Texas Heart® Institute
Project Heart
Activities for the Classroom

Grade 4: Lesson Plan 1

Anatomy: What Are Coronary Arteries?

Goals

- Students will understand the basic function of the heart.
- Students will identify good and bad health behaviors and explain how they affect the heart.

Instructional objectives

Students will be able to

1. Identify the blood vessels of the heart.
2. Describe the basic function of the coronary arteries.
3. Discuss how the coronary arteries help to keep the heart healthy.

Background information

The walls of the heart are made of a thick, special kind of muscle called cardiac muscle. The muscle squeezes (or contracts) and pushes oxygen-rich blood out of the heart and through the arteries to the organs, tissues, and cells of our bodies. The heart muscle—like every other organ or tissue in the body—needs oxygen- and nutrient-rich blood to function. Blood is supplied to the heart by its own delivery or vascular system, called coronary circulation. Because the heart is cardiac muscle that constantly contracts and relaxes, it depends on the coronary arteries for a continuous supply of oxygen and nutrition.

Materials

1. Chart paper and markers
2. Illustration: Oak Tree (Activity 4–A)
3. Illustration: Coronary Artery Tree (Activity 4–B)
4. Worksheet: "How to Feed a Tree" (Activity 4–C)
5. Worksheet: "How to Feed a Heart" (Activity 4–D)
6. Black-and-White Guide: "How to Feed a Heart" (Activity 4–D)
7. Color Guide: "How to Feed a Heart" (Activity 4–D)
8. Optional: Classroom computer with Internet access
9. Optional: Overhead projector for illustrations

Introduction

Place the illustration of the Oak tree (Activity 4–A) and the coronary artery tree (Activity 4–B) at the front of the room. If you have Internet access, display *Blood Vessels of the Heart: Coronary Arteries (Flash)* found under the Circulatory System tab of the Project Heart website.

Ask students if they have ever noticed that the branches of a tree are thickest near the trunk and become thinner as the branches grow towards the leaves. Begin a discussion about how the tree gets its nutrition, what keeps the tree healthy, and why the branches of the tree become thinner as they get closer to the leaves.

Discussion points

- What does the tree use for fuel?
- What keeps the tree healthy?
- Why do the tree branches get thinner?

Ask students to compare the illustration of the coronary arteries to the branching tree. Lead a discussion of how the heart muscle gets its nutrition, how it stays strong and

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healthy, and why the coronary arteries become thinner as they branch.

Lesson procedures/activities

1. Explain to the students how the tree trunk directs nutrients from the ground up to the large branches, and the large branches direct the nutrients out to the thinner branches, and finally to the leaves. Use a drawing of a tree to follow the path of the nutrients from the ground, up the trunk, and out the branches to the leaves.

2. Have the students draw, color and label the parts of a tree on the worksheet "How to Feed a Tree" (Activity 4–C). Ask students to trace the path of the nutrients from the tree roots to the leaves.

3. While referring to the illustration of the coronary artery tree (Activity 4-B), remind students that the heart muscle —like every other organ or tissue in the body—needs oxygen- and nutrient-rich blood (fuel) to function. Because the heart is composed primarily of cardiac muscle that constantly contracts and relaxes, the heart muscle needs a continuous supply of fuel.

   Blood is supplied to the heart by its own vascular system, called coronary circulation. The aorta, which carries blood from the left ventricle, supplies blood to the coronary arteries (blood vessels). The word coronary means crown, and like a crown, the coronary arteries encircle the surface of the heart. There are two main coronary arteries: the right coronary artery, which supplies blood mainly to the right side of the heart; and the left coronary artery, which supplies blood mainly to the left side of the heart. The coronary arteries divide into smaller artery branches called arterioles and finally into the smallest vessels called capillaries. The larger arteries travel along the outside surface of the heart and the smaller arterioles and capillaries travel inside the heart muscle to reach the individual cells where they deliver oxygen and nutrients. The capillaries are so tiny the blood cells must move through single file. (It may be fun to relate this to students lining up single file in the cafeteria lunch line to receive their nutrition.)

   Blood vessels throughout the body that take oxygen-poor blood back to the heart are called veins. In coronary circulation, oxygen-poor blood is carried away from the heart muscle via blood vessels called coronary veins. They collect the oxygen-poor blood from the heart muscle (wall) and empty it back into the right atrium by way of the coronary sinus, which is a small opening in the right atrium wall.

   Students can think of the coronary system as being like a tree: the aorta is the trunk; the two coronary arteries are the main branches that divide into thinner vessels (like tree branches); and the capillaries that deliver nutrients to the body's tissue are like the tiniest branches that distribute nutrients to the tree's leaves.

4. Lead a discussion with students comparing the drawing of the Oak tree to the drawing of the heart and its coronary arteries. (Turn the tree illustration upside-down and observe how they resemble each other.)

5. Describe for students the path of a blood cell through the body to the heart muscle. The path a blood cell takes is more complicated than the path water and nutrients take moving through tree limbs. Look at a blood cell's journey beginning in the right atrium. The blood cell moves from the right atrium into the right ventricle and then into the lungs, where it absorbs oxygen. It travels through the pulmonary vein (another blood vessel) to the left atrium, then on to the left ventricle and out the aorta. The blood cell moves to either the right or left coronary artery, branches off to an arteriole, and finally through a capillary where it gives its oxygen to a muscle cell. When the blood cell delivers its oxygen to the muscle cell, it absorbs carbon dioxide (CO_2) from the muscle cell, and returns to the right atrium where it is pumped into the lungs to give off the CO_2 and absorb more oxygen. Using the guide from Activity 4–D, have the students color and label the vascular system of the heart on the worksheet "How to Feed a Heart" (Activity 4–D).

Guided Practice

If you have a computer with Internet access, go to the Texas Heart Institute's Project Heart website (www.texasheart.org/ ProjectHeart) and give students the opportunity to view illustrations and animations of the heart and coronary arteries (in the *Look* section).

For added interest, discuss how trees, like all plants, need CO_2 (for photosynthesis, the process of turning sunlight into fuel)

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and breathe off oxygen, just the opposite of humans, who need oxygen and breathe off CO_2. Refer to the worksheets "How to Feed a Tree" (Activity 4–C) and "How to Feed a Heart" (Activity 4–D). Discuss with students whether they think it is healthier to live in an environment with or without plants.

Independent practice

- Have students develop an annotated glossary of terms from this lesson. Allow students to choose which terms are important for their glossary. Each entry should include the term, its definition, and why it is important or what it does.
- Have students draw a road map or trail guide and write detailed directions for a blood cell's journey. Label the parts of the anatomy it travels through and describe how it delivers oxygen and nutrients along the way.

Adaptations

Students who have difficulty with writing may have their assignments adapted by allowing them to verbalize, demonstrate, or illustrate their responses.

Extension

Have students research the process of photosynthesis in plants and prepare a report about how it compares to blood cells delivering oxygen and nutrition to the heart.

Introduction to the next lessons

Before closing the anatomy lesson, provide a quick preview of lessons 2 and 3, which pertain to nutrition and exercise. The following topics are covered:

- Exercise (30-60 minutes on most days of the week) makes the heart work harder and burn fuel (oxygen) more efficiently, so the cardiac muscle stays strong. Exercise also strengthens bones, burns calories, helps us think better, and increases self-esteem, which makes us feel better, both physically and mentally.
- Healthy foods provide important nutrients for all of the cells in the body, leading to strong bones and muscles. They also provide energy for growth and exercise. The nutrition lesson pays particular attention to feeding the cardiac muscle, coronary arteries, and blood cells just discussed.

Assessment

You may use observations of students during class activities and responses for written activities to determine their understanding of the lesson objectives.

Objective	Demonstrated lesson objective	Partially demonstrated lesson objective	Did not demonstrate understanding of the objective
Identify the blood vessels of the heart.			
Describe the basic function of the coronary arteries.			
Discuss how the coronary arteries help to keep the heart healthy.			

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Grade 4: Lesson Plan 2

Nutrition: What Nutrients Does My Body Need?

