PISCATAWAY
TOWNSHIP SCHOOLS

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# Math 6

**Content Area:** **Mathematics**

**Grade Span:** **6**

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# COURSE OVERVIEW

## Description

This course aims to: connect ratio and rate to whole number multiplication and division and use concepts of ratio and rate to solve problems; complete understanding of division of fractions and extend the notion of number to the system of rational numbers, which includes negative numbers; write, interpret, and use expressions and equations; and develop understanding of statistical thinking.

## Goals

***Operations and Algebraic Thinking***

- Understand ratio concepts and use ratio reasoning to solve problems.

***The Number System***

- Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
- Compute fluently with multi-digit numbers and find common factors and multiples.
- Apply and extend previous understandings of numbers to the system of rational numbers.

***Expressions and Equations***

- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Reason about and solve one-variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.

***Geometry***

- Solve real-world and mathematical problems involving area, surface area, and volume.

***Statistics and Probability***

- Develop understanding of statistical variability.
- Summarize and describe distributions.

***Mathematical Practices:***

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

## Scope and Sequence

| Unit | Topic | Length |
|---|---|---|
| Unit 1 | Area and Surface Area | 20-22 days |
| Unit 2 | Introducing Ratios | 19-21 days |
| Unit 3 | Unit Rates and Percentages | 18-20 days |
| Unit 4 | Dividing Fractions | 18-20 days |
| Unit 5 | Decimal Arithmetic | 22-24 days |
| Unit 6 | Expressions and Equations | 21-23 days |
| Unit 7 | Positive and Negative Numbers | 17-19 days |
| Unit 8 | Describing Data | 21-23 days |

## Resources

**Core Text:**
https://www.desmos.com/curriculum

# UNIT 1: Area and Surface Area

## Summary and Rationale

In this unit, students learn to calculate areas of polygons by decomposing, rearranging, and composing shapes. They also represent polyhedra with nets and calculate their surface areas. Students develop strategies for calculating the area of parallelograms, triangles, and polygons, including generalizing and using formulas. Students make connections between three-dimensional polyhedra and nets that represent them, then use those nets to calculate the surface area.

## Recommended Pacing

20-22 days

## State Standards

**Standard** Equation and Expressions

| CPI # | Cumulative Progress Indicator (CPI) |
|---|---|
| A.2a | Write, read, and evaluate expressions in which letters stand for numbers.<br>a. Write expressions that record operations with numbers and with letters standing for numbers. |
| A.2c | Write, read, and evaluate expressions in which letters stand for numbers.<br>c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those New Jersey Student Learning Standards for Mathematics 7 involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). |

**Standard** Geometry

| CPI # | Cumulative Progress Indicator (CPI) |
|---|---|
| 1 | Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. |
| 4 | Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. |

## Instructional Focus

**Unit Enduring Understandings**

- Geometric properties can be used to construct geometric figures.
- Geometric relationships provide a means to solve real-life problems.

**Unit Essential Questions**

- How can spatial relationships be described by careful use of geometric language?
- How do geometric relationships help us to solve problems?

**Objectives**

**Students will know:**

- area of quadrilaterals.
- area of triangles.
- area equations.
- area of polygons.
- distance in the coordinate plane.

- polygons in the coordinate plane.
- nets and surface area.
- volume of rectangular prisms.
- solving volume equations.

**Students will be able to:**

*Find and Apply Area*

- Calculate the area of parallelograms and triangles.
- Calculate the area of polygons by decomposing into rectangles and triangles, or surrounding and subtracting.

*Find and Apply Surface Area*

- Connect polyhedra with nets that represent them.
- Calculate the surface area of polyhedra made up of rectangles and triangles.

## Resources

**Core Text:**

https://www.desmos.com/curriculum

**Suggested Resources:**

# UNIT 2: Introducing Ratios

## Summary and Rationale

In this unit, students are introduced to the concept of ratios; represent ratios using double number line diagrams, tables, and tape diagrams; and use ratio reasoning to solve problems. Students learn about what ratios are, how to describe them, and how to generate equivalent ratios. Students are introduced to double number lines as tools for solving problems with equivalent ratios. Students build on their skills from Section 1, using what they know about equivalent ratios to compare ratios and solve more complex problems. Students are introduced to tables as tools for solving problems with equivalent ratios.

## Recommended Pacing

19-21 days:

## State Standards

**Standard**

| CPI # | Cumulative Progress Indicator (CPI) |
|---|---|
| RP.A.1 | Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."* |
| RP.A.2 | Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."* |
| RP.A.3 | Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. |
| RP.A.3A | Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. |
| RP.A.3B | Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* |

## Instructional Focus

**Unit Enduring Understandings**

- There are various ways to represent the relationship between two quantities.
- Ratio tables, tape diagrams, double number lines, and the coordinate plane are all useful models for making comparisons. Use the most reasonable model for the given problem. For example, use a double number line to compare rates.
- A ratio relationship is a multiplicative comparison of two quantities in which both quantities change by the same factor. Two or more ratios are proportional if they represent the same relationship.

- Use ratio reasoning and conversion factors as unit rates to convert between different units of measure.

**Unit Essential Questions**

- What are some ways to represent the relationship between two quantities?
- How do you use ratios and rates to compare quantities?
- How can you use ratios and rates to make predictions?

**Objectives**

**Students will know:**

- ratios
- rates
- how to use ratios and rates to solve problems
- ratios and rates in tables and graphs
- equivalent ratios and double number lines
- how to solve problems with proportions
- how to use unit prices to solve problems

**Students will be able to:**

*Introducing Ratios*

- Students use ratio language to describe a ratio relationship between two quantities and identify equivalent ratios.
- Students use tables, double number line diagrams and unit prices to solve problems with equivalent ratios.

*Solving Problems with Ratios*

- Students develop and use strategies to compare ratios in context.
- Students use unit rates, double number lines, and tables of equivalent ratios to solve real-world and mathematical problems.

## Resources

**Core Text:**

https://www.desmos.com/curriculum

**Suggested Resources:**

# UNIT 3: Unit Rates and Percentages

## Summary and Rationale

In this unit, students apply the ratio reasoning they learned in Unit 2 to convert between units of measurement, solve problems with unit rates, and make sense of percentages. Students use ratio reasoning to convert between units of measurement both within and across systems of measurement. Students recognize that each ratio relationship has two unit rates, and use each of those unit rates to solve problems involving tables of equivalent ratios. Students make connections between percentages, ratios, and rates, then use this ratio reasoning to determine unknown parts, wholes, and percentages.

## Recommended Pacing

18-20 days

## State Standards

**Standard**

| CPI # | Cumulative Progress Indicator (CPI) |
|---|---|
| RP.A.2 | Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."* |

**Standard**

| CPI # | Cumulative Progress Indicator (CPI) |
|---|---|
| RP.A.3 | Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. |
| RP.A.3.B | Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* |
| RP.A.3.C | Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. |
| | |
| RP.A.3.D | Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. |

## Instructional Focus

**Unit Enduring Understandings**

- Ratio tables, tape diagrams, double number lines, and the coordinate plane are all useful models for making comparisons. Use the most reasonable model for the given problem. For example, use a double number line to compare rates.
- A ratio relationship is a multiplicative comparison of two quantities in which both quantities change by the same factor. Two or more ratios are proportional if they represent the same relationship.
- Use ratio reasoning and conversion factors as unit rates to convert between different units of measure.
- Fractions, decimals, and per cents are different forms to represent the same number. It is important to understand the relationship between them to make comparisons that help solve real-world problems.

**Unit Essential Questions**

- What mathematics models can you use for making comparisons, and which models are helpful in which situations?
- What is a ratio and how do we make sense of whether two or more ratios are proportional?
- How can you convert between different units of measure?
- Why is it important to understand the relationship between fractions, decimals, and percents?

**Objectives**

**Students will know:**

- Convert measurements from one unit to another in the same system of measurement.
- Convert measurements from one unit to another in different measurement systems.
- Calculate and interpret the two unit rates for the same relationship.
- Use unit rates to complete a table of equivalent ratios.
- Use unit rates to make comparisons and calculate unknown quantities.
- Create tape diagrams, double number line diagrams, or tables to determine unknown parts, percentages, or wholes.
- Calculate any percent of a number (e.g., `32%` of `40`).
- Calculate an unknown percentage (e.g., `32` is what `%` of `40`).

**Students will be able to:**

*Units and Measurement*

- Use ratio reasoning to convert between units of measurement.

*Unit Rates*

- Recognize and calculate two unit rates of the same ratio relationship.
- Use unit rates to solve problems involving tables of equivalent ratios.

*Percentages*

- Make connections between percentages, ratios, and rates.
- Use ratio reasoning to determine unknown parts, wholes, and percentages.

## Resources

**Core Text:**
https://www.desmos.com/curriculum

**Suggested Resources:**

# UNIT 4: Dividing Fractions

## Summary and Rationale

This unit will focus on operations with rational numbers as expressed as fractions. There will be consistent practice on dividing fractions. Operations will also include dividing whole numbers.

## Recommended Pacing

18-20 days

## State Standards

**Standard The Number System**

| CPI # | Cumulative Progress Indicator (CPI) |
|---|---|
| NS 1 | Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi? |

## Instructional Focus

**Unit Enduring Understandings**

- Division of a fraction involves multiplying with a reciprocal. Reciprocals are number pairs that have a product of 1.
- Computational fluency includes understanding the meaning and the appropriate use of numerical operations.
- The magnitude of numbers affects the outcome of operations of them.

**Unit Essential Questions**

- What is the best way to solve this? What counting strategy works best here?
- What makes a computational strategy both effective and efficient?
- How do operations affect numbers?

**Objectives**

**Students will know:**

- **how to apply GCF and LCM to fraction operations.**
- **division of fractions and mixed numbers.**
- **how to solve multistep problems with fractions and mixed numbers.**
- **division of whole numbers.**

**Students will be able to:**

- model fraction division.
- define and identify reciprocals.
- divide fractions and mixed numbers.
- use fraction operations to solve problems

## Resources

**Core Text:**
https://www.desmos.com/curriculum

**Suggested Resources:**

# Unit 5: Decimal Arithmetic

## Summary and Rationale

This unit will focus on operations with rational numbers as expressed as decimals. There will be consistent practice on adding, subtracting, multiplying, and dividing decimals.

## Recommended Pacing

22-24 days

## State Standards

**Standard: Number System**

| CPI # | Cumulative Progress Indicator (CPI) |
|---|---|
| NS3 | Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation |
| NS4 | Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express 36 + 8 as 4 (9 + 2).. |

**Standard: Ratio and Proportion**

| CPI # | Cumulative Progress Indicator (CPI) |
|---|---|
| RP3A | Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. |
| RP3B | Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed? |

## Instructional Focus

**Unit Enduring Understandings**

- Multiplication does not always make a number larger.
- Computational fluency includes understanding the meaning and the appropriate use of numerical operations.
- The magnitude of numbers affects the outcome of operations of them.

**Unit Essential Questions**

- What is the best way to solve this? What counting strategy works best here?
- What makes a computational strategy both effective and efficient?
- How do operations affect numbers?

**Objectives**

**Students will know:**

- addition and subtraction of decimals.
- multiplication of decimals.
- division of decimals.

**Students will be able to:**

- model decimal addition and subtraction.
- understand place value and use it to add and subtract decimals.
- model decimal multiplication.
- multiply decimals and use estimation to determine reasonableness of the solution.
- model decimal division.
- divide decimals by whole numbers and decimals by decimals.

| Resources |
| --- |
| **Core Text:**<br>https://www.desmos.com/curriculum<br><br>**Suggested Resources:** |

# Unit 6: Expressions and Equations

## Summary and Rationale

Students write and solve equations of the form `x+p=q` and `px=q` in and out of context. They will explore what equivalent expressions with variables are and use the distributive property to write equivalent expressions. In Grade 7, students will solve more complex equations that involve expressions from this unit.

Students extend their work with expressions to evaluate numerical and variable expressions with whole number exponents. In Grade 8, students will explore the properties of exponents. They are introduced to different ways of representing relationships: using tables, equations, and graphs. In Grades 7 and 8, students will dig deeper into each of these representations for proportional relationships and others.

## Recommended Pacing

21-23 days

## State Standards

**Standard Expressions and Equations**

| CPI # | Cumulative Progress Indicator (CPI) |
|---|---|
| EE 1 | Write and evaluate numerical expressions involving whole-number exponents. |
| EE 2a | Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5 - y. |
| EE 2b | Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms. |
| EE 2c | Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s3 and A = 6 s2 to find the volume and surface area of a cube with sides of length s = 1/2. |
| EE 3 | Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y. |
| EE 4 | Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for. |
| EE 5 | Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. |
| EE 6 | Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. |
| EE 7 | Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers. |
| EE 9 | Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent |

| | |
|---|---|
| | and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time. |

## Instructional Focus

**Unit Enduring Understandings**

- One representation may sometimes be more helpful than another; and, used together, multiple representations give a fuller understanding of a problem.
- Patterns and relationships can be represented graphically, numerically, symbolically, and verbally.
- The symbolic language of algebra is used to communicate and generalize the patterns in mathematics.

**Unit Essential Questions**

- Can the knowledge of patterns help you make predictions?
- How do you use exponents to represent numbers?
- How can change be best represented mathematically?
- How can you use equations and relationships to solve real-world problems?

**Objectives**

**Students will know:**

- exponents.
- modeling and writing expressions.
- evaluating expressions.
- generating equivalent expressions.
- writing equations to represent situations.
- writing equations from tables.
- graphing on the coordinate plane.
- independent and dependent variables in tables and graphs.
- algebraic relationships in tables and graphs

**Students will be able to:**

- understand that exponents represent repeated multiplication.
- rewrite numerical expressions using exponents.
- find the value of a power, including the zero power.
- translate verbal phrases into algebraic expressions.
- use models to represent and compare expressions.
- model real world situations using algebraic expressions.
- evaluate algebraic and real world expressions for a given variable.
- identify and write equivalent expressions using mathematical properties.
- determine if a value is a solution to a given equation.
- write equations to represent situations.
- write a situation for a given equation.
- write an equation in two variables based on a table of values.
- use tables and their equations to solve problems.
- write an equation from a graph.
- represent equations in table and graph form.

## Resources

**Core Text:**

https://www.desmos.com/curriculum

**Suggested Resources:**

# Unit 7: Positive and Negative Numbers

## Summary and Rationale

In this unit, students explore positive and negative numbers in several contexts: on a number line, represented as inequalities, and in the coordinate plane. Students describe locations on the number line and situations in context using positive and negative numbers. They also compare and order positive and negative numbers and their absolute values. Students represent inequalities, such as *x>3,* using symbols, words, and graphs, and identify some of their solutions. Students extend what they learned about the coordinate plane in Grade 5 to include points with positive and negative coordinates. Students solve real-world and mathematical problems by graphing points, and draw polygons given coordinates for the vertices.

## Recommended Pacing

17-19 days

## State Standards

| **Standard** | |
|---|---|
| **CPI #** | **Cumulative Progress Indicator (CPI)** |
| NS.C.5 | Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. |
| NS.C.6 | 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. |
| NS.C.6.A | Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., -(-3) = 3, and that 0 is its own opposite. |
| NS.C.6.B | Understand signs of numbers in ordered pairs as indicating locations 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. |
| NS.C.6.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. |
| **Standard** | |
| **CPI #** | **Cumulative Progress Indicator (CPI)** |
| NS.C.7 | Understand ordering and absolute value of rational numbers. |
| NS.C.7.A | Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret -3 > -7 as a statement that -3 is located to the right of -7 on a number line oriented from left to right*. |
| NS.C.7.B | Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write -3 $^{o}C$ > -7 $^{o}C$ to express the fact that -3 $^{o}C$ is warmer than -7 $^{o}C$*. |

| | |
|---|---|
| NS.C.7.C | Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of -30 dollars, write \|-30\| = 30 to describe the size of the debt in dollars*. |
| NS.C.7.D | Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars*. |
| **Standard** | |
| **CPI #** | **Cumulative Progress Indicator (CPI)** |
| NS.C.8 | 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. |
| EE.B.5 | Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. |
| EE.B.6 | Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. |
| EE.B.8 | Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x <$ c have infinitely many solutions; represent solutions of such inequalities on number line diagrams. |
| G.A.3 | 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 or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. |

## Instructional Focus

**Unit Enduring Understandings**

- By placing rational numbers on the number line you can compare their values.
  We need numbers other than positive rational numbers to represent situations of debt, measuring temperature. etc.
- The absolute value of a rational number is its distance from zero on a number line.
- A number line can be used to order rational numbers from least to greatest based on their order from left to right on the number line

**Unit Essential Questions**

- How can we apply and extend our understanding of the number line to include negative and opposite numbers?
- How can you use a number line to order rational numbers?
- What is absolute value?
- How can you use a number line to find the absolute value of rational numbers?
- How can you use a number line to represent solutions of an inequality?

**Objectives**

**Students will know:**

- Understand the concept of negative numbers and that they are used along with positive numbers to describe quantities.
- Compare and order integers.
- Compare and order rational numbers.
- Understand the concept of absolute value.
- Plot and reflect ordered pairs in all four quadrants of a coordinate plane.

**Students will be able to:**

*Negative Numbers and Absolute Values*

- Describe locations on the number line using positive and negative numbers.
- Compare and order positive and negative numbers and absolute values.

*Inequalities*

- Represent inequalities using symbols, words, and graphs.
- Identify solutions to inequalities.

*The Coordinate Plane*

- Describe locations on the number line using positive and negative numbers.
- Compare and order positive and negative numbers and absolute values.
- Solve problems by graphing points with positive and negative coordinates.
- Draw polygons given coordinates for the vertices.

## Resources

**Core Text:**

https://www.desmos.com/curriculum

**Suggested Resources:**

# Unit 8: Describing Data

## Summary and Rationale

In this unit, students visualize data using dot plots, histograms, and box plots, as well as calculate measures of center and spread. Students use dot plots and histograms to visualize data, making informal statements about their center and spread. Students learn about mean as a measure of center and about mean absolute deviation as a measure of spread of a data set. They then use these statistics to describe and compare data. Students learn about a second way to measure center (median) and other ways to measure spread (interquartile range and range). They create box plots to visualize data and make choices about which measures of center and spread to report based on the data.

## Recommended Pacing

21-23 days

## State Standards

**Standard Statistics and Probability**

| CPI # | Cumulative Progress Indicator (CPI) |
|---|---|
| 1 | Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages*. |
| 2 | Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. |
| 3 | Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. |
| 4 | Display numerical data in plots on a number line, including dot plots, histograms, and box plots. |
| 5a | Reporting the number of observations. |
| 5b | Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. |
| 5c | Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. |
| 5d | Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. |

## Instructional Focus

**Unit Enduring Understandings**

- The message conveyed by the data depends on how the data is collected, represented, and summarized.
- The results of a statistical investigation can be used to support an answer.

**Unit Essential Questions**

- How can collection, organization, interpretation and display of data be used to answer questions?

**Objectives**

**Students will know:**

- measures of center.
- mean absolute deviation.

- box plots.
- dot plots and data distribution.
- histograms

**Students will be able to:**

*Visualizing Data*

- Create dot plots and histograms to visualize data.
- Informally describe and compare data sets.

*Mean and MAD*

- Calculate the mean and mean absolute deviation (MAD) of a data set.
- Use mean and MAD to describe and compare data sets.

*Median and IQR*

- Compare and contrast the mean and median as measures of center.
- Calculate the quartiles, interquartile range (IQR), and range of a data set.
- Create box plots to visualize data.
- Use median and IQR to describe and compare data sets.

## Resources

**Core Text:**

https://www.desmos.com/curriculum

**Suggested Resources:**