GUIDING QUESTIONS AND CONCEPTS

1. The heart is a muscle in our body which must be trained and exercised.
   - What type of exercise strengthens the heart? How many minutes of exercise do I need and how hard do I need to do it?

2. Our heart rate changes depending on our level of physical activity.
   - Does someone with a very fit heart have a lower or higher resting heart rate than someone who is less fit?

LESSON OBJECTIVES

Students will be able to...

1. Understand the concept of beats per minute as a measure of aerobic activity.

2. Evaluate different physical activities to determine which strengthen the heart muscle.

3. Understand the importance of getting at least 60 minutes of physical activity on most days.

LESSON OUTLINE

1. Warm-Up/Reflect (3 min.)
2. All About the Heart Discussion (8 min.)
3. Heart Rate Calculator Activity (23 min.)
4. Aerobic Exercise Discussion (3 min.)
5. Fat & Muscle Models Demonstration (5 min.)
6. Closure (3 min.)

VOCABULARY

physical activity, heart rate, pulse, hypothesis, resting heart rate, aerobic exercise

PHS OVERARCHING ESSENTIAL QUESTIONS

- What does it mean to eat healthfully and be physically active, and why is it important?
- How do culture, experience and environment affect one’s health?
- What goals do I have to improve my health?

LESSON PREP

- Write vocabulary words on board
- Review heart diagram (see end of lesson)
- Options to track heart rate:
  - Draw Get the Beat chart on board (see end of lesson)
  - Get the Beat handout (see end of lesson), 1/student

MATERIALS

PROPS:
- 5-lbs. fat model
- 5-lbs. muscle model

DISPOSABLES:
- Sticky notes or scrap paper

Lesson #5, page 1
BACKGROUND INFORMATION

Spending time in front of a screen (watching television, playing video games, surfing the web on the computer, texting, etc.) occupy a large portion of children’s leisure time. It is estimated that children in the United States are spending 25 percent of their waking hours watching television. Statistically, children who watch the most hours of television have the highest incidence of obesity. In 2011, only 29% percent of high school students had participated in at least 60 minutes per day of physical activity on each of the 7 days before the survey. In middle school and even upper elementary grades, recess and gym occur less frequently or not at all. Youth with fewer resources and challenges to their built environment tend to report less physical activity. This lesson seeks to explain to youth how and why getting sufficient cardiovascular exercise is vital to a happy and healthy life.

LESSON RATIONALE AND PURPOSE

This lesson begins by teaching students that their heart is made up of muscle tissue that needs to be conditioned for good health. Students will practice calculating the number of times their own heart beats in a single day and then learn how to measure heart rate in order to evaluate the effectiveness of specific activities on heart health. Students will understand how aerobic activities are necessary to elevate the heart to a rate that promotes cardiovascular health.

RESOURCES

1. Measuring Physical Activity Intensity
   http://www.cdc.gov/nccdphp/dnpa/physical/measuring/target_heart_rate.htm

2. Classroom Energizers
   http://www.ncpe4me.com/energizers.html#ld

3. Kid Health’s Heart Health Info
   http://kidshealth.org/kid/htbw/heart.html

LESSON EXTENSIONS

Available at the end of the lesson:

1. Discussion Questions
2. Additional Activities
WARM-UP/REFLECT (3min.)

- Welcome! Who can tell me what we learned during our last PHS lesson?
  - Answer: Sugary food and beverages do not provide beneficial nutrients; how to use a nutrition label to identify ingredients and sources of added sugar; ways to reduce the amount of sugar we eat and drink; how to make a healthy soda.

- Let’s get refreshed and our hearts pumping with a brain break! *Lead the class in 90 seconds of one of the following movements or ask a student to lead* (jump up and down; jumping jacks; shoot baskets in place; run in place; swing a bat; do squats).

- Everyone have a seat and let’s get started!

ALL ABOUT THE HEART Discussion (8 min.)

*Note: for shorter class periods, you may choose to use the questions in this section as statements rather than questions in order to shorten discussion time. For classes with more than 25 min., PHS encourages you to use the open-ended questions below to engage students.*

- Does anyone know what type of tissue your heart is made up of?
  - Answer: Your heart is made up of muscle tissue. It’s located a little to the left of the middle of your chest and is about the size of your fist.

  *Using your hand, make the sound of a heart beat against your chest.*

- There are lots of muscles all over your body—in your arms, in your legs, in your back and more.

- Muscle groups in our feet and legs keep us standing up, our arm and shoulder muscles are used to carry things or throw a ball. What do you think our heart muscle helps us do?
  - Answer: Our heart is the organ that is responsible for pumping blood throughout our body. It is the center of your body’s circulatory system that sends blood filled with oxygen and nutrients throughout the working body. With every pump it refreshes our cells with oxygen and energy and takes away waste and carbon dioxide.