Goals

- Students will understand the roles carbohydrates, protein, fat, and water play in maintaining a healthy body.
- Students will understand how food provides fuel (energy) to the body, how much fuel the body needs, how the fuel is used, and what happens to unused fuel.

Instructional objectives

Students will be able to

1. Differentiate between carbohydrates, protein, and fat.
2. Determine a healthy balance of carbohydrates, protein, and fat in the diet.
3. Explain what foods provide fuel for the body.
4. Explain why water is necessary to the body.

Background information

The body needs 6 nutrients: carbohydrates, protein, fat, water, vitamins, and minerals. We concentrate on the carbohydrates, protein, fat, and water in this lesson. Vitamins and minerals are covered in depth in grade 5 nutrition. If your students are ready, you may add vitamins and minerals to this lesson.

Carbohydrates

Carbohydrates are the main source of fuel because the body converts them to glucose, a type of sugar. Your body uses some of this glucose right away for energy and converts any extra into a sugar called glycogen. Your body stores glycogen in the liver and muscles for future use; glycogen can be quickly changed back to glucose as needed. Once your body has made enough glycogen, the leftover glucose is stored as fat.

Sugars, starches, and fiber are carbohydrates. Sugars are called simple carbohydrates or simple sugars. (The most common form of simple sugar is glucose.) They give the body a quick source of energy. Some examples are granulated sugar, brown sugar, syrup, molasses, and honey. Fresh fruits also contain sugar and so do candies and soft drinks.

When glucose molecules link together, they form larger molecules called complex carbohydrates. Starches are complex carbohydrates because your body must break them down to use their sugars. So, your body can use them as a source for energy over a longer period of time—just what your heart needs for the long haul. Breads, cereals, corn, peas, potatoes, pasta, tortillas, and rice are some examples of complex carbohydrates.

Fiber, also known as roughage, is another complex carbohydrate your body must break down for energy. Fiber comes in two forms: insoluble (does not dissolve in water) and soluble (does dissolve in water). Insoluble fiber can be found in cereals, whole-grain breads, rice, and many vegetables. Soluble fiber is found in oatmeal, dried beans, peas, and many fruits, including apples, strawberries, and citrus fruits. Many foods contain both forms.

Proteins

Proteins are the building materials for the growth, maintenance, and repair of tissues and muscles. (Remember that the heart is one of the most important muscles in your body.) Extra protein is converted and stored in your body as fat, which can be used as emergency fuel.

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Two main types of protein are animal protein and vegetable protein. Foods rich in animal protein include beef, pork, fish, chicken, eggs, and dairy products. Some foods that contain vegetable protein are broccoli, lentils, potatoes, pasta, oatmeal, rice, nuts, chickpeas (garbanzo beans), soybeans, and kidney, lima, and navy beans.

Fat

Lipid is the general term for fats and oils. Lipids do not dissolve in water. At room temperature, fats are solid (butter or shortening) and oils are liquid (olive or vegetable). A little fat is necessary to help the body store energy; protect cells, tissues and organs; and transport other nutrients.

Fats are generally referred to as saturated or unsaturated. Saturated fat can put you at risk of heart disease because it is hard for the body to break down. Major sources of saturated fat include the butterfat in milk products, fat from red meat, and fat from tropical oils such as coconut or palm oil. Unsaturated fat is healthier and comes from sources such as vegetable oils. Some lipids contain both saturated and unsaturated fat.

Water

Water is essential for life. Water is used both inside and outside each cell as it helps regulate the nervous system, helps muscles to contract, helps transport nutrients, and helps remove waste. Since our bodies cannot produce or store water, we must continuously replenish the supply by drinking beverages such as water, milk, or juice, or eating foods containing plentiful water such as tomatoes, apples, or watermelon.

Materials

1. Optional: Classroom and/or individual computer with Internet access:
   – Understanding food labels: www.texasheart.org/HIC/Topics/HSmart/foodlabl.cfm
   – Nutrition for Athletes: www.houstontexans.com/fitness/nutrition.php
   – Blast Off Game: www.choosemyplate.gov/kids/
2. Illustration: Fueling the Rocket (Activity 4–E)
3. Worksheets: "Calories In/Calories Out– The Energy Balance" (Activity 4–F)
4. Clear, clean plastic soft drink bottle with a nutrition label
5. Granulated sugar
6. Teaspoon measuring spoon
7. Calculator
8. Food labels
9. Worksheet: "How My Favorite Foods Stack Up"(Activity 4–G)
10. Worksheet: "My Venn Diagrams"(Activity 4–H)

Introduction

Begin the classroom discussion of fuel for the body by using a rocket analogy. Referring to the illustration of the rocket, explain how rockets have solid rocket boosters for short-term fuel and fuel tanks for long-term fuel. The solid rocket boosters are quick energy to blast the ship into orbit and the long-term fuel is in reserve for the whole journey and the return trip. Without both kinds of fuel, the rocket will not have the appropriate amount and type of energy for the round trip. What different kinds of fuel does your body need for energy?

Lesson procedures/activities

1. Your body is a lot like a rocket; it needs fuels to perform many different functions. The foods we eat provide the energy for take-offs and landings (exercise) and steady orbits (resting, thinking, studying, playing games, etc.). A balanced diet helps the body function efficiently. The nutrients you need include carbohydrates, proteins, fats, water, vitamins, and minerals. This lesson concentrates on carbohydrates, proteins, fats, and water. Refer to the illustration "Fueling the Rocket," and lead a brief discussion about foods for quick energy versus foods for the long haul, and about the right mix of fuel for the rocket to achieve its mission.

2. Explain the 3 different kinds of carbohydrates (CHO): simple (sugar), complex (starches), and fiber (roughage). Carbohydrates are the main source of fuel in a balanced diet. The body converts carbohydrates into glucose, a type of sugar for immediate energy. Extra glucose is stored as glycogen in the liver to be converted back into glucose when needed. Starch is a complex carbohydrate that must be broken down to be used by the body. Fiber, also called roughage, is the most complex form of carbohydrate. *Interesting Fact:* Herbivores, such as cows and horses, get their carbohydrates by eating and slowly digesting lots of plants (fiber). The plants also contain small amounts of simple carbohydrates (glucose) in leaves and stems.

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Ask the class for examples of simple carbohydrates (sugar), complex CHO (starches), and fiber (plants). Explain that simple is the easiest carbohydrate for the body to break down and use, complex is a little more complicated, and fiber is the most difficult. They are all important and beneficial in a well-balanced diet.

3. To help students visualize how much sugar (simple carbohydrates) we consume and the amount of "quick energy" we get from that sugar, conduct this demonstration: Use a clear, empty soft drink bottle that has sugar listed on its ingredient label. Calculate the amount of sugar in the soft drink using the following formula: 4.24 grams of sugar = 1 teaspoon of sugar or 16.25 calories. Using the teaspoon measure and granulated sugar, counting the teaspoons as you put them in the container, fill the container with sugar equivalent to the total grams listed on the label. Students will be amazed at how much sugar is in a soft drink. Other sugary foods you can discuss are:
   1 tablespoon of ketchup contains 1 teaspoon sugar
   1 carton (8 oz.) of yogurt contains 7 teaspoons sugar
   2 ounces of chocolate (like a plain chocolate candy bar) contains 8 teaspoons sugar

4. Research approximately how many calories/minute are burned when a person runs, and then calculate how long a student could run with the energy from the sugar in the soft drink. What happens when that quick energy is used up? Why do we need complex carbohydrates? Remember what happens when we take in more energy than we need? Use the worksheets, Calories In/Calories Out, for reference, calculations, and notes. Remind students that an average 9-year-old boy who is sedentary* needs about 500 fewer calories per day than if he was physically active for even an hour a day. Note that athletes eat complex carbohydrates prior to their activity to give them energy. Discuss the athlete's need for quick energy versus sustained energy.

