

# GRADE 5: LESSON PLAN 1

## ANATOMY: WHAT IS THE CONDUCTION SYSTEM?

### Goals

- Students will understand the basic function of the heart's conduction system.
- 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 sinoatrial (SA) node.
2. Identify the atrioventricular (AV) node.
3. Identify the bundle of His.
4. Describe the basic function of the conduction system of the heart.
5. Discuss how the conduction system relates to a healthy heart.

### Background information

The walls of the heart are a special kind of thick muscle known as cardiac muscle. The conduction system of the heart causes cardiac muscle to beat (contract and relax). Each heartbeat is a 2-step process that begins in a small group of neural cells located in the upper right atrium. This group of cells is called the sinoatrial (SA) node. The electrical impulse generated by the SA node causes the atrium to contract, pushing blood from the atrium into the ventricles. When the impulse reaches the area between the atrium and the ventricle, it is stopped briefly by the atrioventricular (AV) node. This brief stop in the electrical impulse gives the ventricle a moment to fill before contracting. The AV node determines when the ventricle needs to contract. As the impulse travels from the AV node through the wall of the ventricle, it follows a path of neural conductive tissue called the bundle of His. Each time this circuit is completed, the heart beats in two steps: first the atria contract, then the ventricles contract. The human heart may beat as many as 3 billion times during a lifetime and each beat is developed and controlled by the conduction system.

### Materials

1. Colored pencils and scissors
2. Illustration: Conduction System (PDF from Look: Heart Anatomy)
3. Illustration: Anatomy of the Heart (PDF from Look: Heart Anatomy)
4. Worksheet: "My Heart's Electrical System" (Activity 5–A)
5. Worksheet: "The Conduction System in Action—A Flipbook Project" (Activity 5–B)
6. Optional: Classroom computer with Internet access
  - Project Heart, Look, Heart Anatomy: *Anatomy of the Heart with Descriptive Labels (Flash) and Anatomy of the Heart (Flash)*
  - Project Heart, Look, Heart Anatomy: *Conduction System of the Heart (Flash)*
7. Optional: Overhead projector for illustrations

### Introduction

Begin the lesson by asking students to tell you about electricity. Remind them that electricity is responsible for making many things run such as lights, computers, and televisions. Lightning is nature's conduction system for the earth. Ask your students if they know that they have an electrical system of their own, in their bodies? Referring to the illustrations listed in Materials (PDF or Flash versions), show the conduction system. Trace the path of the electrical impulse in the heart, beginning in the SA node, moving to the AV node, and passing through the bundle of His.

**Project Heart**
  
**Activities for the Classroom**

**GRADE 5: LESSON PLAN 1**
  
**ANATOMY: WHAT IS THE CONDUCTION SYSTEM?**

**Discussion points**

- Where does the electrical impulse begin?
- Where does the electrical impulse go?
- What does the electrical impulse do?

**Lesson procedures/activities**

1. Review the anatomy of the heart. Remind students the heart has 2 sides (right and left), 4 chambers, and 4 valves. Use the illustrations (PDF and Flash) in the Watch section of the Project Heart website.
2. Study the conduction system. Discuss how the heart is run by electricity generated in the SA node (the heart's natural pacemaker). Discuss the AV node and its job as a "timer" or "gatekeeper" of the impulse before it is sent through the bundle of His to signal the ventricle to contract. Assign students the worksheet "My Heart's Electrical System" (Activity 5–A).
3. Lightly touch on the subject of arrhythmias and what they are. An irregular heartbeat is known as an arrhythmia or heart rhythm disorder. The normal heart beats between 60 and 100 beats per minute. If the heart beats too slowly (less than 60 beats/minute), the arrhythmia is known as bradycardia, and if the heart beats too fast (greater than 100 beats/minute), the arrhythmia is known as tachycardia. In either case, people with an irregular heartbeat may feel dizzy or faint because they are not receiving adequate amounts of oxygen with each heartbeat. In some cases arrhythmias can be the result of heart damage. Bad habits such as smoking and drug use can damage the heart and increase the risk of heart disease. For example, the nicotine and other chemicals in cigarettes narrow the blood vessels and create irregularities in the timing of heartbeats.

**Guided Practice**

Ask students to draw their own interpretation of the heart's electrical system and the heart in action. Suggest to the students that they draw an animated heart (flipbook) in different stages of electrical activity. Students should be able to trace the path of the electrical impulse from the SA node to the AV node and out through the bundle of His. (A second flipbook could address lightning traveling from cloud-to-ground during a storm.) Using the worksheet "The Conduction System in Action" (Activity 5–B) as a guide, provide students with instruction for drawing, labeling, and assembling the illustrations for the flipbook. Instructions are available at many sites on the Internet; for some ideas, see Additional Resources on the Grade 5 Activities webpage.

**Independent practice**

Ask students to write a short essay about why their heartbeat speeds up when they exercise. This assignment should determine content mastery of oxygen consumption by muscles (including the heart muscle) during exercise. Using the flipbook, demonstrate bradycardia and tachycardia by controlling the speed of flipping the pages. Hear slow and fast heartbeats at the Listen tab of the Project Heart website.

**Adaptations**

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

**Extension**

Ask students to research why animals have different sized hearts; e.g., elephants have very large hearts that beat slowly, and birds have small hearts that beat very fast. For Internet research, see Suggested Links for website references.

**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
<b>Describe the anatomy of the conduction system.</b>			
<b>Describe the basic function of the conduction system.</b>			
<b>Discuss how the conduction system relates to a healthy heart.</b>			