

THE BEAT GOES ON

BENCHMARKS AND TASKS

SC.F.1.2.1 The student knows that the human body is made of systems with structures and functions that are related.

SC.F.1.2.3 The student knows that living things are different but share similar structures.

- The student knows that processes needed for life are carried out by the cells and that complex animals have specialized organs to carry out life processes.
- The student uses a model to explain the functions of the major organ systems of the human body (e.g., digestive, respiratory, circulatory, skeletal, nervous, muscular, excretory).
- The student collects personal health-related data (e.g., temperature, heart rate) with simple devices such as a watch, a thermometer, and a stethoscope, to get a sense of how such information varies.

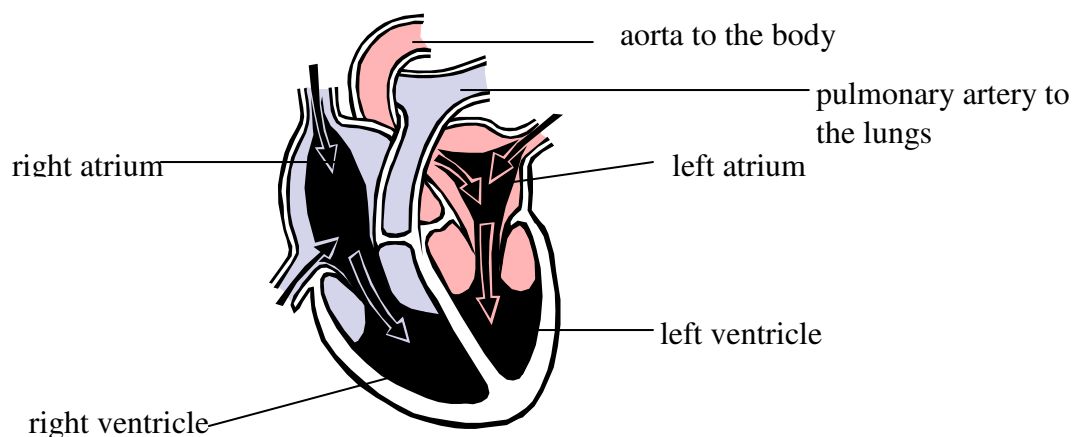
KEY QUESTION

What causes a change in pulse rate?

BACKGROUND INFORMATION

During an average lifetime, your heart, an **organ** the size of your fist, will beat almost 3 billion times. The heart is the strongest muscle in the human body. The heart is located in the center of the chest between the lungs and just under the breastbone.

The heart has four chambers through which blood passes. Both sides of the heart are divided into two chambers. The upper chamber is called the atrium, and the lower chamber is called the ventricle. Blood passes through the right atrium and the right ventricle and then to the lungs, where it picks up oxygen. This oxygen-rich blood is then pumped through the left atrium and the left ventricle and out to the body through the aorta.



When the heart contracts (pumps), it forces blood out into the arteries (tubes that carry blood from the heart to all parts of the body) and the walls of the arteries stretch. As the heart relaxes, the artery walls contract elastically to push the blood along. Each time the heart beats, the artery walls expand and contract once to produce one beat.

You can listen to a heartbeat, but you can feel your pulse. The pulse is caused by blood stopping and starting as it rushes through the arteries. By counting these pulse beats, you can tell how fast your heart beats. A general guide for the pulse rate is: 50-100 beats per minute resting, 90-150 beats per minute after walking, and 160-220 beats per minutes after running. Children's heartbeats are normally faster than adults' heartbeats. A person's resting pulse rate decreases with age.

MATERIALS

Per student

modeling clay
1 wooden match or toothpick
1 calculator
The Human Heart worksheet

Per class

clock/watch with a second hand
model of the human heart

Per group

1 tennis ball

TEACHING TIPS

Show students how to use their fingers to locate their pulse:

1. Begin by putting the tips of the index and middle fingers together side by side on the right hand.
2. Turn the left hand facing you with the palm up.
3. With the two right hand fingertips, trace a path on the left hand beginning at the left thumb all the way up to a point approximately 3.5 cm up the arm from where the wrist begins.
4. Keep the fingertips in an arched position for increased sensitivity. You should now be able to feel a pulse.
5. Do NOT use your thumb to take a pulse as thumbs have their own pulse!

ENGAGE

Have students take turns squeezing a tennis ball to simulate the force needed to squeeze blood out of the heart. If they squeeze 60 times a minute, they will have a good idea of how hard the heart works. The normal resting pulse rate is 50-100 times per minute.

EXPLORE

1. Tell students we can feel our own pulse beat by placing our fingers on a spot where there is an artery close to the surface of the skin. Explain that some arteries are too deep in the body to feel a good pulse beat. Another place to find a pulse is on the side of your throat, just under your chin. This artery is called the carotid artery. Ask students if they can find a pulse any place else on their bodies - face, armpit, elbow, wrist, abdomen, hip joint, knee, or ankle.

2. While students are seated, ask them to count the number of pulse beats in 15 seconds. Have students multiply this number by four to get their resting pulse rate per minute. Have students record this measurement.
3. Have students take a pulse rate again to see if they get the same results.
4. Ask students to walk briskly for one minute and then find their pulse rate again immediately afterwards. Be sure they record the results on their data sheets.
5. Have students run in place for one minute and repeat the procedure.
6. Have students relax and let their pulse rates return to the resting rate. Have them note how long this takes on the data sheet.

EXPLAIN

1. Discuss:
 - Did all students have the same resting pulse rate? Why?*
 - Did all students have the same pulse rate after exercising? Why?*
 - What was the class range of pulse rates for each activity?*
 - What was the difference in your pulse rates after one minute of brisk walking?*
 - What was the difference in your pulse rates after one minute of running in place?*
 - How long did it take for your pulse to return to its resting rate?*
2. Average the students' individual rates to get the average pulse rate for the class - a great calculator activity. Ask: *What was the average resting pulse rate for the class?*

EXTENDAPPLY

1. One way for students to visualize a heart beat is to make a pulse meter.
 - Form a small ball of clay about the size of a dime.
 - Stick a toothpick or wooden matchstick in the clay so that it is facing upwards like a pointer.
 - You may want to color the tip a dark color with a marker so you will be able to see the movement of the pointer better.
 - Place this pulse meter on the pulse spot on your wrist. You may have to move it around to find the best spot. Try the inside of your left wrist on the thumb side.
 - You should now be able to see the pulse meter moving in time with your pulse rate.
2. Use a model of the human heart to help students label the heart on the student worksheet and explain the flow of blood.

EXTENSION

Obtain a stethoscope and have students listen to someone's heart beat.

THE HUMAN HEART

