6th Grade Mathematics Curriculum

Course Description: In grade 6, instructional time will focus on four critical areas: (1) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (2) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems;(3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.

Scope and Sequence:

Time Frame	Unit
6 blocks	Decimals
9 blocks	Factors & Fraction Review
6 blocks	Multiplying & Dividing Fractions
5 blocks	Numerical Expressions
11 blocks	Rates & Ratios
7 Blocks	Percent
8 blocks	Integers, Number Lines, and the Coordinate Plane
11 blocks	Algebraic Expression & Properties
11 blocks	Equations & Inequalities
8 blocks	Statistical Measures and Data Displays

Curriculum Revision Tracking

Spring 2022

- Update Priority Standards and Supporting Standards to align more closely with DESE Priority Standards
- Scope & Sequence adjustment:
  - Unit 1 became Decimals
  - Unit 2 became Factors and includes a review of fractions
  - A mini unit of Multiplying and dividing fractions was added as Unit 3
  - Unit 4 became Numerical Expressions
  - Rates and Ratios shifted to Unit 5
  - Integers, Number Lines, and the Coordinate Plane shifted to Unit 7, before Algebraic Expressions and Properties
  - Inequalities from chapter 8 is blended with Equations from chapter 6 to form Unit 9
  - Statistical Measures and Data Displays were merged to include necessary lessons for Unit 10

Spring 2020

- Changed the order of units
- Adjusted the timing for numerous lessons

Unit 1: Decimals

Subject: Mathematics
Grade: 6th Grade
Name of Unit: Fractions and Decimals
Length of Unit: 6 blocks
Overview of Unit: By the end of this course, all students should be proficient in adding, subtracting, multiplying, and dividing decimals. Students were introduced to some of these concepts in prior courses, now the remaining work will be completed in this course. This is the last opportunity that students will have to make sense of these computations. In future courses, the operations will be performed on rational numbers. The explorations and visual models used throughout the chapter will enable students to develop the conceptual understanding necessary for making sense of the algorithms. Students should understand that the meaning of each operation with decimals is the same as the meaning for whole numbers. Understanding this, and using visual representations, is essential to student success with these concepts. Decimal operations were introduced in the prior course, but fluency is expected by the need of this course. Students need to estimate and recognize patterns to understand where to place the decimal point in the answer. These ideas will be investigated prior to introducing an algorithm.

Priority Standards for unit:
- 6.NS.B.3 Demonstrate fluency with addition, subtraction, multiplication and division of decimals.

Supporting Standards for unit:
- 6.NS.B.2: Demonstrate fluency with division of multi-digit whole numbers.

Priority Standard	Unwrapped Concepts (Students need to know)	Unwrapped Skills (Students need to be able to do)	Bloom's Taxonomy Levels	Webb's DOK
6.NS.B.3	Demonstrate fluency with addition, subtraction, multiplication, and division of decimals	Demonstrate	Apply	3

<u>**Essential Questions**</u>:

1. How can the meaning of division be extended from whole numbers to decimals?
2. How can you extend the use of place value with whole number operations to decimal operations?

<u>Enduring Understanding/Big Ideas</u>:

1. When you divide whole numbers, the quotient is always less than or equal to the dividend. When you divide decimals, the quotient can be greater than the dividend.
2. Adding decimals is like adding whole numbers; in both situations you line up place values before you start. Multiplying decimals is like multiplying whole numbers, but you have to count up the number of decimal places in the factors and use that sum to place the decimal point in the product. Dividing decimals is like dividing whole numbers but if there is a decimal point in the divisor you have to multiply the divisor and the dividend by a power of ten before you start.

<u>Unit Vocabulary:</u>

Academic Cross-Curricular Words	Content/Domain Specific
Compare Convert Contrast Equivalent Estimate Simplify	Dividend Divisor Multiplicative Inverses Numerator Product Quotient

Big Ideas Chapter 2: Decimals

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
6.NS.B.3	2.4 Adding and Subtracting Decimals	1 Block	Add and subtract decimals and solve problems involving addition and subtraction of decimals.	• Explain why it is necessary to line up the decimal points when adding and subtracting decimals. • Add decimals. • Subtract decimals • Evaluate expressions involving addition and subtraction of decimals.
6.NS.B.3	2.5 Multiplying Decimals	1 Block	Multiply decimals and solve problems involving multiplication of decimals.	• Multiply decimals by whole numbers. • Multiply decimals by decimals. • Evaluate expressions involving multiplication of decimals.
6.NS.B.3	2.6 Dividing Whole Numbers	1 Block	Divide whole numbers and solve problems involving division of whole numbers.	• Use long division to divide whole numbers. • Write a remainder as a fraction. • Interpret quotients in real-life problems.
6.NS.B.3	2.7 Dividing Decimals	1 Block	Divide decimals and solve problems involving division of decimals.	• Divide decimals by whole numbers. • Divide decimals by decimals. • Divide whole numbers by decimals.