** sedentary means inactive, spending lots of time sitting*

5. Proteins are the building materials for growth, maintenance, and repair of tissues and muscles. Extra protein is stored as fat for emergency fuel when carbohydrates and fats are not available. The 2 main types of protein are animal and vegetable. Proteins are made from 20 different amino acids, 8 of which are considered essential (also referred to as building blocks). For a protein to be considered a "complete protein" it must have all 8 of the essential amino acids. Ask students to list foods that provide protein. There are 4 calories per gram of protein (the same as carbohydrates), but protein is denser, so portions are smaller for the same total calories.

6. Visit the website of a sports team such as the Houston Texans and review their in-season meals. (www.houstontexans.com/fitness/ nutrition.php) Compare the carbohydrates, protein, and fat in the players' diet to the students' diet. Ask students to look for healthy and unhealthy food choices in the diet. Do they see potato chips and cookies in the team's diet? Discuss the concept of beginning a healthy diet as a child to build good habits to carry into adult life. Athletes can be good examples of healthy eaters.

   Thought-provoking question for the students: We talked about athletes pre-loading with complex carbohydrates before a big game to provide energy. Would an athlete need protein right before a game? Why? Would he or she need protein after the game? Why? (To repair/ rebuild the muscle tissues?)

7. Dietary fat plays an important role in daily nutrition; however, we only need a small amount of fat to keep the body healthy. Fat performs the following functions:
   • Stores energy for life processes
   • Cushions the vital organs
   • Insulates the body
   • Transports some of the vitamins and minerals
   • Adds flavor to foods helping to stimulate the appetite
   • Forms part of the cell membrane
   Some lipids (fats and oils) are better for you than others. The more solid a fat is the less healthy it is. In general liquid fats such as olive oil are healthier for your body because they are unsaturated (break down more easily). Vegetable oils are the best-known sources of unsaturated fat. Problems arise with fat intake because fat contains a lot of calories (fuel for energy). Since fat has 9 calories/gram, it provides more than 2 times the energy of carbohydrates or protein. The body is very efficient at storing unused fuel in fat cells. Many people consume more fat than their bodies need. Discuss how much energy is available from

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fats (calories in) and how much exercise (calories out) it takes to burn that fuel.

Remember that if the body doesn't need the energy in fat right away, it stores it in fat cells. Fat cells can store large amounts of fats. The more they store, the more they grow, until an obese person's fat cells may be a hundred times larger than a thin person's fat cells.

Look for the hidden fats in foods such as french fries, donuts, cookies, and crackers and beverages such as whole milk or shakes. The fats used in these foods, or used to cook these foods, may be saturated. Saturated fat is the type of fat that raises your cholesterol levels and puts you at risk of heart disease. Major sources of saturated fat are the butter fat in milk products, fat from red meat, and fat from tropical oils such as palm kernel or coconut oil often used to fry foods. Students who train themselves to recognize and eat healthy, low-fat meals and snacks will have a better chance of being a healthy adult.

Interesting fact: Hikers and mountain climbers often carry snacks high in simple carbohydrates and fat because they provide short and long-term fuel and are lightweight and easy to carry. (Remember that fat contains twice the calories per gram as carbohydrates or protein.)

Have students refer back to the Calories In/Calories Out worksheet and add calories/gram notations for carbohydrates, protein, and fats. Then they can calculate how much exercise it takes to burn off the calories in their daily diet.

8. Water is essential to your health and makes up 60% of the body's weight. Have students calculate how much of their body weight is made up of water.

   A person can survive without other nutrients for long periods of time, but you can only survive a few days without water. Every cell in the body depends on water.
   - Nutrients and waste products all move through the body in water.
   - Water dissolves the amino acids, glucose, vitamins, and minerals so the cells can use them.
   - Water lubricates joints, protects the spinal cord, and fills the eye chambers.
   - The body's temperature is regulated by sweating. When it gets hot, sweat (water) evaporates, carrying off body heat and cooling the body.

   Ask students to discuss other organs or areas of the body in which water is evident.

   Nearly all foods contain some water; some have more than 90% (for example, watermelon). Without water, the essential nutrient, carbohydrates, protein, fat, vitamins, and minerals in our foods would never reach the cells. When your body needs water, or detects a fluid imbalance, a center in the brain sends a "thirsty" message to the body to drink. Drink about 8 glasses of water a day to stay healthy. Ask the students if they noticed the team's diet often uses water as the beverage for a meal. Discuss other healthy beverages to consume and beverages to limit or avoid.

Guided practice

Have each student or a small group choose a fast-food restaurant and plan a meal by making choices from the menu. Using the worksheet, Calories In, log the calories for the foods and beverages chosen, then complete the Calories Out worksheet. Repeat the exercise with alternate choices. Which choices are more heart-healthy? Which menu provides the right amount of calories for your activity level?

Divide the students into groups. Print off the school lunch menu and assign each group a different weekly menu. Ask the groups to explain the best and worst meal for providing energy (carbohydrate based), or for building muscle (protein based) from the menu and present their findings to the class. (Be sure they are prepared to justify their choices.)

Independent practice

Ask students to list 20 of their favorite foods making sure to include different kinds of foods. (Review MyPlate to help them choose foods from each category.) Ask them to bring food labels to school for some of the foods on their list. (Hint: Fast food restaurants have pamphlets that show nutritional content of various items and also provide nutritional information on their websites.) Using the labels, determine the carbohydrate, protein, and fat content. Ask students to determine if the food is a healthy choice (providing energy for exercise, proteins for building muscles, and small amounts of fat). Or, does the food appear to be an unhealthy choice that students should limit in their diet, such as foods

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high in fat or sugar? Would you suggest that athletes eat this food? Why? Using the worksheet, answer the question, "How do my favorite foods stack up?"

Extension

Students can bring in a favorite recipe (for example, soup, casserole, cookies, or salad). Ask them to analyze the recipe and label each ingredient as carbohydrate (simple, complex, or fiber), protein (animal or vegetable), fat (saturated or unsaturated), or water. Ask students' opinions as to whether the recipe is healthy or unhealthy and to explain why. They could also suggest options to make the recipe more healthy. Students can share their results with the class.

Use the information from independent practice and develop Venn diagrams* demonstrating the overlap in food composition. Some foods contain primarily one kind of nutrient (protein, carbohydrate, or fat); however, many foods have combinations of protein, carbohydrates, or fats. To break it down even further, Venn diagrams could show foods that contain primarily saturated fat or primarily unsaturated fat and those that contain a balance of both. Explain the concept of hidden fats in some foods and why students should be aware of them. This exercise should provide a better understanding of the complexity of foods.

* *Wikipedia defines Venn diagrams: http://en.wikipedia.org/wiki/Venn_diagrams*

Adaptations

Students who have difficulty with writing or drawing may have their assignments adapted by allowing them to verbalize their responses or work with other students during guided and independent practice.

Assessment

Students' understanding of the lesson objectives can be measured by observing them in group activities and by assessing their independent practice work.

Objective	Demonstrated lesson objective	Partially demonstrated lesson objective	Did not demonstrate understanding of the objective
Differentiate between carbohydrates, protein, and fat			
Determine a healthy balance of carbohydrates, protein, and fat in the diet			
Explain what foods provide fuel for the body			
Explain why water is necessary to the body			

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Grade 4: Lesson Plan 3

Exercise: How Does Exercise Help My Heart?

Goals

Students will understand the relationship between life-long physical activity and a healthy heart.

Instructional objectives

Students will be able to
1. List the types of exercise that develop endurance, strength, and flexibility.
2. Understand how aerobic exercise helps the heart.
3. Set personal goals for exercising to increase their physical fitness.
4. Design their own fitness plan and help develop a family fitness plan.

Background information

The heart muscle—like every other organ or tissue in the body—needs oxygen- and nutrient-rich blood to function. The heart pumps blood throughout the body to deliver oxygen and nutrients to the cells. When the blood cell delivers its oxygen to the muscle cell, it removes carbon dioxide (CO_2) from the cell, and returns to the right atrium. From there it is pumped into the lungs to give off CO_2 and absorb more oxygen. Refer to the flash illustration, "Circulatory System," in the Project Heart, Look section.

