

STANDARD	
<p><u>CCSS.ELA-Literacy.RST.6-8.3</u> Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.</p> <p>1.2f The circulatory system moves substances to and from cells, where they are needed or produced, responding to changing demands.</p> <p>S1.2a Independently formulate a hypothesis</p> <p>S2.1b Conduct an experiment designed by others.</p> <p>S3.1a Organize results, using appropriate graphs, diagrams, data tables, and other models to show relationships</p> <p>S3.2c Evaluate the original hypothesis in light of the data</p> <p>S3.2d Formulate and defend explanations and conclusions as they relate to scientific phenomena</p> <p>S3.2e Form and defend a logical argument about cause-and-effect relationships in an investigation</p> <p>S3.2g Suggest improvements and recommendations for further studying</p>	
OBJECTIVE	AGENDA
SWBAT test how different variables affect heart rate and draw conclusions based on trends they observe.	<ul style="list-style-type: none"> • Do Now & Hook (10 min) • Launching the Lab (5 min) • Experiment – Data Collection & Analysis (45 min) • Discussing Conclusions (10 min)
DO NOW (4 min)	
<p>Checking for Understanding Question (collect and review to assess mastery of content): What role does the heart play in supporting life? Use the <i>terms vein, artery, capillary, nutrient, oxygen, circulation, carbon dioxide, and blood vessel</i> in your answer.</p>	
HOOK (3 min)	
<p>Turn and Talk: Have you ever felt your heart pounding in your chest? When does this happen? (Examples might include: caffeine intake, being afraid, playing an intense game, running.)</p> <p>Today we are going to focus on the impact of exercise on heart rate.</p> <p>Turn and Talk: Imagine walking up four flights of stairs. Do you think different people's heart rates would be impacted the same or differently? What variables do you think make a difference in a person's heart rate?</p>	
LAUNCHING THE LAB (5 min)	
<p>Today, we are going to test out some of these hypotheses to determine how different variables affect heart rate. As you know from yesterday, the heart works really hard to power the circulatory system. As a class, we will conduct an experiment to test out multiple different hypotheses about the different variables that affect our heart rate and draw conclusions based on trends we observe.</p> <p>Ask (assess prior knowledge): What are the qualities of a good scientific experiment? (Cover the scientific method chart; once students share appropriate responses, reveal the chart.) A good experiment asks a question, focuses on proving/disproving a valid hypothesis, tests the hypothesis, and produces valid data to draw conclusions about the hypothesis.</p>	
EXPERIMENT – DATA COLLECTION AND ANALYSIS (45 min)	
<p>Explain: The purpose of today's experiment is to measure your heart rate before and after exercise.</p> <p>Opening (5 minutes) We are going to test out hypotheses about the way in which different variables may impact the outcome of this experiment. Ask students to think about variables they discussed earlier that might impact the outcome of this experiment and what that impact might be. For example, gender, previous activities such as sleep, eating breakfast, whether someone plays a sport, plays an instrument, etc.</p> <p>Put the following examples on the board on chart paper:</p> <ul style="list-style-type: none"> - If the person being tested is a girl, their heart rate will increase more than a boy's. - If the person being tested is a participant in a sports activity, then their heart rate will not increase as much as a non-participant. - If the person being tested plays a wind instrument, then the heart rate will not increase as much as a person who does not play a wind instrument. <p>Students will be working in groups (see attached groupings). In their groups, students may select one of the hypotheses above, or choose to write a different hypothesis to test.</p> <p>Students will receive their lab sheets with the specific steps to follow. Each individual should write their group's hypothesis at the top. If students are selecting their own hypothesis, one member of the group should raise their hand to receive approval on their hypothesis to ensure that it can be tested within the data set of the classroom.</p> <p>Experiment (20 minutes)</p> <ol style="list-style-type: none"> 1. Find your pulse by using your first and second fingers of your right hand at the base of your left thumb at the wrist. Or, you can find your pulse on your neck at the point that your jaw bends. (Model briefly to ensure consistent measurement and ask students to raise their hands if they need further clarification once the experiment begins.) 2. Working in pairs within the group, one person will use the stop watch while the other measures pulse. You will complete the entire experiment for the first person, and then switch roles. 	

