Conservation of Momentum Exploration

Student Activity

Name _____

Class _____

Open the TI-Nspire document *Conserv_of_Momentum Exploration.tns.*

If two students are standing on skateboards and push against one another, what happens to each boarder? What affects how fast each boarder leaves? In this exploration, the answers to these questions will be answered.

Move to pages 1.2 – 1.3.

Answer questions 1 and 2 here and/or in the .tns file.

Q1. Two kids are standing on skateboards. Kid 1 weighs 750 N, and Kid 2 weighs 350 N. If they push against one another, _____.

A. the force is the same on each kid.
B. the force is greater on kid 1.
C. the force is greater on kid 2.
D. the force cannot be determined either way.

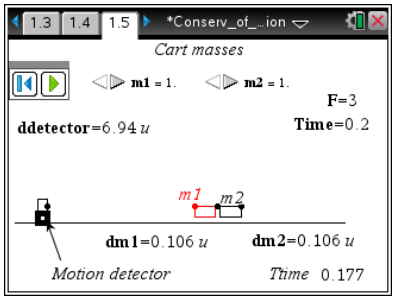
Q2. Two kids are standing on skateboards. Kid 1 weighs 750 N, and Kid 2 weighs 350 N. If they push against one another, _____.

A. kid 1 will have a greater velocity.
B. kid 2 will have a greater velocity.
C. they will have the same velocity.
D. the relationship of velocity cannot be determined.

Move to pages 1.4 – 1.5.

1. After reading the directions, move to page 1.5.

2. Select the play button, and observe the two carts, m1 and m2, as they move away from each other.
   - **ddetector** is the distance to the motion detector.
   - **dm1** is the distance from the center point to cart 1.
   - **dm2** is the distance from the center point to cart 2.



Tech Tip: The play button is located in the upper right-hand corner of the screen.

Move to pages 1.6 – 1.7.

Answer questions 3 and 4 here and/or in the .tns file.

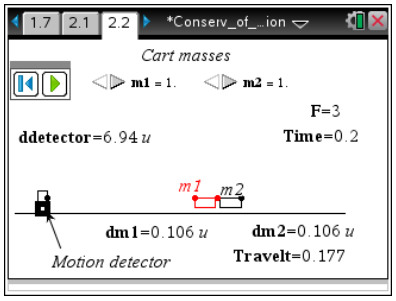
Q3. With a force pushing on each of the carts, the position from the starting point _____.

A. is further for cart 1.
B. is further for cart 2.
C. is the same for each cart.
D. cannot be determined.

Q4. If the masses are the same, the carts will move away from the center point by the same distance each time.

A. Always
B. Sometimes
C. Never

Move to pages 2.1 – 2.3.



3. After reading the directions, move to page 2.2.

4. Select the right arrow button ▶ of m1 to increase the mass of cart 1 to 2 units. Select the play button and observe what happens.

5. Observe the graph produced from the two carts on page 2.3. Determine a linear regression for the graphs.

Tech Tip: To create a best fit line, select **Menu** or **>** **Analyze > Regression > Show Linear (mx + b)**. You may need to back-out to the main Tools Menu to see the desired menu option.

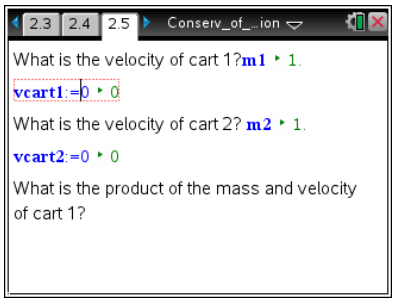
Move to page 2.4. Answer question 5 here and/or in the .tns file.

Q5. What does the best fit line through the data on the graph represent?

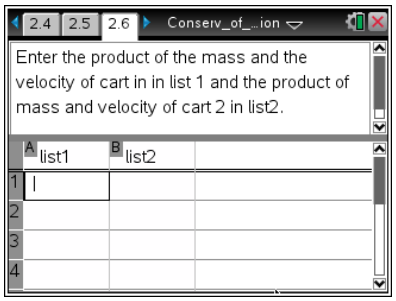
A. Time
B. Velocity
C. Distance
D. Acceleration

Move to pages 2.5 – 2.6.

6. Select the MathBox containing **vcart1** and enter the velocity of cart 1. Then click on on the MathBox containing **vcart2** and enter the velocity of cart 2.



7. Move to page 2.6 and determine the product of mass and velocity of cart 1. Enter it in List 1. Determine the product of mass and velocity of cart 2 and enter it in List 2.



Tech Tip: To enter data into a cell, select the cell. The keyboard will appear. Enter the numerical value and then select enter.

Move to pages 2.7 – 2.8. Answer questions 6 and 7 here and/or in the .tns file.

Q6. Will the products of the velocity and the mass for each cart equal one another?

A. Always
B. Sometimes
C. Never

Q7. Move back to the animation of the carts and press the reset button. Change the mass of cart 1 and run the simulation again. Do you still agree with your last answer?