Unit 2: Factors and Fractions Review

Subject: Mathematics
Grade: 6th grade
Name of Unit: Numerical Expressions and Factors
Length of Unit: 9 blocks
Overview of Unit: Number theory concepts are presented in the first part of this unit. Students should be familiar with prime and composite numbers and know the difference between factors and multiples. A factor tree is introduced as a tool for finding the prime factorization of a number. Prime factorizations will be used to find the greatest common factor (GCF) and least common multiple (LCM) of two numbers. Contextual applications of the GCF and the LCM will also be explored in this chapter. Students will then apply those concepts while reviewing fractions concepts from previous coursework. Students should be able to proficiently simplify and rewrite fractions, as well as add and subtract fractions in order to be prepared to multiply and divide fractions in the next unit.

Priority Standards for unit:
- 6.NS.B.4b Find common factors and multiples. (Use the distributive property to express the sum of two whole numbers with a common factor as a multiple of two whole numbers.)

Supporting Standards for unit:
- 6.NS.B.4a Find common factors and multiples.(Find the greatest common factor (gcf) and the least common multiple (lcm).)

Priority Standard	Unwrapped Concepts (Students need to know)	Unwrapped Skills (Students need to be able to do)	Bloom's Taxonomy Levels	Webb's DOK
6.NS.B.4b	**Find common factors and multiples.(Use the distributive property to express a sum of two whole numbers with a common factor as a multiple of a sum of two whole numbers.)**	Find	Apply	3

Essential Questions:

1. What is prime factorization and how is it helpful?

Enduring Understanding/Big Ideas:

1. The prime factorization of a composite number is the number written as the product of its prime factors. Using prime factorization will more quickly allow you to find the LCM or GCF of a set of numbers.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
Equivalent Product	Common Factors Common Multiples Factor Pair Factor Tree Greatest Common Factor Least Common Multiples Ordered Pair Perfect Squares Prime Prime Factorization

Big Ideas Chapter 1: Numerical Expressions and Factors

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
6.NS.B.4	1.3 Prime Factorization	1 block	Write a number as a product of prime factors and represent the product using exponents.	• Find factor pairs of a number. • Explain the meanings of prime and composite numbers • Create a factor tree to find the prime factors of a number. • Write the prime factorization of a number.
6.NS.B.4	1.4 Greatest Common Factor	1 block	Find the greatest common factor of two numbers	• Explain the meaning of factors of a number. • Use lists of factors to identity the greatest common factor of numbers. • Use prime factors to identify the greatest common factor of numbers.
6.NS.B.4	1.5 Least Common Multiple	1 block	Find the least common multiple of two numbers	• Explain the meaning of multiples of a number. • Use list of multiples to identify the least common multiple of numbers. • Use prime factors to identify the least common multiple of numbers.
	Fractions Review	1-4 blocks (depending on student need)	Assess & review prerequisite fraction concepts	• Reduce/simplify fractions. • Rewrite equivalent fractions. • Add & subtract fractions.

Unit 3: Multiplying & Dividing Fractions

Subject: Mathematics
Grade: 6th Grade
Name of Unit: Multiplying & Dividing Fractions
Length of Unit: 6 blocks
Overview of Unit: By the end of this course, all students should be proficient in multiplying and dividing fractions, including mixed numbers. Students were introduced to some of these concepts in prior courses, now the remaining work will be completed in this course. This is the last opportunity that students will have to make sense of these computations. In future courses, the operations will be performed on rational numbers. The explorations and visual models used throughout the chapter will enable students to develop the conceptual understanding necessary for making sense of the algorithms. Students should understand that the meaning of each operation with fractions is the same as the meaning for whole numbers. Understanding this, and using visual representations, is essential to student success with these concepts.

