



<p><b>Lesson Title:</b></p> <p>Groovin' to the Graph</p>	<p style="text-align: center;"><b><u>Big Idea &amp; Learning Objectives</u></b></p> <ol style="list-style-type: none"> <li>1. Students will use movement to plot points on a classroom floor coordinate plane.</li> <li>2. Students will use movement to demonstrate knowledge of a unit rate and a proportional relationship on a coordinate plane.</li> <li>3. Students (8th) will use movement to identify the type of slope created by a set of ordered pairs.</li> </ol>
<p><b>Content Area &amp; Arts Discipline:</b></p> <p>Math and Dance/Movement</p>	<p style="text-align: center;"><b><u>Overview of the Lesson</u></b></p> <p>The students will create movements to represent the x- and y-axes. They will also determine a way to differentiate between a positive and a negative coordinate. The students will plot themselves on a coordinate plane on the classroom floor. The students will then determine if they have created a proportional relationship. The students will create a cohesive, smooth movement to represent a proportional relationship and will create a cohesive, rigid movement to represent not a proportional relationship. For an 8th grade class, the students will determine different cohesive movements to represent the different types of slope.</p>
<p><b>Grade Level:</b></p> <p>Grades 7 and 8</p> <p>adaptations for 6th grade given at the end of the lesson</p>	<p style="text-align: center;"><b><u>Procedures</u></b></p> <p><b>Engaging Students (“The Hook”):</b></p> <p>The teacher will have a coordinate plane marked with painters tape on the classroom floor prior to class. Using this, the teacher will allow the students to start a discussion about what they will be doing in class.</p> <p>The teacher will review the process of coordinates. The teacher will direct different students to coordinates on the plane in order to create a shape (i.e., 4 students make the corners of a quadrilateral).</p>

<p><b>Proposed Time Frame:</b></p> <p>&lt; 1 hours (1 class period)</p>	<p><b>Building Knowledge:</b></p> <p>The teacher will facilitate a discussion about taking information from a ratio table and creating ordered pairs that can be plotted on a coordinate plane.</p> <p>The teacher will review the specific order that the coordinates move: the x-coordinate moves first and that the y-coordinate will move second. This will lead into sequencing steps for dance.</p> <p>The teacher will have students create movements for the x-axis and the y-axis. The teacher will continue to challenge students to find a way to differentiate the movements so that a person would be able to identify the difference between a negative coordinate and a positive coordinate.</p>
<p><b>Date Lesson Created:</b></p> <p>April 21, 2014</p>	<p><b>Modeling the Experience:</b></p> <p>The teacher will have pre-made movements (or can use the movements by the class) and will demonstrate combining the movements to illustrate her location on the grid. The teacher will also take time to model the location of the origin (0, 0) and the unit rate (1, r).</p>
<p><b>Lesson Author:</b></p> <p>Shasta Long -classroom teacher</p>	<p><b>Guided Practice:</b></p> <p>The teacher will group students and will guide groups through the graphing of a problem. Each student will become a point on the graph. If the graph proves a proportional relationship, the students will develop a smooth movement within their line. If the graph is not a proportional relationship, the students will develop a more rigid movement within their graph.</p>
	<p><b>Applying Understanding:</b></p> <p>Students will form groups and will create particular movements for the x- and y-axes, unit rate, and not a unit rate. The students will also create a movement for the one person on the line that represents the unit rate (1, r) and the one person that represents the origin (0, 0). The students will then take turns presenting on the classroom coordinate plane.</p>
<p><b>Room Requirements &amp; Arrangement:</b></p> <p>classroom -desks need to be pushed to the edge of the classroom to create an open space with a coordinate plane marked on the floor</p>	<p><b>Opportunities for Reflection (Closing):</b></p> <ul style="list-style-type: none"> <li>•Students will identify how to determine the unit rate from a graph.</li> <li>•Students will identify how to tell if a graph forms a unit rate.</li> <li>•Students will identify how to tell if a graph is a proportional relationship.</li> <li>•Students will discuss how the movement of the different parts helped them to find each piece of information.</li> </ul>

**Material Equipment:**

- painters tape to create number line
- cards with coordinates

**Assessing the Learning:**

- The teacher will observe students as they develop movements within their groups.
- The students will present their movements and answers on the class coordinate plane.
- The students will model appropriate behavior while other classmates present their information.

