

## Grade 5 Unit 6: Graph Points on the Coordinate Plane to Solve Problems (8 Weeks)

### Stage 1 – Desired Results

#### Established Goals

##### Unit Description

Students will learn to plot points on a line graph. All their work with bar graphs over the years has set the stage for line plots, which are both the natural extension of bar graphs and the precursor to linear functions. Students will learn that a simple line plot of a straight line is presented on a coordinate plane and students will be asked about the scaling relationship between the increase in the units of the vertical axis for 1 unit of increase in the horizontal axis—the first hint of slope and the beginning ratio work in middle school. The Mathematical Practices should be evident throughout instruction and connected to the content addressed in this unit. Students should engage in mathematical tasks that provide an opportunity to connect content and practices.

##### Common Core Learning Standards

##### **Write and interpret numerical expressions.**

**5.OA.2** Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation “add 8 and 7, then multiply by 2” as  $2 \times (8 + 7)$ . Recognize that  $3 \times (18932 + 921)$  is three times as large as  $18932 + 921$ , without having to calculate the indicated sum or product.*

##### **Analyze patterns and relationships.**

**5.OA.3** Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.

##### **Graph points on the coordinate plane to solve real-world and mathematical problems.**

**5.G.1** Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y coordinate).

**5.G.2** Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

##### Common Core Standards of Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

##### ESL Language Standards

##### **Standard 1: Students will listen, speak, read, and write in English for information and understanding**

1.1. Identify and use reading and listening strategies to make text comprehensible and meaningful.

1.3 Select information appropriate to the purpose of the investigation, relate ideas from one written or spoken source to

another, and exclude nonessential information.

1.5 Formulate, ask, and respond to various question forms to obtain, clarify, and extend information and meaning.

1.7 Present information clearly in a variety of oral and written forms for different audiences and purposes related to all academic content areas.

**Big Ideas**

1. The same number sentence can be associated with different concrete or real-world situations, AND different number sentences can be associated with the same concrete or real-world situation.
2. Data can be represented visually using tables, charts, and graphs. The type of data determines the best choice of visual representation.

**Essential Questions**

1. How can we solve real world problems using multiplication and division and the relationship between multiplication and division?
  1. What relationships can be determined by analyzing two sets of given rules?
  2. How does the coordinate system work?
2. How do we graph ordered pairs?
  2. How can the coordinate system help you better understand other map systems?
2. How do coordinate grids help you organize information?
  2. How can we represent numerical patterns on a coordinate grid?

**Content (Students will know...)**

A. Numerical expressions (5.OA.2)

B. Patterns and relationships (5.OA.3)

C. On the coordinate plane, a point represents the two facets of information associated with an ordered pair. (5.G.1)

**Skills (Students will be able to...)**

- A1. Translate verbal expressions to numerical expressions.
- A2. Write simple numerical expressions from verbal expressions without evaluating the expression.
- A3. Translate numerical expressions to verbal expressions.
- A4. Interpret numerical expressions without evaluating them.
- B1. Generate two numerical patterns using two given rules.
- B2. Describe the relationship between two numerical patterns.
- B3. Construct input/output table to form ordered pairs.
- B4. Graph ordered pairs on a coordinate plane to form a line.
- B5. Identify the relationship between two numerical patterns on a graph.
- B6. Explain why the relationship between two numerical patterns on a graph exists.
- B7. Write the rule for a pattern using a variable.
- C1. Define the coordinate plane as a set of perpendicular lines, called axes.
- C2. Identify the intersection of the perpendicular lines as the origin.
- C3. Describe the horizontal axis as the x-axis and the vertical axis as the y axis.
- C4. Determine the first number in an ordered pair as how far the point travels left or right, known as the x-coordinate.
- C5. Determine the second number in an ordered pair as how far the point travels up or down, known as the y-

<p>D. Graphical representations can be used to make predictions and interpretations about real world situations. (5.G.2)</p>	<p>coordinate.  D1. Graph points in the first quadrant based on word problems.  D2. Plot coordinates on a plane.  D3. Identify an ordered pair, start at the origin, and move correctly along the x-axis and y-axis.  D4. Construct the coordinate grid using perpendicular lines as the axes.</p>
<p><b>Terms/ Vocabulary</b>  ordered pairs, corresponding terms, patterns coordinate plane, perpendicular lines, origin, y-coordinate, x-coordinate, y-axis x-axis coordinates, quadrant, axes, ordered pairs, numerical patterns, coordinate plane, variable, corresponding terms, parentheses, brackets, braces, symbol, sum, difference, product, quotient</p>	
<p><b>Stage 2 – Assessment Evidence</b></p>	
<p><b>Initial Task:</b> Going to the Movies</p> <p><b>Final Performance Task:</b></p>	<p><b>Other Evidence</b>  Teacher observation, conferencing, teacher designed assessment pieces, student work, exit slips, journal entries</p>
<p><b>Stage 3 – Learning Plan</b></p>	
<p><b>Everyday Mathematics/Impact Mathematics Lessons –</b>  <i>The following lessons may support some of the CCLS &amp; essential questions outlined in this unit map:</i>  5.OA.2: 1.7, 1.8, 2.4, 3.2, 4.1, 4.6, 7.4 7.5, 10.3  5.OA.3: 10.6  5.G.1: 9.1, 9.2, 9.3, 10.4, 10.6, 10.7, 12.8  5.G.2: 9.2, 9.3, 10.4, 10.6 Project 8</p> <p><b>Additional Resources:</b>  <a href="http://www.k-5mathteaching.com/">http://www.k-5mathteaching.com/</a>  Activities: Coordinate Grid Geoboards, Coordinate Shapes, Coordinate Grid Swap, Coordinate Grid Tangram, Assorted Coordinate Grid Paper ( copy of grip paper)</p> <p><b>NCTM Illuminations: Rescue Mission Game</b>  <a href="http://www.georgiastandards.org">www.georgiastandards.org</a> : Unit 5 ( 5.G.1, 5.G.2, and 5.OA.3)  <a href="http://www.georgiastandards.org">www.georgiastandards.org</a>: Unit 1 (5.OA.2)</p> <p><b>5.G.2:</b>  Math Game <a href="http://www.mathwire.com/archives/geometry.html">http://www.mathwire.com/archives/geometry.html</a>  Sample Lesson Plans: <a href="http://www.pbs.org/parents/cyberchase/lessons/lessonplans/lesson1.html">http://www.pbs.org/parents/cyberchase/lessons/lessonplans/lesson1.html</a>  Creating a graph <a href="http://nces.ed.gov/nceskids/createagraph/">http://nces.ed.gov/nceskids/createagraph/</a></p> <p><b>Utah Education Network Curriculum Guides</b>  <b>5.G.1 and 5.G.2</b>  <a href="http://www.uen.org/core/math/downloads/5G1.pdf">http://www.uen.org/core/math/downloads/5G1.pdf</a>  <a href="http://www.uen.org/core/math/downloads/5G2.pdf">http://www.uen.org/core/math/downloads/5G2.pdf</a>  <b>5.OA.2 and 5.OA.3</b>  <a href="http://www.uen.org/core/math/downloads/5OA2.pdf">http://www.uen.org/core/math/downloads/5OA2.pdf</a>  <a href="http://www.uen.org/core/math/downloads/5OA3.pdf">http://www.uen.org/core/math/downloads/5OA3.pdf</a></p>	

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Grade 5 Unit 6**  
**Initial Performance Task: Going to the Movies**

1) Mary and her friends are buying snacks for the new Twilight movie at the concession stand.

a) Mary bought 6 bags of Skittles for \$0.85 each and 9 packs of gum for \$1.20 each. Write a numerical expression that represents the total cost of the Skittles and gum

Numerical expression: \_\_\_\_\_

b) Explain how your expression matches the situation

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2) Mary has a membership for the movies that cost \$ 20.00 per year. It allows her to pay \$6.00 per person for herself and five guests.

