



Conservation of Momentum Exploration

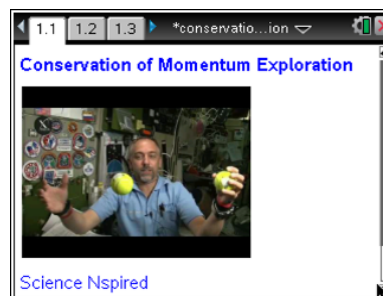
Student Activity

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.



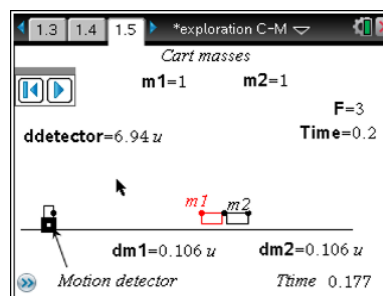
Move to page 1.2.

Press **ctrl** **▶** and **ctrl** **◀** to navigate through the lesson.

- Two kids are standing on skateboards. Kid 1 weighs 750 N, and Kid 2 weighs 350 N. If they push against one another, _____.
 - the force is the same on each kid.
 - the force is greater on kid 1.
 - the force is greater on kid 2.
 - the force cannot be determined either way.
- Two kids are standing on skateboards. Kid 1 weighs 750 N, and Kid 2 weighs 350 N if they push against one another, _____.
 - kid 1 will have a greater velocity.
 - kid 2 will have a greater velocity.
 - they will have the same velocity.
 - the relationship of velocity cannot be determined.

Move to page 1.5.

- Press the play button, and observe the two carts 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.





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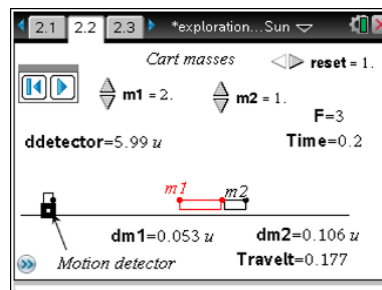
Name _____

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4. With a force pushing on each of the carts, the position from the starting point _____.
- Is further for cart 1.
 - Is further for cart 2.
 - Is the same for each cart.
 - Cannot be determined.
5. If the masses are the same, the carts will move away from the center point by the same distance each time.
- Always
 - sometimes
 - Never

Move to page 2.1.

6. Increase the mass of Cart 1 on the next page to 2 units, and press the play button. Then examine the data and graphs on the pages that follows.
7. Click on the up button of m1.



8. Observe the graph produced from the two carts. Determine a linear regression for the graphs.
9. On the graph page, what does the best fit line through the data represent?
- Time
 - Velocity
 - Distance
 - Acceleration



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10. Click on the vcart1 and enter the velocity of cart 1 then click on vcart2 and enter the velocity of cart 2.

2.3 2.4 2.5 *exploration C-M

What is the velocity of cart 1? $m_1 \rightarrow 2.$

$v_{cart1} = 0 \rightarrow 0$

What is the velocity of cart 2? $m_2 \rightarrow 1$

$v_{cart2} = 0 \rightarrow 0$

What is the product of the mass and velocity of cart 1?

11. Determine the mass times the velocity of cart 1 and enter it in List 1. Determine the mass times the velocity of cart 2 and enter it in List 2.

2.5 2.6 2.7 *exploration C-M

Enter the product of the mass and the velocity of cart in list 1 and the product of mass and velocity of cart 2 in list2.

	A list1	B list2
1		
2		
3		
4		

12. Will the products of the velocity and the mass for each cart equal one another?
- a. Always
 - b. Sometimes
 - c. never
13. Move back to the animation of the carts and reset. Change the mass of cart one and run the experiment again. Do you still agree with your last answer?



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