



University Health Care

PRESENTS

Gunther von Hagens'

BODY WORLDS

The Original Exhibition of Real Human Bodies

& The Story of the Heart



CLASSROOM ACTIVITY
GUIDE (GRADES 5-8)

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The Leonardo

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These classroom activities can be used as either pre-visit activities to prepare students for *BODY WORLDS 3 & The Story of the Heart* or as post-visit activities to help debrief them. As you know your students best, please modify these activities to best suit your class' needs. Additional classroom activities are available for purchase in the *BODY WORLDS* Shop at the exhibition exit or via the *BODY WORLDS* website at www.bodyworldshop.com.

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BUILD YOUR OWN LUNG

Purpose:

Students will investigate how their lungs function.

Materials:

- clear plastic cup
- plastic drinking straw
- small round balloon
- large round balloon
- 2 rubber bands
- small ball of modeling clay or play dough
- pair of scissors

Directions:

1. Insert the straw into the neck of the small balloon. Wrap the rubber band around the balloon neck the end of the straw to make an airtight seal. (You should still be able to blow up the balloon through the straw.)
2. Punch a small hole in the bottom of the cup. Enlarge it so that the free end of the straw can just be pushed through from inside the cup.
3. Seal around the straw and the hole using the modeling clay or play dough. Cut off the bottom half of the large balloon and stretch it over the opening of the cup. Use the other rubber band to hold it in place.

What's happening?

The straw represents the trachea, the cup represents the chest, the small balloon represents the lungs. The stretched balloon represents the diaphragm. When you pull on the middle of the diaphragm (simulates breathing in), the lungs will increase in size; when you release the diaphragm, the lungs will decrease in size.

Explanation:

When you pull on the middle of the diaphragm, this increases the volume of the “chest cavity” and lowers the air pressure inside. The higher pressure of air outside then pushes air into the “lungs” through the “trachea.” To exhale air, the diaphragm is allowed to return to its resting point, reversing the process.

MAKE A STETHOSCOPE TO LISTEN TO YOUR HEART AND GUTS

Purpose:

Students will be able to listen to the sounds produced by their hearts and stomachs.

Materials:

- scissors
- small plastic funnel
- plastic tubing
- 3-way hose connector (from hardware store)
- cellophane tape
- stopwatch
- notepad
- pen

Directions:

1. Carefully cut three lengths of tubing, each about 12 inches long. Tape the funnel to the end of one of the tubes.
2. Push the other end of this tube and one end of each of the other tubes into the hose connector. Use tape to make sure that they fit snugly.
3. Ask a classmate to do something active, such as running, for one minute. Since the sounds that you are listening for are very faint, you must do these activities in a quiet room.
4. Now ask your classmate to hold the funnel over his or her chest and hold the tube ends to your ears. (Do not push them in.) Count the number of heartbeats in one minute—this is their heart rate.

What's happening?

Sometimes you can hear sounds from your stomach and intestines. While you are digesting your food, faint gurgling sounds may be heard as the organs squeeze food along. Listen over different parts of the abdomen to try to hear some of these sounds. The stomach makes much louder sounds when it is empty compared to when it is full. These result from the squeezing around of air bubbles and stomach juices.

HOW BLOOD TRAVELS THROUGH THE BODY

Purpose:

Students will develop a clear understanding of the circulatory system and its parts.

Directions:

Fill in the blanks below with these words. Each word may only be used once.

Aorta	Inferior vena cava	Veins	Arteries
Capillary	Oxygen	Ventricle	Atrium
Circulatory system	Superior vena cava	Blood vessels	Food
Vein	Capillaries		

A system of _____ carries blood through the body. These vessels include _____, _____, and _____. These vessels and the heart make up the _____. Let's follow that droplet of blood through the blood vessels. When it leaves the left _____ of the heart, it goes into the _____. This vessel is the largest artery in the body. Soon after leaving the heart, this vessel branches, so the droplet could move into the smaller arteries leading to the head or arms. Let's assume this droplet travels down toward the legs. The largest artery divides to carry blood to each leg. This droplet of blood goes into one of the branches. From here, the blood travels in smaller and smaller arteries until it reaches the very end of the big toe. The blood vessel here is so small it cannot be seen by the naked eye. This tiny vessel is a _____. At this point, the droplet nourishes the cells next to this tiny vessel and takes away the waste products.

