LIVE FROM THE HEART

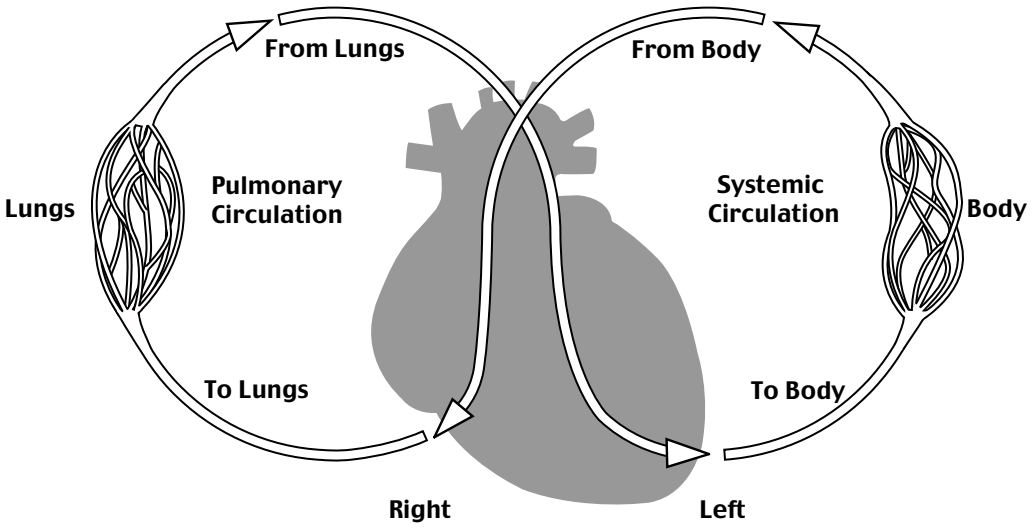
Lesson 2: Let's Circulate!

Name_____ Date_____

Part A: Blood Flow Throughout the Body

The circulatory system transports oxygen and nutrients to the cells of the body and removes wastes (such as carbon dioxide). The heart serves as a "double pump" for the circulatory system, receiving deoxygenated blood from the body, pumping it to the lungs to be oxygenated, and then receiving oxygenated blood from the lungs and pumping it to the rest of the body.

There are two types of blood vessels: arteries and veins. The arteries carry blood away from the heart to the cells of the body, and the veins return blood to the heart. The aorta is the main artery of the body. Arteries branch into smaller vessels called arterioles, which branch into even smaller vessels called capillaries. It is in the capillaries where the exchange of gases (oxygen and carbon dioxide) and nutrients takes place. The blood then moves into small veins called venules, which merge into larger veins, until they finally join the vena cava, which feeds blood back into the heart. This completes the "double circle" of the circulatory system.



Human Circulatory System

Trace the flow of blood through the body. Use a red colored pencil to denote oxygenated blood and a blue colored pencil to signify deoxygenated blood.

Part B: Important Notes on the Circulatory System

_____

_____

_____

_____

_____

LIVE FROM THE HEART

Lesson 2: Let's Circulate!

Part C: "Double Circle" Activity

1. Your teacher will give you a circulation card.
2. Use your cards to position yourselves to form a "double circle" (or figure eight) representing the correct flow of blood from the heart to the lungs, back to the heart, out to the body and back to the heart.
3. Make sure that both oxygenated and deoxygenated blood is pumped throughout the body at all times.
4. After forming a "double circle", pass around the red blood cells (tennis ball), reading your part of the body when you receive the ball.
5. Finally, tape your cards on the board in a "double circle", showing the correct flow of blood through the body.

Part D: Blood Flow Through the Heart

To: Junior Heart Doc
From: Marc Silver, M.D.
Re: How Blood Travels Through the Heart

The heart is a vital organ that pumps blood and oxygen to all the body cells.

As a Junior Heart Doc, it is important that you can describe how the blood flows through the heart. Write notes and draw diagrams to explain the flow of blood through the circulatory system.

Next, find a colleague (or partner) with whom you will practice explaining this concept to Mr. Harvey.