**Resources:**

•<http://www.opusmath.com>

**Standards & Principles**

**Common Core State Standards:**

**6.NS.8 Number System**

Standard: Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

**6.G.3 Geometry**

Standard: Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate

**7.RP.2.a Ratios and Proportional Relationships**

Standard: Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

**7.RP.2.b Ratios and Proportional Relationships**

Standard: Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

**7.RP.2.d Ratios and Proportional Relationships**

Standard: Explain what a point  $(x, y)$  on the graph of a proportional relationship means in terms of the situation, with special attention to the points  $(0, 0)$  and  $(1, r)$  where  $r$  is the unit rate.

**8.EE.5 Expressions and Equations**

Standard: Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.

**Arts Standards:**

**Dance: Middle Level III**

**1 - Demonstrate an understanding of movement skills while applying anatomical knowledge and correct terms. (CP, C)**

- a. Develop and demonstrate an understanding of movement initiation.
- e. Demonstrate and recognize planes in space: vertical, horizontal, sagittal.

**6 - Perceive, practice, and advocate an appreciation for the creation, beauty, and value of dance.**

- c. Exhibit proper audience and performing arts etiquette.

**Vocabulary (math):**

- coordinate plane
- horizontal
- negative slope
- ordered pair
- positive slope
- slope
- undefined slope
- unit rate
- vertical
- x-axis
- x-coordinate
- y-axis
- y-coordinate
- zero slope

**Vocabulary (music):**

- direction
- horizontal
- movement
- sagittal
- vertical

**Principles of Universal Design for Learning:**

- I. Provide Multiple Means of Representation
  - 2: Provide options for language, mathematical expressions, and symbols
    - 2.1 Clarify vocabulary and symbols
    - 2.3 Support decoding of text, mathematical notation, and symbols
  - 3: Provide options for comprehension
    - 3.1 Activate or supply background knowledge
    - 3.2 Highlight patterns, critical features, big ideas, and relationships
    - 3.3 Guide information processing, visualization, and manipulation
    - 3.4 Maximize transfer and generalization
- II. Provide Multiple Means of Action and Expression
  - 4: Provide options for physical action
    - 4.1 Vary the methods for response and navigation
  - 5: Provide options for expression and communication
    - 5.3 Build fluencies with graduated levels of support for practice and performance
  - 6: Provide options for executive functions
    - 6.2 Support planning and strategy development
- III. Provide Multiple means of engagement
  - 7: Provide options for recruiting interest
    - 7.1 Optimize individual choice and autonomy
    - 7.2 Optimize relevance, value, and authenticity
    - 7.3 Minimize threats and distractions
  - 8: Provide options for sustaining effort and persistence
    - 8.1 Heighten salience of goals and objectives
    - 8.2 Vary demands and resources to optimize challenge
    - 8.3 Foster collaboration and community
    - 8.4 Increase mastery-oriented feedback
  - 9: Provide options for self-regulation
    - 9.1 Provide expectations and beliefs that optimize motivation
    - 9.3 Develop self-assessment and reflection

## Appendix

### **Extended Learning Activities:**

- Allow students to create word problems around the graph of a unit rate to further demonstrate knowledge of how unit rates are used.

### **TIPS/FAQs:**

- If the teacher has the facility, the football field would be a fun location to complete activities like this since they are already marked by yard line. This would allow students to make larger and louder movements as they work.

### **References:**

- <http://www.opusmath.com>

### **Ways to Adapt:**

•**6th grade** - students are not required to know unit rate through graphs at this level, but students do need to be able to identify the distance between two points on a coordinate plane. As a class, the students will create movements representing the x- and y-axes and will create a way to differentiate between the positive and negative values. Students will plot themselves on a coordinate plane and will perform their movements while trying to find the other person doing one of the same movements. For example: Sally will go to the point (-1, 3) and will hop 3 times for the y-coordinate and will clap below the waist for the x-coordinate. Johnny will go to the point (2, 3) and will hop 3 times for the y-coordinate and will clap 2 times above his head for the x-coordinate. Johnny and Sally will determine their distance from each other based on their x-coordinate because their y-coordinate movements were the same. Their distance would be 3 because  $2 - (-1)$  is 3.

•**6th grade** - the teacher can extend the above activity and allow the students to plot themselves to create shapes on the coordinate planes. This time, the students would need to find their distance from 2 different people through the use of identifying identical movements and subtracting the different movements.