MeTEOR Performance Task
Fourth Grade

English Language Arts
Wild Rides

Performance Task Item: Wild Rides

Grade Level: 4th Grade

Focus Areas: Narrative Writing; Expository Writing; Informational Text

Essential Questions:

- How is energy used to cause motion, generate force, and do work?
- Has the increasing need for a bigger thrill from some personality types encouraged the evolution of the roller coaster?

Learning Targets:

- Students will cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
- Students will offer and support opinions and negotiate with others in communicative exchanges.
- Students will read closely informational texts and view multimedia to determine how meaning is conveyed explicitly and implicitly through language.
- Students will use domain-specific vocabulary to explain concepts.
- Students will organize and present their ideas and information according to the purpose of the research and their audience.
- Students will write a narrative about an imagined experience.
- Students will gather information and analyze texts to synthesize information in order to design a roller coaster using scientific principals and create an advertisement.

STANDARDS

Content Standards:

- Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
- Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a *grade 4 topic or subject area*.
- Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
- Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 4 topics and texts*, building on others' ideas and expressing their own clearly.

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- Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
- Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.
- Use precise language and domain-specific vocabulary to inform about or explain the topic.
- Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

Supporting Standards:

- Differentiate among forms of energy, including mechanical, sound, electrical, light, and heat/thermal.
- Understand force, motion and the relationship between them.

Materials/Resources:

- "Everyday Mysteries: Why Don't I fall Out of an Upside-Down Roller Coaster?" www.newsela.com Lexile 770
- Picture and brief description of early Russian ice slide www.brittanica.com
- Excerpt of "Riding roller coasters is about the need that some people have to seek thrills and take risks" https://www.sciencenewsforstudents.org/article/roller-coaster-thrills
- Roller Coaster Energy – Interactive Graph: https://kttz.pbslearningmedia.org/resource/hew06.sci.phys.maf.rollercoaster/energy-in-a-roller-coaster-ride/#.WQbH8trythE
- Energy explained through roller coaster ride: https://www.youtube.com/watch?v=LrRdKmjhOgw
- Wild Rides "Concept Graphic Organizer" using article and videos
- Wild Rides "Vocabulary"
- Wild Rides "Kinetic vs Potential Energy" sheet
- Venn Diagram for Russian Ice Slides and Modern Roller Coaster
- Personality Question sheet
- Personality Survey
- Narrative Writing Rubric
- Poster Rubric
- Optional Science Activity- Roller Coaster Designer

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Vocabulary

- Potential Energy
- Kinetic Energy
- Inertia
- Gravity

Concepts:

- Force and motion
- Gravity
- Compare/Contrast

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Part A:

Read "Everyday Mysteries: Why don't I fall out of an upside-down roller coaster?" and answer questions 1 – 3.

1. What two types of energy are used to make a roller coaster work? (DOK 1)

2. Explain in your own words what keeps you from falling out of a roller coaster. (DOK 1)

3. According to the text, what type of material allows for more twist and turns? What are the reasons that different materials might work better than others for roller coasters? What are the limitations of one material over the other? (DOK 2)

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Watch the two videos below and answer question 4. Be sure to take notes, you will need this information later.

The first will show you how a real modern roller coaster works:
https://www.youtube.com/watch?v=LrRdKmjhOgw
The second shows an interactive graphic video "Roller Coaster Energy":
https://kttz.pbslearningmedia.org/resource/hew06.sci.phys.maf.rollercoaster/energy-in-a-roller-coaster-ride/#.WQbH8trythE

4. With a group and using the information from the articles and videos as a reference, discuss all of the things you learned about some of the science concepts. You will fill out the "Concept Graphic Organizer". After your group has discussed these concepts, your group will make a science vocabulary book. You will write the vocabulary word, the concept in your own words based on the information you've gathered and some research, and draw a picture/graph to show the concept – a template has been provided for you to use. (DOK 2/3)

Teacher Note: This could be a good time for the optional Science Activity- Roller Coaster Designer

5. Now that you have a little better understanding of the science vocabulary and concepts. Complete the Wild Rides Kinetic Energy and Potential Energy form. (DOK 2/3)