*(Note: See heart diagram in additional resources if you have more time and wish to describe the anatomy of the heart and the cardiovascular system.)*
Optional Math Problem

- The heart generally beats 60 to 100 times per minute, but can go much faster when it needs to. How would we figure out how many times our heart beats in a single day?
  - Answer: Allow students to construct the formula to figure this out. If there are 60 minutes in one hour and 24 hours in one day we know that there are 1440 minutes in a day. Since we know that for every minute the heart beats 60 times, we can calculate 60x1440 which equals 86,400. So our heart beats between 86,400 and 144,000 times per day.

- The heart is a hard and important worker. How can you take care of it?
  - Answer: Your heart muscle isn’t like the muscles in your arms where you can lift weights to make them stronger, but we must make our heart work harder in order to strengthen it. Activities that make us breathe hard and our heart beat fast for 10 minutes or more will make our heart stronger. Examples include running, swimming, dancing, and basketball.

- Because physical activity is so important for our heart, in a minute we are going to do several different physical activities in an experiment to find out how they change our heart rate. But first, let’s define physical activity. Have students discuss their idea of physical activity with partners, then share as a whole group.

**Physical activity:** movement of the body that increases energy expenditure. Significant health benefits can be obtained by including 60 minutes of physical activity every day.

- What are the significant health benefits that you get from being physically active?
  - Students share answers.
  - Benefits: reduces blood pressure, reduces risk of heart disease, increases energy levels, better sleep habits, better food digestion, decreases stress/anxiety/depression, improves brain functioning, improves mood and attitude, improves concentration, increases self-esteem, and improves athletic ability.

- What are some of your favorite ways to be physically active?
  - Students share answers
HEART RATE CALCULATOR Activity (23 min.)
(Materials: sticky notes/scrap paper)

Draw the Get the Beat chart on the board (this should be done before class).

Does anyone know what a heart rate or a pulse is?

Heart rate or Pulse: a measure of how many beats per minute our heart pumps to meet the oxygen and energy demands of the body.

- Before we begin our upcoming physical activity experiment, let’s first make a hypothesis as to what activity will cause your heart rate to go up the most.

- What is a hypothesis?

Hypothesis is an educated guess about what you think will happen, based on your observations.

Let class decide by show of hands which activity (sitting in front of a screen, walking, jumping jacks, high knees) will cause their heart rate to go up the most. The activity that the majority of the class agrees on will be the class hypothesis. Circle the activity on the Get the Beat chart. (Note: For longer class periods, you can take classes outside for an activity, use the gym, or use other open areas at the school.)

- Now that we have a hypothesis, we can begin an experiment to see if our hypothesis is correct!

Give each student one sticky note/scrap paper (or handout) to record their heart rate for each activity.

- On your sticky note, please write down each activity like this:
  
  Sitting in front of a screen:
  Walking:
  Jumping jacks:
  High knees:

- We can measure our heart rate, or pulse, on our wrist or neck. Here’s how to find the pulse in your neck:
  - Take your index and middle finger and place them together while curling the rest of the fingers and thumb down.
LESSON OUTLINE

- Place the two fingers on your jaw bone right below your ear lobe. Next, slide the two fingers down your jaw bone half-way to your chin.
- Now slide the two fingers straight down to your neck about 1” below the jaw bone. Press gently to feel the pulse.
- Once a student finds their pulse on one side of their neck, have them try to find it the same way on the other side of the neck as the rest of the students work to find their pulse. **Instruct them to only find the pulse on one side at a time. Refrain from finding the pulse on both sides at the same time as this restricts blood flow to the brain.**

**There are also several YouTube videos that you can use to show students how to properly take their heart rate.**

_Circulate around the room to visually inspect that students are correctly finding their pulse before moving on._

- We are going to take our heart rate for each activity. We will start by taking our heart rate for sitting in front of a screen. We will just sit at our desks for this, but imagine you are in front of a screen watching TV at home or playing on the computer, and we will find out what your heart rate does.

- I’m going to time you for 15 seconds while you feel how many times your heart beats. We will then multiply our count by 4 to convert our heart rate in beats per minute (bpm). Everyone should find their pulse now. When I say “GO”, you need to start counting the beats. I will time you for 15 seconds. When I say “STOP,” please write down your number on your sticky note and multiply your number by 4. Write down your heart rate (in bpm) next to where you wrote “sitting in front of a screen.” When I say “GO,” start counting!

