

Title	How does caffeine affect heart rate?*
Grades	7-8
Objectives	<p>Students will be able to:</p> <ul style="list-style-type: none"> • understand how caffeine effects the body. • write a hypothesis and make conclusion based on experimental results. • use the internet as research tool. • make predictions about how caffeine affects another body part/system based on further research.
Materials	<ul style="list-style-type: none"> • computers with internet access, for each group of 4 students if possible • way to project YouTube video for the class to view • stopwatch or clock with seconds • two kinds of soda: one with caffeine and one without, just enough for each student to have a small cup
Procedure	<ol style="list-style-type: none"> 1. Preface the lesson with a short YouTube video over viewing how caffeine affects the body. (Recommended: http://www.youtube.com/watch?v=xoH1miTp-Bw&feature=related and/or http://www.youtube.com/watch?v=Nw3erwWgT28&feature=related) 2. As a class, create meanings for the following terms related to laboratory procedures: <ul style="list-style-type: none"> • control group • experimental group • hypothesis • sample size 3. Split class into lab groups of 4 if possible. If each group has internet access with a desktop computer or laptop, have them watch this video about how to find their heart rate (http://www.youtube.com/watch?v=qPKVft5L4X8). If not, watch it as a class. 4. Two students will be a control and two will be part of the experimental group. Each group will get two cups of a non-caffeinated soda like Sprite and two cups of caffeinated soda like Coke. (Note: Students do not have to participate in drinking the soda if they do not want to.) First, they need to form a hypothesis about caffeine and heart rate they will test in this experiment. Next, they need to calculate how much caffeine is in the cup of caffeinated soda based on the “cup” given and the amount of caffeine in a serving of the soda. Then, they should take the resting heart rate of each member. Finally, they should drink their respective control or experimental beverage and wait fifteen minutes. During this time, be sure students are sitting and not being active. At the end of the fifteen minute period, they should recheck their heart rate again. 5. Compile class data to increase the sample size. The teacher can create a graphical representation of the data. Students should use the compiled class results to form a conclusion. Groups should do a little more research, using YouTube or another similar online resource to investigate how caffeine can affect some other body system. In a short write up (1-2 pages double spaced), each group should explain the following: <ul style="list-style-type: none"> • Hypothesis • <i>Briefly</i> describe methods (specifically control and treatment groups)

*Lesson slightly adapted from <http://www.teachervision.fen.com/biology/lesson-plan/63837.html>

	<ul style="list-style-type: none"> • Results (class) • Conclusion (do results support hypothesis?) • Future directions (based on further research with at least one citation of where they found information during brief research) <p>6. Each group could present their ideas for future directions by showing the YouTube video they found. These should only be two or three minutes in length, so students may have to choose a clip of a longer video.</p>
Evaluation	<p>Assign points for each of the following parts (10 possible points):</p> <ul style="list-style-type: none"> • <u>Data</u>: 2 points group turns in complete set of data; 1 points data set is incomplete • <u>Write up</u>: 5 points 1-2 pages double spaced in length and all 5 areas (hypothesis, methods, results, conclusion, further directions) are present and well addressed; 4 points 1-2 pages in length but one or two of the areas are not well addressed; 3 points less than 1 page in length and lacking more than two areas or did not do any further research; 2 points • <u>Presentation</u>: 3 points the chosen video is relevant and well explained; 2 points video is not relevant <u>or</u> not well explained; 1 point video is not relevant <u>and</u> not explained
Standards	<p>The National Science Education Standards (1996) are created by the National Committee on Science Education Standards and Assessment. Chapter 6 (which can be found at this link: http://www.nap.edu/openbook.php?record_id=4962&page=103) addresses Science Content Standards. The following, which are standards for levels 5-8, are covered in this lesson plan:</p> <ul style="list-style-type: none"> • Inquiry standards: <ul style="list-style-type: none"> -Abilities necessary to do scientific inquiry • Life Science Standards: <ul style="list-style-type: none"> -Structure and function of living systems • Science and Technology standards: <ul style="list-style-type: none"> -Understanding about science and technology • Personal and Social Perspective: <ul style="list-style-type: none"> -Personal health

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