Now that the blood has given up its _____ and _____ it must return to the heart. It moves into a larger blood vessel. This blood vessel is called a _____. This droplet joins other blood going back to the heart. The blood vessels become larger and larger and finally they all join one large blood vessel that receives all blood from the lower part of the body. This blood vessel is called the _____. Another large blood vessel called the _____ collects blood from the head and arms. Both then separately enter the right _____ of the heart.

HOW BLOOD TRAVELS THROUGH THE BODY

ANSWER KEY

A system of blood vessels carries blood through the body. These vessels include arteries, veins and capillaries. These vessels and the heart make up the circulatory system. Let's follow that droplet of blood through the blood vessels. When it leaves the left ventricle of the heart, it goes into the aorta. This vessel is the largest artery in the body. Soon after leaving the heart, this vessel branches, so the droplet could move into the smaller arteries leading to the head or arms. Let's assume this droplet travels down toward the legs. The largest artery divides to carry blood to each leg. This droplet of blood goes into one of the branches. From here, the blood travels in smaller and smaller arteries until it reaches the very end of the big toe. The blood vessel here is so small it cannot be seen by the naked eye. This tiny vessel is a capillary. At this point, the droplet nourishes the cells next to this tiny vessel and takes away the waste products.

Now that the blood has given up its oxygen and food it must return to the heart. It moves into a larger blood vessel. This blood vessel is called a vein. This droplet joins other blood going back to the heart. The blood vessels become larger and larger and finally they all join one large blood vessel that receives all blood from the lower part of the body. This blood vessel is called the inferior vena cava. Another large blood vessel called the superior vena cava collects blood from the head and arms. Both then separately enter the right atrium of the heart.

MYSELF IN NUMBERS

Purpose:

Students discover how diversely and, at the same time, how similarly people are built. With this aim, students take various measurements of themselves or their classmates.

Materials:

- 6 foot measuring tape

Directions:

1. Take tape measure and take the following measurements:
 - Height
 - Length of foot
 - Outstretched arm (shoulder to fingertip)
 - Forearm length (wrist to elbow)
 - Circumference of the head
 - Outstretched arm span (fingertip to fingertip)
 - Highest point you can reach
2. Produce a large poster with a table into which all students can enter their results.
3. Compare the results.
4. Lie on your side on a large piece of paper. Ask a classmate to draw your profile on the paper. Now turn yourself over and face the opposite direction on the same piece of paper and get someone to draw your silhouette once again. What do you notice?
5. In the exhibition, look for a similar plastinate and compare it with your picture on the piece of paper!

STUDENT REACTIONS

This activity can be done on paper or as a verbal discussion.

What effect did the *BODY WORLDS* exhibition have on you?

1. What did you think about the plastinates? Check the boxes.

- | | |
|---|---|
| <input type="checkbox"/> Fake | <input type="checkbox"/> Complicated |
| <input type="checkbox"/> Scary | <input type="checkbox"/> Like they were made of plastic |
| <input type="checkbox"/> Like a model | <input type="checkbox"/> Funny |
| <input type="checkbox"/> Lifelike | <input type="checkbox"/> Like a person |
| <input type="checkbox"/> Real | <input type="checkbox"/> Serious |
| <input type="checkbox"/> Interesting | <input type="checkbox"/> Like a corpse |
| <input type="checkbox"/> Like they were made of meat | <input type="checkbox"/> Dumb |
| <input type="checkbox"/> Like someone I knew | |
| <input type="checkbox"/> Like they were trying to say something | |

2. Use your own words to describe what you saw:

3. Explain what struck you the most:

4. Which features of the plastinates looked most authentic?

5. How would you describe the behavior of other people looking at the plastinates?

PUMP UP YOUR BODY!

Purpose:

Students will investigate how exercise affects their breathing rate and heart rate.

Materials:

- stopwatch
- pencil
- large area such as a gymnasium

Directions:

1. Pose the following questions to students:

- Why is it important to exercise?
- How does exercise help our body function?