Priority Standards for unit:
- **6.NS.A.1a Compute and interpret quotients of positive fractions.(Solve problems involving division of fractions by fractions.)**

Supporting Standards for unit:
- 5.NF.B.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

Priority Standard	Unwrapped Concepts (Students need to know)	Unwrapped Skills (Students need to be able to do)	Bloom's Taxonomy Levels	Webb's DOK
6.NS.A.1	Compute and interpret quotients of positive fractions	Compute	Apply	3
6.NS.A.1	Compute and interpret quotients of positive fractions	Interpret	Understand	2

<u>**Essential Questions**</u>:

1. How is dividing by a fraction like dividing by a whole number and how is it different?
2. How can the meaning of division be extended from whole numbers to fractions?

Enduring Understanding/Big Ideas:

1. You can use a number line model to show division of whole numbers or division of fractions: when you divide whole number, the quotient is always less than (or equal to) the dividend: when you divide fractions, the quotient can be greater than the dividend
2. When you divide whole numbers, the quotient is always less than or equal to the dividend. When you divide fractions, the quotient can be greater than the dividend.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
Compare Convert Contrast Equivalent Estimate Simplify	Denominator Dividend Divisor Factor Improper Fraction Mixed Number Multiplicative Inverses Numerator Product Quotient Reciprocal Reduce Simplest Form

Big Ideas Chapter 2: Fractions and Decimals

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
5.NF.B.6	2.1 Multiplying Fractions	1 block	Find products involving fractions and mixed numbers.	• Draw a model to explain fraction multiplication. • Multiply fractions • Find products involving mixed numbers. • Interpret products involving fractions and mixed numbers to solve real-life problems.
6.NS.A.1	2.2 Dividing Fractions	2 Blocks	Compute quotients of fractions and solve problems involving division by fractions.	• Draw a model to explain division of fractions. • Find reciprocals of numbers. • Divide fractions by fractions. • Divide fractions and whole numbers.
6.NS.A.1	2.3 Dividing Mixed Numbers	1 Block	Compute quotients with mixed numbers and solve problems involving division with mixed numbers.	• Draw a model to explain division of mixed numbers. • Write a mixed number as an improper fraction. • Divide with mixed numbers. • Evaluate expressions involving mixed numbers using the order of operations.

Unit 4: Numerical Expressions

Subject: Mathematics
Grade: 6th grade
Name of Unit: Numerical Expressions and Factors
Length of Unit: 5 blocks
Overview of Unit: Chapter 1 includes the order of operations, which is an essential understanding for work in mathematics. The inclusion of exponents as they evaluate expressions is new to students. Knowledge and understanding of these skills will be imperative to future success in mathematics.

Priority Standards for unit:
- 6.EEI.A.1 Describe the difference between an expression and an equation.

Supporting Standards for unit:
- 6.EEI.A.2a Create and evaluate expressions involving variables and whole number exponents.(Identify parts of an expression using mathematical terminology.)
- 6.EEI.A.2b Create and evaluate expressions involving variables and whole number exponents.(Evaluate expressions at specific values of the variables.)
- 6.EEI.A.2c Create and evaluate expressions involving variables and whole number exponents.(Evaluate non-negative rational number expressions.)

Priority Standard	Unwrapped Concepts (Students need to know)	Unwrapped Skills (Students need to be able to do)	Bloom's Taxonomy Levels	Webb's DOK
6.EEI.A.1	The expectation of the student is to describe the difference between an expression and an equation.	Describe	Knowledge	1

Essential Questions:

1. How do exponents allow you to communicate more precisely to others?
2. How can you use Algebraic Expressions to make decisions?

<u>Enduring Understanding/Big Ideas</u>:

1. Exponents are shorthand notations that allow you to write expressions containing repeated multiplication more efficiently and precisely.
2. Evaluating Algebraic expressions allows you to compare situations and make decisions using replacement values that make sense in a real-world situation.

<u>Unit Vocabulary:</u>

Academic Cross-Curricular Words	Content/Domain Specific
Equivalent Expression Evaluate Power Product	Base Composition Exponent Numerical Expression Order of Operations Ordered Pair Perfect Squares

Big Ideas Chapter 1: Numerical Expressions and Factors

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
6.EEI.A.1	1.1 Powers and Exponents	1 block	Write and evaluate expressions involving exponents.	• Write products of repeated factors as powers. • Evaluate powers.
6.EE1.A.2c	1.2 Order of Operations	2 blocks	Write and evaluate numerical expressions using the order of operations.	• Explain why there is a need for a standard order of operations. • Evaluate numerical expressions involving several operations, exponents, and grouping symbols. • Write numerical expressions involving exponents to represent a real-life problem.

