

Easy Lesson Plan Template[†]

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P = Pretest (think essential questions)

O = Objectives (measurable - see Bloom's taxonomy)

C = Catch (hook, anticipatory set, etc... use different senses, not a question)

A = Activity (procedure of what the students should do)

R = Review (how will students go over what they've learned?)

A = Assessment (formative and/or summative)

P = Posttest (same as pretest for comparison purposes)

S = Standards (Wyoming, NGSS, etc...) showcasing crosscutting concepts[‡]

Pretest Questions	<p>How is heart rate used as a diagnostic tool for the evaluation of heart disease and/or fitness level?</p> <p>How can an infrared (IR) sensor and detector determine the heart rate of a person using the finger tip?</p> <p>How can an exercise protocol be used to collect pre exercise baseline data and post exercise data to determine normal changes in heart rate.</p>
Objectives	<p>Students will understand basic cardiac function.</p> <p>Students will design a basic heart rate monitor using Arduino's and (IR) infrared sensors and detectors.</p> <p>Students will design an exercise protocol to collect pre and post exercise data and compare the data to normal values to determine abnormalities.</p>
Catch	<p>ESSENTIAL QUESTIONS- What determines a person's fitness level? Why are some athletes better at endurance sports while others are better at speed and power sports. What is the optimal way to train for endurance or speed?</p>
Activity	<p>Students will design a physiological monitor using an Arduino and sensors to detect heart beat. They will design an exercise protocol to get baseline data for pre and post exercise heart rate. They will compare, analyze and conclude on pre and post exercise data as to why there is a difference and compare data to normal values.</p>
Review	<p>Students will analyze collected data and determine the mechanisms that change the resting heart rate during exercise. Students will compare data with normal values to see if there are abnormalities.</p>
Assessments	<p>Assessments will be comprised of formative check points using oral/ written and/or group discussions regarding basic cardiac function, the design and functionality of the heart rate monitor and the effectiveness of the exercise testing protocol to gather reliable data.</p>
Posttest Questions (same as pretest questions)	<p>See above</p>

[†] Please add/attach any handouts for this activity to the end of this template

[‡] <http://ngss.nsta.org/CrosscuttingConceptsFull.aspx>

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<p>Standards</p>	<p>HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.</p> <p>HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of sugar molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.</p> <p>HS-LS2-3. Construct an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions, and revise as needed.</p>
<p>Crosscutting Concepts from NGSS</p>	<p>Feedback (negative and positive) can stabilize or destabilize a system.</p> <p>Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems.</p> <p>Energy drives the cycling of matter within and between systems.</p>