Possible student predictions about how exercise affects your body may include: increases heartbeat, breathing rate increases, muscles get sore, etc.

2. After the brainstorming session, talk to the class about the need to be active and how exercise affects your body. Ask, “Do you think all types of exercise have the same effect? Why or why not?”
3. Explain to the students that they will participate in an activity to see how exercise affects their heart rate. Explain that the heart is a muscle that pumps blood throughout the body. Have students select three different exercises to do in the gymnasium/large area. It may even be a fun idea to enlist the assistance of your physical education teacher to help with this activity. The exercises should involve varying levels of exertion (e.g. resting/sitting, walking, jumping jacks, etc.).
4. Next, students should predict which exercise will increase their heartbeat the most and which one will increase their heartbeat the least. Record the predictions on the board.
5. Have the students practice taking their pulse on the inside of their wrist. Students should use their index and middle fingers, not their thumbs, to feel for a pulse. The students should practice recording their pulse for one minute. If students are not able to locate their pulse on their wrist, have them try to find it on their neck, slightly to the side.
6. Now that the students have selected their exercise and can take their own pulse, have them gather data on a chart (sample provided). Each exercise chosen should be done for at least 3 minutes. Students should allow their heart rate to return to normal before doing the next exercise.

Students should be monitored during exercises and teachers should check with the appropriate office about health-related issues involving exercise.

7. Using the data, ask, “Did all activities affect your heart in the same way? Which activity increased your heart rate most? Did it take the same amount of time for your heart rate to return to normal after each exercise?” Students may choose to graph their pulse rate against a time on a large graph to show the difference between individuals. It is recommended that you exercise continuously for 30 minutes a day. Ask, “Which exercise would you choose? Why?”

Exercise	Pulse Rate Before Exercise	Pulse Rate Immediately After Exercise	Pulse Rate After 1 Minute	Pulse Rate After 3 Minutes	Pulse Rate After 5 Minutes

What's happening?

Your body needs nutrients from food and oxygen to survive and function. These nutrients are carried throughout your body by blood. Blood is being pushed through your body constantly by your heart.

When you play hard or exercise, your body needs even more oxygen. The extra oxygen helps your body to turn more food into energy. To get more oxygen to your body parts, your heart begins to beat faster.

As your heart beats, your blood vessels expand and contract. You can feel the expansion and contraction of blood vessels as blood is pumped through them on certain parts of your body where the blood vessels are close to the surface of your skin, such as on the inside of your wrist or on the side of your neck. This throbbing is called your pulse. Your pulse rate is the number of times your heart beats in one minute.

Adapted from Teaching through Trade Books

TRYING TASKS

Purpose:

To engage students in recognizing the different joints in the human body and how they help in daily tasks.

Materials:

- poker chips-10 per student
- pennies- 10 per student
- box
- masking tape
- two different size balls (one basketball-sized, the other a bit smaller)
- laundry basket or box
- ace bandage

Directions:

1. Students should tape their right or left thumb down to the palm of their hand. Using that hand, have students remove 10 poker chips from a box and neatly stack them in two groups of five. Students can make observations about how hard or easy it was.
2. Still having the thumbs taped down, students should try to pick up 10 pennies from a box. They should then neatly place them into 2 stacks of 5. Is this easier or harder than the poker chips?
3. After removing the tape from the thumb, students should use the ace bandage to wrap their elbow to make it so they cannot bend their elbow. Using only this arm, have students pick up the smaller ball and throw it into the basket roughly six feet away. Students can make observations about how hard or easy this way.
4. Still with their elbow not able to bend, have students pick up and throw the bigger ball in the basket. Was it easier or harder than the smaller ball?

What's happening?

Your skeleton provides the framework around which your body is built - much like a building is constructed around scaffolding. Bones also help us move. Since bones can not bend much themselves, our body has joints where the bones meet. These joints allow our body to twist, turn, jump, and run. Different joints have different functions. The hinge joint at our elbow functions like a lever and allows our arm to bend and extend. Other important joints, like the ball and socket joint at our hip, work differently. This one allows us to walk upright.

