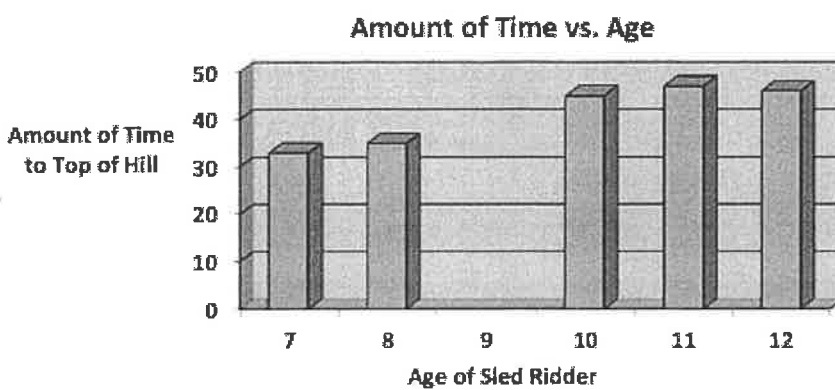


Newton's Law Reasoning

Name _____ Period _____

A student comes up with an idea to make some extra money during a snow day. All the neighborhood kids are outside sledding. The student offers to pull the students to the top of the hill for one dollar per ride. The student notices that it was taking more time to pull some student to the top than it was other students even though he was pulling with the same force. He decides to start timing how long it takes to pull each kid and see if there was a pattern based on their age.



Explain why some kids took longer to pull to the top of the hill than other kids despite pulling with the same force.

In your response, be sure to include:

- Identify the pattern in the data including any exceptions to the trend [Evidence]
- Utilize the pattern and exceptions to the trend to determine why some kids took longer to get pulled to the top of the hill.[Reasoning]
- Apply the role of Newton's 2nd Law in taking longer to pull some kids. {Reasoning}

Sled Pull Newton's 2nd law

Proficient Response

* The pattern is that as the age of the sled rider increases, the longer it takes to get the sled rider to the top, with the 12 year old not following this trend.

* Inferring that if weight "increases with age, then if the students are older, they weigh more, and time to top increased.

* Newton said that if an object is more massive, then it will accelerate slower. Therefore the older

Proficient Response

Newton's Third Law Reasoning Space Shuttle

Name _____ Period _____

The motion of space shuttles is caused differently than that of most modes of transportation. As the fuel is burned, the hot gasses produced rush out of the bottom of the craft. This causes the space shuttle to launch into the air.



Describe how hot gasses rushing out of the bottom of a space shuttle cause it to launch.

In your response, be sure to include:

- labels of the forces acting on the space shuttle using arrows and appropriate terms.
- how Newton's third law allows the space shuttle to launch.
- why there is a delay between when the fuel starts to burn and when the space shuttle launches.

[Handwritten scribbles and the word "remove" with an arrow pointing to the right.]

Proficient Response

Space Shuttle Newton's 3rd law

2nd * Newton said that for every action there is an opposite and equal reaction. To allow the space shuttle to launch, the hot gasses going down provide the action force, and the space shuttle reacts by going up.