



Unit Plan

5.7 Shapes on the Coordinate Plane

Chester / Littleville Elementary / Grade 5 / Mathematics

[Week 27 - Week 29](#) | 4 Curriculum Developers | Last Updated: Mar 26, 2024 by LeBlanc, Deanna[Style Guide](#)

What is the purpose of the unit? What are the major take-aways?

Standards

MA: Mathematics (2017)**MA: Grade 5****Operations & Algebraic Thinking****5.OA Write and interpret numerical expressions.**

- 2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.
[Show Details](#)

5.OA Analyze patterns and relationships.

- 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.
[Show Details](#)

Number & Operations in Base Ten**5.NBT Perform operations with multi-digit whole numbers and with decimals to hundredths.**

- 7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction and multiplication and division; relate the strategy to a written method and explain the reasoning used.

Geometry**5.G Graph points on the coordinate plane to solve real-world and mathematical problems.**

- 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).
- 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.

5.G Classify two-dimensional figures into categories based on their properties.

- 3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.
- 4. Classify two-dimensional figures in a hierarchy based on properties. For example, all rectangles are parallelograms, because they are all quadrilaterals with two pairs of opposite sides parallel.

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1. Coordinate Systems as Frameworks for Location:

Students will understand that a coordinate system is an organized structure that allows us to identify precise locations in a plane using perpendicular number lines, known as axes. This system depends on a starting point, or origin, and uses ordered pairs of numbers to represent the location of points. Understanding how to navigate this system is key to plotting shapes and understanding spatial relationships.

2. Expressions as Blueprints for Calculation:

Students will recognize that expressions are like blueprints for mathematical calculations. They provide a set of instructions that can be followed to perform calculations, and interpreting these expressions is crucial for understanding underlying mathematical concepts, even before the actual calculation is performed.

3. Numerical Patterns and Relationships:

Students will comprehend that generating and analyzing numerical patterns can reveal relationships that are not immediately obvious. They will learn to identify these relationships and express them as ordered pairs, which then can be effectively represented on a coordinate plane to visualize the patterns and relationships graphically.

4. Operations with Decimals as Extensions of Whole Number Operations:

Students will understand that adding, subtracting, multiplying, and dividing decimals are operations that extend beyond whole numbers and follow the same properties and logic. Using concrete models, drawings, or strategies based on place value and properties of operations will solidify their understanding and help them relate these strategies to written methods.

5. Attributes of Two-Dimensional Figures:

Students will learn that certain attributes are shared across different but related categories of two-dimensional figures. They will explore how these shared characteristics help us classify shapes and understand their properties more deeply. Recognizing that attributes of a broader category (such as rectangles having four right angles) apply to subcategories (such as squares) helps establish a more organized and interconnected understanding of geometric shapes.

1. How can we use algebraic expressions to describe patterns and relationships in mathematics? (Standard 2)

2. What are the steps to create a numerical pattern, and how can these patterns help us understand relationships in math? (Standard 3)

3. How can we apply our understanding of decimal operations when working with coordinates and shapes on a coordinate plane? (Standard 7)

4. Why is it important to understand the coordinate system, and how can we use it to locate points and shapes in a plane? (Standard 1)

5. How do the properties of two-dimensional figures help us categorize and understand them better? (Standard 3 related to geometry)

To ensure that students grasp the concepts tied to these questions, consider integrating activities where they:

- Write and interpret simple expressions from patterns found in numerical sequences or geometric arrangements.
- Generate numerical patterns based on given rules, discern relationships between terms, and represent these using ordered pairs and graphing.
- Use operations with decimals (addition, subtraction, multiplication, and division) to solve problems related to plotting points and drawing shapes on the coordinate plane.
- Practice finding coordinates and plotting points using the understanding of a coordinate plane, making sure to reinforce the use of the origin and axes.
- Explore and classify shapes based on their properties, such as identifying all squares as rectangles because they share the attribute of having four right angles.

