

FROZEN SNEAKER SAGA

Materials:

- old tennis shoes (traditional ones with fairly smooth bottoms like Keds or Converse work best)
- a freezer (optional)
- a wide rubber band
- a ruler
- various surfaces (carpet, wood floor, etc.)

Note: We put a pair of old tennis shoes in the freezer for 24 hours. If you do this, please be sure they are shoes you no longer want as they may break or crack. Also, we do not suggest a child actually wear them because of the danger of injuries from falls or frostbite.

Characters:

The Friction family — Mom, Dad, their son, Fred; his friend, Ben and Bowser (the dog). Also, a narrator.

Narrator: The Friction family lives in the icy state of Alaska, U.S.A. It's late afternoon and the family has just finished a special dinner celebrating Fred's 12th birthday. His mother hands him a gift-wrapped package.

Fred: (throwing aside wrappings) Cool! I love these new shoes! Dad, look at the cool shoes Mom got me for my birthday. I've wanted some of these retro hightops for ages.

Dad: (pulling out a wiggling pup) They are cool. Look what I got you!

The Dog: WOOF!

Fred: Wow! (He grabs the pup lifting him up eye to eye). Hey guy! How would you like to be called Bowser?

Mom: He's so cute! I've always wanted a St. Bernard.

Fred: (pulling on his new shoes) I'm going to take him on a little tour of the neighborhood.

Mom: Don't be long. It's dark out there.

Dad: And cold! The porch thermometer says it's only 14 degrees Fahrenheit (-10 degrees Celsius)

Narrator: About an hour passes. (Fred happily bursts back into the house with the pup at his heels)

Fred: We stopped to see Ben. He really liked Bowser. He's going to meet me an hour early tomorrow so we can break in my new shoes on the basketball court before school.

Dad: That's great, but it's getting late so you need to go to bed, Mister.

Fred: All right. But can Bowser sleep by my bed?

Mom: OK, but don't lose your shoes. Make sure you know where you left them so you can find them fast in the morning.

Fred: Yes Mama. I'm putting them right by my door.

Narrator: Fred goes to sleep. During the night, Bowser leaves the room taking one shoe at a time in his mouth. The porch door isn't tightly closed and Bowser pushes it open, taking the shoes outside with him. Early next morning

(Fred wakes up slowly, stretching his arms to the sky and notices his shoes missing)

Fred: (screaming) Mom!!!! Where are my new shoes?

Mom: Go look where you put them last night!

Fred: I already did!!!!

Mom: Well, you just need to look harder!

Fred: I promise I looked very hard and they're just not here!

Dad: Have you checked your closet?

Fred: Yes! I've looked everywhere!

Dad: Are you sure?

Fred: YES!!!! I am positive!!!!

Mom: Did the dog get a hold of them?

Fred: I hope not!!! BOWSER!!!!!! (Bowser comes in with a shoelace in his mouth) Oh NO!!!!

Dad: Bowser, why did you take Fred's shoes?

Bowser: WOOF!

Fred: (angry) Well, where are they?

Bowser: (taking him to the shoes) WOOF, WOOF!

Fred: (not knowing that the shoes are frozen) Oh, here they are.

Fred: (putting them on) WOW! These are freezing!

(Hearing Ben at the door, Fred runs to let him in. But, as he tries to stop his feet slip and he falls.)

Fred: Mom! What's wrong with these shoes? They're too slippery!

Dad: (lets Ben in and comes to take a look) Fred, they re frozen. Freezing reduces the friction and the shoes don t have as much traction on the floor. Take those shoes off and warm your feet up.

Ben: I think I know what friction is, but what s traction?

Dad: Friction is the force created when two surfaces rub against each other and slow motion. Traction is the sticky effect of friction that helps things grip a surface. An athlete needs foot traction in order to speed up, slow down or make a quick change of direction without falling. When your shoes became frozen they lost most of that sticky effect. Of course, too much friction would slow you down. But without friction, your feet would just slip.

Fred: I noticed.

Dad: There are different kinds of friction. Most friction is caused because the surfaces of materials being rubbed together are not smooth. The rougher the surface, the more friction it creates. You will also get friction resistance from soft surfaces or those that sink in when you step on them like carpet or sand. You have to work harder to move fast on these surfaces. Another example of friction is the way a car s tires flatten out at the point of contact to better grip the road. Since you won t be rushing over to try out your shoes this morning, let s take a minute and let you test the friction created by a couple of surfaces.

Fred: Come on! We are waiting!

Dad: OK! But first I need a shoe that is NOT frozen!

Mom: (handing Dad her tennis shoe) Here. Have mine!

Dad: (Grabs a thick rubber band from a nearby table) Fred, get a measuring stick.

Dad: (cuts the rubber band and ties one end through one eyelet of the shoe and places the shoe on the smooth kitchen floor. He holds the band straight out in front of the shoe) Fred, measure the length of the band.



Dad: Now, Ben, pull the band gradually until the shoe begins to move. When it begins to move, Fred will measure how far the band has stretched.

Dad: Now let s repeat the experiment, but this time move the shoe to the carpet.

Dad: What is the difference in the length of the band as the shoe begins to move on carpet?

Narrator: Was there a difference? How much? (variations — measure the amount the band stretches after the shoe has been moving a while. Is it shorter than what it was when it began moving? You can also try this with a frozen shoe. How long did the band stretch on a smooth surface before the

frozen shoe moved?)

Fred: Dad, this is really cool! Ben, look at the time! We've got to get to school!

Ben: What about your tennis shoe?

Mom: I think you can handle wearing your old ones until these thaw out.

Fred: OK. But I think the frozen ones would have helped me get to class quicker! After all Mom, those who experiment with thin ice will achieve a breakthrough!

Mom & Dad: (in a cheesy end of 1950s family based show voice) Oh Fred

Variations: try items other than shoes and try lubricants —oil, water (on washable surfaces) to see how they affect friction. Wheels or rollers also affect the amount of friction