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Newton's Laws

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CMST SCOLLARCITY "**First tool"** Interactive Physics

Name: Kendra Brewster Interactive Physics
Grade level(s)/Subject taught: Living Environment – 8th grade General Science
Objectives: Students will be able to • Interpret the principles of Newton's Laws • Identify and relate movement of objects to Newton's laws • Identify forces such as air resistance, friction, gravity

1b. *Write* the Science Concept or "key idea" that your first modeling tool will be used to teach: (e.g. Organisms maintain a dynamic equilibrium that sustains life).

NYS Standards: **Standard 6. 2**- Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design. **Standard 6.5**- Identifying patterns of change is necessary for making predictions about future behavior and conditions. **Standard 5.1**- Describe different patterns of motion of objects. **Standard 5.2d**-Friction is a force that opposes motion.

Engagement- Assessing Prior Knowledge

Students will watch a 2 minute clip of a roller coaster ride. Students will be asked to discuss what makes the roller coaster move? Why does it not fall off the track? Why does the roller coaster only need help up the hill and not down the hill?

Exploring Ideas of Movement

First demonstration

The teacher will demonstrate the following: a square piece of cloth, hanging a little over the edge of a smooth table with a small plate on top of it will be at the front of the classroom. A few items will be placed on the plat. The teacher will grab the cloth that extends over the end of the table with both hands, and quickly pull it off of the table. The plate and the content will stay on the table. Students will be asked what caused the plate to remain nearly stationary when the cloth was removed. Class discussion will occur. Ideas will be written on an overhead.

Second demonstration

Two recycle bins will be on the floor, one is empty and one is full of newspapers a start and finish line will be marked with tape on the floor. Students will be asked to push each bin the same distance. Which bin was easier to push? Why? Ideas will be written on overhead