Dr. Marc Silver, Cardiologist

Advocate Christ Medical Center

Notes:

LIVE FROM THE HEART

Lesson 2 Extension: Let's Circulate!

Part E: Explore Your Pulse and Heartbeat

Your heart has a big job. It serves as the pump that sends blood to all parts of your body. You can feel this pumping when you take your pulse. Two places to easily feel your pulse are your wrist and the side of your throat.

Here's what to do:

1. Place your second and third fingers on the side of your throat or on your wrist until you feel your pulse.

2. Predict how many times your heart will beat in one minute. Write this number, which represents your resting heart rate, in the space below. Look at a clock with a second hand and count how many times your heart beats in 15 seconds. Multiply this number by four to get the number of beats per minute (bpm). Compare your actual heart rate with your predicted heart rate.

   _____ _____
   Predicted resting heart rate *Actual resting heart rate*

3. Predict what your heart rate will be during exercise. Write the number in the space below. Now, run in place or do jumping jacks for one minute. When you are finished, measure your heart rate again for 15 seconds and multiply by four. Record it c
   during exercise compare with yo

museum of science+industry chicago

	Predicted Heart Rate	Actual Heart Rate
Before Exercise		
During Exercise		

4. Record your resting heart rate on the table. Calculate the number of beats per hour, day, year and lifetime for an active adult, a sedentary adult, Mr. Harvey, and yourself based on a 77-year life span.

	Resting Heart Rate	Beats per Hour (x 60)	Beats per Day (x 24)	Beats per Year (x 365)	Beats per Lifetime (x 77)
Active Adult*	60 bpm				
Sedentary Adult*	110 bpm				
Mr. Harvey*	90 bpm				
Me					

*Younger people usually have resting heart rates of 90–120 bpm, because they have higher metabolisms. Women tend to have slightly higher heart rates than men.

Mr. Harvey's pulse was 90 bpm when he arrived at the hospital for his first visit. How many times will his heart beat in a lifetime? _____

In a lifetime, how many fewer times does the active adult's heart beat than the sedentary adult's heart? _____

Did You Know?

Taking Your Pulse

Heart rates vary from person to person based on age, degree of physical activity and other factors. Generally, a person who is in good physical shape will have a lower heart rate. A lower heart rate means that your heart has to work less to circulate blood throughout your body. Over the course of many years, a person with a lower heart rate places a lot less stress on their heart than someone with a higher heart rate.

LIVE FROM THE HEART

Lesson 2 Extension: Let's Circulate!

5. A strong heart can do more efficient work than a weak heart, providing the same amount of oxygen and nutrients to the body in fewer beats. Exercise is the best way to strengthen your heart muscle. Exercise physiologists suggest that the minimum amount of exercise the heart needs to maintain physical fitness is 30 minutes of activity within the range of your target heart rate 3 to 4 times a week.

What is target heart rate?
If you are exercising at a moderate intensity level, you should be working at your target heart rate, which is 60–70 percent of your maximum heart rate. Use the following formula to calculate your target heart rate:

220 – your age = your maximum heart rate
0.60 x your maximum heart rate = lower end of your target heart rate
0.70 x your maximum heart rate = higher end of your target heart rate

Example: Shawn is 14 years old.

220 – 14 = 206 (Shawn's maximum heart rate)
0.60 x 206 = 124 (lower end of Shawn's target heart rate)
0.70 x 206 = 144 (higher end of Shawn's target heart rate)

So, when Shawn is exercising at a moderate intensity level, he should stay within the target range of 124–144 bpm.

Calculate your target heart rate:

220 – _____ = _____
your age — your maximum heart rate

0.60 x _____ = _____
your maximum heart rate — lower end of your target heart rate

0.70 x _____ = _____
your maximum heart rate — higher end of your target heart rate

Your target range: _____

6. Keep a log of your exercise this week, noting the type of exercise, the number of minutes of activity and your heart rate at some point during that activity.

Day	Type of Exercise	Minutes of Activity	Heart Rate During Exercise

Notes: