

LESSON PLANS

FriXionSTEM.com

Bringing science to life with the incredible, ERASABLE FriXion pens, markers and highlighters.

Grades K-2

MAKE SOME FRICTION!



Student groups make drawings using FriXion pens. Using the thermo-sensitive ink in FriXion pens as an indicator of heat and friction, they explore how different materials generate varying amounts of friction and heat as they are rubbed over the drawings.



LEARNING OBJECTIVES

After this activity, students should be able to:

- Define heat as a byproduct of situations involving friction.
- Give examples of materials that generate large amounts of friction.
- Use evidence to identify situations involving relatively large and small amounts of friction.
- Explain how the use of FriXion ink indicates if a material generates large or small amounts of friction.





MATERIALS

Each group needs:

- FriXion Pens
- Paper
- An assortment of different friction-generating materials such as: felt, cotton balls, sandpaper, steel wool, wooden blocks, pencil erasers, Pilot FriXion eraser

INTRODUCTION

Have you ever rubbed your hands together on a cold winter day to warm them? If so, you've experienced the generation of two things: friction and heat. A simple definition of friction is the resistance that an object encounters when moving over another. Friction happens anytime that two objects come in contact with one another, like the rubbing together of your hands. A consequence of friction is that it generates heat, which you can feel build up between your hands as you rub them together. Heat is generated whenever there is friction.

Not all materials generate the same amount of friction when they rub together. Can you think of some materials that feel rough when you touch them? How about some materials that feel very smooth? The roughness or smoothness of materials plays a role in the amount of friction (and heat) that is generated.

In this activity, you will have the opportunity to explore how different materials generate friction and heat when rubbed together. To help categorize materials as high friction or low friction, we will use the thermo-sensitive ink in FriXion pens, which will change color when enough heat is generated.

PROCEDURE

Before the Activity

- Gather materials.
- Make sure students are familiar with how FriXion pens work and how they will work within the experiment.
- You may wish to demonstrate how to rub materials onto student drawings prior to students beginning their exploration.
- Student groups of 2-3 are recommended.

With the Students

- 1. After you have read/discussed the introduction above with students, break them up into small groups of 2-3 and distribute paper and pens.
- 2. Have students create drawings using Pilot FriXion pens.
- 3. Distribute the friction-generating materials to each small group. Consider demonstrating the proper method for testing the amount of friction and heat generated.



- 4. Allow students time to experiment with the materials. As they work, have them categorize materials as "high friction" or "low friction" based upon the following criteria:a. If some or part of the drawing disappears, the material is "high friction"b. If none of the drawing disappears, the material is "low friction"
- 5. Once each small group has finished experimenting, have groups share their results.
- 6. Conclude with the discussion questions below.

DISCUSSION QUESTIONS

- What happened when you rubbed the different materials on your drawings?
- Why do you think this happened?
- What materials caused the FriXion ink to disappear?
- Did the materials that made the FriXion ink disappear have anything in common?
- How could you use your testing to tell if a material generates a lot of friction?
- Why is FriXion ink disappearing an indicator of heat?
- How could this be helpful in other situations?
- If you could test another material, what would you test?