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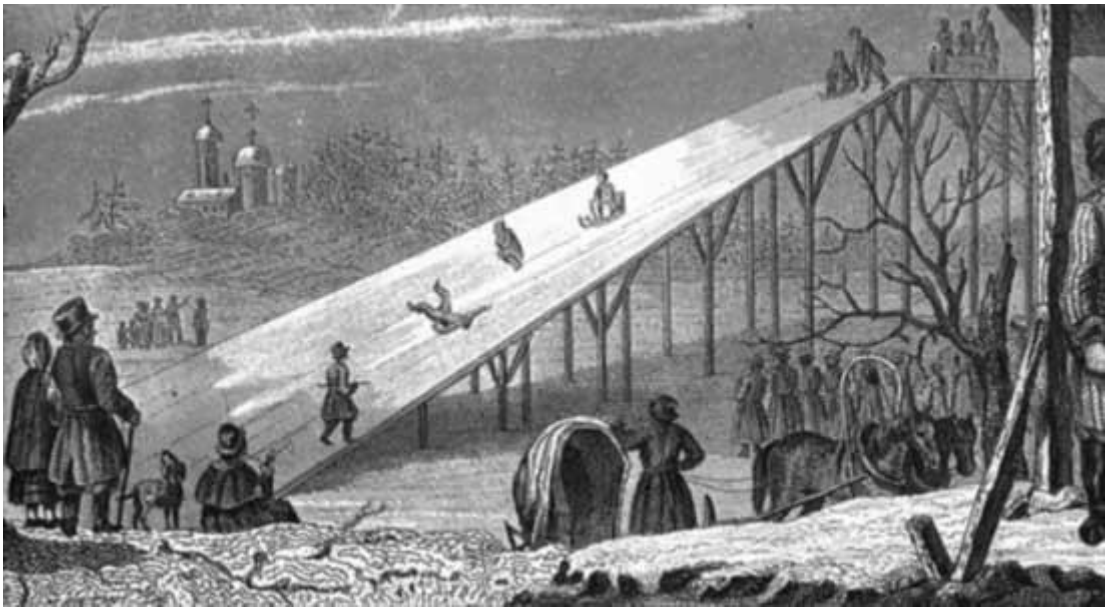
6. Below is a picture and brief description of one of the early roller coasters called a Russian ice slide. Looking at the picture and using the information you have learned so far, what does the text evidence show us about the weather? What about the safety and comfort of the roller coaster? Basically the seat was an "ice-block sled with a straw seat" which would be like riding on a big ice cube with some hay (like for animals) on top. Compare and contrast the modern roller coaster with the Russian ice slides. Be sure to think about the appearance, energy used for both, speed and more. There is a graphic organizer provided to complete this task.



"Among the predecessors of modern roller coasters were rides in Russia in the 15th century: sleds constructed of cut lumber and tree trunks sped down man-made ice-covered hills. The rides were more elaborate than simply sledding, reaching speeds of 50 miles (80 km) per hour and earning the nickname "flying mountains." Both children and adults would make the trek up stairs about 70 feet (21 meters) high to an ice-block sled outfitted with a straw seat. Though some constructions were hundreds of feet in length, the trip back down was relatively brief. A ride inaugurated at St. Petersburg in 1784 comprised carriages in grooved tracks that traveled up and down small hills by means of power generated by the height and slope of the initial descent."

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7. Write a short story from the point of view of a Russian child who is about to ride the Russian ice slide for the first time. Also, remember the time period that it took place. Some research will be required for accurate details. Remember the basics of narrative story writing. There is a rubric for your reference. (DOK 3/4)

Part B:

Read "Roller Coaster Thrills" and answer questions 8 – 11.

8. What do think is the author's purpose? What is the main idea of the passage? (DOK 2)

9. According to the article, what are some reasons people love to ride roller coasters? (DOK 1)

10. The author says that roller coasters provide a safe outlet for adventurous people. Do you agree or disagree? Show evidence for you opinion from the articles. (DOK 2)

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11. The text says that the enjoyment of roller coasters is dependent on a person's personality type but that most of us fall in the middle of the range of thrill seeker to comfort zone. In your group, design some questions that you think could be used to determine where a person falls in the personality range from **type-T** (Thrill Seeker) to **type-t** (safety zone). Do not ask questions about roller coasters until after the interview! (Ask friends and family members questions from the survey and then find out if they like or do not like roller coasters. Only the last question should be about roller coasters to not give away what the survey is about .) Your questions should be things that would give you insight into the person's personality. There are some personality surveys you could research if needed. Are there any similarities to the person's answers on the questions and whether they like roller coasters? There is a form to help you keep your data straight. After looking at the data, what conclusion did you draw? Is the article correct that it depends on personality type or did your research show differently? Write a conclusion based on your research. (DOK 3/4)

Look at the infographic below plus the articles you've read to answer question 12.

