Traveling Science Shows

THE FRANKLIN INSTITUTE

Pre-Show

HUMAN BODY

About the Show

Our body is an incredible, complex system of related parts that work together to allow us to interact with the world around us. As with many things, however, the whole is only as good as the parts that make it up. For example, a car without an engine would be useless.

The Human Body Show is the story of five major systems. Students will follow the path of food through the digestive system and trace the flow of blood through the circulatory system. We will explore how co-operating muscles, bound to our sturdy skeleton, allow us to move. We will learn to appreciate the immune system, which keeps foreign invaders out of the body. Finally, we will discover that without the control center of the nervous system, the body wouldn't function at all! Most importantly, we'll see how these systems work together to accomplish the amazing array of tasks that go into something as simple as moving your arm.

We have provided the following activities to help students preview some of the major concepts covered in our show. Please remember to use appropriate safety measures for all activities. Adults should always supervise students during experiments.

Thank you for scheduling a Franklin Institute Traveling Science Show.
We are excited to visit you soon!

THINK FAST!

FOR GRADES 1-8

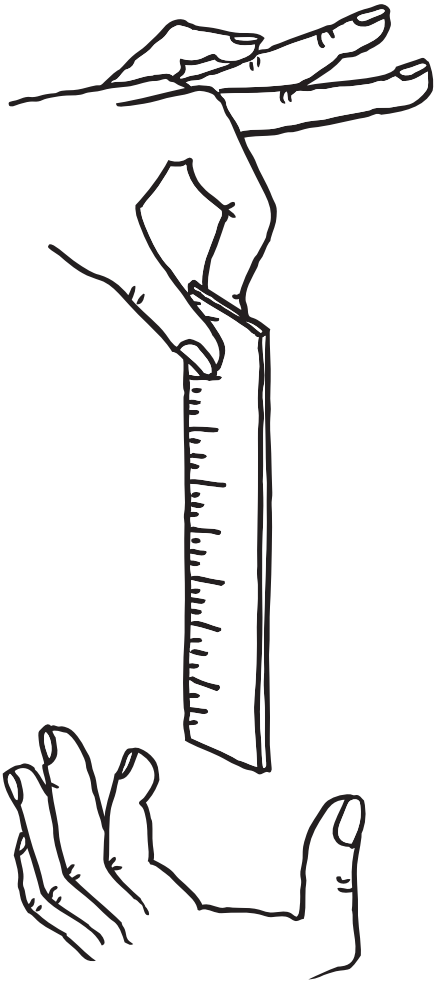
In the show, we will explain how our nervous system tells our muscles to move. When we try to catch something, for instance, our eyes have to tell our brain that the object is falling, and then our brain has to tell our hand to grab it. Your reaction time is the amount of time it takes for this communication to happen. In this experiment, students will conduct a simple test to find their reaction time.

EQUIPMENT

Ruler

PROCEDURE

1. Sit in a chair with your arm resting on a table. Your wrist should be hanging off the edge.
2. Have a partner hold the 12" end of a ruler, letting the 0" end dangle just above your hand.
3. Ask your partner to let go of the ruler without warning you. As the ruler drops, try to catch it between your thumb and finger as quickly as possible.
4. Look at the marking on the ruler where you caught it. Compare the measurement to the Reaction Time Chart. Record your data.
5. Try other experiments! Does your reaction time improve with practice? Does it improve with brighter lights, or when you are wide awake?



REACTION TIME CHART

Distance on Ruler	*Reaction Time*
5 centimeters	0.10 seconds
10 centimeters	0.14 seconds
15 centimeters	0.18 seconds
20 centimeters	0.20 seconds
25 centimeters	0.23 seconds
30 centimeters	0.25 seconds