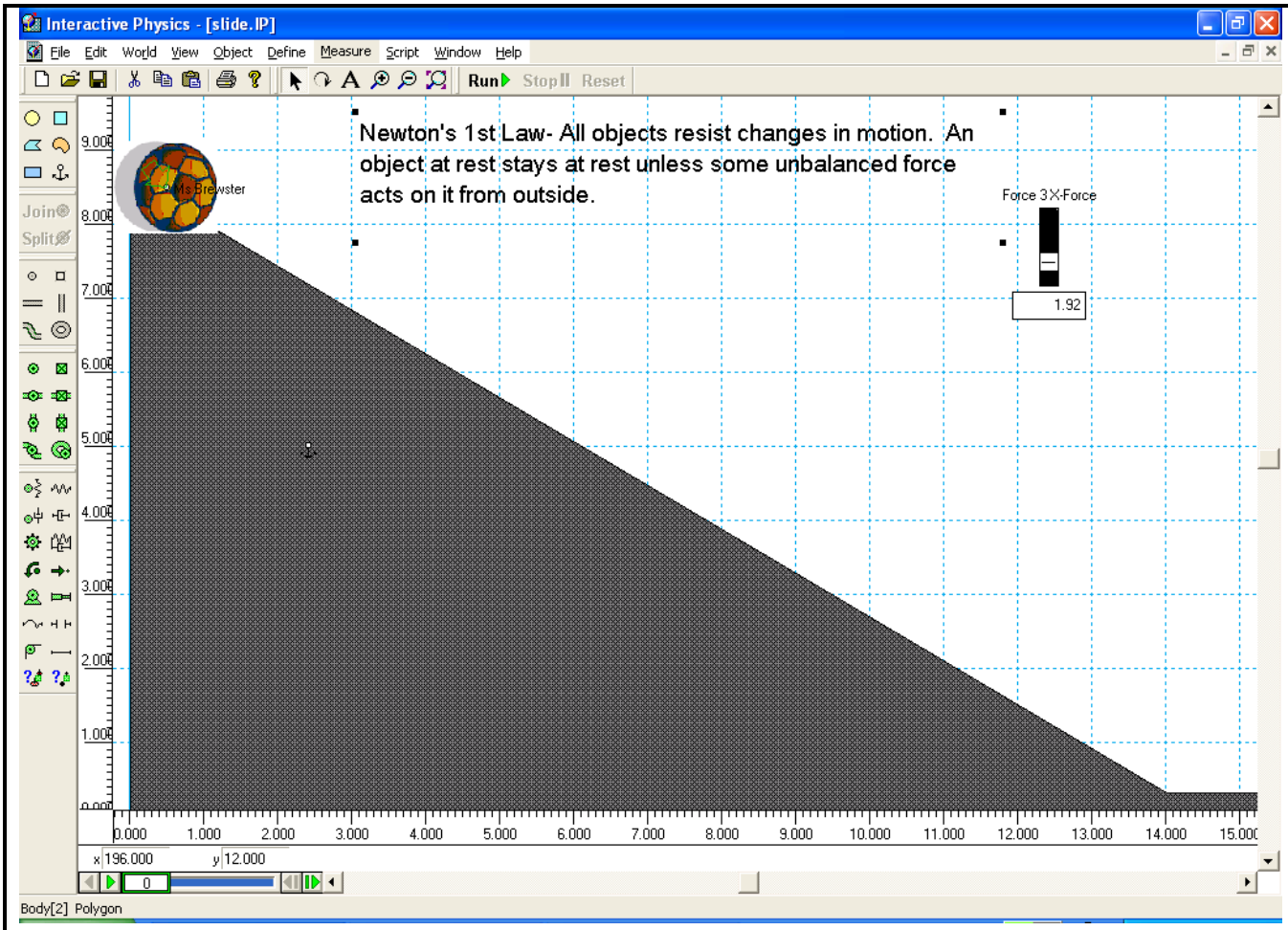
Third demonstration

A foam ball and bat will be used in this demonstration. A volunteer will be asked to hit a ball to the right, to the left, and to the back of the room. What made the ball move? Can we hit the ball to a certain area? Why? Ideas will be written on the overhead.