a) Describe how the situation described above is related to the expression  $(6 \times 6) + 20$

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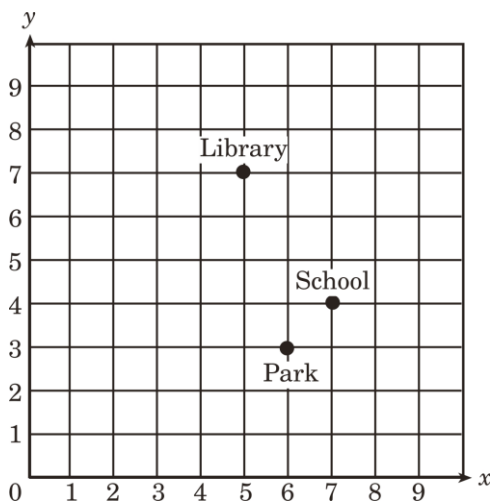
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3) Mary and her friends are at the park before going to the movies.

a) Write the coordinate pair for the location of the park \_\_\_\_\_

b) Which building is located at  $(5, 7)$ ? \_\_\_\_\_

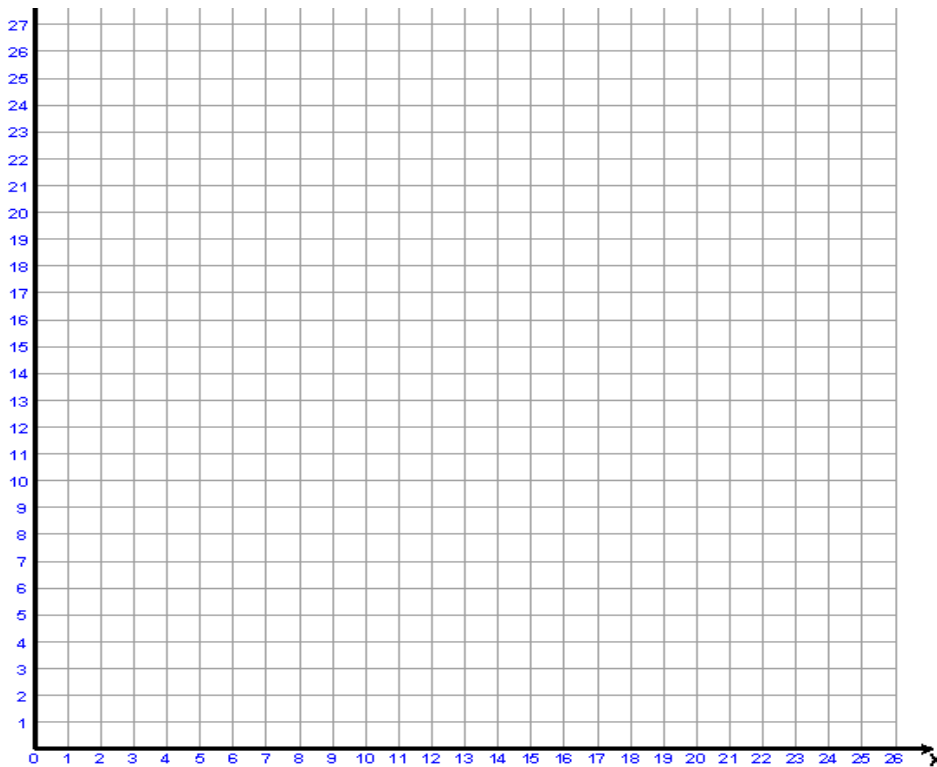


4) Swedish Fish cost \$3.00 per box and popcorn costs \$5.00 per bag.

a) Fill in the table for the price of Swedish Fish and popcorn for up to 5 people

	Cost (Swedish Fish)	Cost (Popcorn)
0		
1		
2		
3		
4		
5		

b) Use your table to graph the cost of Swedish fish and Popcorn on the coordinate plane below. Connect your points with a line:



c) Will the cost of Swedish Fish always be less than the cost of popcorn? How do you know? Use your graph or the table to explain your reasoning