_Say “Go” and time for 15 seconds, then say “Stop.” After multiplying their number by 4, have them write down their heart rate next to where they wrote “sitting in front of a screen.”_

- This equals your resting heart rate.

**Resting heart rate:** the rate at which your heart beats when you are inactive, such as when you are sleeping or engaged in screen time.

- Now you are going to stand up and walk for one minute. After one minute, I will say “STOP” and you will measure your heart rate again for one minute. Before we get up, let’s make sure the floor is
clear of any items that will get in our way and that your shoes are tied.

Repeat this process with jumping jacks and high knees (or other aerobic activities if you want to let the class pick different ones). If you are short on time, just do three activities instead of four. If you have extra time, you may add additional activities.

- Now we’ve completed our experiment and it’s time to share.

Ask for five kids to share their heart rate from when they were sitting in front of a screen and plot these numbers on the Get the Beat chart on the board. Ask five more students for their heart rates from walking and plot these numbers on the chart. Repeat this with the other activities so that you have a chart with data points for all activities. There should be a trend of the heart rates rising with each activity. Discuss with the class what was found:

- Which activity made your heart rate change the most?
  - Answer: probably jumping jacks or high knees

- Was the class hypothesis correct? (Yes/No)

- What conclusions can we draw from the chart?
  - Answer: The more intense the activity is, the more the heart rate increases.

- Why does your heart have to beat harder when you are doing more activity?
  - Answer: Your body is doing more activity and therefore needs more oxygen. Your heart must pump faster to deliver it.

**Aerobic Exercise Discussion (3 min.)**

- We learned earlier that physical activity is important for our health in many ways. Does anyone a word to describe physical activities that make us out of breath?
  - Answer: Aerobic

- Look at the word “aerobic.” Is there a clue in the word that can help us figure out what it means?
  - Answer: “Aero” (students may need help with this; try circling “aero” first and ask if they have seen this prefix anywhere else—i.e., “aerodynamic”).

- The first part of the word “aero” means air, so it’s exercise that requires air. Of course all exercise
requires that we breathe, but activities such as weight training and stretching do not work our heart as much as aerobic activities.

**Aerobic exercise**: any activity that keeps your body in motion for an extended period of time (10 minutes or more) and causes your heart and lungs to circulate blood and oxygen more quickly. This includes activities that use large muscle groups such as soccer, jump roping, biking, basketball, and running.

- What would happen to your resting heart rate if you increased the amount of aerobic exercise you did regularly?
  - Answer: Your resting heart rate would decrease. Your heart muscle gets stronger and more efficient so it pumps less often but pushes the same amount of blood. Also, your heart rate returns to its normal resting rate faster.

**FAT AND MUSCLE MODELS**  
*Demonstration (5 min.)*  
(Materials: fat and muscle models)

*Show the 5-lbs. models of fat and muscle.*

- Which weighs more: five pounds of muscle or five pounds of fat?
  - Answer: It's a trick question. Five pounds of fat and five pounds of muscle both weigh five pounds.

- When you become more fit, you strengthen your heart muscle and build more muscle on your body. We say your lean body mass increases. Often, the amount of body fat decreases. Notice the difference in these two models. The muscle is dense and tightly bound so it occupies less space than fat. The muscle takes up less space than the fat but they both weigh five pounds.

**Closure (3 min.)**

- Consider using a whole-group discussion, small- to whole-group discussion or think-pair-share to review important lesson information.

- How many minutes of moderate to high intensity physical activity should you aim to get every day?

- What are some strategies you can use to make sure you are getting your 60 minutes a day?
  - Answer: be active during recess, join a team, create a personal goal, find friends/neighbors who enjoy similar activities as you, encourage family members to be active with you, short bouts of exercise during commercial breaks, etc.

- What is one the most important message from today's lesson that you will share with someone else?
DISCUSSION QUESTIONS
• Now that we know what our heart rate is and how exercise affects it, do you think that ________________ (insert name of professional athlete) has a low or a high resting heart rate?
  o Answer: They have a low resting heart rate. They exercise their heart so frequently that it is very strong and doesn’t have to beat very often when the athlete is at rest. When our heart becomes stronger, it can pump more blood in a single beat. This means that someone who does a lot of aerobic activity has a heart that beats fewer times to send the same amount of blood throughout the body than the heart of someone who gets much less aerobic exercise.

• What are some examples of aerobic exercise that you like to do?
  o Examples: Running, dancing, skating, swimming, etc.

ADDITIONAL ACTIVITIES
If you have extra time, you can take the students outside to complete this lesson. You may also add additional activities for them to do to test their heart rate.

If the class can go outside, you can incorporate a cardiovascular activity such as a jump contest, a game of tag, or soccer.