine speed of each section based on force and motion
2nd Block	- Finish blueprint drawing - Label track	- Research safety measures and designs - Take notes and make sketches
3rd Block	- Slope of first drop - Angle of the first drop	- Research track material and design - Make sketches - Research car design - Draw car design
4th Block	**Artistic Rendering of Coaster:** - 3-D view - Stay proportional (no giant people, etc.)	- Prepare information to be put in the Microsoft PowerPoint* presentation
5th Block	- Finish artistic rendition - Graph motion - Check grade chart	- Communicate with an outside source - Check grade chart

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	Researchers *Lang. Arts Class*	PR Directors *Soc.Stud. Class*
1st Block	**Research Planning Sheet:** - Database - Select project format - Start taking notes	**Storyboard**: - Brainstorm together - Create the storyboard - Review specific do's and don'ts when creating presentation
2nd Block	- Read and take notes from sources - Planning chart	**Script**: - Create background, headings, graphics, video clips, etc. - Microsoft PowerPoint* slides, or other display
3rd Block	- Start work on project - Begin outline and rough draft using AlphaSmart board	- Finish visuals - Start presentation script
4th Block	- Continue writing draft - Revise and edit work	- Write presentation script
5th Block	- Final copy ready for group presentation - Check grade chart	- Final touches for group presentation - Check grade chart

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Group Planning Pages

Assign Job Roles:
Architect _____
Engineer _____
Researcher _____
PR Director _____

Architect

• List special effects and features that are part of
  the ride:

• Time of ride: _____

• Top speed: _____

Engineer

• Type of track: _____

• Type of passenger system: _____

• List specific design elements of ride:

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Public Relations Director

• Type of presentation format: _____

• List the steps that you will take to produce this
  presentation:

Researcher

Based on your Internet scavenger hunt, choose a
 specific topic to create a research project.

• List some ideas you could research:

• How does this help sell your group's ride?

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The name of your ride is: _____ Sketch a rough draft of the ride below. Include as much detail as possible.	**Architect Tasks** • Make maquette model of the group's roller coaster design • Draw a blueprint on poster board - Establish the scale - Draw continuous side view using two dimensions - Draw top (include loading platform) using two dimensions • Draw an artistic rendition - 3-D view - Add backdrop (setting) - Maintain a scale perspective (no giant people, trees, etc.) • Draw a car design - Label track • Create a graph

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Chart for Segments of Track

Questions to consider:
- How long does it take your car to travel each section of the track?
- Take the length of each section of track and divide by the speed you estimate the car will be traveling during that section.
- What is the overall length of the track?
- How long will your ride last?

Overall length of track: _____

Total time of ride: _____

Segment	Height	Distance	Speed	Segment Time	Total Time
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

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Architect Scoring Guide

	Score	Teacher Comments
Journal entries are complete		
The Blueprint		
Established appropriate scale		
Continuous side view to scale		
Top view to scale		
Track is correctly labeled for speed, time, distance, & forces		
Car design		
The Artistic Rendition		
3-D view of track		
Added backdrop		
Maintained a scaled perspective		
Overall Score:	**Average Score:**	

Scoring Guide
6 - It's a Wild Ride
    Excellent, top-notch work with flair and creativity
4 - It's a Fun Ride
    Good work of average quality, followed all directions
2 - Still Waiting in Line
    Needs to complete work at a more accurate level
0 - Did Not Enter the Park Today
    No attempt, did not turn in work

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Engineer Tasks

Check when finished:

- ☐ Sketch design of roller coaster on paper

- ☐ Make a maquette identical to Architect's model

- ☐ Divide track into sections and number each segment

- ☐ Determine the speed of each section based on force & motion principles. Use roller coaster Web site to gather information, record on chart

- ☐ Determine materials used for track. Use roller coaster
  Web site to gather information, record on chart

- ☐ Determine car design

- ☐ Determine distance for each section & record on chart

- ☐ Calculate for time and record on chart

- ☐ Calculate for acceleration and record on chart

- ☐ Sketch design of roller coaster on paper

- ☐ Readjust if necessary

- ☐ Create a speed/distance graph and/or a distance/time graph

Segment	Force	Mass	Potential Energy	Kinetic Energy	Acceler-ation
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Notes from Internet research on roller coasters:

Notes on safety, car design, and track materials:

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Engineer Scoring Guide

	Score	Teacher Comments
Journal entries are complete		
Technical Report		
Car and track design		
Research on materials and design		
Math calculations are correct and charts and graphs represent calculations		
Safety design		
Evidence of Newton's Laws applied		
Speed, distance, time, and acceleration are included		
Evidence of communication with an outside source		
Overall Score:		**Average Score:**

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Researcher Tasks

Remember! You need to relate your research paper to the entire group project. (Example: discuss safety issues, location, main attractions at theme parks, etc.) Support your topic by researching and finding evidence.