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**Grade 5 Unit 6  
Initial Task Scoring Guide**

Going to the Movies Scoring Guide	Points	Section Points																					
<p>1. 5.OA.2</p> <p>a) Student correctly writes the expression: <math>(6 \times 0.85) + (9 \times 1.20)</math> OR <math>6(.85) + 9(1.20)</math> OR another viable expression (such as repeated addition or a combination of repeated addition and multiplication)  <b>Note: students may not get credit if it is not a numerical expression (cannot have an equal sign!)</b></p> <p>b) Student correctly explains that numerical expression matches the given situation because if I need to find the total cost, the Skittles cost \$.85 each and I am buying 6 packs so the Skittles would be <math>6 \times .85</math>. And I need to add that to the cost of buying 9 packs of gum that cost \$1.20 each so that would be <math>9 \times 1.20</math>. So, the expression perfectly matches the situation and could be used to find the total cost of Skittles and gum.</p>	<p>1</p> <p>2</p>	<p>3</p>																					
<p>2. 5.OA.2</p> <p>a) Student is able to explain that the expression represents the situation because to find the cost for 6 people, I would have to multiply <math>6 \times \\$6</math> then add the \$20 membership fee, which is exactly what the expression says.  <b>Note: Student may evaluate both expressions but it is not required in this standard to evaluate</b></p>	<p>2</p>	<p>2</p>																					
<p>3. 5.G.2</p> <p>a) Correct answer: (6, 3)</p> <p>b) Correct answer: Library</p>	<p>1</p> <p>1</p>	<p>2</p>																					
<p>4. 5.OA.3. 5.G1 and 5.G.2</p> <p>a. Students are able to complete the table with all correct information</p> <table border="1" data-bbox="289 1184 1029 1453"> <thead> <tr> <th>#</th> <th>Cost (SF)</th> <th>Cost (P)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>\$0</td> <td>\$0</td> </tr> <tr> <td>1</td> <td>\$3.00</td> <td>\$ 5.00</td> </tr> <tr> <td>2</td> <td>\$6.00</td> <td>\$ 10.00</td> </tr> <tr> <td>3</td> <td>\$9.00</td> <td>\$15.00</td> </tr> <tr> <td>4</td> <td>\$12.00</td> <td>\$20.00</td> </tr> <tr> <td>5</td> <td>\$15.00</td> <td>\$25.00</td> </tr> </tbody> </table> <p>a. Students correctly plots ordered pairs onto graph and connects the points to create a graph with 2 lines</p> <ul style="list-style-type: none"> <li>• Swedish Fish: (0,0), (1,3), (2,6), (3,9), (4,12), (5,15)</li> <li>• Popcorn: (0,0), (1,5), (2,10), (3,15), (4,20), (5,25)</li> </ul> <p>b. Student correctly answers, “Yes, the cost will always be less for the Swedish Fish than the popcorn” and uses the numbers from the table of references the graph to justify their response. For example: I noticed that it doesn’t matter how many you buy, like 2 or 10, the cost will always be higher for popcorn because popcorn costs \$5 and Swedish Fish only cost \$3.</p>	#	Cost (SF)	Cost (P)	0	\$0	\$0	1	\$3.00	\$ 5.00	2	\$6.00	\$ 10.00	3	\$9.00	\$15.00	4	\$12.00	\$20.00	5	\$15.00	\$25.00	<p>4</p> <p>6 (3 points per correct line)</p> <p>2</p>	<p>12</p>
#	Cost (SF)	Cost (P)																					
0	\$0	\$0																					
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4	\$12.00	\$20.00																					
5	\$15.00	\$25.00																					
<p>Total Points</p>	<p>19</p>	<p>19</p>																					