SAMPLE LESSON PLAN (6th Grade Science)

3. First, measure your pulse while at rest. Count the number of heart beats in 30 seconds. Multiply by 2 to calculate the heart rate per minute and record in the data table.
4. Conduct vigorous exercise for 1 minute – 30 seconds running in place, and 30 seconds doing jumping jacks. Remember our lab safety rules.
5. Immediately after 1 minute of exercise, take your pulse for 30 seconds. Multiply by 2 to calculate the heart rate per minute and record in the data table.
6. At two minutes after you stopped exercising, measure your heart rate again and record in the data table.
7. Repeat at five minutes after you stopped exercising.
8. Switch roles and repeat steps 3-7.

Data Analysis (20 minutes)

In their groups of four, students will discuss which data they need to look at to draw a conclusion for their hypothesis. For example, if they are examining the impact of gender on heart rate, they will need to select 3-5 boys/girls to compare with one another. Students will need to apply the scientific principles they have learned to prevent their conclusions from being impacted by other variables, so will need to consider other potential variables in their selection of students. Independently, students will record the data set they are going to use on their data sheets and write 1-2 sentences explaining their selection. Students will then graph the data and will record what they are able to conclude based on their data. (To be collected as an assessment of student understanding.)

DISCUSSING CONCLUSIONS (10 min)

Discussion (10 minutes)

I will be walking around to check in with students and push thinking/understanding. Individuals will be identified (using presentation cards) to share their conclusion and briefly explain how the data supports their findings. Students will engage in student facilitated class discussion: Do you agree/disagree with the findings that have been shared? What data do you have to support your agreement/disagreement? Are there any other conclusions you are able to make based on the findings that have been shared? What data do you have to support these conclusions? Has this discussion raised any additional hypotheses for you? How might you go about proving/disproving these?

I will summarize key trends/findings as needed to ensure that students' interpretation of the data is accurate and will highlight any key misconceptions I observed and recorded during the lesson.

HOMEWORK

Students will receive a worksheet with the following questions to answer independently:

- 1) Explain how the data you looked at supported/disproved your hypothesis.
- 2) What next steps would you take to further support your findings?
- 3) What lessons can you take away about heart rate? Why?
- 4) Based on what you know about the circulatory system, what theories do you have to explain why heart rate increases and decreases in the ways we saw today?

Ask students to come to class tomorrow ready to discuss their theories. Explain to students that in tomorrow's lesson, we will discuss this further, and solve the mystery of why our heart rate increases and decreases.

TABLE GROUPS – Week of 4/15

Jalen	Sara	Miguel	Xen	Taylor	Guillermo
Mia	Fred	Janna	Kayla	Mark	Shay

Aamir	Cheri	Derwin	Robert
Jacob	Akiri	Tevin	Ella

Groups are mixed ability, based on last week's lab results. Jalen, Miguel, Taylor, and Akiri demonstrated the highest levels of mastery over our last lab content, with exemplary lab reports and detailed conclusions. Each one of these students will lead a group. Sara, Xen, Guillermo, Cheri, Derwin, Robert, and Jacob have showed mastery as well. Mia, Janna, Mark, Shay, Aamir, and Tevin were approaching mastery. Fred, Kayla, Jacob, and Ella struggle the most with lab activities.

I've kept Derwin and Tevin together to support Tevin's good behavior. Derwin and Tevin are friends, and Derwin's appropriate behavior is a good model for Tevin.

Ella is now sitting apart from Cheri and Akiri, to support her focus on our class tasks. Jacob will sit in the front of the classroom, near the board so he can see, and near his peer tutor Aamir.