- Complete a planning sheet
- You must find & document several sources for your paper
   - Use the database
- Take notes from your sources on note cards or on the planning sheet
- Make an outline and rough draft (using AlphaSmart* boards)
- Edit your paper! (get help from your teacher or another adult)
- Make a "Works Cited" page
- Final draft

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Planning a Research Report	**Finding and Documenting Sources**
My report will be about: _____	**Taking notes**
	• Use the database that was created during Science
Here are questions I want to answer in my report:	• Use the Readers' Guide
	• Use any other book sources that may help you
	(Guinness Book of World Records, etc.)
Research the answers to your questions. Write the information on note cards. Did you add or change any questions as you did your research? Write any new or different questions here:	As you read your research, write useful information on note cards. (Get these from your teacher.)
	Using note cards
	Write down important details and quotations, along with the page numbers where this information can be found.
Now write the main topics for your outline. Think about the best order for your main topics.	**Types of notes**
I.	*Summarize*:
	To condense what you have read into a few important ideas
II.	
	Paraphrase:
III.	Summarize what you have read using your own words
IV.	*Quote Directly*:
	Record the statement or idea word for word
V.	
	Give each card a descriptive heading (a word or phrase to highlight the main idea of that note card).

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Writing and Completing the Research Paper

Make an outline

Organize your note cards into the most logical order and use them to construct an outline. Then, search for any additional information that may be needed to develop your thesis.

Use your outline to type a rough draft.

Revise your first draft several times
• Use the editing symbols that we have used in class
• Have an adult check your work
• Important questions to answer:
- Do you have a clear, specific thesis statement?
- Do you have evidence that supports your thesis statement in your paper?
- Have you checked for spelling, grammar, and punctuation errors?

Document your sources
• Put the works cited section together, listing all of the sources you have cited in your paper
• Give credit for ideas and direct quotations from different sources that you have used in your paper
• For specific details on citing your sources, see the blue "Writing With Style Manual" in the back of the room
• Make sure your final draft is error free!

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Writing Tips
Use your own words as much as possible. Use direct quotations only when the wording in the quotation is exactly as you want it. Drop statements that you cannot support with facts and opinions.

Introduction: Say something interesting, surprising, or personal about your subject to gain your readers' attention. You should also identify the specific focus, or thesis of your research.

Body: Support or prove your thesis. You may want to consider giving important background information and interesting or surprising facts.

Conclusion: You should leave readers with a clear understanding of the importance of your research. Review important points you have made and draw a final conclusion.

Research Project Checklist

☐ Did Internet research using database
☐ Took notes and cited sources
☐ Created design layout
☐ Organized information to fit design layout
☐ Completed rough draft
☐ Had rough draft edited by parent, peer, or teacher
☐ Made final copy
☐ Completed self-evaluation

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Research Paper Scoring Guide

	Score	Teacher Comments
Sources: Uses Internet research and traditional research (magazines, reference books, newspapers), sites resources with a "Works Cited" page.		
Writing Skills: Mature sense of audience and purpose, logical, effective, and engaging details and examples, inviting introduction		
Conventions: Few, if any, errors in mechanics, usage, spelling, or sentence structure.		
Creativity: Exciting information and appealing layout, design is neat and readable.		
Purpose: Relates to overall project, helps to "sell" the ride.		
Journal: Entries are complete and thorough		
Overall Score:		**Average Score:**

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Scoring Guide

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Public Relations Tasks

You are the person who needs to really "sell" your ride. Use all of the information from your team members to develop a presentation.

• Begin by deciding on your presentation format
- (Microsoft PowerPoint*, digital scrapbook, Web site, etc.)
- Brainstorm with other public relations people, get some ideas on how to complete this job
• Develop a storyboard
- Plan your presentation step-by-step, include a script

Make your presentation appealing. Use graphics, images, catchy sayings, video clips, anything that says, "WOW!"

• Plan the presentation
- Who will say what during the presentation? Plan what each team member will be doing during the presentation
• Practice the presentation several times

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Plan Presentation Jobs

Architect:

Engineer:

Researcher:

Public Relations Director:

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Storyboard

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Public Relations Director Scoring Guide

	Score	Teacher Comments
Presentation uses technology effectively		
Presentation uses persuasive techniques to "sell" the ride		
Presentation ties all job roles together into one complete project		
Presentation is creative and says, "WOW!"		
Journal entries are complete and thorough		
Overall Score:		**Average Score:**

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    No attempt, did not turn in work

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Journal Entries
Complete a journal entry after each block. State what you have accomplished. List any frustrations and breakthroughs you experienced. Share how you think your group is working.

First Block	
Second Block	
Third Block	
Fourth Block	
Fifth Block	
Team Block	
Extra time at home or school	
Whole group presentation	

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It's a Wild Ride

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Committee Scoring Guide

	Score	Teacher Comments
Group "sells" their ride, presentation is persuasive		
All project components are connect and relate to one another		
Ride is creative and unique		
Presentation is organized		
Maquette's blueprint, technical project, and research project are present		
The group achieves synergy!		
Overall Score:		**Average Score:**

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4 - It's a Fun Ride
   Good work of average quality, followed all directions
2 - Still Waiting in Line
   Needs to complete work at a more accurate level
0 - Did Not Enter the Park Today
   No attempt, did not turn in work

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