Unit 5: Ratios and Rates

Subject: Mathematics
Grade: 6th Grade
Name of Unit: Ratios and Rates
Length of Unit: 11 blocks
Overview of Unit: This unit begins with introductory skills associated with writing and representing ratios. Fractional notation is purposely avoided. Instead, the number a/b is referred to as the value of the ratio a: b. Once the concept of a ratio has been introduced, equivalent ratios can be used to solve a wide variety of problems. Students will use the structure of a ratio table to find equivalent ratios, which in turn are used to solve real-life applications. Various operations are used to create ratio tables. Once students have a good understanding of ratios and can solve a variety of ratio problems using a tape diagram or a ratio table, rates are introduced. Students begin by graphing ratios in the first quadrant and recognizing that there is a constant rate at which the line is increasing. Rates, unit rates, and converting measures complete the unit. Converting rates, or simply converting a measurement to a different unit, integrates prior computational skills and ratio work.

Priority Standards for unit:
- 6.RP.A.1 Understand a ratio as a comparison of two quantities and represent these comparisons.
- 6.RP.A.3 Solve problems involving ratios and rates.
  - a) Create tables of equivalent ratios, find missing values in the tables and plot the pairs of values on the Cartesian coordinate plane.
  - b) Solve unit rate problems.
  - d) Convert measurement units within and between two systems of measurement.

Supporting Standards for unit:
- 6.RP.A.2 Understand the concept of a unit rate associated with a ratio and describe the meaning of unit rate.

Priority Standard	Unwrapped Concepts (Students need to know)	Unwrapped Skills (Students need to be able to do)	Bloom's Taxonomy Levels	Webb's DoK
6.RP.A.1	Understand a ratio as a comparison of two quantities and represent these comparisons	Understand	Understand	2
6.RP.A.3	Solve problems involving ratios and rates	Solve	Apply	3
6.RP.A.3.A	Create tables of equivalent ratios, find missing values in the tables and plot the pairs of values on the Cartesian coordinate plane.	Create	Create	4
6.RP.A.3.B	Solve unit rate problems.	Solve	Apply	3
6.RP.A.3.D	Convert measurement units within and between two systems of measurement	Convert	Understand	2

Essential Questions:

1. Which models are helpful in which situations?
2. How are models helpful in making comparisons?
3. Why might one representation be more useful than another?

Enduring Understanding/Big Ideas:

1. Usefulness of equivalent ratios/fractions for making predictions and scaling up and down. Usefulness of ratios as fractions for comparing terms of ratios. Usefulness of ratios as decimals for comparing ratios. A rate is a number that compares two quantities with different units. Comparing unit prices is helpful when you have to decide what to purchase. You can use rates to convert measurements from one unit to another.
2. Two ratios that are equivalent form a proportion. You can use tables, graphs, and equations to represent a proportional relationship and make comparisons. You can use a percent to represent a part to a whole ratio.
3. Being able to analyze a situation and communicate it effectively.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
Bargain Shopping Equivalent Conversions	Conversion Factor Equivalent Rates Equivalent Ratios Metric System Ratios Ratio Table Tape Diagram Unit Analysis Unit Rate US Customary System Value of the Ratio

Big Ideas Chapter 3: Ratios and Rates

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
6.RP.A.1	3.1 Ratios	1 block	Understand the concepts of ratios and equivalent ratios.	• Write and interpret ratios using appropriate notation and language. • Recognize multiplicative relationships in ratios. • Describe how to determine whether ratios are equivalent. • Name ratios equivalent to a given ratio.
6.RP.A.1	3.2 Using Tape Diagrams	1.5 blocks	Use tape diagrams to model and solve ratio problems.	• Interpret tape diagrams that represent ratio relationships. • Draw tape diagrams to model ratio relationships. • Find the value of one part of a tape diagram. • Use tape diagrams to solve ratio problems.
6.RP.A.1 6.RP.A.3.a	3.3 Using Ratio Tables	1.5 blocks	Use ratios tables to represent equivalent ratios and solve ratio problems.	• Use various operations to create tables of equivalent ratios. • Use ratio tables to solve ratio problems • Use ratio tables to compare ratios.
6.RP.A.1 6.RP.A.3.a	3.4 Graphing Ratio Relationships	1 block	Represent ratio relationships in a coordinate plane.	• Create a plot ordered pairs from a ratio relationship • Create graphs to solve ratio problems. • Create graphs to compare ratios