12. The infographic shows the "Top 10 Ultimate Roller Coasters on Earth" and their height and velocity (speed). Research some of the roller coasters and their characteristics. Looking at all of the information including background knowledge, infographics, articles and research. Create your own Ultimate Roller Coaster and make a poster to advertise it. You will need to come up with a name for the roller coaster as well as the name of the amusement park and its location. How high will it be? How will it be designed (looks, twists, turns)? What will it be made of? Safety features? Your poster should answer these questions and should show the design. Remember it is to build excitement for your roller coaster.

    NOTE: There are several websites that allow you to create your own rollercoaster such as one by learner.org where you can put in height, etc. The website is https://www.learner.org/exhibits/parkphysics/coaster/ and there is also http://gated.jason.org/digital_library/4851.aspx if you want to get a little more in depth with the science concepts. There are simpler versions as well. You can also use white paper that is longer but just remember the principles you learned earlier in the lesson. No matter what you use, be sure you take notes during the creation process so you can use them for your poster. (DOK 3/ 4)

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ARTICLES/STUDENT MATERIALS

"Everyday Mysteries: Why don't I fall out of an upside-down roller coaster?"

TOP: An amusement park steel rail roller coaster with its cars full of screaming riders; MyLoupe/UIG Via Getty Images.

Question: Why don't I fall out when a roller coaster turns upside down?

Answer: Inertia keeps you from falling out. It is a resistance against a change in direction. It keeps you pressed against the bottom of the car with a force stronger than gravity. Gravity is the pulling force that makes things fall to the ground.

Have you ever wondered how roller coasters work? How can people hang upside down in them without falling out? The answer involves different forces. It also involves different kinds of energy that act together. Energy is the ability to do work. It is a kind of power.

Potential Then Kinetic

A roller coaster does not have an engine. It is pulled up the first hill it climbs by a cable, a thick cord. This pulling builds up stored energy in the roller coaster. Stored energy is also called potential energy. This stored energy will be used to go down the hill as the train is pulled down by gravity.

At the bottom of the hill, all of that stored energy is converted into kinetic energy. Kinetic energy is the energy that builds up when a body or object is moving. This type of energy pushes the coaster up to the top of the next hill. Then the process starts all over again. So, as the train travels up and down hills, it moves back and forth between potential and kinetic energy.

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Over time, the coaster starts to slow down. This is caused by the wheels pushing against the track, and by wind pushing against the cars. So toward the end of the ride, the coaster has less energy. For that reason, the coaster's final hills are usually lower.

Loops, Flips After 1959

Most roller coasters are made of wood or steel. Wooden tracks are not as bendable as steel tracks. For that reason, they usually do not have complicated shapes, like big twists and loops.

Steel tracks were first introduced in 1959. After that, more adventurous coasters became possible. Soon, some tracks included loops that flip passengers completely upside down.

Staying Seated

When you go upside down on a roller coaster, inertia keeps you from falling out. Inertia presses your body to the outside of the loop as the train spins around.

As you go upside down, gravity is pulling you toward the Earth. But inertia keeps you pressed against the floor of the roller coaster car. This resistance to a change in motion is stronger than gravity.

The loop cannot be a perfect circle, though. If it was, the force would be too strong. This would make the ride uncomfortable and unsafe. For that reason, roller coaster loops are shaped like stretched-out circles.

Roller Coaster Records

The earliest version of a roller coaster was a Russian sled ride. It was popular in the 1400s. It was called Russian Mountains.

La Marcus Thompson built the first American roller coaster. It opened at Coney Island in Brooklyn, New York, in 1884.

The Corkscrew was the first coaster to go completely upside down. It opened at Knott's Berry Farm in Buena Park, California, in 1975.

The world's tallest and fastest roller coaster is the Kingda Ka. It is located at Six Flags Great Adventure in Jackson Township, New Jersey. Kingda Ka is 456 feet tall. It travels at a speed of 128 miles an hour.

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"Roller Coaster Thrills"

Riding roller coasters is about the need that some people have to seek thrills and take risks.

We tried to act calm. My friend Greg and I were waiting in line for the Incredible Hulk Coaster—a ride at the Islands of Adventure theme park in Orlando, Fla.

