

Lincoln Park Public Schools – CURRICULUM FRAMEWORK

UNIT NUMBER: 8

UNIT TITLE: Coordinate Graphing

Course: Math 6

Timeframe: 10 days



Stage 1: Identify Desired Results

Essential Question:

How can coordinate graphs help us better understand and make efficient use of the world in which we live?

Scaffold Questions:

Rational Numbers and the Coordinate Plane

- Why does order matter when using ordered pairs of numbers?
- Alayna says the order in which the values are given in an ordered pair does not always matter. Give an example of when the order does matter and an example of when the order does not matter.
- Explain how to locate points when pairs of integers are used.
- If a point lies on an axis, what must be true about its coordinates? Specifically, what is true for a point that is on the x-axis? The y-axis?
- What do you know about the location of a point on the coordinate plane if:
 - Both coordinates are positive? Only one coordinate is positive? Both coordinates are negative? One coordinate is zero? Both coordinates are zero?
- When the coordinates of two points differ only by one sign, such as $(-8, 2)$ and $(8, 2)$, what do the similarities and differences in the coordinates tell us about their relative locations on the plane?
- What is the relationship between $(5, 1)$ and $(5, -1)$? Given one point, how can you locate the other?
- Why is it important to label the axes when setting up a coordinate plane?
- Why shouldn't you draw and label the entire coordinate grid before looking at the points to be graphed?
- Why is it possible for us to find the length of a horizontal or vertical line segment even if it's not on the x- or y-axis?

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	<ul style="list-style-type: none">• Can you think of a real-world situation where this might be useful?• How do we determine the length of a horizontal line segment whose endpoints lie in different quadrants of the coordinate plane?• If we know one end point of a vertical line segment and the length of the line segment, how do we find the other end of the line segment? Is the process the same with a horizontal line segment?
Brief Summary of Unit:	<p>In this unit, students transition from the number line model to represent points in the coordinate plane. Students will use ordered pairs of rational numbers to name points on a grid, and given a point's location, then identify the first number in the ordered pair as the first coordinate and the second number as the second coordinate. Then students construct the plane; identify the axes, quadrants, and origin; and graph points in the plane, using an appropriate scale on the axes. Students will recognize the relationship that exists between points whose coordinates differ only by signs (as reflections across one or both axes) and locate such points using the symmetry in the plane. Finally, students will graph points in the coordinate plane and use absolute value to find the lengths of vertical and horizontal segments to solve real-world problems.</p>
Desired Understanding:	<p>In this unit, students will extend their understanding of the ordering of rational numbers in one dimension (on a number line) to the two-dimensional space of the coordinate plane. They construct the plane's vertical and horizontal axes, discovering the relationship between the four quadrants and the signs of the coordinates of points that lie in each quadrant. Students build upon their foundational understanding from 5th grade of plotting points in the first quadrant and transition to locating points in all four quadrants. Students apply the concept of absolute value to find the distance between points located on vertical or horizontal lines and solve real-world problems related to distance, segments, and shapes. Students will understand how a coordinate plane is used to measure</p>

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	distance and connect concepts to reading maps, finding distance, and locating objects using a map or coordinate plane.
Key Knowledge and Skills (Content):	<p>Students will be able to:</p> <ul style="list-style-type: none">• Use ordered pairs to name points in a grid and to locate points on a map.• Students identify the first number in an ordered pair as the first coordinate and the second number as the second coordinate.• Extend their understanding of the coordinate plane to include all four quadrants and recognize that the axes (identified as the x-axis and y-axis) of the coordinate plane divide the plane into four regions called quadrants (that are labeled from first to fourth and are denoted by roman numerals).• Identify the origin and locate points other than the origin, which lie on an axis.• Locate points in the coordinate plane that correspond to given ordered pairs of integers and rational numbers.• Understand that two numbers are said to differ only by signs if they are opposites of each other.• Recognize that when two ordered pairs differ only by the sign of one or both of the coordinates, then the locations of the points are related by reflections across one or both axes.• Draw a coordinate plane on graph paper in two steps: (1) Draw and label the horizontal and vertical axes; (2) Mark the number scale on each axis.• Given some points as ordered pairs, students make reasonable choices for scales on both axes and locate and label the points on graph paper.• Compute the length of horizontal and vertical line segments with integer coordinates for end points in the coordinate plane by counting the number of units between end points and using absolute value.• Solve problems related to the distance between points that lie on the same horizontal or vertical line.

