

**CIRCULATORY SYSTEM**  
**GRADES 4-6**

**BACKGROUND**

**Circulatory System**

It's a big name for one of the most important systems in the body. Made up of the heart, blood and blood vessels, the circulatory system is your body's delivery system. Blood moving from the heart delivers oxygen and nutrients to every part of the body. On the return trip, the blood picks up waste products so that your body can get rid of them.

**Your Heart**

About the size of your clenched fist, your heart is a muscle. It contracts and relaxes some 70 or so times a minute at rest -- more if you are exercising -- and squeezes and pumps blood through its chambers to all parts of the body. And it does this through an extraordinary collection of blood vessels.

**Your Blood Stream**

Your blood travels through a rubbery pipeline with many branches, both big and small. Strung together end to end, your blood vessels could circle the globe 2 1/2 times! The tubes that carry blood away from your heart are called arteries. They're hoses that carry blood pumped under high pressure to smaller and smaller branched tubes called capillaries. The tubes that more gently drain back to the heart are veins.

**How does your blood get oxygen?**

When you inhale, you breathe in air and send it down to your lungs. Blood is pumped from the heart to your lungs, where oxygen from the air you've breathed in gets mixed with it. That oxygen-rich blood then travels back to the heart where it is pumped through arteries and capillaries to the whole body, delivering oxygen to all the cells in the body -- including bones, skin and other organs. Veins then carry the oxygen-depleted blood back to the heart for another ride.

**What's blood, anyway?**

Most of your blood is a colorless liquid called plasma. Red blood cells make the blood look red and deliver oxygen to the cells in the body and carry back waste gases in exchange. White blood cells are part of your body's defense against disease. Some attack and kill germs by gobbling them up; others by manufacturing chemical warfare agents that attack. Platelets are other cells that help your body repair itself after injury.

**Did You Know?**

- The body of an adult contains over 60,000 miles of blood vessels!
- An adult's heart pumps nearly 4000 gallons of blood each day!
- Your heart beats some 30 million times a year!

- The average three-year-old has two pints of blood in their body; the average adult at least five times more!
- A "heartbeat" is really the sound of the valves in the heart closing as they push blood through its chambers.

from Kids.Discovery.com

The Heart - The two halves of the heart are separated by a membrane called the septum. This wall prevents the flow of blood between the two atria or the two ventricles.

The heart pumps blood in two phases. In the systolic phase, the ventricles contract, pumping blood into the arteries. In the diastolic phase, or second phase, the ventricles relax and blood flows into them from the atria. These two phases of the heartbeat are measured when the blood pressure is taken. The valves within the heart are one-way valves. This means that blood can flow into the heart but not back into the arteries or ventricles.

The heart is a hollow muscle. It is about the size of your fist. It is located slightly to the left of the center of your chest. The hollow inside is divided into four sections. These sections are called chambers. Two chambers are on the left and right side. Each side has an upper and lower chamber. The right upper receives blood from the body. The right lower pumps blood to the lungs. The left upper receives blood from the lungs. The left lower pumps blood to the rest of the body.

## BASIC LESSON

### Objective(s)

*Students will be able to*

- hear a heartbeat and understand the basic mechanics of the heart, veins and arteries.
- learn the basic components of blood.

### State Science Content Standard(s)

1.1: Develop abilities necessary to safely conduct scientific inquiry, including asking questions about objects, events, and organisms in the environment.

- Make observations using the five senses
- Record observations by drawing or orally explaining

3.1: Identify that plants and animals have structures and systems that serve functions for growth, survival, and reproduction.

- List characteristics of living organisms (body systems)]

### Materials

### Safety

#### From the Kit

#### Provided by Teacher

- Circulatory Chart
- cross-section heart – foam model
- 6 stethoscopes
- large plastic heart model
- tubing (artery/vein)

- Play-Doh
- corn syrup
- little marshmallows
- uncooked rice
- red hot candies
- small ziploc baggies
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- Wash hands after handling any meat or body parts.
- Wash hands before eating the candy.