Cardiovascular exercise, also known as aerobic exercise, uses the large muscles and can be continued for long periods of time. Aerobic exercise makes your heart beat faster, and makes you breathe hard. This type of exercise drives your body to use oxygen more efficiently, delivering maximum benefits to your cardiovascular (heart and blood vessels) and pulmonary (lungs) systems. People who regularly participate in exercise have a healthier heart and lungs, stronger muscles and bones, and a leaner body. Exercise also helps people think more clearly, boost their self esteem, and maintain a more positive outlook on life.

There are three aspects to fitness: endurance, strength, and flexibility. Examples of endurance (aerobic) exercise are bicycling, playing ball, walking, jogging, running, jumping rope, and swimming. Examples of strength exercise are push-ups, pull-ups, lifting weights, stomach curls, and stomach crunches. Examples of flexibility exercises are stretching, reaching, bending, and tumbling. Many activities combine two or all three aspects of fitness.

The number of obese children has actually doubled in the last 30 years. Children should be getting 30 to 60 minutes of exercise each day (or on most days). Instead, they are exercising less and becoming more sedentary (inactive). Watching TV and playing video or computer games decrease the amount of time children spend actively playing and those sedentary activities contribute to poor eating habits, poor health, and weight gain.

Materials

1. Pedometer (one for each group)
2. Worksheet: "Taking Your Pulse" (Activity 4–I)
3. Film or pictures of a rocket launch
4. Worksheet: "Designing Our School Trail Map" (Activity 4–J)
5. Worksheet: "My School Day Step Record" (Activity 4–K)
6. Worksheet: "Family Exercise Plan" (Activity 4–L)

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Exercise: How Does Exercise Help My Heart?

Introduction

Show students a film, video, or pictures of a rocket launching. Talk about the energy or fuel that the rocket needs to blast out of the atmosphere and how the rocket needs to reserve some fuel for course corrections and the return trip to Earth. Ask students to think about and discuss what would happen if the rocket used all of its fuel before it reached its destination. Relate the discussion to endurance. Discuss how people need fuel to make it through the day. Reinforce what they have been learning—we need the right kind and amounts of food and exercise to keep our hearts and bodies healthy.

Lesson procedures/activities

1. Define aerobic exercise and give one example. Ask students to list other types of exercise that can be considered aerobic ("cardio" or endurance). The body responds to exercise by increasing the heart rate to pump more oxygen-containing blood to the muscle cells. Guide students through a discussion of energy/fuel usage when comparing the rocket analogy to aerobic exercise. (Their muscles need continuous fuel/oxygen to function during endurance exercise.)

2. Discuss the other two aspects of fitness, strength and flexibility. If appropriate, allow students to demonstrate flexibility exercises such as stretching and reaching. Explain that they are lengthening their muscles and warming them up (preparing them) for vigorous exercise. Ask why it is important to do strength and flexibility exercises.

3. Ask about activities (exercises) that students can do alone, with friends, or with their families. Ask them how they could, for example, make walking a fun activity for the whole family.

4. Introduce the methods of checking the pulse. Demonstrate and have students try both ways. Refer to the worksheet, "Taking Your Pulse."

You can find your pulse in 2 places: at the base of your thumb on either hand (called the radial pulse), or at the side of your neck (called the carotid pulse). Put your first 2 fingers over your pulse and count the number of beats within a 10-second period. (It helps to have a buddy time the 10 seconds.) Multiply this number by 6, and you will have the number of heartbeats in a minute. For example, if you counted your pulse to be 20 during the 10-second pulse count, your heart rate would be 120 beats per minute.

Guided Practice

Introduce the idea of designing a walking trail at school. Divide students into groups and have them wear a pedometer while stepping off sections of a trail winding throughout the hallways inside the school building. Have them designate where 100-step landmarks occur. Design signs showing these landmarks along the trail. To encourage other students to join in with the heart-healthy walking activity, ask your students to think of slogans and encouraging phrases that can be made into signs to be posted along the route.

After the trail has been laid out, have the students take their resting pulse, record it, and then try out the walking trail while strolling, walking at a normal pace, speed walking, and skipping, each time taking a 10-second pulse and calculating how many heartbeats per minute they reach. Be sure to allow rest time between each activity so their heart rates can return to normal resting rate. Using the worksheet provided, ask students to fill in their heart rate for each category of activity. Discuss the differences between activity level and amount of work their hearts are doing. Relate their answers back to the concept of endurance and building a strong heart.

Continuing the rocket theme, create a Blast Off to Exercise bulletin board in a prominent place in the school. Students can color their own personal rocket and add their school picture or name to track their progress through the solar system. Use the moon, space station, planets, and stars to designate success points. Allow students to help you build the bulletin board and provide special recognition for students who reach their goals.

Independent practice

Students can design their own trail maps and name their own routes to track their accumulated steps throughout the school day. Use the worksheet, "My School Day Step Record." Remind them to record all their steps, every time they leave the classroom. For example, each time they visit the library or cafeteria, or walk to the playground at recess, they should record the number of steps they took there and back. Calculate how many steps they take in a day and convert them to miles. Record steps for different days to help build the habit and an awareness of the benefits of regular exercise.

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Exercise: How Does Exercise Help My Heart?

Ask students to talk with their families about designing a family exercise plan. (Even a weekly 20-minute walk provides meaningful family time and encourages outside activity.) Ask students to make a concentrated effort to watch 30 minutes less TV per day or play 15 minutes less video or computer games per day and replace that time with physical activity. Provide the worksheet "My Weekly Activity Record" for students to record exercise time and type (outside of school) and their daily actual TV or gaming time vs. goal TV or gaming time. Ask parents to sign the sheet each day. Present Heart-Smart Student certificates to each student who is successful at reaching his or her goals for a week and getting the family up and moving.

Ask students to interview their parents or other adults and write a 1-page paper discussing the physical, mental, and social benefits of regular exercise.

Adaptations

For those students who are physically challenged and can't walk, plan to have a parent volunteer or classroom aide available to assist with alternative exercises that the students can perform. Have students team up to help coach each other toward exercise goals. Keep track of everyone's individual progress on the bulletin board.

Extension

For those students who are ready for more complex learning and more difficult tasks, have them do a web search to find how many calories (how much energy) are consumed by different kinds of exercise. They should consider weight, gender, and age when making their calculations. As a result, they could create a classroom chart showing some of the different, unique exercises performed by members of the class and/or popular stars (a baseball player, a soccer player, a TV star, a teacher, etc.).

Challenge

Students could design and log a step trail at a local park or shopping mall using landmarks like trees or store names on their maps. Present Heart-Smart Student certificates to students completing a map of a new local step trail.

Assessment

Objective	Demonstrated lesson objective	Partially demonstrated lesson objective	Did not demonstrate understanding of the objective
List the types of exercise that develop endurance, strength, and flexibility.			
Understand how aerobic exercise helps the heart.			
Set personal goals for exercising to increase physical fitness.			
Design their own fitness plan and help develop a family fitness plan.			

