HEART SURGERY LESSON PLAN

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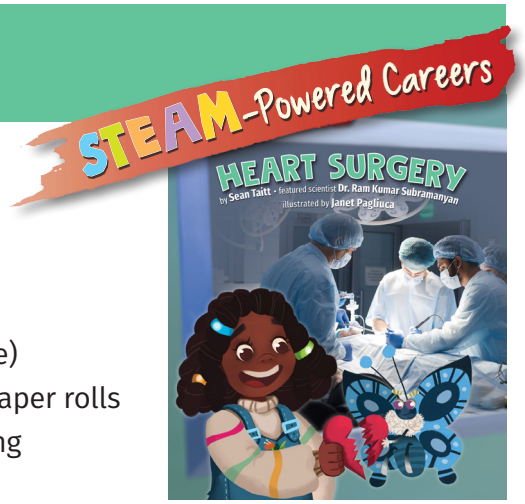


Subject / Grade Level: Heart Surgery / Lower elementary

Materials:

- graph paper or white paper
- pencils
- mini marshmallows or clay
- toothpicks
- stopwatch (on computer or phone)
- cardboard paper towel or toilet paper rolls
- computer or projector (for showing animation video)

NGSS Essential Standards and Clarifying Objectives:

- **K-LS1-1:** Use observations to describe patterns of what plants and animals (including humans) need to survive.
- **4-LS1-1:** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Lesson Objectives:

- Students will use multiple methods to determine their pulse.
- Students will differentiate between their resting and active heart rates.
- Students will carry out an investigation by completing multiple trials.
- Students will graph their heartbeat data.
- Students will learn to analyze and make predictions about their data.

Differentiation Strategies to Meet Diverse Learner Needs:

- Think-pair-share, for students who learn through engaging with others.
- Students will complete a hands-on activity, for students who are tactile learners.
- Students will be able to observe their pulse during the activity, for students who are visual learners.

ENGAGEMENT

- Read the heart surgery book to capture student interest in surgery and the circulatory system.
  - In the book, Cora and Bonnie observe how the heart functions.
- Ask students to place their hand on their chest, close their eyes, and think about what they feel. After giving students a few seconds, have a few students share what they felt.
  - Response examples:
    - Heart, heartbeat, pulse, blood moving
    - Some students may say they can feel themselves breathing.
- Watch a YouTube video of an animated heart beating: https://www.youtube.com/watch?v=ebzbKa32kuk
- Ask students if they know what the heart does when it beats.
  - In the surgery book, Cora and Bonnie observe that the heart pumps blood through the body with and without oxygen.
- Ask students what sound their heart makes when it beats.
  - Students should respond with something like "BA-BUMP BA-BUMP BA-BUMP."

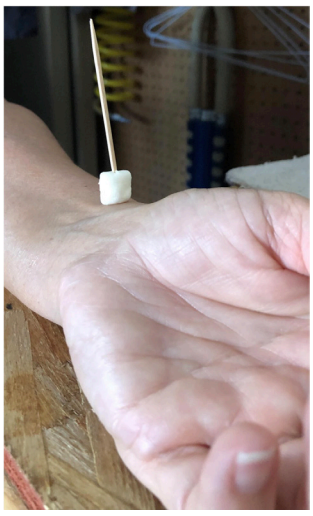
Room to Read®

EXPLORATION

- Tell students that today they are going to use different methods to find their heartbeat.
  - Students will check their heartbeat using the following three methods:
    - two fingers on the neck
    - the pulse reader (marshmallow and toothpick) on the wrist
    - a stethoscope (paper towel roll) on the chest
- Give each student a piece of paper. Use graph paper if it is available.
- Fold the paper in half, with the short sides touching. Have students create the following table on one side of the fold. It should have eight rows and four columns.
- Optional: Have students add a fifth column with beats per minute if the class is comfortable with multiplication.

Trial Number	**Method** (fingers, pulse reader, or stethoscope)	**Resting** or **Active Heart Rate**	**Beats** per 15 seconds
1			
2			
3			
4			
5			
6			
7			

- **Method 1: Fingers**
  - Demonstrate how students can find their heartbeat using two fingers on their neck.
  - Have students count their heartbeat for 15 seconds. Use the stopwatch to count the time, so students can focus on counting the heartbeat.
  - Have students fill in trial one on the table. The method should be **fingers**, the heart rate should be **resting**, and students should record the number of beats they counted.
- **Method 2: Pulse Reader**



  - Demonstrate how students will create a pulse reader with a mini marshmallow and a toothpick.
  - Show students how they will find their pulse by laying their arm on the table and placing the pulse reader on their wrist, and how the toothpick will twitch with each beat of their pulse.
  - Pass out a marshmallow and toothpick to each student.
  - After students have created their pulse readers, have students count their heartbeat for 15 seconds. Use the stopwatch to count the time, so students can focus on counting the heartbeat.
  - Have students fill in trial two of the table. The method should be **pulse reader**, the heart rate should be **resting**, and students should record the number of beats they counted.

Method 3: Stethoscope

- Demonstrate how students can use a paper towel roll as a stethoscope by placing the roll against the chest of a partner and putting their ear up to the other end.
- Have students count the heartbeat of a partner for 15 seconds. Use the stopwatch to count the time, so students can focus on counting the heartbeat.
- Have students switch and count the heartbeat of the other partner.
- Have students fill in trial three of their partner's table (since they recorded their partner's heartbeat, not their own). The method should be **stethoscope**, the heart rate should be **resting**.
- Students will now find the **active** heart rates of their partner.
  - The first partner should do 20 jumping jacks. The pair will then find that student's heart rate using the stethoscope for 15 seconds.
  - Have students fill in trial four of their partner's table (since they recorded their partner's heartbeat, not their own). The method should be **stethoscope**, the heart rate should be **active**.
  - Have the second partner complete 20 jumping jacks, and find their heart rate, taken for 15 seconds.

EXPLANATION

- Ask students what their favorite method was and why.
  - Student responses could include:
    - the method they chose allowed them to find the loudest heartbeat, the method was the easiest to use, the method was the most fun.
- Explain to students that all of these methods are used by doctors, nurses, and first responders.
- Ask students for their observations when their heart rate was resting compared to when it was active.
  - Student responses should include that their active heart rate was faster than their resting heart rate.
- Explain to students that their heart beat faster while they did their jumping jacks because the body needs lots of oxygen and blood when it is exercising. Muscles need blood and oxygen to move. The body also moves the blood around to keep itself cool. That is why people sweat when they exercise.

ELABORATION

- Tell students to turn to their partner and pick their favorite method of finding their heartbeat. Students will use this method to find their active heart rate three more times.
- Help students by setting timers or by running the trials in unison. Before each trial, have the student whose heart rate is being counted do 20 jumping jacks. Tell the students to count the heart rate using the preferred method.
- Have students fill in trials five, six, and seven of their or their partner's table (depending on whose heart beat they recorded). Remind students to fill in the correct method. The heart rate should be **active**. Each table should now be filled.

EVALUATION

- Students will have a completed table on one half of their piece of paper.
- On the second half of the paper, tell students to create a graph of their findings.
- The x-axis should be labeled **trial number**. The y-axis should be labeled **beats per 15 seconds**, or **beats per minute** for classes that chose to do multiplication.
- Have students graph the data from their tables.
- Have students share their data and their graphs in groups of four. Ask students to predict what they think the graph means.
- Have a few students share their predictions with the class.
- Clarify any misconceptions or answer questions that the class may have at the end of the lesson.
- If time permits, have students draw their favorite method on the back of their piece of paper with the answer to the question: Why is the method you chose your favorite method?