



Theme-Integrated Lesson Plans

Title: Measuring Heart Rate

Grade: 9-12

Subject: Algebra I

Length of Lesson: 90 minutes

Standards: NC Objective 1.02: Use formulas and algebraic expressions, including iterative and recursive forms, to model and solve problems.
NC Objective 3.03: Create linear models, for sets of data, to solve problems.
NC Objective 4.01: Use linear functions or inequalities to model and solve problems; justify results.

Abstract: Using data collected from the heart rate and exercise project, the students will learn to correctly plot and interpret the data.

Essential Question(s): What does the slope of a line tell us about the change of heart rate with exercise?

Instructional Strategies:

Activation of Prior Knowledge/Purpose: Warm-up: Finding slopes from ordered pairs.

Engaging the content: **Overhead Transparency Review:** Finding a slope from equation.

Open Ended Response: Me, We, You: How can we use the slope of a line to interpret data on a graph.

ME: On the overhead or the board write several examples of the graph of a slope. Explain the positive and negative slope, and how to tell the difference. Also cover the concept of rate of change, rise over run, and change in y over the change in x. Discuss what the different slopes mean when compared to each other. Demonstrate how to graph the slope-intercept form of a linear equation. Do one or two examples.

WE: Have the students assist you by calling out the next step. Practice this to the point where you feel the majority of the class has grasped the concept.

YOU: Have the students begin on practice problems, while you help students and assess their progress.

Cooperative pairs Learning: Heart Rate [exercise](#).

Content Assessment: Treasure Hunt: Using slope to plot a course. (This is meant as an extension for students who have completed their primary assignments, giving the student an opportunity to explore the concept differently.)

Summarizing/Assessment: **Ticket out the Door:** How does heart rate vary with exercise?

Resources/Materials needed: Stopwatch, stethoscope, graph paper.

Student Assessment: **Ticket out the Door:** How does heart rate vary with exercise?

Websites: <http://www.glencoe.com/>

Notes from Author: David Frazer: The students should use some of the skills that they have developed in other classes to help collect data for this lesson. For example, a student could take the pulse of another student, record medical data, and plotting a graph, and interpreting a graph. The heart rate project can be replaced with any kind of comparative data, such as weight vs. height, blood pressure and exercise, etc. The treasure hunt exercise is a chance for the student to demonstrate their knowledge of slopes and how they function

Algebra 1 Warm-up
Find the slope

1) $(2, 4), (-5, 7)$

2) $(-6, 3), (-2, 5)$

3) $(15, -3), (12, -7)$

4) $(-2, -3), (5, -7)$

5) $(-5, 400), (-5, 7)$

Algebra 1

Slope/Intercept

Write the equation in slope/intercept form:

1) $3x - 2y = 4$

2) $9x - 3y = -3$

3) $4/5x - 3y = 2$

4) $4x - 1/2y = -2$

5) $-1/2x - 2/3y = 2$

Algebra 1
Cooperative Pairs Exercise:
Heart Rate Data Collection

Two students will work together to collect data for a graph, which compares heart rate to the amount of time exercise. The goal of this exercise is to learn how to collect data, how to record data on a graph, and how to interpret the data.

Part 1. Collect heart rate data.

One student, using a stop watch, will take the pulse of the other student while sitting. Record the data on the table provided. Next, the pulse of student will be taken while standing, then recorded. The subject will then do jumping jacks or some other form of exercise that will raise the heart rate, for 15 seconds, then their pulse will be taken, and recorded. Repeat for 30 second intervals until the heart rate stops increasing.

Heart Rate	Activity
	Sitting
	Standing
	Exercise 15 seconds
	Exercise 45 seconds
	Exercise 75 seconds
	Exercise 90 seconds

Once the data is collected, students will plot a graph of the data on a sheet of graph paper.

1. Do you notice a pattern to the points you plotted?
2. Is the pattern of the points look positive or negative?
3. What happens to the heart rate as more exercise is done?
4. Can you draw a line that fits the plotted points?
5. Does the line have a definite slope?
6. What is the slope of your line?
7. Can you predict what the heart rate will be after 120 seconds of exercise?
8. What other ways can you use a graph to help interpret data?