

## 5E Lesson Plan

Teacher: Erin Skallerup

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Subject area / course / grade level: Circulatory & Respiratory System: Heart Rate /Science /7<sup>th</sup> grade

Materials: Computer (1 per lab group), powerpoint/flipchart, ACTIVboard/projector, whiteboard, stopwatch, lab worksheet, clipboard (1 per lab group), music (Ex: YMCA), Microsoft excel, heart rate spreadsheet, and Olympian heart rates ([http://www.nytimes.com/slideshow/2008/07/30/magazine/803BODIES\\_2.html](http://www.nytimes.com/slideshow/2008/07/30/magazine/803BODIES_2.html))

TEKS/SEs: 112.19 1A; 2B,C,D,E; 4A; 12B  
126.15 4C,E; 6Lii,

Lesson objective(s):

TLW locate the carotid artery and radial artery.

TLW define what a pulse is in his or her own words.

TLW calculate his or her heart rate before and after exercise by checking his or her pulse.

TLW analyze how activity affects heart rate by jogging in place, dancing, and doing jumping jacks.

TLW analyze the relationship between respiration (number of breaths and oxygen intake) and heart rate.

TLW create a graph to demonstrate how heart rate changes with exercise.

TLW evaluate how long-term exercise affects heart rate and overall health using Olympian heart rates.

Differentiation strategies to meet diverse learner needs: Visual and auditory directions are given for English language learners and students with dyslexia. Students with disabilities will be placed in groups with students known to work well with students with disabilities.

### ENGAGEMENT

- Have the class measure their resting heart rate (20 seconds). Now have students take a deep breath and hold their breath while measuring their heart rate.
- Ask the students what they noticed. Take a few student responses. (The heart rate should have slowed).
- Ask the students why they think that is. Assess the students prior knowledge.
- Tell the students that by the end of the lesson, they will understand the relationship between the breathing and heart rate.

### EXPLORATION

- Tell students to form their lab groups and turn on one laptop for each group. The materials manager for the day needs to collect a stopwatch and the lab worksheet.
- Call on one student to read the directions aloud. After the directions have been read, briefly recap the experiment using visuals like holding up the stopwatch and pushing start and pause to time.
- After directions have been read, students can open Microsoft excel on the computer and open the heart rate spreadsheet (as stated in the directions on the lab worksheet). Guide students to open the spreadsheet if necessary.
- Guide student groups to measure their resting heart rates.
- The heart rates should be recorded in the spreadsheet and averaged using Excel functions.
- Next, start playing YMCA. Every student has to participate! Run through a dance to the YMCA. Students will take their heart rate after each YMCA chorus. Make sure that you (the teacher) takes note of the times students are taking their pulse because they should be dancing.
- After dancing, have students measure their heart rates, which should be recorded and averaged on the spreadsheet.
- Students will then complete the rest of the lab activity and heart rate spreadsheet by following the directions on the lab worksheet.
  - The following steps in the worksheet include measuring heart rate after jumping jacks and jogging in place.
  - Students will then use the data to create a line graph on the heart rate spreadsheet using the lab worksheet directions.
- While students complete the activity, monitor for participation and provide clarification when necessary.

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### EXPLANATION

- First, ask students what exactly they were measuring. When they mention pulse, ask students what a pulse is and what creates a pulse. Guide students to create a definition for "pulse" using a think-pair-share activity. Ask students where they took their pulse from and if anyone knows the names of those spots (carotid artery in neck and radial artery in the wrist). Expose the students to that vocabulary.
- Next, ask students why they measured pulse using arteries rather than veins.
- Ask students what they found in their graphs. Hold a class discussion. Did any group have results that stray from other groups'? Why could that be?
- Ask students what they noticed about their breath rate as they progressed through the activity. What kind of relationship is this? Introduce positive/direct relationship vocabulary.

### ELABORATION

- Guide students to make connections to respiration (which they have previously learned). Why does the body require more oxygen during exercise (glycolysis requires oxygen to make energy in aerobic respiration). What is the heart's role in aerobic respiration for cells throughout the body?
- Direct students to New York Times website ([http://www.nytimes.com/slideshow/2008/07/30/magazine/803BODIES\\_2.html](http://www.nytimes.com/slideshow/2008/07/30/magazine/803BODIES_2.html))
- Ask the students what they notice about the resting heart rates of Olympians compared to their own heart rates. Why could this be? Do Olympians' cells need less oxygen than their cells do? Guide students to mention that the heart is a muscle. When it is exercised, it can pump more blood per beat. This is called maximal oxygen uptake. Think-Pair-Share this question. Students need to connect this concept to cellular aerobic respiration!
- How does this relate to exercise and health?
- In groups, have students discuss the original question (why does heart rate slow when you hold your breath?). Then have each student write his or her own answer on an exit ticket.

### EVALUATION

- The circulatory system and heart rate will be included on a unit test.
- The heart rate spreadsheet will be collected for a grade.
- Groups are formatively assessed during the lab activity and discussions.
- The exit ticket is collected to formatively assess understanding.

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### Works Cited

New York Times (n.d.). *Bodies of work*. Retrieved from

[http://www.nytimes.com/slideshow/2008/07/30/magazine/803BODIES\\_2.html](http://www.nytimes.com/slideshow/2008/07/30/magazine/803BODIES_2.html)

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