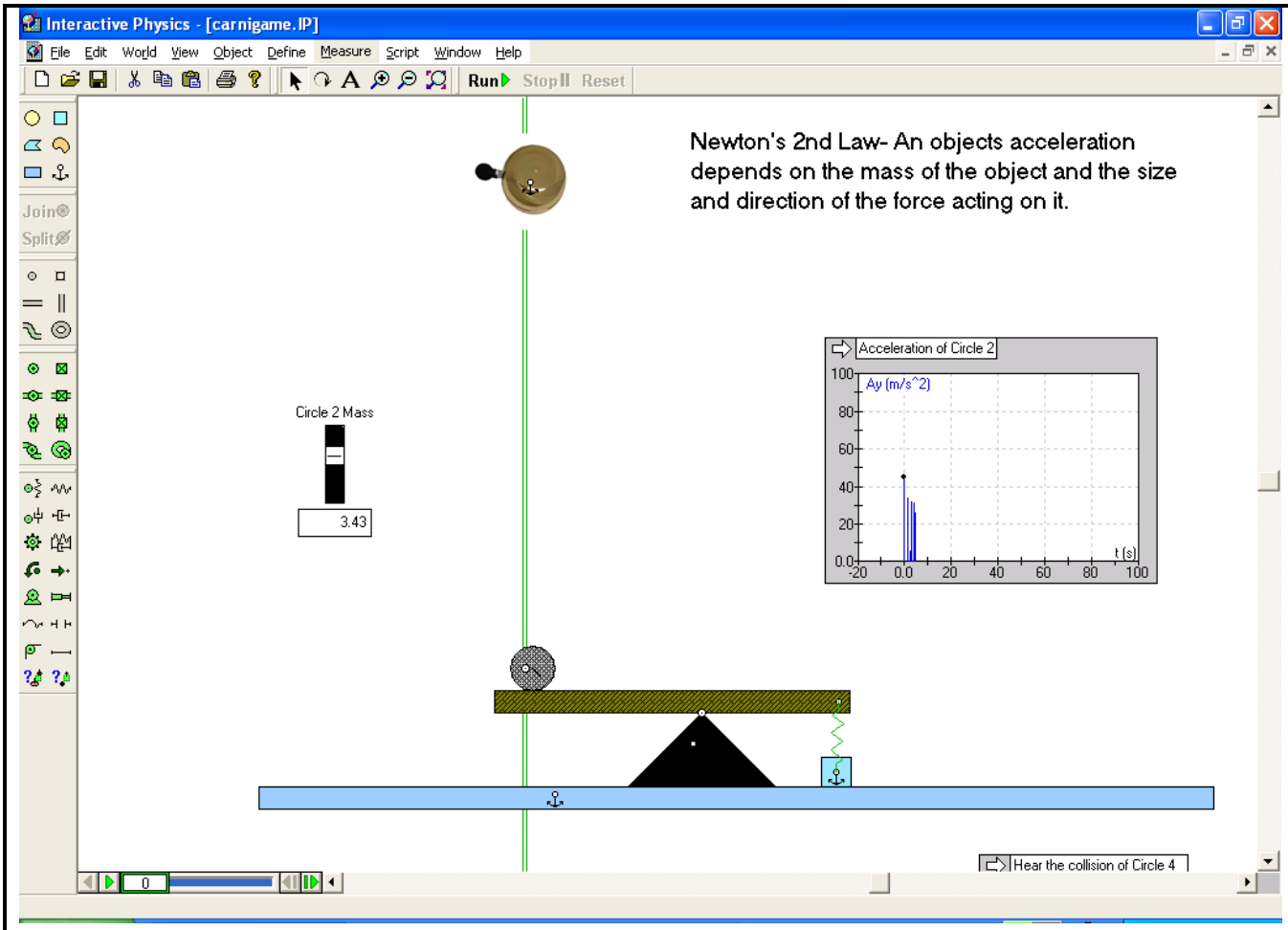
With a list of ideas on the overhead students will be put into groups of 3. When in their group students will be asked to create a list of rules (Laws) that all objects that move must obey by. Students will be given 10 minutes to create a list. Each group will share their ideas with the class.

