

Name:

# Spinning Shelves (Teacher Version)

## Facts About Friction

Friction is a force that works against motion. Do you see friction at work in the picture?

How does the skier in picture A move easier than in picture B? *The smooth snow and waxed skis reduce friction more than the rubber shoes and blades of grass.*



## Helpful or Hindering?

Below are several examples of everyday friction. Are they helpful, or hindering?



*Helpful, hindering, hindering, helpful*

## Lazy Susan

### Materials:

- Marbles (same size)
- 2 jar lids, one slightly bigger.
- Sticky Tack
- Plastic plate



### Instructions:

1. Place just enough marbles inside the smaller lid to fill it.

2. Use a lump of sticky tack to attach the top of the smaller lid to the bottom of the plate's centre.

3. Set the larger lid onto the marble-filled smaller lid.

4. Fill the plate with snacks, and set the Lazy Susan in the middle of the table for everyone to reach by spinning!

Name: \_\_\_\_\_

## Talk About It!

1. Why does the Lazy Susan spin freely?  
*The marbles keep the two lids from touching, acting like ball bearings to reduce friction for a smoother action.*

2. Why did the marbles all have to be the same size?  
*Otherwise the smaller ones would not touch both lids and wouldn't roll the widget.*



## Real & Rolling

Beside the table-top version we made today, Lazy Susans are also a useful storage invention for a cramped kitchen! How do you think the Lazy Susan in the picture works?

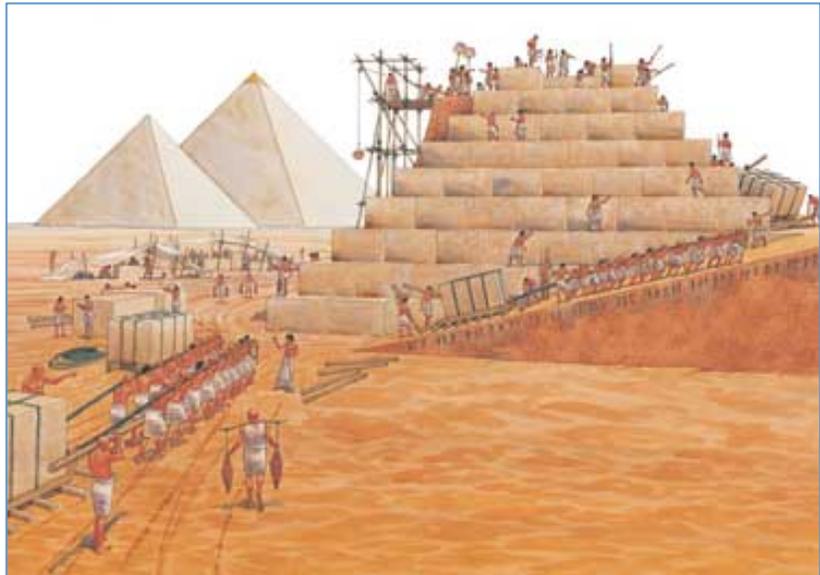


*The two levels spin so that people don't have to strain and reach so far into the corner of the cupboard.*

## Clever Carting

**The Problem:** The Pyramid builders back in ancient Egypt had a tricky issue to tackle: How could they overcome friction to move stones to the top of a pyramid?

**The Solution:** The clever Egyptians build Earth ramps around the pyramid and hauled the stones on log sledges (a sled on logs). What seemed impossible became possible when friction was reduced.



## Make Your Own Sledge!

Try pushing a book across a smooth floor or tabletop using your pinkie. Now, line up 6 pencils evenly underneath the book and push again. What's the difference?

Compare the action of the pencil sledge to the Lazy Susan. *The sledge set-up moves things back and forth, while the marbles allow for circular motion, or free motion if not in the caps.*



Name:

## **Image Sources:**

### **Helpful or Hindering?**

1. The Austin Diagnostic Clinic: <http://www.adclinic.com/2011/10/healthy-feet-for-runners-treatment-tips-for-blisters/>
2. ekShiksha: <http://www.it.iitb.ac.in/ekshiksha/eContent-Show.do?documentId=60>
3. A: <http://abduzeedo.com/snowboarding-action-photography>
4. FotoSearch: <http://www.fotosearch.com/clip-art/brake.html>

### **Lazy Susan:**

1. Webstaurant Store: <http://www.webstaurantstore.com/45835/plastic-disposable-plates.html?filter=color:red>
2. Amazon: <http://www.amazon.com/Factory-Card-and-Party-Outlet/dp/B000HAZCS8>
3. Home Sweet Hive: <http://taoshivehome.blogspot.ca/2011/12/project-gingerbag-house.html>
4. The Naked Scientist: <http://www.thenakedscientists.com/forum/index.php?topic=16828.0>

### **Talk About It!**

1. IEC: <http://www.iecltd.co.uk/catalogues/abis/>

### **Real & Rolling:**

1. Cabinet Makers' Supply: [http://www.cabinetmakerssupply.com/lazy\\_susan\\_pie\\_cut\\_deep\\_bin\\_cabinet\\_wood\\_pie\\_cut\\_5589\\_prd1.htm](http://www.cabinetmakerssupply.com/lazy_susan_pie_cut_deep_bin_cabinet_wood_pie_cut_5589_prd1.htm)

### **Clever Carting:**

1. Ask Aladdin: <http://www.ask-aladdin.com/Pyramids-of-Egypt/>

### **Make Your Own Sledge!**

1. Can Stock Photo: <http://www.canstockphoto.com/images-photos/round-logs.html>