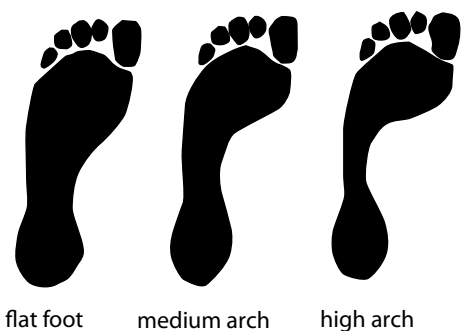


Science of Athletic Shoes

Human feet take quite a pounding. A typical athlete can generate up to 700 pounds of pressure on a foot in a single stride or bound. Many athletic shoes are designed to minimize the stress that sports put on the feet. In this activity, you'll examine foot types and the types of wear patterns that occur on shoes.

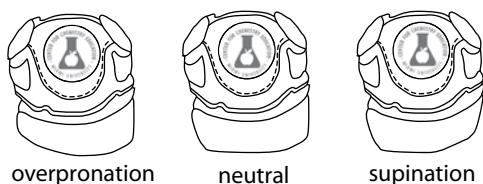
Stuff You'll Use: ▶ spray bottle and water ▶ paper grocery bags
▶ permanent marker ▶ paper towels ▶ pair of worn sneakers or athletic shoes
▶ (optional) ruler



flat foot medium arch high arch

Sample data table

Person	Foot Length (L)	Foot Width at Narrowest (W)	L/W
Alex			
Sandy			
Joshua			
Kaitlyn			
Jordan			



overpronation neutral supination

Rear view of right shoes

What to Do:

! Activity works best if done with a large group of individuals.

- 1 Take off a shoe and sock and spray the bottom of your foot with water.
- 2 Make a wet print of your foot by standing on a paper grocery bag for about 10 seconds, making sure the weight on your foot is equally distributed.
- 3 Use the permanent marker to trace your wet foot print.
- 4 Compare your wet print to the ones at left. *Which type matches your foot the best?*
- 5 (optional for advanced students) For each wet print, measure the length and divide it by the width at the narrowest part. Record results in a data table. *What do you think a high number indicates? What do you think a low number indicates? Plot the results on a histogram. What range of numbers was most common in the group? What was the high number? What was the lowest number? Why did you need to measure the length of the foot when collecting your data?*
- 6 Look at the soles on your pair of athletic shoes. Notice any areas of heavy wear. Place a shoe on a level surface and examine it from behind. Does it tilt to the inside or the outside?
- 7 Based on the figure at left, does the wear on your right shoe indicate that your gait is neutral, overpronated, or supinated?

How It Works:

The arch in your foot is an energy storing mechanism. The arch flattens when you step down, storing energy like a spring. This energy is released when you step up. The width of the band connecting the forefoot with the heel (narrowest part of the wet print) determines your arch type. If the band is narrow you have a high arch, and if it is wide you have a flat foot.

In optional step 5, you divided the foot length by the width at the narrowest part of the print. This normalizes the data to account for different foot sizes. A higher number indicates a higher arch.

The type of arch you have can affect your style of walking, contributing to how the heels of your shoes wear down. Heavy wear along the inside of your shoes indicates that you overpronate, or roll your foot inward, as you walk. Wear on the outside of the heel indicates that you supinate, or roll your foot to the outside, as you walk. People with flat feet commonly (but not always) overpronate, while those with high arches are more likely to supinate.



Athletes should buy shoes that work best for their arch and gait to avoid injury. Straight shoes with firm midsoles are ideal for flat or overpronate feet. Feet that supinate or have high, firm arches feel most comfortable with curved shoes that allow plenty of flexibility.

Activity adapted from Athletic Shoes: Studies in Compounding Polymers; Carolina® Active Science™ Series: Burlington, NC, 1999.