Key Vocabulary	Mastery Questions
<ul style="list-style-type: none"> <li>Heart</li> <li>Artery</li> <li>Vein</li> </ul>	<ul style="list-style-type: none"> <li>See lessons</li> </ul>
Detailed Plan	
<p><b><u>Getting to Know Your Heart</u></b></p>	
<p><b><u>Introduction</u></b>            Have the students locate their hearts by placing their hands on their chests. Allow each student to listen to his/her heartbeat through a stethoscope. Ask: <b>“Does anyone know what the heart does? What human body system is it a part of? What other parts of the body are important to the heart?”</b> (veins, arteries, lungs, blood)</p>	
<p><b><u>Explanation/Exploration</u></b>            Using the circulatory chart and large model of the heart, describe the heart: chambers, arteries -blood out, veins = blood in. Make a fist and hold it up for all the students to see. Explain that the heart is a muscle about the size of your fist that pumps blood through the body. Open and close your fist to demonstrate the pumping of the heart. Have the students copy your motions.</p> <p>Distribute a handful of Play-Doh to each student, and instruct them to place it in one hand. When everyone has their Play-Doh, show the students how to make the heart-pumping motion with their hand again, only this time with the Play-Doh in their palm. When they squeeze their fingers into a fist, the Play-Doh will squirt out between them. Explain that this is what happens with the heart and blood. When the heart pumps, it squeezes blood out into the body.</p> <p>Hold up a piece of tubing for all the students to see. Explain that the heart has a lot of tubes attached to it to carry the blood to all parts of the body. Veins carry blood to the heart, and arteries carry blood away from the heart. (Hint: students can remember this by remembering that arteries and away both begin with the letter "a.")</p> <p>Display the body chart, and explain that blood takes a trip through the body. Trace the blood's path through the body on the chart as you explain. The heart pumps the blood into the lungs so that it can be mixed with oxygen. The lungs send the blood back to the heart. Then, the heart sends the blood through the entire body. When blood is running low on oxygen, it travels back to the heart and starts the trip all over again. As you do this, allow the small foam heart to be handed around the room so the students can see the inside of the heart closely.</p>	
<p><b>MAKING BLOOD:</b>  <b>(information from KidsHealth.org/activity from a clever teacher)</b></p>	
<p><b><u>Introduction</u></b>            Ask: <b>“How Does the Body Make Blood?”</b></p>	

It's not made in a kitchen, but blood has ingredients, just like a recipe. To make blood, your body needs to mix:

- red blood cells, which carry oxygen throughout the body
- white blood cells, which fight infections
- platelets, which are cells that help you stop bleeding if you get a cut
- plasma, a yellowish liquid that carries nutrients, hormones, and proteins throughout the body

### **Explanation**

Your body doesn't go to the store to buy those ingredients. It makes them. Bone marrow — that goopy stuff inside your bones — makes the red blood cells, the white blood cells, and the platelets. Plasma is mostly water, which is absorbed from the intestines from what you drink and eat, with the liver supplying important proteins.

Put all these ingredients together and you have blood — an essential part of the circulatory system. Thanks to your heart (which pumps blood) and your blood vessels (which carry it), blood travels throughout your body from your head to your toes.

### **Exploration (You can also do this as a demonstration for the entire class)**

Give each student a Ziploc bag, then distribute the “ingredients” as you discuss them:

- red dots are the red blood cells
- little marshmallows are the white blood cells
- rice kernels are the platelets
- corn syrup is the plasma

Have students seal their Ziploc then gently squeeze to mix up their “blood”!

**Another alternative demonstration using colored beads is found in the Advanced Lesson #3.**

### **Assessment**

On a piece of paper have the students write the name of each ingredient of the blood and then describe its function. Have them identify which ingredients in the bag match the ingredient in the blood.

## **Assessment**

### **Integration of Topic with other Subjects**

- Math - Students will calculate how many times your heart beats per minute. Hour? Day? Year?
- Health - Students will keep a record of heart rate for a period of two weeks to find their average. They will also create a healthy diet plan.

- History - Students will research the first heart transplant.
- Language Arts - Students will write a letter to their heart and tell what they will do to keep it healthy.
- Art - Students will create a poster with a message relating to the heart.

Students may pick any one or two to complete the lesson.