6.RP.A.3b	3.5 Rates and Unit Rates	1 block	Understand the concept of a unit rate and solve rate problems.	• Find unit rates • Use unit rates to solve rate problems. • Use unit rates to compare rates
6.RP.A.3.d	3.6 Converting Measures	2 blocks	Use ratio reasoning to convert units of measure.	• Write conversion facts as unit rates. • Convert units of measure using ratio tables. • Convert units of measure using conversion factors. • Convert rates using conversion factors.

Unit 6: Percents

Subject: Mathematics
Grade: 6th Grade
Name of Unit: Percents
Length of Unit: 7 blocks
Overview of Unit: A major goal of this chapter is to describe percents as another way of representing fractions and decimals. More specifically, because the term *percent* means *per one hundred*, you can write percents as fractions or decimals. The terminology and notation may be new to students, but the concept is not. The first two lessons examine the relationship between fractions and percents, and then decimals and percents. Mathematical language and models will be used to make these connections. The chapter continues with a lesson on comparing and ordering the three representations of numbers. Help students further develop their number sense by working with number line representations of fractions and decimals. There are many online tools that may aid in this understanding. The last lesson of the chapter is on solving percent problems. Tape diagrams are used to model the whole, the part, and the percent. Help students understand how the model is labeled, and how to use and interpret the model.

Priority Standards for unit:
- 6.NS.C.8: Extend prior knowledge to generate equivalent representations of rational numbers between fractions, decimals and percentages (limited to terminating decimals and/or benchmark fractions of 1/3 and 2/3).
- 6.RP.A.3c: Solve problems involving ratios and rates.(Solve percent problems.)

Standard	Unwrapped Concepts (Students need to know)	Unwrapped Skills (Students need to be able to do)	Bloom's Taxonomy Levels	Webb's DOK
6.NS.C.8	Generate equivalent representations of rational numbers between fractions, decimals and percentages	Generate	Apply	3
6.RP.A.3	Find a percent of a quantity and solve percent problems	Find	Understand	2
6.RP.A.3	Find a percent of a quantity and solve percent problems	Solve	Apply	3

Essential Questions:

1. What are percents? What is the value of having a common language for comparing ratios?
2. How is a fraction used to represent a percent?

Enduring Understanding/Big Ideas:

1. Percents are a common language for comparing ratios. Having a common language helps situations be compared more easily. For example, it is easier to compare 25% to 20 than to compare ¼ to ⅖.
2. A percent can be written as a fraction over 100, where 100 is the whole, (denominator) and the percent is the part, (numerator).

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
Ascending Compare Descending Order	Base Ten Blocks Decimal Fraction Percent Whole Number

Big Ideas Chapter 4: Percents

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
6.NS.C.8	4.1 Percents and Fractions	1 block	Write percents as fractions and fractions as percents.	• Draw models to represent fractions and percents. • Write percents as fractions. • Write equivalent fractions with denominators of 100. • Write fractions as percents.
6.NS.C.8	4.2 Percents and Decimals	1 block	Write percents as decimals and decimals as percents.	• Draw models to represent decimals. • Explain why the decimal point moves when multiplying and dividing by 100 • Write percents as decimals • Write decimals as percents
6.NS.C.8	4.3 Comparing and Ordering Fractions, Decimals and Percents	1 block	Compare and order fractions, decimals, and percents.	• Rewrite a group of fractions, decimals, and percents using the same representation. • Explain how to compare fractions, decimals, and percents. • Order fractions, decimals, and percents from least to greatest.
6.RP.A.3a	4.4 Solving Percent Problems	2 blocks	Find a percent of a quantity and solve percent problems.	• Represent percents of numbers using an equation, a ratio table, or a model. • Find percents of numbers. • Find the whole given a part and the percent

