

Inside Bones

Overview: Bones and muscles work together to provide a structural framework for movement. The skeleton is your body's internal supporting structure. It holds everything together. In addition to providing support, bones act as shock absorbers when you jump, fall, and run. Bones have big responsibilities, and so they must be really strong. They also need to be arranged properly for the best support and shock absorption. In this experiment, we will look at the internal arrangement of the bones holding together your body.

Materials

- toilet paper tube
- 50-100 straws
- tape
- book

Experiment

1. First you will explore different bone structures. Start by taking about 20 straws and arranging them randomly in your hand so that they are pointing in different directions.
2. Lay your arm and hand on a table so that the group of straws is braced against the table. Next, have a friend place a heavy book on this column of straws. What happens then it's exposed to the weight?
3. Now take 20 more straws and arrange in a circle so that they are all held vertically in your hand.
4. Repeat step 2 with these more-organized straws. Do you notice a difference? The uniformly arranged straws should be stronger than those that were randomly arranged.
5. The tubes inside your bones are more like the uniform model of straws. They also have a kind of glue that holds them in place inside the bones. Let's incorporate this idea into your model by lining the inside of the toilet paper tube with tape.
6. Place some straws inside the tube. Fill the middle of the tube with straws, making sure they are tightly packed.
7. Test your model's strength by placing a book on top of the tube. What happens when the model is exposed to the book's weight?
8. Finally, take some tape and wrap it tightly around and around the group of straws. Test this new model by placing the book on top of the tape-wrapped group of straws.
9. What happens if you use both the tube and the tape? How about if you loosely arrange the straws as you did in step 3 and tape them – does this help, or is it more important that the straws are orderly?
10. For an extra study opportunity, visit the butcher in your local grocery store and ask for the end of a beef bone. (This is sometimes packaged as a soup bone). Look at the end of the bone. What do you see? It should look like a hard outer shell of bone protecting a softer, spongy portion. Draw a picture of your observations.

Inside Bones Data Table

Straw Bundle Type	Weight Applied	Observations

Reading

The skeletal system is the foundation of the body's skeletal system is its bones. It also includes cartilage, ligaments, tendons, joints, and other connective tissues. Our skeletal system provides both shape and protection for our bodies. Along with the attached muscles, it forms the musculoskeletal system, which gives us locomotion – movement, but not of trains! The bones in our skeleton work together with our muscles and connective tissue to allow us to walk, jump, dance, dribble basketballs, knit scarves, and so much more.

The bones of our skeleton have a very unique composition which makes them really strong and allows them to absorb shock. This arrangement is very important to support and protect the body. In fact, there's a soft, spongy part inside our bones called cancellous bone. It has a honeycomb structure which makes our bones light, but still helps them to be very strong.

The tubes inside these honeycombed, cancellous bone tissue are called the Haversian system, and they are in part made up of collagen, but with lots of calcium and phosphorus to keep them hard and strong.

Exercises

1. Name some of the parts that make up our skeletal system.
2. What is the smooth, hard, protective layer on the outside of bones called?
3. What is the inside spongy, porous, honeycombed bone called?
4. What is the network of tubes inside bones called?

Answers to Exercises: Inside Bones

1. Name some of the parts that make up our skeletal system. (bones and connective tissues like cartilage, joints, tendons, ligaments)
2. What is the smooth, hard, protective layer on the outside of bones called? (cortical bone)
3. What is the inside spongy, porous, honeycombed bone called? (cancellous bone)
4. What is the network of tubes inside bones called? (Haversian system)