Every few minutes the roller coaster flew by, hurling its passengers upside down, whipping them from side to side, and shaking everything out of their pockets. Screams filled the air. My insides churned. It had been years since I'd been on a roller coaster. "Why am I doing this to myself," I wondered. "Why, in fact, do people go on roller coasters at all?"

"Where else in the world can you scream at the top of your lungs and throw your arms in the air?" Frank Farley asks. "If you did that in most other places, they'd take you to your parents and probably put you through a psychological evaluation." Farley is a psychologist at Temple University in Philadelphia.

The freedom to act wildly is one reason why millions of people flock to amusement parks every year. Roller coasters are a major part of this attraction, and the people who run the parks keep looking for ways to make coasters taller, faster, and scarier.

The new Top Thrill Dragster at Cedar Point in Sandusky, Ohio, for example, rises 420 feet into the air and travels at speeds up to 120 miles per hour. It's the tallest and fastest coaster in the world. And there's no shortage of people willing and eager to ride it.

For many people, there's only one good reason to go to an amusement park: the roller coaster. Other people, however, would rather hide behind the closest candy stand than go near a coaster.

What separates these two types of people—those who seek thrills and those who prefer the quiet life?

Roller coasters often appeal to kids whose lives are stressful, structured, or controlled, Farley says. "The summers of yore where kids could be kids and float down a river in an inner tube are over," he says. "Roller coasters are a way of breaking out of the humdrum and expectations

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of everyday life. You can let it all go and scream and shout or do whatever you want." Attendance at amusement parks shows that many adults feel the same way.

Compared with skateboarding, extreme mountain biking, and other adventure sports, riding roller coasters is safe. Parents usually don't mind when kids go on coasters.

Roller coasters also have a way of bringing people together. Riders share the thrill and adventure of surviving what feels like an extreme experience.

A matter of personality

Whether you like to ride a roller coaster may depend on your personality.

Farley suggests that, when it comes to thrill-seeking behavior, there's a spectrum of personality types. At one extreme are risk-taking people who always seek out new experiences, whether the adventures involve skydiving, mountain climbing, or even coming up with new mathematical theories. Farley describes such people as having type-T personalities. "T" stands for thrill.

If you enjoy mountain or cliff climbing, you probably have a type-T personality.

At the other extreme are people who avoid risks and hate new experiences. Farley describes these people as having type-t personalities.

Most people lie somewhere in between, he says.

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WILD RIDES

From the articles and videos you watched, fill out the Concept graphic organizer with your group.

CONCEPT	Article	VIDEO #1	VIDEO #2
Kinetic Energy			
Potential Energy			
Gravity			
Inertia	**Ex. Keeps people from falling out, resistance with a change in direction, stronger than gravity**		
Other			

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WILD RIDES VOCABULARY

(Word)

(Definition in your own words)

(Draw a picture below that defines the concept. Be sure to label)

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Wild Rides!

KINETIC ENERGY AND POTENTIAL ENERGY

Using two colors- red for kinetic energy and blue for potential energy, - color along the roller coaster tracks which type of energy would be used.

