

Friction In Our Lives

2nd – 5th Grade Science Lesson (Go Kart)(Fun Slide)

Florida Sunshine State Science Standards

2nd Grade

SC.2.N.1.1 - Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate explanations based on those explorations.

SC.2.N.1.2 - Compare the observations made by different groups using the same tools.

SC.2.P.13.4 - Demonstrate that the greater the force (push or pull) applied to an object, the greater the change in motion of the object.

SC.2.P.13.3 - Recognize that objects are pulled toward the ground unless something holds them up.

3rd Grade

SC.3.N.1.2 - Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups.

SC.3.N.3.2 - Recognize that scientists use models to help understand and explain how things work.

SC.3.P.10.2 - Recognize that energy has the ability to cause motion or create change.

SC.3.P.11.2 - Investigate, observe, and explain that heat is produced when one object rubs against another, such as rubbing one's hands together.

SC.3.E.5.4 - Explore the Law of Gravity by demonstrating that gravity is a force that can be overcome.

4th Grade

SC.4.P.12.1 - Recognize that an object in motion always changes its position and may change its direction.

SC.4.P.12.2 - Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds.

5th Grade

SC.5.P.13.1 - Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects.

SC.5.P.13.2 - Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object.

SC.5.P.13.3 - Investigate and describe that the more mass an object has, the less effect a given force will have on the object's motion.

SC.5.P.13.4 - Investigate and explain that when a force is applied to an object but it does not move, it is because another opposing force is being applied by something in the environment so that the forces are balanced.

Objectives:

Students will understand the following:

1. Friction is a force that opposes motion, or makes it difficult for an object to move across a surface.
2. The amount of friction depends on the surface type and the forces pressing two surfaces together.
3. Everyday life provides examples of how friction both helps and hinders everything we do.

Vocabulary:

1. **Contact – a coming together or touching, as of objects or surfaces.** (When two surfaces are in contact, friction is always present)
2. **Drag – to pull along with difficulty or effort.** (An airplane comes to a stop because of the drag or pull on it as it moves through air and across a surface.)

3. **Force – strength or energy exerted** (A force can change the direction of motion, increase the rate of motion, slow down motion, or stop it all together.)
4. **Friction – the rubbing of one object or surface against another, the force that resist motion between bodies in contact.** (Go-kart brakes use friction to stop the wheels from turning)
5. **Motion – an act, process, or instance of changing place.** (A change in position of an object is a result of motion.)
6. **Surface – the exterior or upper boundary of an object or body.** (The rougher an object's surface, the greater the amount of friction when another object moves against it.)

This lesson will help students understand motion and the principles that explain it. They will learn that when a force is applied to an object, the object either speeds up, slows down, or goes in a different direction. Students will also learn about the relationship between the strength of a force and its effect on an object (ex. The greater the force, the greater the change in motion; the more massive the object, the smaller the effect of a given force).

Friction Basics

Friction is a force that acts in an opposite direction to movement. Friction is a force that holds back the movement of a sliding object. That's it. Friction is just that simple.

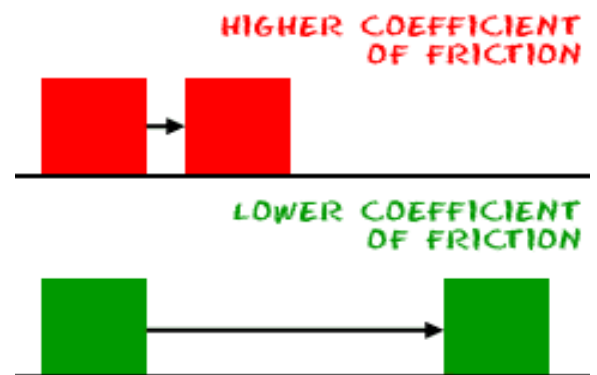
You will find friction everywhere that objects come into contact with each other. The force acts in the opposite direction to the way an object wants to slide. If a car needs to stop at a stop sign, it slows because of the friction between the brakes and the wheels. If you run down the sidewalk and stop quickly, you can stop because of the friction between your shoes and the cement.

What happens if you run down the sidewalk and you try to stop on a puddle? Friction is still there, but the liquid makes the surfaces smoother and the friction a lot less. Less friction means it is harder to stop. The low friction thing happens to cars when it rains. That's why there are often so many accidents. Even though the friction of the brakes is still there, the brakes may be wet, and the wheels are not in as much contact with the ground. Cars hydroplane when they go too fast on puddles of water.

Measuring Friction

Measures of friction are based on the type of materials that are in contact. Concrete on concrete has a very high **coefficient of friction**. That coefficient is a measure of how easily one object moves in relationship to another. When you have a high coefficient of friction, you have a lot of friction between the materials. Concrete on concrete has a very high coefficient, and Teflon on most things has a very low coefficient. **Teflon** is used on surfaces where we don't want things to stick; such as pots and pans.

Scientists have discovered that there is even less friction in your joints than in Teflon! It is one more example at how efficient living organisms can be.



Suggested Readings

Planes and Other Aircraft: Learn the Science? Build the Model

Nigel Hawkes, Alex Pang [Illustrator]. Millbrook Press, 1999

Eyewitness: Train (Dorling Kindersley Eyewitness Books)

John Coiley, Mike Dunning [Photographer]. DK Publishing, 2000

Credit

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Reader's- Physics4kids.com ; motion website

Wikipedia: <http://en.wikipedia.org/wiki/Friction>