

Newton's 1st Law

4th Grade

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Benchmarks:

SLC 12: A.) Students will apply concepts of Newton's Laws in scientific explorations. B.) Students will explore the relationships among force, mass, direction and speed on moving objects.

Objectives:

To understand Newton's 1st Law of motion.

Materials:

- Wooden dowel rods
- A ball

Initial Model:

-A force is a pushing or pulling of another object.

-Newton's 3rd Law: When something is pushed or pulled, even if it doesn't move, it pushes or pulls back.

-When the forces on an object are balanced the object doesn't move.

-When an object rubs or rolls against another object, the friction force slows the moving object down.

-Friction is different for different surfaces. Rough surfaces like sandpaper have more friction, while smooth surfaces like a table have less friction, because sandpaper has lots of bumps but a table does not.

Initial Demonstration:

What would happen to a ball that you place carefully on perfectly slippery ice? Pass out the wooden dowels again and have them just set them on their tables. What is happening to the dowel rods? Now imagine it sitting on slippery ice. What would it be doing then? What would you have to do to get it moving?

Target Observations:

- The dowel rod, sitting on the table, is not moving
- If the dowel rod were on slippery ice, it would still not be moving
- To get the dowel rod moving someone or something would need to push or pull it

Target Model:

-A force is a pushing or pulling of another object.

-Newton's 3rd Law: When something is pushed or pulled, even if it doesn't move, it pushes or pulls back.

-When the forces on an object are balanced the object doesn't move.

-When an object rubs or rolls against another object, the friction force slows the moving object down.

-Friction is different for different surfaces. Rough surfaces like sandpaper have more friction, while smooth surfaces like a table have less friction, because sandpaper has lots of bumps but a table does not.

-An object has to be pushed or pulled to get it to move, even if it is on a slippery surface.

Procedure:

Ask students to picture that ball on perfectly slippery ice again, but now imagine someone or something push it. What happens to the ball now? Will it ever stop? Remember, the ice is perfectly slippery.

Target Responses:

- The ball will eventually hit a wall
- If there is no wall, the ball will keep going because the ice is perfectly slippery

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-When an object rubs or rolls against another object, the friction force slows the moving object down.

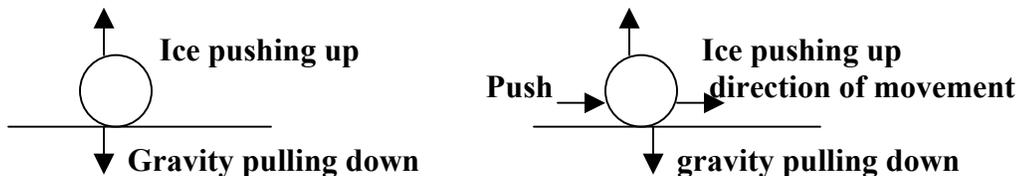
-Friction is different for different surfaces. Rough surfaces like sandpaper have more friction, while smooth surfaces like a table have less friction, because sandpaper has lots of bumps but a table does not.

-An object has to be pushed or pulled to get it to move, even if it is on a slippery surface.

-An object on a perfectly slippery (frictionless) surface will keep moving if it is pushed.

Procedure:

Draw the ball at rest and in motion on the board, with the appropriate arrows.



Roll a ball on the ground. Didn't we just say that an object in motion stays in motion? So why did this ball come to a stop? What else could you do to make the ball come to a stop? What are all of these things examples of? We have discovered Newton's 1st Law of Motion: An object at rest stays at rest and an object in motion stays in motion unless acted on by a force.

Target Observations:

- The ball stopped because friction slowed it down
- The ball could be stopped by pushing, catching, kicking, or grabbing the ball
- All of these are examples of forces

Target Revised Model:

-A force is a pushing or pulling of another object.

-When the forces on an object are balanced the object doesn't move.

-When an object rubs or rolls against another object, the friction force slows the moving object down.

-Friction is different for different surfaces. Rough surfaces like sandpaper have more friction, while smooth surfaces like a table have less friction, because sandpaper has lots of bumps but a table does not.

-Newton's 3rd Law: When something is pushed or pulled, even if it doesn't move, it pushes or pulls back.

-*Newton's 1st Law: Objects at rest stay at rest and objects in motion stay in motion unless acted on by a force.*