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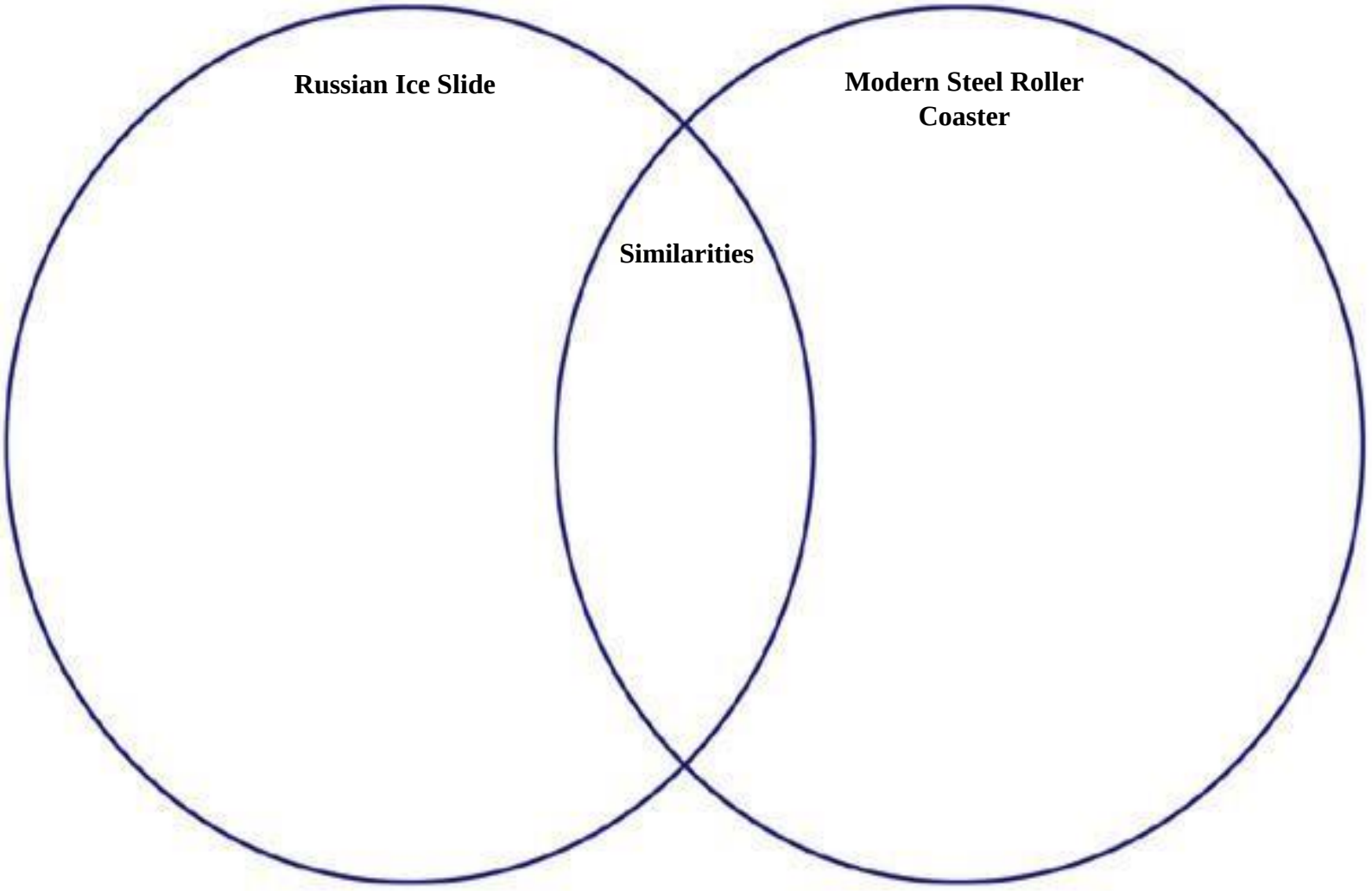
WILD RIDES!

Fill out the Venn Diagram using the information from a Russian Ice Slide and a Modern Steel Roller Coaster



Conclusion:

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Narrative Writing Rubric

Score	Organization	Elaboration of Evidence	Language and Vocabulary	Conventions
4 Proficient	☒ Organizes a clear sequence of events that unfolds naturally. ☒ Uses a variety of transition words and phrases to manage the sequence of events. ☒ Provides a conclusion that follows from the experiences or events.	☒ Uses descriptions of actions, thoughts, and feelings to develop experiences and events. ☒ Uses dialogue to develop character and plot.	☒ Uses correct and varied sentence structures. ☒ Uses strong, grade-level appropriate word choice.	☒ Demonstrates command of grade-level conventions; errors are minor and do not interfere with understanding of the text.
3 Approaching	☒ Attempts to organize a clear sequence of events that unfolds naturally. ☒ Attempts to use a variety of transition words and phrases to manage the sequence of events. ☒ Attempts to provide a conclusion that follows from the experiences or events.	☒Attempts to use descriptions of actions, thoughts, and feelings to develop experiences and events. ☒Attempts to use dialogue to develop character and plot.	☒Uses correct and varied sentence structures most of the time. ☒Uses strong, grade-level appropriate word choice most of the time.	☒ Uses grade-level appropriate conventions most of the time; errors do not interfere with understanding of the text.
2 Below	☒Organizes a sequence of events that unfolds somewhat unnaturally. ☒ Uses some transition words and phrases to manage the sequence of events. ☒Provides a limited conclusion that follows from the experiences or events.	☒ Uses some descriptions of actions, thoughts, and feelings to develop experiences and events. ☒Uses some dialogue to develop character and plot.	☒Uses correct and varied sentence structures some of the time. ☒Uses strong, grade-level appropriate word choice some of the time.	☒ Uses grade-level appropriate conventions some of the time; some errors interfere with understanding of the text.
1 Far Below	☒Does not organize a clear sequence of events. ☒Uses little to no transition words or phrases. ☒Provides little or no conclusion.	☒ Uses little to no descriptions of actions, thoughts, and feelings. ☒ Uses little to no dialogue.	☒ Does not use correct or varied sentence structures. ☒ Uses simplistic or inappropriate word choice.	☒ Does not use grade-level appropriate conventions; errors prohibit understanding of the text.