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- Use the coordinate plane to graph points, line segments, and geometric shapes in the various quadrants and then use the absolute value to find the related distances.

Key Vocabulary

- Ordered pair
- Coordinate plane
- Coordinates
- Coordinate Pair
- Corresponds
- x-coordinate
- y-coordinate
- Origin
- x-axis
- y-axis
- Quadrant
- Symmetry

Resources:

- [Vocabulary Cards/Word Wall for Middle School Grades 6-8](#)
- [Illustrative Mathematics Tasks by Standard](#)
- [Desmos Polygraph: Points Activity](#)
- [Desmos The \(Awesome\) Coordinate Plane Activity](#)
- [Desmos Collect the Coconuts Activity](#)
- [Mystery Picture Activity](#) and [Graphs](#)

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	<ul style="list-style-type: none">• Math Pickle - Puzzles, games, and mini-competitions• Betterlesson.com - Interactive Lesson ideas for graphing ordered pairs• Game Over Gopher Game - Online game that allows students to graph points in a fun way.• Locate the Aliens Game - Online game that students must enter the coordinate point of a given alien.• Space Graph - Online game that students plot a given point to earn points.
Content Lesson Links	Lesson Links
State Standards - Math	<p><u>4.G.A.3</u> Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.</p> <p><u>5.G.A.1</u> 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).</p> <p><u>5.G.A.2</u></p>

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	<p>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.</p> <p><u>6.NS.C.6</u> Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.</p> <ul style="list-style-type: none">b) Understand signs of numbers in ordered pairs as indicating location in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.c) Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. <p><u>6.NS.C.8</u> 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.</p>
State Standards - Reading	<p><u>RST.6-8.4</u> Determine the meaning of symbols, key terms and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 topics.</p>

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State Standards - Writing	<u>WHST.6-8.1.B</u> Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
Essential Standards	<u>6.NS.C.6</u> Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. <ul style="list-style-type: none">b) Understand signs of numbers in ordered pairs as indicating location in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.c) Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. <u>6.NS.C.8</u> 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.
Alignment to the Vision of High Quality Instruction in Math	<u>Lincoln Park Vision for Ambitious Mathematics Teaching</u> Core practices of ambitious teaching in mathematics, include: eliciting and responding to student reasoning, orienting students to each others' ideas and to the mathematical goal, setting and maintaining expectations for student participation, positioning students competently, teaching towards an instructional goal, assessing students' understanding, and using mathematical representations.



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Students confidently engage in complex mathematical tasks chosen carefully by teachers. They draw on knowledge from a wide variety of mathematical topics, sometimes approaching the same problem from different mathematical perspectives or representing the mathematics in different ways until they find methods that enable them to make progress. Teachers help students make, refine, and explore conjectures on the basis of evidence and use a variety of reasoning and proof techniques to confirm or disprove those conjectures. Students are flexible and resourceful problem solvers. Alone or in groups with access to technology, they work productively and reflectively, with the skills and guidance of their teacher. Orally and in writing, students communicate their ideas and results effectively. They value mathematics and engage actively in learning it.

Stage 2: Determine Acceptable Evidence

(With the exception of formative assessments, all assessments listed in this section are required elements of the district's curriculum and the data associated will be collected in the district's performance management driver system.)

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Measure of Understanding (Performance Task)	Paintball Performance Task (Word Doc or PDF) <ul style="list-style-type: none">Standards Assessed: 6.NS.C.6b and 6.NS.C.8
Assessing the Performance Task	Performance Task Grading Rubric
Summative Assessment	District common assessment tested within Illuminate. <ul style="list-style-type: none">Standards Assessed: 6.NS.C.6b, 6.NS.C.6c, and 6.NS.6.8
Interim Assessments	<i>Interim Assessments pending. Final decisions will be made upon revision at the end of the 2019-2020 school year.</i>
Formative Assessments	Formative assessments are teacher driven and not reported in Illuminate. For this unit, specific formative assessments have already been created and linked in the Key Knowledge and Skills Section in Stage 1.

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Student Self-Reflection and Self-Regulation	3-2-1 Self-Reflection Sheet <ul style="list-style-type: none">• 3-2-1 Reflection Technique Web Resource• Teacher Toolkit Resources and Variations Standards for Mathematical Practice Self-Reflections
State Assessment Practice	District Common Assessment based on State Standards covered in the unit. 6th Grade Mathematics M-Step Practice and Sample Questions