**Resources**

Getting to Know the Heart Instructions (e.how.com)

- [The Yuckiest Site on the Internet; Your Gross and Cool Body: Cardiovascular System; 2000 Connect Ed; How to Teach the Cardiovascular System; Anna Scanlon; May 2011](#)
- [ProTeacher: Circulatory System](#)
- [MES English: How to Teach the Circulatory System](#)

Read more: [http://www.ehow.com/how\\_8370984\\_teach-circulatory-systems-kids.html#ixzz2iBz2zBGz](http://www.ehow.com/how_8370984_teach-circulatory-systems-kids.html#ixzz2iBz2zBGz)

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**ADVANCED LESSON**

**Objective(s)**

*Students will be able to:*

- identify the four chambers of the heart.
- identify four important structures of the Circulatory System and what they do.
- explain heart rate and be able to take their resting and active heart rates.
- describe the major functions of the Circulatory System.
- explain the role of the heart in circulation.
- give a basic explanation of the cardio-pulmonary sequence.
- describe systemic circulation.

**State Science Content Standard(s)**

1.1: Develop abilities necessary to safely conduct scientific inquiry, including asking questions about objects, events, and organisms in the environment.

- Make observation using the five senses
- Record observations by drawing or orally explaining

3.1: Identify that plants and animals have structures and systems that serve functions for growth, survival, and reproduction.

- List characteristics of living organisms (body systems)

Materials		Safety
From the Kit	Provided by Teacher	
<ul style="list-style-type: none"> <li>• Heart Term Cards</li> <li>• Circulatory Chart</li> <li>• Heart Diagram-Figure 1 found in the binder</li> <li>• Large model of the heart</li> <li>• Red Beads</li> <li>• White Beads</li> <li>• Blue-green Beads</li> <li>• Pacemaker</li> </ul>	<ul style="list-style-type: none"> <li>• Large animal heart obtained from the meat market – cow, sheep, or pig</li> <li>• Access to computers to research the different parts of the heart</li> <li>• Corn Syrup</li> <li>• Yellow food coloring</li> <li>• Sandwich size plastic bag</li> <li>• Measuring cup</li> <li>• Butcher Paper</li> <li>• Colored Pencils/markers</li> </ul>	<ul style="list-style-type: none"> <li>• Wash hands after handling any of the meat or animal hearts.</li> </ul>
Key Vocabulary		Mastery Questions
<ul style="list-style-type: none"> <li>• Circulatory System</li> <li>• Systemic circulation</li> <li>• Aorta</li> <li>• Vena Cava</li> <li>• Ventricles</li> <li>• Atria</li> <li>• Arteries</li> <li>• Veins</li> <li>• Capillaries</li> <li>• Cardiac cycle</li> <li>• Heart rate</li> <li>• Pulmonary</li> <li>• Cholesterol</li> </ul>		<ul style="list-style-type: none"> <li>• See lessons</li> </ul>
Detailed Plan		
<b><u>Lesson 1: The Heart</u></b>		
<p><b><u>Introduction</u></b></p> <p>Go to a meat market, meat locker, or butcher store. Ask for a cow heart, sheep heart, pig heart, or other large animal heart. Let the students look at the heart. Discuss. Encourage students to ask questions.</p>		
<p><b><u>Explore</u></b></p>		

Obtain the heart term cards from the kit also the circulatory chart will be helpful:

- Right Atrium
- Left Atrium
- Right Ventricle
- Left Ventricle
- Pulmonary Artery
- Pulmonary Vein
- Aorta
- Vena Cava

Divide the class into eight groups. Each group gets one note card with one of the terms listed above and will need to research where their particular part is located in the heart. Students will also need to determine where the blood came from to get to their part and where it will go when it leaves their part of the heart.

Next, students will create a station where they can teach their classmates about their part of the heart. The station should include a diagram showing where their part is within the structure of the heart. After each group selects a representative from their group, the representatives will all meet and discuss in what order each of the groups will present their information so that they are in the proper sequence. The representatives will also create a map of how the classroom can be set up so that the stations will be in a circle around the classroom in the correct sequence in which the blood is pumped through the heart.