Texas Heart® Institute

Project Heart

Activities for the Classroom

Grade 4:
Lesson Plan Activity Masters

4–A Oak Tree (illustration)

4–B Coronary Artery Tree (illustration)

4–C Anatomy: How to Feed a Tree (worksheet)

4–D Anatomy: How to Feed a Heart (worksheet and guides)

4–E Nutrition: Fueling the Rocket (illustration)

4–F Nutrition: "Calories In/Calories Out–The Energy Balance" (worksheets)

4–G Nutrition: "How My Favorite Foods Stack Up" (worksheet)

4–H Nutrition: "My Venn Diagrams" (worksheet)

4–I Exercise: "Taking Your Pulse" (worksheet)

4–J Exercise: "Designing Our School Trail Map" (worksheet)

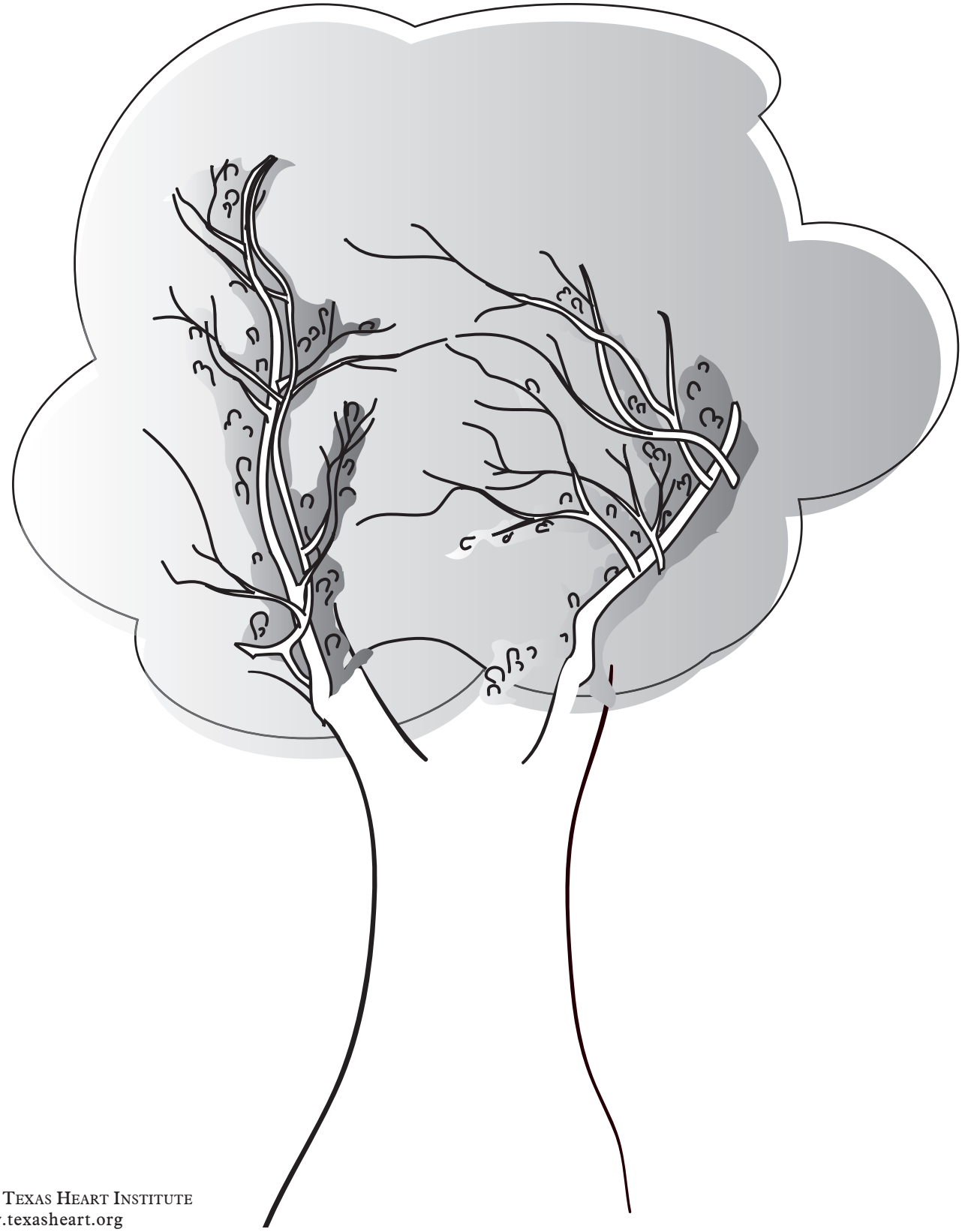
4–K Exercise: "My School Day Step Record" (worksheet)

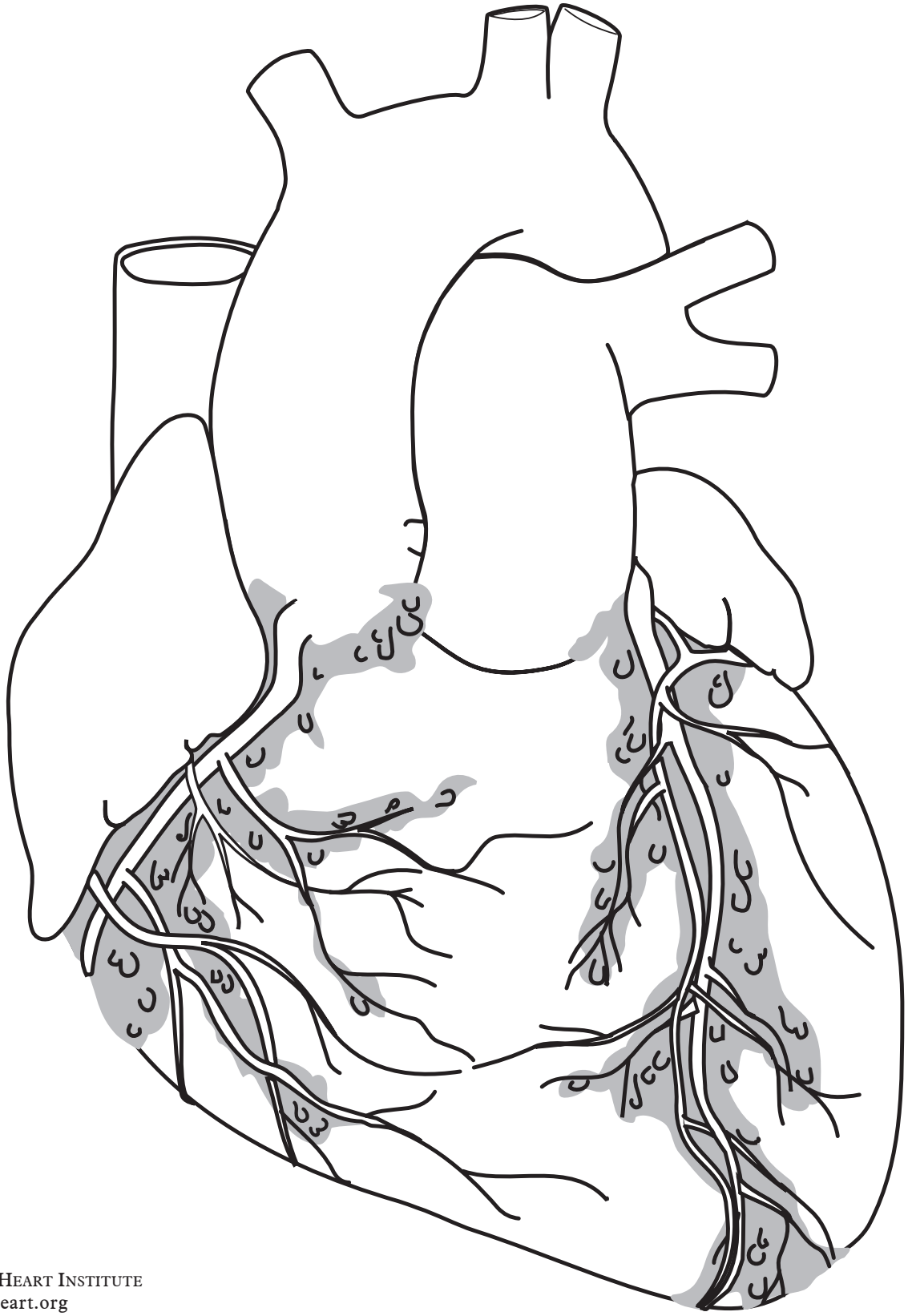
4–L Exercise: "My Family Exercise Plan" (worksheet)

Additional Resources

Suggested Links on Project Heart website

- Aim for a Healthy Weight: Interactive Menu Planner
- Alliance for a Healthier Generation
- Children's Nutrition Research Center
- Dole SuperKids
- Food Composition
- Healthy Kids Challenge
- Nemours Foundation's Center for Children's Health Media
- Nickelodeon: Nicktrition
- Powerful Girls have Powerful Bones
- 5 A Day the Color Way
- Square Meals
- U.S. Department of Agriculture: MyPlate for Kids





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Activities for the Classroom

Anatomy
How to Feed a Tree

Draw and color a tree and then label its parts. Trace the path of nutrients from the roots to the leaves.

