Grade 5 Science
Week of January 25 – January 29

Forces and Friction

Force Overview

Physics – Forces: https://youtu.be/w9JGlcx0knY

A force **changes** an object's **motion**.

A force can **speed things up** or **slow things down**.

A force that we often forget about is **friction** force.

The bigger the force, the more quickly the object speeds up.

The bigger the force, the more quickly the object slows down.

Friction

You might have noticed during the bobsled simulator that it went farther depending on what surface it was sliding on. Ice was a better surface than asphalt because of an invisible force called **Friction**.

Think about this: If you were to slide two hockey pucks, using the same force, but one puck was on ice and one puck was sandpaper, which would go farther? The puck on the ice would! But why? It's because ice has less friction than sandpaper; it's smoother, so it causes less friction and in turn, will allow the hockey puck to slide farther.

Friction always acts in the opposite direction of the object in motion. Now, that's certainly a bit tricky to

wrap your brain around, especially since friction is an invisible force! But take a look at the image of the soccer ball below. When you kick the ball, you're applying a force from your foot to the ball pushing it forward, while the grass is applying friction in the opposite direction, ultimately slowing the ball down.

Friction: https://youtu.be/_LSevw1sfpk

The smoother the surface and the object are, the less friction there will be.

So, are there ways we can *intentionally* **reduce friction**? Yes! Think about sliding down a waterslide vs. sliding down a regular slide. Which slide will make you go faster? The waterslide will, and that's because the addition of water **reduces the amount of friction** between your body and the slide.

Have you ever used a slip and slide during the summer? Water definitely helps reduce the friction between your body and the plastic of the slip and slide, but have you ever tried adding soap? Soap **lubricates** the surface of the slip and slides reducing friction even further, making you go even faster!

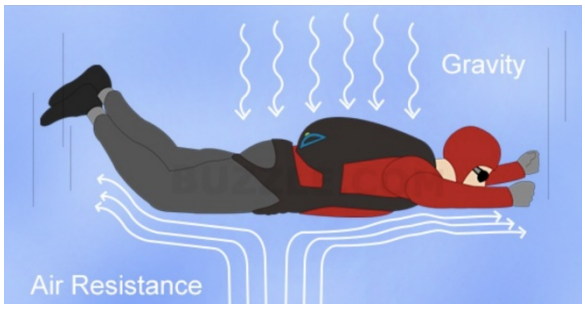
Other ways we try and reduce friction are the use of things such as wax or oil. If you ski or snowboard, you'll know that each year it's a good idea to get your skis or snowboard waxed, so that you can glide down the hill smoother and faster! Really, it's all about **lubrication**. Soap, water, wax, and oil are all **lubricants** that can help reduce friction.

Air Resistance

However, something that causes friction can't always be seen. For example, **air resistance** is a type of friction that is caused by, yes you guessed it, air! **Particles of air hinder the motion of an object** (slow it down). So for instance, when someone skydives and parachutes out of a plane, **gravity** is *pulling* them down to earth, but **air resistance** (a type of friction) is also working in the opposite direction to slow them down.

Air resistance is also known as **drag** in physics.

However, skydivers need the help of a **parachute to increase the air resistance**, since gravity is a stronger force naturally.



Watch this quick experiment that demonstrates air resistance using 2 sheets of paper. Make sure to follow along in your Learning Guide!

How to Demonstrate Air Resistance: https://youtu.be/O-KYLXp2MG4

Types of Friction

There are 3 main types of friction:

Sliding Friction: The friction that occurs when an object slides, for example when you slide down a slide.

Rolling Friction: The friction that occurs when an object rolls, for example, skateboard wheels rolling on the sidewalk.

Fluid Friction: The friction that occurs between an object and a fluid or a gas, for example, a shark swimming through the ocean water.

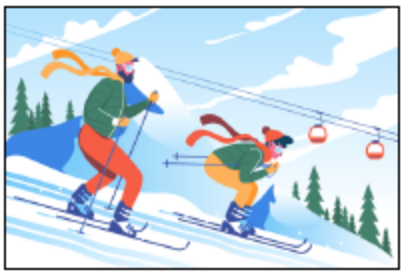
Watch the video below to help you further understand these types of friction. Make sure you follow along in your learning guide!

Types of Friction: https://youtu.be/H877C_5BMkI

Friction

1. True or False: Friction is an invisible force.
    a. True
    b. False
2. True or False: Friction acts in the same direction of the object in motion.
    a. True
    b. False

3. Fill in the blanks: The_____ the surface and the object are, the_____ friction there will be.



4. Fill in the blanks: Soap, water, wax and oil are all _____that can help _____ friction.

5. Air resistance is when:

_____

_____

6. Air resistance is also known as: _____

7. After watching the video demonstration of air resistance, circle which paper will fall to the ground faster:

a) 

b) 

8. How is it possible that one paper falls to the ground faster than the other, when they both weigh the same amount? Explain.

_____

_____

_____

9. Types of Friction: Write the definition beside each type of friction.

Sliding Friction:

_____

Rolling Friction:

_____

Fluid Friction:

_____

10. Indicated which type of friction is *most likely* occurring in the examples below.

a. You and your friend sled down a snowy hill: _____

b. You kick a soccer ball during your soccer game: _____

c. You pull your little cousin in a wagon on the pavement: _____

d. Your dad snowboards down a black diamond run: _____

e. A pod of dolphins swimming in the bay: _____

f. You rollerblade to the park with your family: _____

g. Your Grandma kayaks over to your lake house: _____

11. Watch the following video to answer the following questions: Types of Friction

1. True or False: There is Friction between your jacket and your t-shirt.
    a. True
    b. False
2. True or False: Air resistance is a type of fluid friction.
    a. True
    b. False
3. True or False: If friction wasn't present when you were swimming, you would be able to glide all the way across a pool with one stroke.
    a. True
    b. False