Suggested Website: [www.kidshealth.org](http://www.kidshealth.org)

Using the large heart model (**please be careful as the heart is breakable**) or the animal's heart, have each group demonstrate where their part is located.

### **Explanation**

As groups present their research, take the opportunity to guide them, providing additional information and/or correcting any misconceptions. Let each group try to demonstrate to the class where their part of the heart is located on the real animal heart. (**See Heart Diagram - Figure 1** for a picture of the heart with each of the parts labeled to use as a guide.)

Open up the animal heart OR use the large model of the heart. If you choose to open the heart, do this prior to class to save time. *NOTE: The following directions were taken from a website that is no longer in existence.*

1. Place the heart in the dissecting pan (a cooking pan will work) so that the front or ventral side is towards you (the major blood vessels are on the top and the apex is down). The front of the heart is recognized by a groove that extends from the right side of the broad end of the heart diagonally to a point above and to your left of the apex.

2. Use scissors to cut through the side of the pulmonary artery and continue cutting down into the wall of the right ventricle. Be careful to cut just deep enough to go through the wall of the heart chamber. (Your cutting line should be above and parallel to the groove of the coronary artery.)
3. With your fingers, push open the heart at the cut and examine the internal structure. If there is any dried blood inside the chambers, rinse out the heart completely before continuing.
4. Locate the right atrium. Notice the thinner muscular wall of this receiving chamber.
5. Find where the inferior and superior vena cava enter this chamber and notice the lack of valves.
6. Locate the valve that is between the right atrium and right ventricle. This is called the tricuspid valve. This valve allows blood flow from the right atrium into the right ventricle during diastole (period when the heart is relaxed). When the heart begins to contract (systole phase), ventricular pressure increases until it is greater than the pressure in the atrium, causing the tricuspid to snap closed.
7. Use your fingers to feel the thickness of the right ventricle and its smooth lining.
8. Inside the right ventricle, locate the pulmonary artery that carries blood away from this chamber. Find the one-way valve called the pulmonary valve that controls blood flow away from the right ventricle at the entrance to this blood vessel.
9. Using your scissors, continue to cut open the heart. Start a cut on the outside of the left atrium downward into the left ventricle, cutting toward the apex to the septum at the center groove. Push open the heart at this cut with your fingers and rinse out any dried blood with water.
10. Examine the left atrium. Find the openings of the pulmonary veins from the lungs.
11. Inside this chamber, look for the valve that controls blood flow between the upper left atrium and lower left ventricle. This valve is called the bicuspid or mitral valve.
12. Examine the left ventricle. Notice the thickness of the ventricular wall. This heart chamber is responsible for pumping blood throughout the body.
13. Using your scissors, cut across the left ventricle toward the aorta & continue cutting to expose the valve.
14. Using scissors, cut through the aorta and examine the inside of the structure.

Explain what happens when the blood goes to the lungs via the pulmonary artery and returns via the pulmonary vein. Ask: **“How does oxygen get into the blood?”** (*Blood moves from the heart to the lungs.*) **“Then what happens?”** (*Oxygenated blood comes back to the heart and then gets a big push out of the heart and into the body. The heart pumps about 2,000 gallons--more than 7,570 liters--of blood a day.*)

This part of blood circulation is called pulmonary circulation. Ask: **“Why is it called pulmonary circulation?”** (*Blood moves from the heart through the lungs and back to the heart.*)

#### **The Pulmonary Circulatory Sequence:**

1. Blood is brought into the right atrium from the body via the superior vena cava.
2. Passing through a valve, blood moves from the right atrium to the right ventricle.
3. The right ventricle pumps the blood through another valve into the pulmonary artery and on to the lungs. Blood is carried through the lungs, releasing carbon dioxide and becoming replenished with oxygen.
4. Pulmonary veins return oxygenated blood to the heart via the left atrium.



5. Moving through a third valve, blood enters the left ventricle. This ventricle is the most thickly muscled chamber. The additional musculature gives it the extra power it needs to push blood into the aorta and around the body.
6. A fourth valve controls blood movement from the fourth ventricle into the aorta. This is the primary artery of the body.
7. From the aorta, blood travels to all the organs and muscles of the body. This is called **Systemic Circulation**.

**Extension: Homework or extra credit**

Have students to do the following activity individually. Using any material they choose, have students create a basic model of the heart. Encourage students to be creative. Students will need to identify and label the Right Atrium, Left Atrium, Right Ventricle, Left Ventricle, Pulmonary Artery, Pulmonary Vein, and Aorta. They can describe the sequence the blood flows through the different parts of the heart.

**Assessment**

Have students return their homework from the Extend portion and evaluate whether or not the students created and identified each portion of the heart.

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**Lesson 2: The Heart Rate**

**Introduction:**

Ask: **“How many times does the heart beat in a minute?”** (*Seventy-two beats per minute for an adult, up to 80 for children.*) Write these numbers on the board, and then have students figure out the answer by tapping the beat out for 15 seconds and converting that to the correct number of beats for 60 seconds.

First, do the tap rhythm yourself using your hand and a hard surface or a small drum. Do 20 beats in 15 seconds but don't tell them how many beats you are going to do. Next, have the students do the 20 beats/15 seconds rhythm **with you** by tapping their hands on their desks and counting the number of beats. Have students do the math to convert it to the number of beats per minute.

The cardiac cycle is one complete heartbeat and it takes about .8 seconds.

**Exploration:**

1. Question: **“Is your heart rate always the same? If not, why is it different?”** Exercise, sleeping, eating, sitting....Discuss.
2. Demonstrate how to take a carotid pulse. (*For instructions on how to take a carotid pulse, go to: [www.tutorials.com/09/0902/0902.asp](http://www.tutorials.com/09/0902/0902.asp). Have students practice before attempting the following activities.*)
3. Have students work in pairs to take each other's' pulse. Have them count and record their partner's number of heartbeats for **15 seconds**.

4. Optional: Using the stethoscopes available, pair up some students and have them listen to the heart beating. Ask: **“What is the sound of the heart beating?”** If they can hear the heartbeat clearly enough, have them count and record the number of heartbeats for 15 seconds for their partner.
5. Next have them take their partner’s **resting pulse** and their pulse **after** doing three minutes of jogging in place. (*Optional-- if stethoscopes are available--ask students to listen to the heart again after they measure their partner’s active heartbeat.*)
6. Have the pairs hypothesize about why the heart rate changes with activity. Each pair should present their theory to the class for discussion.

### **Explanation**

1. Heart rates vary in order to meet the different needs of the body. During exercise we need more oxygen and blood in the muscles so the heart rate increases.
2. Ask: **“What are some other times when our heart rate changes?”**
  - **Eating:** Our Digestive System needs more blood during and after meals, so our heart beats more quickly.
  - **Illness:** When we have a fever more blood is pumped to the surface so heat can be released through the skin.
  - **Stress:** The Sympathetic Nervous System (a division of the Autonomic Nervous System) increases the heart rate and the volume of blood pumped through the heart. (This is known as cardiac output.) The Parasympathetic Nervous System restores the heart rate to normal.

Ask: **“What is the primary job of the heart?”** (*The main function of the heart is to distribute blood throughout the body. It is the primary engine that drives the all-important Circulatory System.*)

Ask: **“How big is the heart?”** (*About the size of a fist.*) **“Is it a solid muscle?”** (*No – it is a hollow organ.*)

Explain further by asking the following questions:

- **“What kind of tissue is the heart made of?”** (*Specialized muscle tissue.*)
- **“How much does it weigh?”** (*In an adult, about 10-11 oz. or 300 grams.*)
- **“What is INSIDE the heart?”** (*Four chambers: two ventricles and two atria.*)

(NOTE: since students will probably not know the answers, you may have to guide their thinking.)

### **Assessment/Extension**

1. Conduct a study of heart rates in different individuals. Working in small groups, have the students **design** (inquiry opportunity) a study of resting and active heart rates in a variety of people. Encourage the students to design their study to examine a hypothesis or to find the answer to a question about heart rates. (Example: “The active heart rate for men is greater than

for women.” An example of a question could be: “Do men have a higher heart rate than women after exercise?”)

