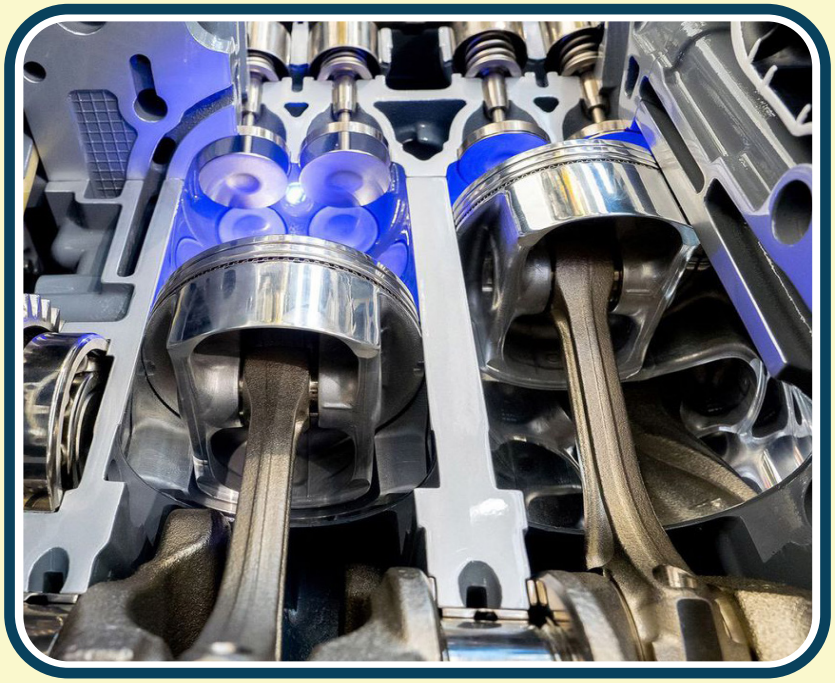
STEM Sims™

Friction



STEM Sims™

Friction

Do you need an idea for a scientific study? Try out one of our ideas or make one of your own.

Sometimes you want it. Sometimes you need it. Other times you'd love it to go away. What is it? Friction. Take the following brief quiz to see how much you already know about friction. See the bottom of page 4 to check your answers.

1. Friction blisters on the feet can be caused by shoes that do not fit properly.
   a. true
   b. false

2. Most of the laws describing friction were first documented by:
   a. Galileo
   b. Aristotle
   c. Guillaume Amontons
   d. Isaac Newton

3. What of the following is the most frictionless surface?
   a. glass on glass
   b. wet ice on wet ice
   c. steel on steel
   d. wood on wood

4. Helium can become a superfluid at very low temperatures that can flow without friction.
   a. true
   b. false

5. Tiremakers report that the average new tire can disperse how many gallons of water each second from the bottom of the tire to keep a vehicle driving at 50 miles per hour from hydroplaning?
   a. ½ gallon
   b. 1 gallon
   c. 4 gallons
   d. 8 gallons

Friction and Temperature

Friction is present in everyone's daily life. But what are some implications of friction? How does friction affect the environment around the object undergoing friction? Get started now with this investigation of the force of friction.

Materials Required

10 cm x 10 cm sheet of aluminum foil non-contact thermometer
piece sandpaper 2" x 4" x 12" wooden block sheet of notebook paper

Procedure

1. Use the noncontact thermometer to measure the temperature of the wooden block. Record this value in Table 1.
2. Rub the piece of aluminum foil across the wooden block about 10 times.
3. Observe and record in Table 1 the temperature of the area on the block where you rubbed the foil.
4. Wait about two minutes, then rub the piece of notebook paper across the wooden block about 10 times. Be careful not to press too hard and get a splinter in your hand if the paper rips.
5. Observe and record in Table 1 the temperature of the area on the block where you rubbed the paper.
6. Wait about two minutes, then rub the piece of sandpaper across the wooden block about 10 times.
7. Observe and record in Table 1 the temperature of the area on the block where you rubbed the sandpaper.

Table 1. Experimental Results

Experiment	Wooden Block Temperature
Wooden Block Initially	
Wooden Block Rubbed with Aluminum Foil	
Wooden block Rubbed with Notebook Paper	
Wooden Block Rubbed with Sandpaper	

Questions

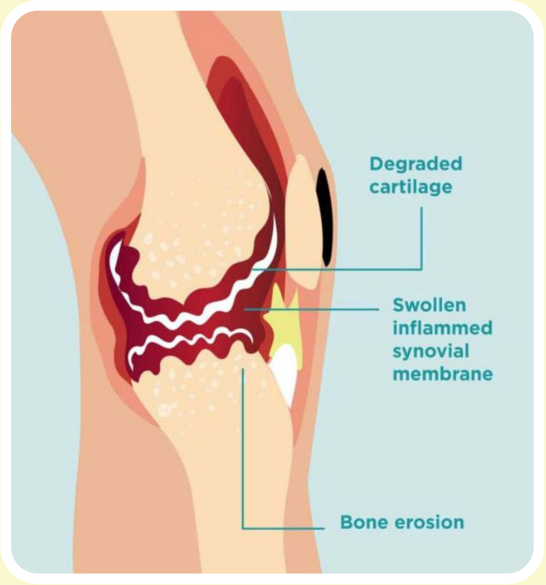
1. What was the purpose of having you wait two minutes between rubbings?`

2. Rubbing the wooden block with which material caused the block's temperature to increase the most?

3. Provide a reason for your response to the previous question.

Friction

My Aching Body!



While friction is often desirable, just as often its presence causes pain. Osteoarthritis is one condition that friction helped cause and friction helps to increase the suffering. This disease is due to friction wearing out the cartilage and slick coating that covers the joints where bones meet. The cartilage cushions the bone's ends and provides an almost frictionless surface for the joint movement. Over time, repeated movements of the joint can cause enough damage to the cartilage that the ends of the connecting bones rub directly against each other. This bone-on-bone movement can cause serious pain and restrict the movement of the joint.

Osteoarthritis can also cause changes and damage to the tissues that connects the muscles to the bone and hold the joint together. This damage can cause additional inflammation and pain in the joint. Several factors can lead to increased risks of osteoarthritis including family history, age, gender, obesity, and previous injury to the joint.

There is good news for sufferers of this painful disorder. These include anti-inflammatory drugs to reduce inflammation and pain, counterirritants, pain relievers, and steroids. Physical therapy can sometimes be helpful in increasing the patient's range of joint motion. If these less invasive measures are unsuccessful, surgery to repair, replace, or fuse the joints may be necessary to reduce the discomfort associated with an arthritic joint.

A relatively new treatment is currently being debated regarding its effectiveness in reducing the effects of osteoarthritis: stem cell therapy. This method harvests stem cells from a patient's fat, blood, or bone marrow that are then placed in the patient's joint during a surgical procedure. While some studies have shown positive results, critics say this new therapy does not work any better than a placebo.

Please visit our site for more helpful information:
STEMsims.com

Answers: **Page 2 Answers:** 1) a, 2) c, 3) b, 4) a, 5) d. **Page 3 Answers:** Friction and Temperature 1) To let the temperature of the block go back to its original state. 2) The sandpaper caused the greatest temperature increase. 3) This was due to the increased roughness of the sandpaper's surface that caused increased friction and increased temperature of the block.