Unit 7: Integers, Number Lines, and the Coordinate Plane

Subject: Mathematics
Grade: 6th Grade
Name of Unit: Integers, Number Lines, and the Coordinate Plane
Length of Unit: 8 blocks
Overview of Unit: This unit brings together and extends two areas of previous study, the number system and work with equations. Students' understanding of decimals and fractions is applied to negative quantities and their understanding of equations is applied to inequalities. Understanding that negative numbers can represent quantities that have opposite directions or values is more difficult and representing negative numbers on a number line is often the most challenging. Temperatures and elevations are familiar applications for students and are both typically represented in a vertical form. When rational numbers are represented on a horizontal number line, students can become very confused.
Absolute value is introduced, defining IaI as the distance between the number and zero. Students have previously learned to plot ordered pairs in the first quadrant and with the introduction of negative numbers students can now plot in all four quadrants.

Priority Standards for unit:
- 6.NS.C.6c Locate a rational number as a point on the number line. (Understand that a number and its opposite (additive inverse) are located on opposite sides of zero on the number line.).
- 6.NS.C.7 Understand that the absolute value of a rational number is its distance from 0 on the number line.
- 6.GM.A.3 Solve problems by graphing points in all four quadrants of the Cartesian coordinate plane.
  - a) Understand signs of numbers in ordered pairs as indicating locations in quadrants of the Cartesian coordinate plane.
  - b) 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 distances between points with the same first coordinate or the same second coordinate.
  - d) Construct polygons in the Cartesian coordinate plane.

Supporting Standards for unit:
- 6.NS.C.5:Use positive and negative numbers to represent quantities.
- 6.NS.C.6a Locate a rational number as a point on the number line.(Locate rational numbers on a horizontal or vertical number line.)
- 6.NS.C.6b Locate a rational number as a point on the number line.(Write, interpret and explain problems of ordering of rational numbers.)

Priority Standard	Unwrapped Concepts (Students need to know)	Unwrapped Skills (Students need to be able to do)	Bloom's Taxonomy Levels	Webb's DOK
6.NS.C.6	Locate a rational number as a point on the number line. a. Locate rational numbers on a horizontal or vertical number line.	Locate	Knowledge	1
6.NS.C.7	Understand that the absolute value of a rational number is its distance from 0 on the number line.	Understand	Understand	2
6.GM.A.3	Solve problems by graphing points in all four quadrants of the Cartesian coordinate plane.	Solve	Solve	3

Essential Questions:

1. What does it mean for one negative number to be greater than another negative number?
2. How can you use that information?
3. How can you express the distance of any number from zero?
4. When might you might need to know the distance from zero?
5. How is a number line related to the coordinate plane?
6. How are integers used within a coordinate plane?
7. How are integers used to express distances?

Enduring Understanding/Big Ideas:

1. As with positive numbers, the greater negative number is located farther to the right on a number line.
2. This allows you to use a number line to compare and order integers so you can determine which is the greater or least.
3. The absolute value of any number expresses the distance of the number from zero.
4. The absolute value allows you to compare numbers on either side of zero to find which is closest to or farthest from zero.
5. The coordinate plane is formed by two number lines, one vertical and one horizontal, that intersect at the origin.

6. Pairs of integers, called coordinates, are used to describe the locations of points on the coordinate plane.
7. Positive integers and zero are used to measure distance. Negative integers can't be used to measure distances, but they can be used to indicate a position relative to another location.
   From 0 is greater. When comparing two negative numbers, the number closer to 0 is greater.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
Deposit Distance Greater than Horizontal Less Than Number Line Vertical Withdraw	Absolute Value Coordinate Plane Graph of inequality Inequality Integers Opposites Order Pair Origin Negative Numbers Polygon Positive Numbers Quadrants Rational Numbers Reciprocal Reflection Solution of an inequality Solution Set Vertices X-Axis X coordinate Y-Axis Y coordinate

Big Ideas Chapter 8: Integers, Number Lines, and the Coordinate Plane

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
6.NS.C.5	8.1 Integers	1 Block	Understand the concept of negative numbers and that they are used along with positive numbers to describe quantities.	• Write integers to represent quantities in real life. • Graph integers on a number line. • Find the opposite of an integer. • Apply integers to model real-life problems.
6.NS.C.6	8.2 Comparing and Ordering Integers	1 Block	Compare and order integers.	• Explain how to determine which of two integers is greater. • Order a set of integers from least to greatest. • Interpret statements about order in real-life problems.
6.NS.C.6c	8.3 Rational Numbers	1 Block	Compare and order rational numbers.	• Explain the meaning of a rational number. • Graph rational numbers on a number line • Determine which of two rational numbers is greater. • Order a set of rational numbers from least to greatest.
6.NS.C.7	8.4 Absolute Value	1 Block	Understand the concept of absolute value.	• Find the absolute value of a number. • Make comparisons that involve absolute values of numbers. • Apply absolute value in real-life problems.