2. In designing the study, groups also need to determine the protocols of their study, such as;
  - The number of participants needed
  - The number of male and female participants
  - Age groups to include or exclude
  - What heart rates will be measured and how
  - Recordkeeping charts
  - Time frames for the study
  - Tools needed
  - How results will be compiled and analyzed
  - Format for final report (including charts, graphs, and conclusions)
3. Groups should brainstorm other factors they need to consider in designing and completing their study.
4. Each member of the group should be assigned a responsibility, such as recording heart rate results, preparing the final report, arranging for participants, writing up the study protocols, etc.
5. Each group should make a presentation to the class regarding their study and results.

**Alternate Assessment**

1. Conduct an experiment. Take your resting heart rate and the resting heart rate of two other people. (Parent, guardian, sister, brother, grandparent, etc.)
2. Next, have everyone do the same exercise for a set amount of time. (Example: jump rope for two minutes.) Take their heart rate again **immediately after the activity**.
3. Create a bar graph. Include the resting heart rate and the heart rate after activity. Graph the resting heart rate in red and the heart rate after activity in green. Compare the **red** bars and draw conclusions. Compare the **green** bars and draw conclusions. Finally, compare the red bars to the green bars and draw conclusions.

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**Lesson 3: The Circulatory System and Blood**

**Introduction: Let’s Make Blood**

1. Ask: **“What’s in blood?”** Ask for ideas and write answers on the board.
2. Blood contains four main ingredients: **plasma, red blood cells, white blood cells, and platelets.**
3. Ask for a group of volunteers to help make up some blood for the class.
4. Ask: **“What is the primary ingredient in blood?”** (*Plasma, which makes up about 55% of whole blood. It is very thick and kind of syrupy--that’s what makes blood “sticky”--and looks yellowish.*)
5. Have one volunteer pour  $\frac{3}{4}$  of a cup of clear syrup (corn syrup) with some yellow food coloring into a clear container.

6. Ask: **“What’s next? What do we have the most of: red or white blood cells?”** Red cells are the next most prevalent ingredient, making up about 44% of our blood. White blood cells and platelets make up the last 1% of whole blood.
7. Use three different kinds of plastic beads to use for these components:
  - Round flat red beads in red (red blood cells)
  - Oval white beads (white blood cells)
  - Small round green or blue seed beads (platelets)
8. Have students add enough beads in the appropriate proportions to complete the blood. (18 red beads, plus one white and one seed bead.) **Total volume** of the whole blood mixture should be about one cup. Hand the mixture around after the baggy is taped shut.
9. Ask: **“Why do we need . . .**
  - . . . **Plasma?”** (Transportation medium)
  - . . . **Red Blood Cells?”** (Contain hemoglobin and oxygen)
  - . . . **White Blood Cells?”** (Fight infection and disease)
  - . . . **Platelets?** (Help wound healing by making blood clots)

### Exploration

1. Ask: **“After blood leaves the heart, where does it go?”** Break students into groups of four. Students will need to look up the definition of **ARTERY, VEIN** and **CAPILLARY**, then review the definition of **VENA CAVA** and **AORTA**. Next they will need to outline one member of their group on a sheet of butcher paper, drawing the heart, labeling the parts of the heart, and including all of the terms listed above.
2. Have students color each part of the heart as follows:
  - aorta (purple)
  - arteries (red)
  - veins (blue)
  - capillaries
  - vena cava (green)
3. Have each group present their information, making sure students have defined each word listed above and have displayed it clearly on their student outline.
4. After each group gives their presentation, the other groups will need to agree with what was presented **or** disagree and explain why. Guide students as needed.
5. Reiterate: **“From the aorta, blood travels to the organs and muscles of the body. What are the pathways throughout our body that blood travels through?”** (*Blood vessels: arteries, veins, and capillaries.*)
6. Ask: **“How does blood get from our heart to our toes and back again?”** (*Systemic circulation.*)
7. Explain: **The movement of blood throughout the body is known as Systemic Circulation and works like this:**
  - The aorta carries blood from the heart to the body.
  - The large aorta branches into smaller and smaller arteries. Arteries carry blood away from the heart.

