

Motion

2nd or 3rd Grade

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Benchmarks:

SLC 12: Explain and or predict the motion of objects and/or describe the effects of some objects on other objects.

Objectives:

Students will learn that objects stay put unless moved, objects can move in other ways than a person pushing it, and that when one object is on another object, the top one falls unless you push lightly (or tape it).

Materials:

- Toy car
- Clay
- Rubber Balls
- Paper
- Coins
- Plastic cups
- Small wood blocks
- Incline planes
- Heavy Books

Initial Demonstration 1:

Demonstrator places the toy car on the ground.

Target Observations:

- The car is not moving / it is sitting still

Initial Demonstration 2:

Demonstrator pushes the toy car lightly

Target Observations:

- The teacher pushed the car
- The car moved
- The car stopped

Target Model:

-Objects do not move unless they are pushed

Procedure:

Break the class up into groups of 4-5 students per group. Give the students a piece of paper with pictures of a ball, a block, an incline plane (from *Moving Upwards in Science*, or a ruler on a book), and a book. Give the students one of the following roles to resolve conflicts over who does what: leader (takes plan up to teacher, gets materials, makes sure others are doing their job), writer (writes up plan for experiment, writes down

observations), and experimenters (actually carry out the experiment; can be 1-3 of these, depending on how large the group is). Ask the students to come up with an experiment to prove wrong the idea that “objects do not move unless they are pushed.” The students should choose what they want to do and what they need to do it, marking these things on the experiment sheet, circling the materials they need. When the students have these things marked, the leader may come up to the teacher, show the teacher what they want to do, and (with approval of the teacher) collect materials and carry out the experiment. If students finish their experiment and have enough time, they may revise their experiment through the approval process outlined above.

The target experiment for students to come up with is to use an incline plane and a ball or block, showing that the ball or block moves down the incline plane “without being pushed.”

Discussion/Summary:

What experiment did each group do? What did they find? I.e., did they find a case when an object moved “without being pushed.” What was the object doing when it was moving without being pushed? (Was it rolling uphill, downhill, flat, flying, jumping?)

Target Revised Model:

- Objects do not move unless they are pushed or going downhill or dropped

Demonstration 3:

Demonstrator puts a ball of clay on the top of the toy car and hits the car with a sharp force.

Target Observations:

- The clay fell off
- The car kept going
- The clay rolled a little bit when it fell off
- The car hit the wall
- The clay is flat where it hit the ground

The first 2 observations are the important ones. All others are good observations, but perhaps not what needs to be emphasized here.

Target Revised Model:

-Objects tend to stay put unless they are pushed or going downhill or dropped.
-(For one object resting on another) When the bottom object is pushed forwards, the other falls down and a little backwards.

Procedure:

Break the class up into the same groups again. Give the groups the sheet of pictures of paper, a block, a coin, a plastic cup, and newspaper. This time, ask the students to come up with a test “prove wrong” the idea that, “when the bottom object is

pushed forwards, the other falls down and a little backwards.” They should use the approval process outlined above, keeping their assigned roles and recording their ideas on the experiment sheet. The target tests for students to come up with is to put one thing (a coin, cup, or block) on the paper or newspaper and push gently, and/or to place the coin on the newspaper and push it, making the coin move with the newspaper (since it is light).

Discussion/Summary:

Ask the students what they did for their experiments. Do they agree with the statement they were to “prove wrong”? How would they change it to make it correct? (i.e. does it matter how hard you push/pull, how heavy the top object is...?)

Target Revised Model:

-Objects tend to stay put unless they are pushed or going downhill or dropped
-(For one object resting on another) When the bottom object is pushed forwards hard or fast, the other falls down and a little backwards, unless the top object is taped or glued or stuck somehow on the top object.

Prove me wrong: create an experiment that shows that things can move without being pushed.



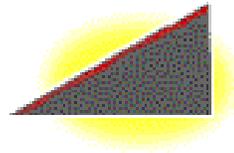
Ball



Block



Book



Incline Plane

Names:

Describe your experiment – what are you going to do, and how are you going to do it?

Prove me wrong: when a bottom object is pushed forwards, the top object falls down
and a little backwards.



Paper



Block



Plastic Cup



Coin

Names:

Describe your experiment – what are you going to do, and how are you going to do it?