6.GM.A.3a-d	8.5 The Coordinate Plane	1 Block	Plot and reflect ordered pairs in all four quadrants of a coordinate plane.	• Identify ordered pairs in a coordinate plane. • Plot ordered pairs in a coordinate plane and describe their locations. • Reflect points in the x-axis, the y-axis, or both axes. • Apply plotting points in all four quadrants to solve real-life problems.
6.GM.A.3a-d	8.6 Polygons in the Coordinate Plane	1 Block	Draw polygons in the coordinate plane and find distances between points in the coordinate plane.	• Draw polygons in the coordinate plane. • Find distances between points in the coordinate plane with the same x-coordinates or the same y-coordinates. • Find horizontal and vertical side lengths of polygons in the coordinate plane • Draw polygons in the coordinate plane to solve real-life problems.

Unit 8: Algebraic Expressions and Properties

Subject: Mathematics
Grade: 6th Grade
Name of Unit: Algebraic Expressions and Properties
Length of Unit: 11 blocks
Overview of Unit: Students will write and evaluate algebraic expressions, use properties with algebraic expressions, and factor expressions.

Students used variable in prior courses, often in the context of finding the area or the perimeter of a geometric figure. Formulas were written as verbal models and then variables were introduced. The order of operations, including exponents and grouping symbols, is extended to algebraic expressions. In prior courses, students were introduced to the Commutative and Associative Properties. The Addition Property of Zero and the Multiplication Properties of Zero and One are presented in this unit All the properties are shown with words, numbers, and variables. Students have some experience using the Distributive Property with numerical expressions. Help students recognize that factoring is represented in the Distributive Property.

Priority Standards for unit:
- 6.EEI.A.2 Create and evaluate expressions involving variables and whole number exponents
  - d) Write and evaluate algebraic expressions
  - e) Understand the meaning of the variable in the context of the situation
- 6.EEI.A.3:Identify and generate equivalent algebraic expressions using mathematical properties.

Priority Standard	Unwrapped Concepts (Students need to know)	Unwrapped Skills (Students need to be able to do)	Bloom's Taxonomy Levels	Webb's DOK
6.EEI.A.2	Evaluate algebraic expressions given values of their variables	Evaluate	Evaluate	4
6.EEI.A.2	Write algebraic expressions and solve problems involving algebraic expressions.	Solve	Apply	3

6.EEI.A.3	Identify and generate equivalent algebraic expressions using mathematical properties.	Generate	Apply	3

Essential Questions:

1. What is an advantage of using mathematical expressions?
2. What are properties? How are properties useful?

Enduring Understanding/Big Ideas:

1. When you don't know all of the information, a numerical expression isn't enough, and you need to write an algebraic expression

2. They allow you to rewrite expression in different ways. Rewriting an expression allows you to see the problem in a new way, which can sometimes help you see a solution path, or a new way of looking at the problem

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
Collect Factor Order	Algebraic Expression Associative Property of Addition Associative Property of Multiplication. Coefficient Commutative Property of Addition commutative Property of Multiplication Constant Distributive Property Equivalent Expressions Factoring the Expression Identity Property of Addition Identity Property of Multiplication Like Terms Term Variable Zero Property

Big Ideas Chapter 5: Algebraic Expressions and Properties

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
6.EEI.A.2d 6.EEI.A.2e	5.1 Algebraic Expressions	1.5 blocks	Evaluate algebraic expressions given values of their variables	• Identify Parts of an algebraic expressions. • Evaluate algebraic expressions with one or more variables. • Evaluate algebraic expressions with one or more operations.
6.EEI.A.2d	5.2 Writing Expressions	1.5 blocks	Write algebraic expressions and solve problems involving algebraic expressions.	• Write numerical expressions. • Write algebraic expressions. • Write and evaluate algebraic expressions that represent real-life problems.
6.EE.I.A.3	5.3 Properties of Addition and Multiplication	1 block	Identify equivalent expressions and apply properties to generate equivalent expressions.	• Explain the meaning of equivalent expressions. • Use properties of addition to generate equivalent expressions. • Use properties of multiplication to generate equivalent expressions.
6.EE.I.A.3	5.4 The Distributive Property	2 blocks	Apply the Distributive property to generate equivalent expressions.	• Explain how to apply the Distributive Property. • Use the Distributive Property to simplify algebraic expressions. • Use the Distributive Property to combine like terms.