- The smallest arterial transport mechanisms are the capillaries. Blood moves through the capillaries into very small veins.
  - Small veins branch into larger veins.
  - These finally feed into the largest vein, the vena cava.
  - The superior vena cava returns blood directly into the left atrium of the heart.
8. Question: ***“What makes blood move in our body?” (Muscles--the heart is a muscle, and movement is created through the skeletal muscles in our body, and the muscles in the blood vessel walls.)***
  9. The pumping action of the heart is the force that moves blood through the arterial system and all the way into our brain, our fingertips and our toes.  
Arterial walls are muscular. They are also flexible and smooth. This elasticity also helps move blood throughout the body. Finally, the muscles in the body help move blood through our system, especially back “up” from our toes.
  10. Ask: ***“Why is it especially hard for blood to move from the toes and fingertips to the heart?” (Gravity. Blood needs to flow “up” against the force of gravity to get back to the heart.)***
  11. Ask: ***“What helps blood move through the veins and back up the body?” (Veins depend on the action of surrounding muscles to keep blood moving. They have a special one-way valve feature that opens to allow blood to move “up” the vein and then closes to prevent it from falling back “down” the vein. Veins are thinner than arteries and they don’t have as strong a muscle structure as arteries. Veins have a tough job that can be likened to sending water uphill.)***

### **Assessment: Home Activity**

To introduce this activity, show the students the [pacemaker](#) and explain:

A pacemaker is a small device that's placed in the chest or abdomen to help control abnormal heart rhythms. This device uses electrical pulses to prompt the heart to beat at a normal rate. Pacemakers are used to treat [arrhythmias](#) (ah-RITH-me-ahs). Arrhythmias are problems with the rate or rhythm of the heartbeat. During an arrhythmia, the heart can beat too fast, too slow, or with an irregular rhythm. This may be a sign of heart disease.

U.S. Department of Health and Human Services <http://www.nhlbi.nih.gov/health/health-topics/topics/pace/>

For this activity students will need to explain to a parent or guardian what blood consists of, as well as what they've learned about veins, arteries, and capillaries. The parent or guardian will then need to write down what they learned from their child. Have the parent or guardian share what they know about heart disease or health concerns affecting the heart and/or arteries with the student. Do any of the adults have a pacemaker or know someone who does? They will write down what they learn from the adult.

**Optional Enrichment Activity/Group Project: Researching the Incidence of Heart Disease around the World**

Arrange students into groups to conduct research about the incidence of heart disease in different countries around the world compared to the United States. Groups can be assigned to study the U.S. and other countries in Europe, Asia, Africa, Australia, North America or South America. (Comparisons should include countries representative of each continent.)

Research material can be found on the internet or in reference materials such as encyclopedias and almanacs.

Have each group prepare charts or graphs with their results, then work together as a class to compare/contrast the information obtained. Discuss **why** the incidence of heart disease might be different in different places. What impact does diet, lifestyle, etc., have on heart disease?

**Assessment**

See Lessons

**Resources**

Home Science Tools: The Gateway to Discovery: [www.hometrainingtools.com](http://www.hometrainingtools.com) - Contains resources for parents, teachers and kids to make learning science both fun and accessible. Features detailed dissection guides.

Anatomy and Physiology: [www.gwc.maricopa.edu/class/bio202/heart/anthrt.htm](http://www.gwc.maricopa.edu/class/bio202/heart/anthrt.htm) - Features many different views of the heart with an interactive component that lets you click on any part of the heart for help with locating and identifying various structures.

The Heart: An Online Exploration - <http://sln2.fi.edu/biosci/heart.html>

KidInfo-The Human Body: [http://www.kidinfo.com/Health/Human\\_Body.html](http://www.kidinfo.com/Health/Human_Body.html)

KidsHealth.org: [http://www.kidshealth.org/teen/your\\_body/body\\_basics/heart.html](http://www.kidshealth.org/teen/your_body/body_basics/heart.html)

**EXPLORE MORE**

- 1 [Heart Activities for the Classroom](#)
- 2 [Reading and Resources](#)
- 3 [Index of all "The Human Heart" pages](#)
- 4 [Heart Image Gallery](#)