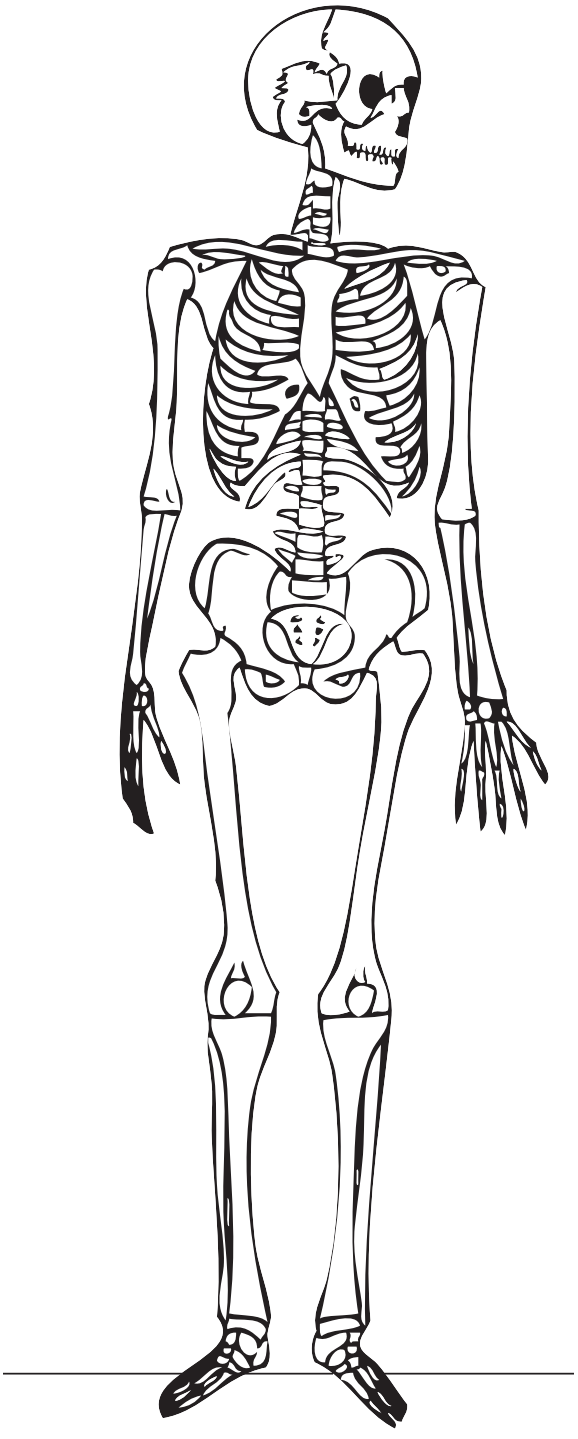
DESIGN A SPINE

FOR GRADES 1-4

As we will demonstrate in the show, our spine is integral to the whole skeletal system. It is a series of joints where many vertebrae (bones) come together. However, since the vertebrae are not permanently attached to each other, the spine can bend in different directions. A cartilage disc between each pair of vertebrae acts as a cushion to absorb shock and keep the vertebrae from grinding together. Finally, the spinal cord runs through a hole in the center of each vertebra. The vertebrae protect the spinal cord, and the spinal cord helps hold the spine together. In this activity, students will build a model of a spine.

EQUIPMENT

Wagon wheel pasta
Mini-marshmallows
Stiff wire (un-insulated)
Wire cutters



PROCEDURE

1. Cut the wire into pieces approximately 6 inches long. Fold over one end of each piece, so that the pasta won't fall off. This wire represents the spinal cord.

2. Thread the wire through the center of a piece of pasta. The pasta represents a vertebra.

3. Thread it through a marshmallow, so that the marshmallow sits on top of the pasta. The marshmallow represents a cartilage disc.

4. Continue alternating pasta and marshmallows until the model is about 5 inches long.

5. Try bending the spine in different directions. What would happen if there was no spinal cord? Why are the cartilage discs important?

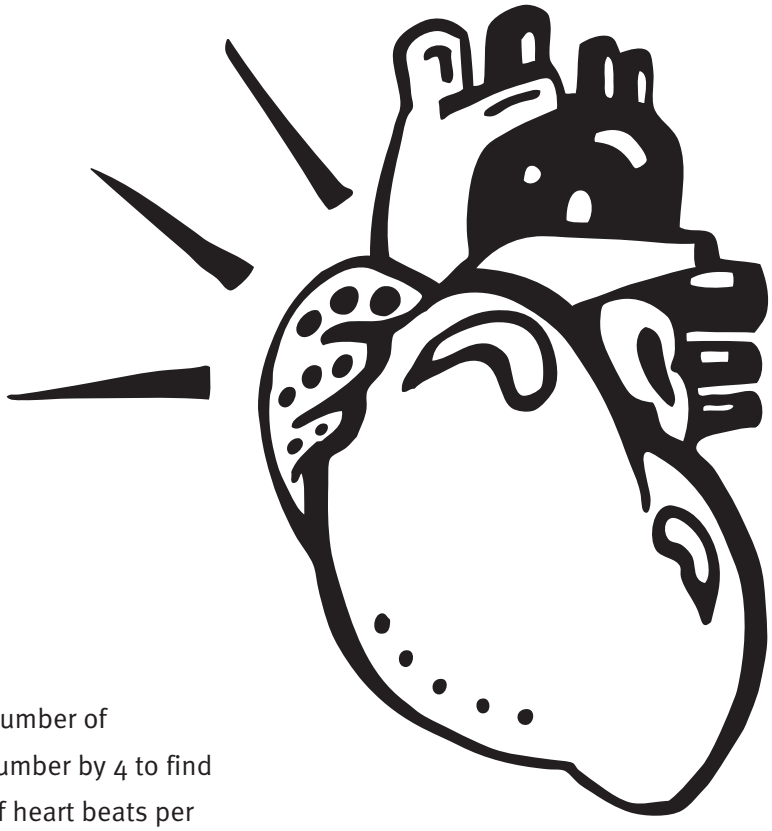
HAVE A HEART!

FOR GRADES 5-8

Our circulatory system is always running, all day every day. Yet we usually don't pay attention until we force it to work harder. In this activity, students will compare their resting and working pulse rates. Then during the show, we will explain how the heart helps us run, jump, skip, and more!

EQUIPMENT

Pencil
Paper
Stop-watch
Calculator (optional)



PROCEDURE

1. To find your wrist artery, lay your hand and wrist flat on a table. Then feel with fingertips along the thumb-side edge of your wrist for a pulse. If you have trouble finding the wrist artery, feel for the neck artery, which is beside the windpipe and just below the chin.

2. Have a partner use a stop-watch to time 15 seconds. During this time, count the number of beats of your pulse. Then multiply that number by 4 to find your Resting Pulse Rate, or the number of heart beats per minute when you are at rest.

3. Do 20 jumping jacks. Monitor your pulse again and calculate your Working Pulse Rate, or the number of heart beats per minute when you are exercising. Why does your heart beat faster when you exercise? Can you observe any other effects in your body?

4. Calculate how many times your heart beats per hour, per day, or per year. How many times has your heart beat in your whole life?