In a joint, strong, stretchy straps called ligaments hold two bones together. These fibers help keep the bones in place. The ends of the bones (where they meet at the joint) are covered by cartilage, a kind of cushion that stops them from rubbing against each other and wearing out.

Adapted from Teaching through Trade Books

TWO CHAIRS

Purpose:

This activity will give students the opportunity to voice their opinions about the concept of Plastination and prompt discussions about the exhibit both before and after the visit.

Materials:

- two chairs

Directions:

Place two chairs at the front of the classroom: the “for-chair” and the “against-chair.” All students are given the opportunity to come to the front, sit down on a chair and voice an opinion which is either for or against the exhibition of plastinates. A few students are given the task of briefly noting the arguments made.

Option: Run the same activity both before and after students have visited the exhibit. Notice if any of their opinions have changed.

**Adapted from Wendel Niehl and Arthur Thommes, Munich 1998*

Further Discussion Prompts:

- Consider what motivates a donor to allow his body to be plastinated for an exhibition.
- Consider how the friends and relatives of a donor might feel.
- Imagine that a member of your immediate family wanted to be plastinated.
- Would you donate your body for the purposes of Plastination?
- What did you learn about your own body from viewing the *BODY WORLDS* exhibition?

EXTENSION ACTIVITY IDEAS

Science: Arrange students into pairs and ask each student to trace an outline of his or her partners body on a large piece of butcher paper. Then have each student draw (or create using construction paper) as many body organs as possible within the outline. Encourage students to label their drawings.

More science: Arrange students into groups and ask each group to create a diagram of a major body system. Combine their drawings into a book entitled “The Human Body.”

Vocabulary: Provide students with a list of scientific words and terms related to the human body and ask them to find the definition for each word. Then have students use their definitions to create a personal glossary. Encourage them to illustrate as many of the words and terms as possible.

Health: Briefly discuss with students the major body systems and review how those systems function. Brainstorm a list of things kids can do to keep their bodies functioning smoothly. Ask each student to write and illustrate one health or safety rule they can follow. Display the rules on a classroom bulletin board.

RELATED WEB SITES

The Visible Human Project

(www.nlm.nih.gov/research/visible/visible_human.html) This site provides anatomically detailed three-dimensional representations of the male and female human body.

KidsHealth Organization

(www.kidshealth.org) This site offers a variety of information about the human body and its care for parents, teachers, and students of all ages.

ABOUT THE LEONARDO

Inspired by the spirit of ingenuity that guided Renaissance master Leonardo da Vinci, The Leonardo is an educational and cultural center fusing science, technology, and the arts in experiences that inspire human creativity and innovation. When the center permanently opens its doors in a few years, The Leonardo will be part of Library Square, a vibrant civic and educational hub that already draws over three million visitors each year.

A NEW APPROACH

The Leonardo's multidisciplinary approach integrates traditional science exhibits with historical and contemporary developments in the world of arts and culture. By offering myriad pathways to explore each topic, visitors can learn in ways that are more personally engaging, meaningful, and inspiring.

BEYOND HANDS-ON

The Leonardo will also allow visitors to reach beyond the traditional “hands-on” science center experience and actively explore topics of their own choosing. Workshops, on-site experts, and classes will ensure visitors encounter fresh, exhilarating realms of understanding.

YOU MAKE THE MUSEUM

Visitors to The Leonardo will help shape the experience. Each person who comes through our doors brings a different understanding and set of skills. By archiving and sharing visitor input, The Leonardo will become a living gallery, library, and lab, where the conversation is continually developing in unexpected and thought-provoking directions.

CURRENTLY AT THE LEONARDO

Although it will not permanently open its doors on Library Square for several years, The Leonardo will continue to offer exhibits, workshops, public dialogs and educational outreach programs to the community. One of these programs, The Leonardo on Wheels-Science, brings hands-on science to junior high and middle schools across the state. Each year, the program travels to over 20 schools and serves about 8,000 students. The Leonardo on Wheels-Science features interactive science, engineering and mathematics activities that support Utah state curriculum standards. Most school visits also include a Community Night for parents and families.