Name: _____

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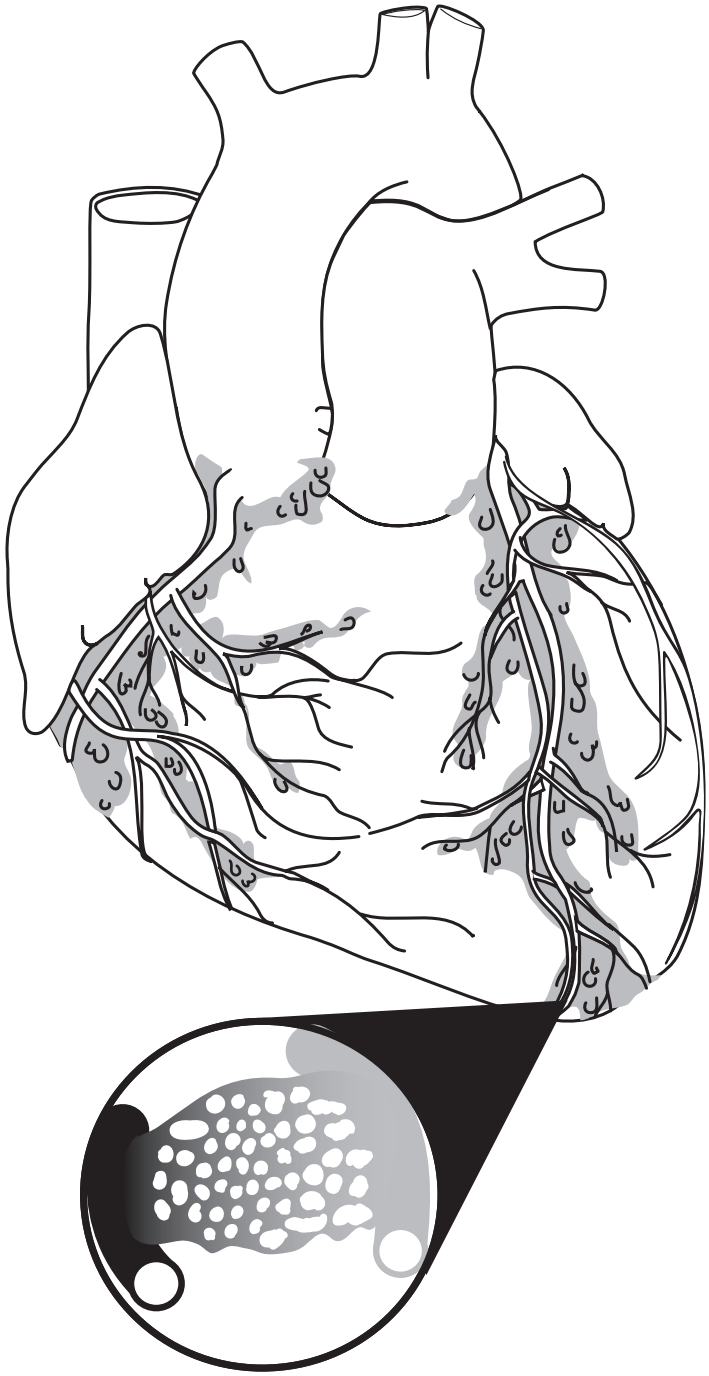
Activities for the Classroom

Anatomy
How to Feed a Heart

Color and label the heart including the aorta, vena cava, right and left atria, and right and left coronary arteries, arteriole, venule and capillaries.



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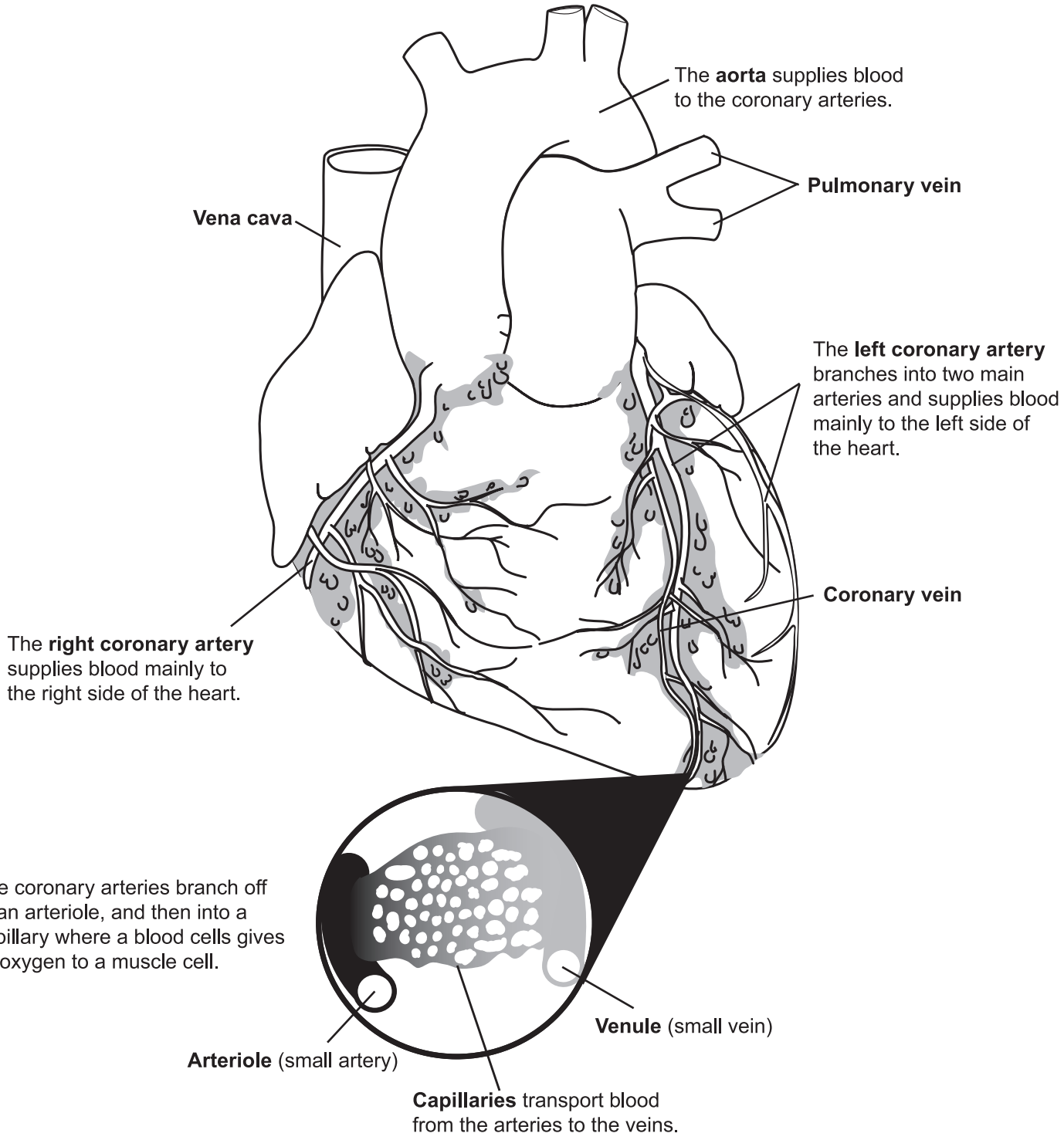
Activities for the Classroom