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WILD RIDES PERSONALITY TYPE

Question 1: Would you rather go to a vacation where you would go see things or do wild things?

Question 2: Would you rather go eat in a restaurant you know or try out something exotic?

Question 3:

Question 4:

Question 5:

Question 6:

Question 7:

Question 8:

Question 9:

Question 10: Do you like to ride roller coasters?

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Marking Sheet for Personality Survey

Questions	Subject 1	Subject 2	Subject 3	Subject 4	Subject 5
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10. Do you like roller coasters?					
Comments					

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ROLLER COASTER DESIGNER

MATERIALS

- At least two 6 foot (183 cm) sections of 1-1/2 in (about 4 cm) diameter foam pipe insulation or pool noodles work great too!
- Glass marbles
- Utility knife (adult only)
- Masking tape
- Tape measure
- Bookshelf, table, or other support for roller coaster starting point

DIRECTIONS

Cut the foam pipe insulation or pool noodles in half (the long way) to make two U-shaped channels. (You'll end up with two separate U-channel foam pieces. You can use masking tape to attach pieces end-to-end to make the roller coaster track as long as you want.)

Pick a diameter for the loop. Something in the range of 30–50 cm (12–20 in) should work well.

Tape two lengths of the foam U-channel together, end-to-end. The joint between the two pieces should be as smooth as possible.

Curl the track into a loop of the desired diameter. Tape the loop together where the two tracks meet at the bottom. Don't tape the loop to the floor just yet.

Raise the other end of the track up to make a ramp coming down into the loop.

Tape the top of the ramp in place on a bookshelf or other piece of furniture.

Now you can tape the loop down to the floor.

Measure the diameter of the loop.

Measure the height of the starting point for the track (rise).

Measure the horizontal distance from the track starting point to the beginning of the loop (run).

Run a single marble down the track 10 separate times. How many times does it successfully go through the loop?

Change the height and repeat the previous step. If the marble makes it through the loop most of the time, lower the height. If the marble fails to make it through the loop most of the time, raise the height.

What starting height was needed for the marble to make it through the loop most of the time?

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Wild Rides Poster Rubric

CATEGORY	5	4	3	2	1	Points Earned
Creativity/Originality	The poster shows a very original presentation of the materials which captures the viewer's attention and shows that the student went over and beyond the requirements, which were all met and exceeded. A great deal of time was spent on creativity.	The poster shows a lot of originality; good variety and blending of materials. The poster is very interesting to the viewer. The student spent a lot of time on the work and most of the requirements were met. A lot of time was spent on creativity.	The poster has some originality and variety of materials. Some but not all of the requirements were fulfilled. It shows some creativity and that a moderate amount of time was taken to create the poster. Viewers have some interest.	The poster has little originality or variety of materials. Few of the requirements are met. It shows little creativity and that a minimum amount of time was taken to create the poster. Viewers have little interest.	The poster has no originality. Insufficient use of materials. None of the requirements were met. It shows no creativity and that almost no time was taken to create the poster. Viewers have no interest.	
Quality of Poster Presentation	The poster is effective in relating all of the topics and requirements. Physical appearance of project shows attention to details in terms of lettering, organization, typing, proofreading, neatness, picture, art labels, etc.	The poster is interesting and adequately addresses the requirements and topics. Good physical appearance. Minor flaws in details.	The poster is somewhat interesting and vaguely addresses the requirements and topics. Appearance is not very appealing. Moderate errors in details.	The poster is not interesting and barely addresses the requirements and topic. Some vital elements are missing. Physical appearance is not appealing. Major errors in details.	The poster is not interesting and badly done and does not meet the requirements or topic. Vital elements are incomplete or not appropriate. Unappealing with extreme errors in details.	

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