Explain

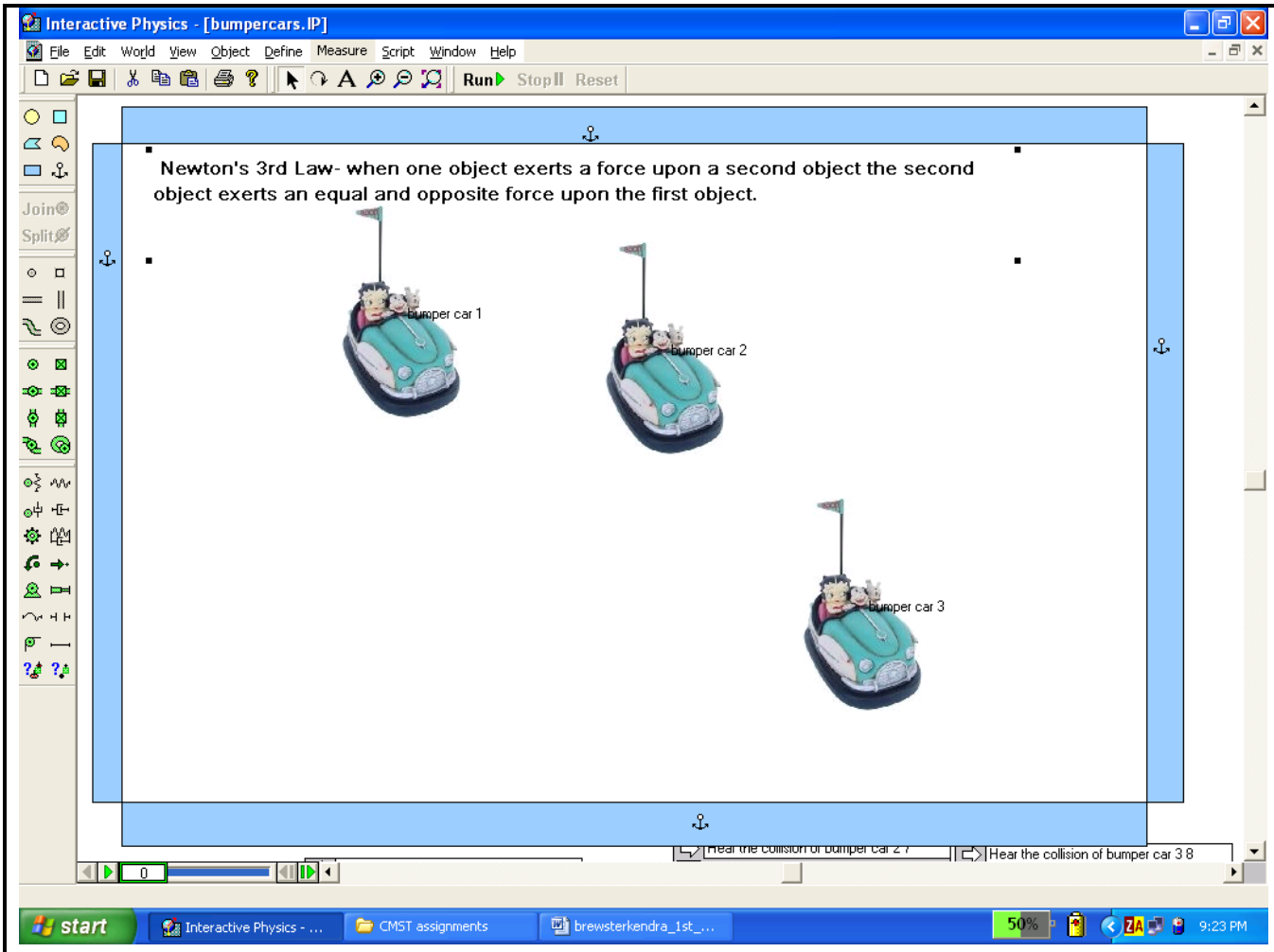
The teacher will discuss with students what a scientific law is and how we use them in science. Newton's Laws of Motion will be introduced by first a short biography on who Newton was and the Laws. Each law will be introduced independently by first showing the students the Law, and then explaining what it means by showing a computer simulation. Discussion will occur after each demonstration. The following images are examples of each model.



In this model the ball stays stationary until a force is put on the ball to roll down the hill. This demonstrates that all objects that are at rest stay at rest until an unbalanced force acts on it from outside. When the force is at 0 the object stays stationary. When the force is added the ball rolls down the slide. The teacher could also demonstrate that if the force was equal and exact opposite that the ball still would not move.



In this model the spring attached to the board is constant. The mass on the grey ball is all that can change. If the same force is applied and the ball is heavier the acceleration will be less and the ball will not be able to travel upwards to hit the bell.



When this model is run the bumper cars hit each other then move in opposite directions.

Evaluation

Students will be given the following assignment to complete for homework. Students are to find 2 examples for each law in their everyday lives and give a brief explanation as to why each example satisfies each law.

Homework Rubric

	5	3	1
Effort	Student completed every requirement to the best of their ability.	Student worked on the assignment with some effort, but did not complete it to the best of my ability	Student put very little effort into attempting and completing assignment
Neatness	The assignment was easy to understand and was well organized.	The assignment was somewhat messy but could be understood.	The assignment was messy, unorganized and hard to understand
Promptness	Assignment was completed on time	Assignment was turned in the same day but not during class.	Assignment was turned in but not on time.