Anatomy
"How to Feed a Heart" Guide



www.texasheart.org

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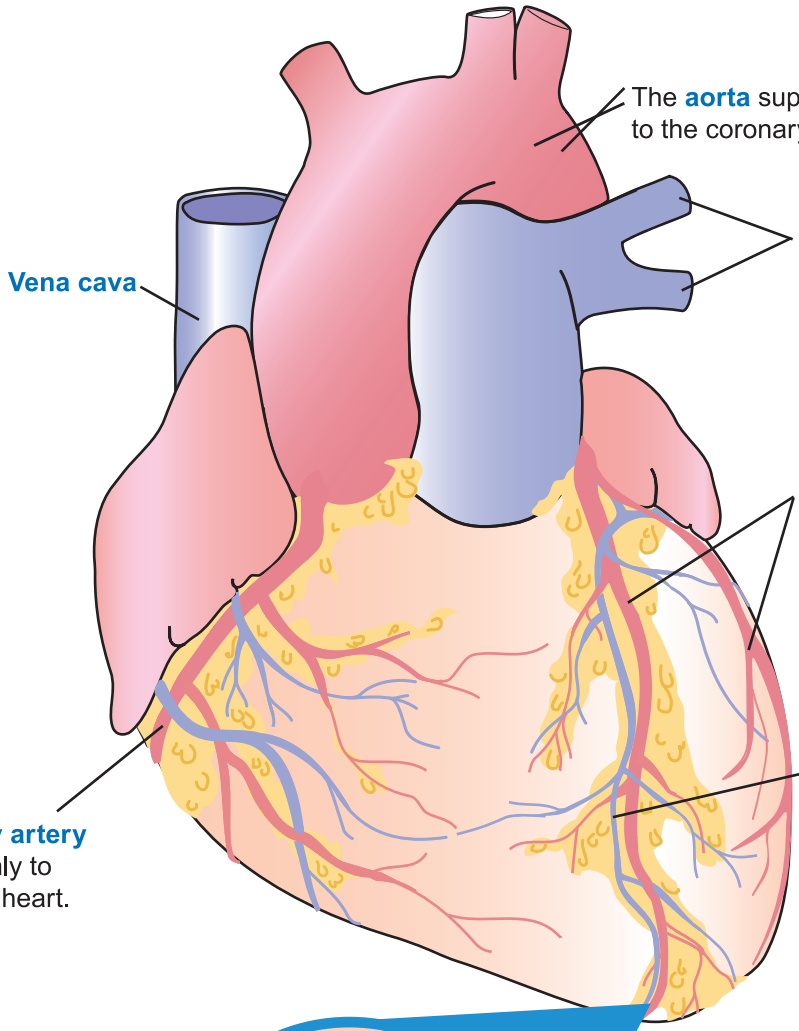
Project Heart
Activities for the Classroom

Anatomy
"How to Feed a Heart" Guide



The **aorta** supplies blood to the coronary arteries.

Pulmonary vein

Vena cava

The **left coronary artery** branches into two main arteries and supplies blood mainly to the left side of the heart.

Coronary vein

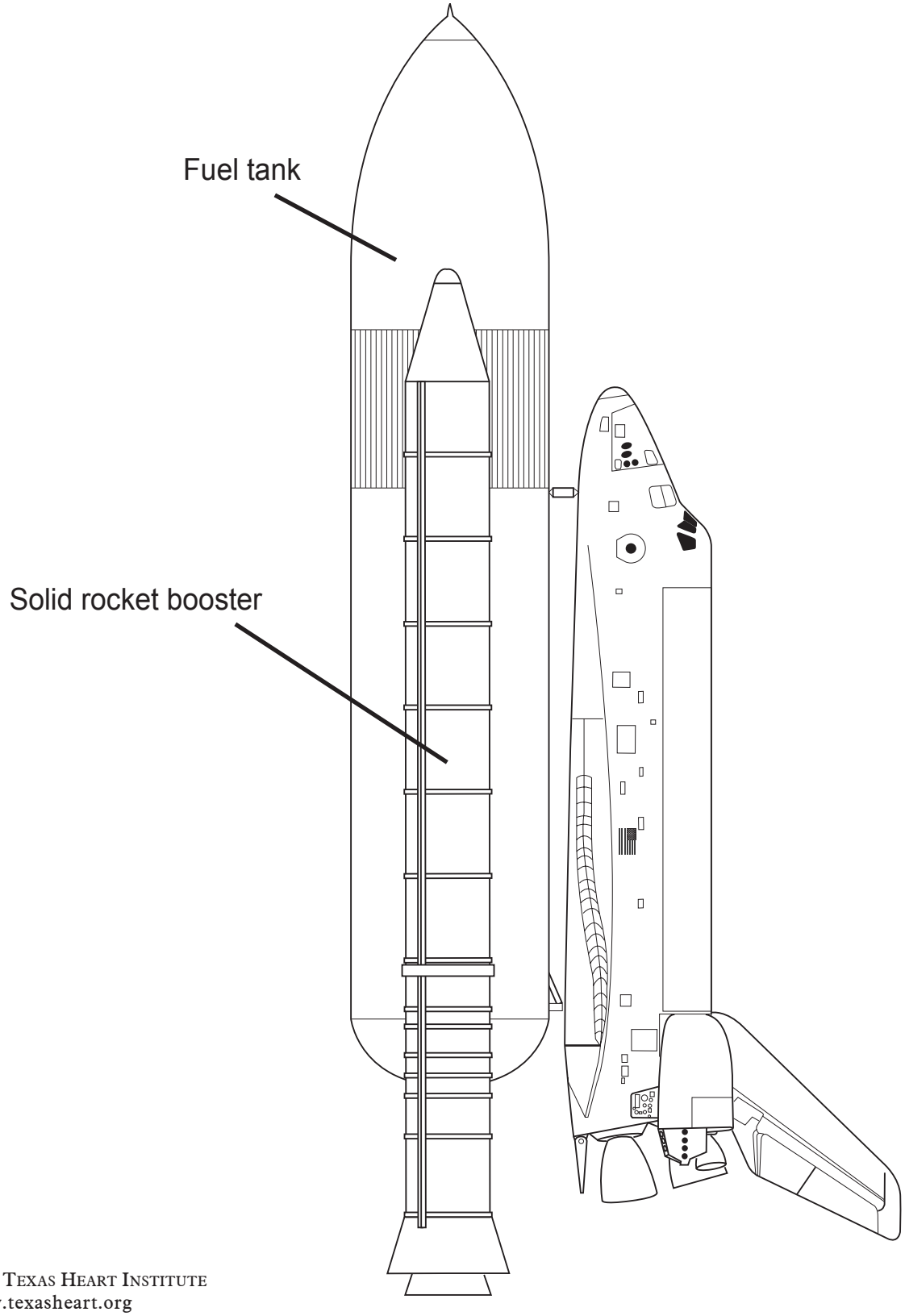
The **right coronary artery** supplies blood mainly to the right side of the heart.

The coronary arteries branch off to an arteriole, and then into a capillary where a blood cells gives its oxygen to a muscle cell.

Venule (small vein)

Arteriole (small artery)

Capillaries transport blood from the arteries to the veins.



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Project Heart
Activities for the Classroom

Nutrition
Calories In–The Energy Balance

How healthy is your favorite fast food meal? Write down all the items, including beverages, that you order from a fast food restaurant. Using the company website or nutrition pamphlet, fill in the calories, fat, carbohydrate, and protein content of all the items. Complete the worksheet to determine the nutritional content of this meal.

Item	Calories	Fat	Carbs	Protein
TOTALS				

Using the Calories Out worksheet, determine if this meal exceeds the number of calories needed in just one day. If so, can you pick a healthier meal from your restaurant menu? Use the table below to calculate those totals.

Item	Calories	Fat	Carbs	Protein
TOTALS				

Name: _____

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Activities for the Classroom

Nutrition
Calories Out–The Energy Balance

Enter the number of calories from the Calories In worksheet _____

Based on the **Calorie Requirements** listed below, were your "calories in" less than, equal to, or greater than your calories required?

_____ less than

_____ equal to

_____ greater than

If "greater than" what could you have eliminated from your meal so that your calories in were less than or equal to your calories required?

_____

_____

_____

Calorie Requirements (9–11 years old)

Sedentary	1600 cal.
Moderate	1800 cal.
Active	2000 cal.

Sedentary: Less than 30 minutes of moderate physical activity each day in addition to your normal routine.