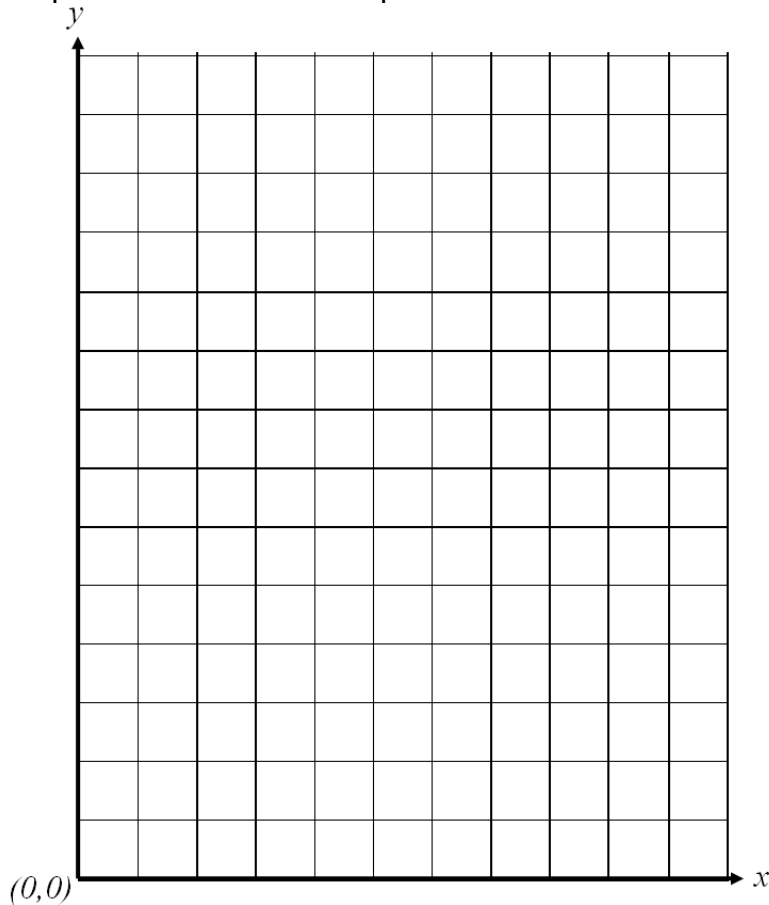
Novice	Apprentice	Practitioner	Expert
0 - 4	5 - 10	11 – 16	17 - 19

**Grade 5 Unit 6**  
**Final Performance Task: Bake Sale**

1. Joanna and Amy's class is having a bake sale to raise money for a trip to Six Flags. Giant cookies cost \$2.00 each and brownies cost \$3.00 each

a) Create a table that shows how much money they will earn if they sell **up to** 4 giant cookies and 4 brownies

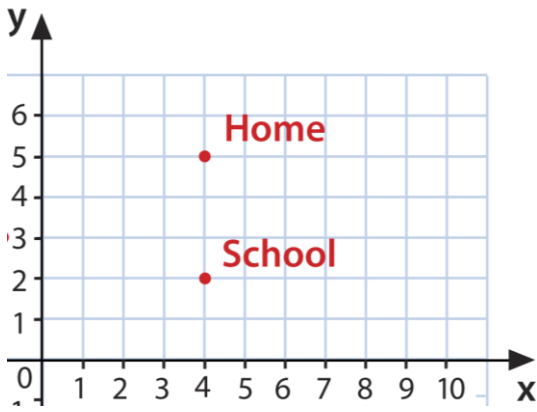
b) Graph each set of ordered pairs to create a line for cookies and brownies. Label your graph.



c) Write a numerical expression for how much will they earn if they sell 8 cookies and 10 brownies: \_\_\_\_\_



2. Below is a map of Joanna's neighborhood:



- a) What are the coordinates of:  
Her school? \_\_\_\_\_  
Her home? \_\_\_\_\_

b) The Bakery is located at (9, 4). Label the bakery with the letter "B".

3. Principal Louis buys 5 cupcakes for \$2.50 each and 5 slices of apple pie for \$3.00 each.

a) Write a numerical expression for how much money Principal Louis spent at the Bake Sale:

\_\_\_\_\_

b) How is the expression  $(2.50 + 3.00)$  related to the one you wrote above? Explain:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