Content

In this unit, students learn about the coordinate grid, deepen their knowledge of two-dimensional shapes, and use the coordinate grid to study relationships of pairs of numbers in various situations. Here, students learn about grids that are numbered in two directions. They see that the structure of a coordinate grid allows us to precisely communicate the location of points and shapes.

Students also continue to study two-dimensional shapes and their attributes. In grade 3, they classified triangles and quadrilaterals by the presence of right angles and sides of equal length. In grade 4, they learned about angles and parallel and perpendicular lines, which allowed them to further distinguish shapes. In this unit, students use these insights to make sense of the hierarchy of shapes.

Skills

Section A Goals

- Locate points on a coordinate grid.

Section B Goals

- Classify triangles and quadrilaterals in a hierarchy based on angle measurements and side lengths.

Section C Goals

- Generate, identify, and graph relationships between corresponding terms in two patterns, given a rule.
- Represent and interpret real world and mathematical problems on a coordinate grid.

Later in the unit, students analyze and generate numerical patterns based on pairs of rules and graph pairs of numbers on the coordinate grid. They also interpret points on the coordinate grid in terms of situations, plot points to better understand the relationship between two sets of numbers, and use the coordinate grid to solve problems.


Throughout the unit

The True or False routine is used to revisit some of the concepts students have learned in prior units. Students look at the relationship between multiplication and division and the properties of operations, including the distributive properties.

How will you gauge student learning?

Assessments

5.7 End-of-Unit Assessment | Summative | Written Test

 [Grade5-7-End-of-Unit-Assessment-assessment.pdf](#)

[5 State Standards Assessed](#)

How will students learn?

Learning Activities

Section A:

This section introduces students to the coordinate grid.

Students begin by drawing rectangles based only on verbal descriptions. They first do so without a grid, then on an unmarked grid, and finally on a coordinate grid. Along the way, they recognize that numbered grid lines allow them to locate points and communicate the features of shapes precisely.

Students then learn to use the numbers on the horizontal axis and vertical axis to describe the position of points and plot them on the coordinate grid. They learn that pairs of numbers such as (1,4), called coordinates, describe the numbers of units a point is from the axes and the point (0,0), which is called the origin.

The first number tells us its horizontal position, and the second number tells us its vertical position.

Students then practice plotting points given their coordinates and identifying the coordinates of points on the grid.

Section B:

In this section, students classify quadrilaterals and triangles into different categories and study the relationships between the categories.

They begin by sorting a large set of quadrilaterals in a way that makes sense to them, using attributes such as angle measures (especially right angles) and pairs of parallel sides. Then, they focus on relating the attributes of trapezoids, rectangles, parallelograms, squares, and rhombuses. Students explore two ways of defining trapezoids. One way is to say a parallelogram is a trapezoid, and the other is to say that a parallelogram is not a trapezoid. In this course, the former (inclusive) definition is used.

Students then study the relationship between squares and rhombuses, and between rectangles and parallelograms. They build these shapes with toothpicks, and see that a square is a special kind of rhombus and a rectangle is a special kind of parallelogram.

As they learn more about the relationships between quadrilateral categories, students use a Venn diagram to highlight their understanding.

Section C:

In this section, students apply the concepts of this unit as they analyze numerical relationships between two quantities in different contexts.

Students begin by examining patterns in numbers generated by following a pair of rules. They record the patterns in a table and interpret the relationships between the pairs of numbers. Students learn that they can form ordered pairs using corresponding terms from each pattern and these pairs can be graphed on the coordinate grid, which allows them to better understand the behavior of the patterns.

Next, students use the coordinate grid to explore the relationship of pairs of values in different situations. For instance, they look at the numbers of heads and tails that result from flipping a coin a certain number of times, the number of coins and the value of coins, and the length and width of rectangles with a fixed perimeter or a fixed area.

Differentiated Instruction

Technology Integration

21st Century Skills

Positive Behavior

CASEL

Collaborative for Academic, Social, and Emotional Learning

Resources

Teacher Notes and Reflections