Moderate: 30-60 minutes of moderate physical activity each day in addition to your normal routine.

Active: More than 60 minutes of moderate-to-intense physical activity each day in addition to your normal routine.

Name: _____

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Activities for the Classroom

Using nutrition labels or other resources, fill in the carbohydrate, protein, and fat content of several of your favorite snacks. Complete the worksheet to determine the nutritional benefit of this food.

Nutrition
How My Favorite Foods Stack Up

Food _____

Portion (serving) size _____

CHO (starch) content _____

Protein content _____

Fat type and content _____

How many calories? _____

It will primarily (check one)
__ supply energy __ quick or __ sustained
__ build muscle

It will (check all that apply)
__ give me a small amount of good fat
__ give me an unhealthy amount of saturated fat
__ give me an unhealthy amount of sugar
__ rehydrate me (replenish the water in my body)
__ offer no nutritional value

Should your favorite athlete eat this food? _____

If yes, when and why? _____

_____

_____

If no, why not? _____

_____

_____

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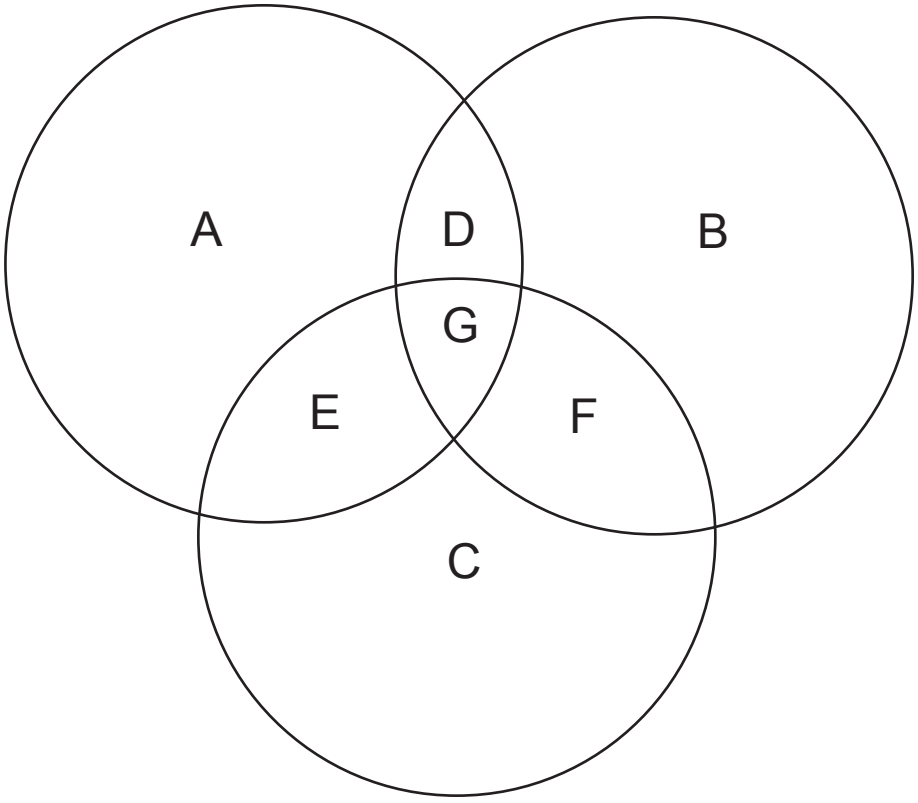
Activities for the Classroom

Nutrition
My Venn Diagrams

An example Venn diagram of the nutritional composition of foods.

A Carbohydrates
B Proteins
C Fats
D Carbohydrate + Protein
E Carbohydrate + Fat
F Protein + Fat
G Carbohydrate + Protein + Fat



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Nutrition
My Venn Diagrams

Using categories from the MyPlate Food Guide, create your own Venn diagrams.

Name: _____

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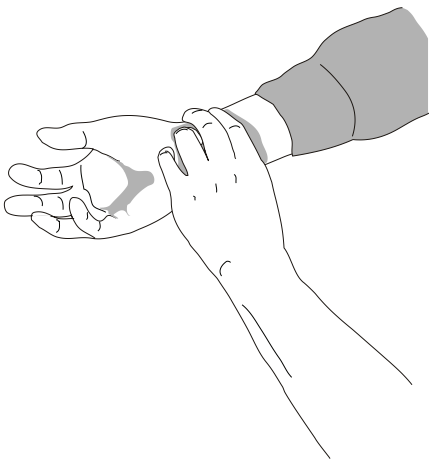
Activities for the Classroom

Exercise
Taking Your Pulse

Your pulse tells you how fast your heart beats. The more you exercise, the faster your heart beats (and the faster your pulse beats).

Find your pulse by counting the number of beats within a 10-second period and multiplying the number by six. The answer equals the number of heartbeats in a minute.

Use the graph to chart how fast your heart beats after exercising. Place an "X" in the square closest to the number of beats you count after walking, jogging, and skipping.



Radial Pulse

Carotid Pulse

200				
190				
180				
170				
160				
150				
140				
130				
120				
110				
100				
90				
80				
70				
	Sitting	Walking	Jogging	Skipping

Name: _____

Texas Heart® Institute

Project Heart

Activities for the Classroom

Exercise

Designing Our School Trail Map

Design a school trail map. Use this worksheet to list the start, each step marker, and the end of your trail. Include the signs and slogans for each landmark. Calculate the total for the whole route. Finally, convert steps to approximate miles using t he chart provided.

On the second worksheet, draw your trail map. Mark the start, step markers, and end of your trail. Include the signs and slogans for each landmark.

	Landmark	Sign or Slogan	No. of Steps
Start			
Step marker 1			
Step marker 2			
Step marker 3			
Step marker 4			
Step marker 5			
Step marker 6			
Step marker 7			
Step marker 8			
Step marker 9			
End			
		TOTAL STEPS	
		Approximate no. of miles	

Use this chart to approximate the number of miles walked.

STEPS	MILES	STEPS	MILES
500	.25	6,000	3.0
1,000	.50	7,000	3.5
2,000	1.0	8,000	4.0
3,000	1.5	9,000	4.5
4,000	2.0	10,000	5.0
5,000	2.5		

Name: _____

Exercise
Designing Our School Trail Map

Name: _____

Texas Heart® Institute

Project Heart

Activities for the Classroom

Exercise
My School Day Step Record

Chart how many steps you take during the day. Write your start location, end location and the number of steps taken. If you make a roundtrip, be sure to notate those steps as well. At the end of the day, add up the total number of steps. Use the table to convert the steps to miles.

Start	End	No. of Steps
	TOTAL	

Use this chart to approximate the number of miles walked.

STEPS	MILES	STEPS	MILES
500	.25	6,000	3.0
1,000	.50	7,000	3.5
2,000	1.0	8,000	4.0
3,000	1.5	9,000	4.5
4,000	2.0	10,000	5.0
5,000	2.5		

Name: _____

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Activities for the Classroom

Design a family exercise plan. Set a goal to exercise 3–4 times a week for at least 20 minutes. Set another goal to watch less television and spend less time playing video or computer games. Record the amount of time spent and the type of exercise done (outside of school) and actual TV or gaming time. If you met the time goal for that day, check the box next to the activity. Have your parents initial the sheet each day.

At the end of one week turn your list in to your teacher. Keep up the challenge for 4 weeks and earn a Heart Smart certificate from the Texas Heart Institute.

Exercise
Family Exercise Plan

Set your goals:

_____ Number of days you will exercise this week.

_____ Number of minutes you will exercise each day.

_____ Number of minutes you will watch TV each day.

_____ Number of minutes you will play computer or video games each day.

	Type of Exercise	Exercise (min)	TV (min)	Games (min)
Sunday		❑	❑	❑
Monday		❑	❑	❑
Tuesday		❑	❑	❑
Wednesday		❑	❑	❑
Thursday		❑	❑	❑
Friday		❑	❑	❑
Saturday		❑	❑	❑

Parent initials

S	M	T	W	T	F	S

Name: _____