6.EE.I.A.3	5.5 Factoring Expressions	2 blocks	Factor numerical and algebraic expressions	- Use the Distributive Property to factor numerical expressions. - Identify the greatest common factor of terms including variables. - Use the Distributive Property to factor algebraic expressions. - Interpret factored expressions in real-life problems.

Unit 9: Equations and Inequalities

Subject: Mathematics
Grade: 6th Grade
Name of Unit: Equations
Length of Unit: 11 blocks
Overview of Unit: The algebra strand continues in this unit as students learn to write and solve equations in one variable with nonnegative rational-number solutions. Students will also analyze the quantitative relationship between independent and dependent variables.

You want students to understand that performing the inverse operation allows them to solve the equation, with the exception of multiplying by the reciprocal being a more efficient method for solving an equation with a fractional coefficient.

Students will also write and graph equations in two variables. Students will graph the equation by first creating a table of solutions to the equation and then plotting the ordered pairs.

Priority Standards for unit:
- 6.EEI.B.5 Understand that if any solution exist, the solution set for an equation or inequality consists of values that makes the equation or inequality true.
- 6.EEI.B.6 Write and solve equations using variables to represent quantities, and understand the meaning of the variable in the context of the situation.
- 6.EEI.C.9a Identify and describe relationships between two variables that change in relationships to one another. (Write an equation to express one quantity, the dependent variable, in terms of the other quantity, the independent variable.)
- 6.EEI.C.9b Identify and describe relationships between two variables that change in relationship to one another.(Analyze the relationship between the dependent and independent variables using graphs, tables and equations and relate these representations to each other.)

Supporting Standards for unit:
- 6.EEI.B.7 Solve one-step linear equations in one variable involving non-negative rational numbers.
- 6.EEI.B.4 Use substitution to determine whether a given number in a specified set makes a one-variable equation or inequality true.
- 6.EEI.B.8a Recognize that inequalities may have infinitely many solutions.(Write an inequality of the form $x > c$, $x < c$, $x \geq c$, or $x \leq c$ to represent a constraint or condition.)
- 6.EEI.B.8b Recognize that inequalities may have infinitely many solutions.(Graph the solution set of an inequality.)

Priority Standard	Unwrapped Concepts (Students need to know)	Unwrapped Skills (Students need to be able to do)	Bloom's Taxonomy Levels	Webb's DOK
6.EEI.B5	Understand that if any solution exists, the solution set for an equation or inequality consists of values that makes the equation or inequality true.	Understand	Understand	3
6.EEI.B.6	Write and solve equations using variables to represent quantities and understand the meaning of the variable in the context of the situation.	Write and Solve	Apply	3
6.EEI.C.9	Identify and describe relationships between two variables that change in relationships to one another.	Write	Apply	3

Essential Questions:

1. How are mathematical equations used to represent real-world situations?
2. How can you represent relationships that are equal?
3. How are two-variable relationships different from one-variable relationships? When do you need two variables?

Enduring Understanding/Big Ideas:

1. A lot of real-world situation can be represented with numbers.
2. You can represent a relationship with a verbal description, math symbols, or you can draw a diagram. You can write an equation to represent an equal relationship.
3. Sometimes there are two unknown quantities in a problem situation, so you need two variables. In a two-variable situation, a change in one quantity affects the other quantity. You can solve an equation with one variable by undoing operation, and the answer is usually a single number. Equations with two variables have many solutions, and you can find one of the solutions by substituting a value for one of the variables and solving for the other variable.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
Balance Solve Unknown	Area Equation in two variables Dependent Variable Division Property of Equality Independent Variable Inverse Operations Perimeter Solution of an equation in two variables.

Big Ideas Chapter 6: Equations

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
6.EEI.B.5 6.EEI.B.6	6.1 Writing Equations in One Variable	1 block	Write equations in one variable and write equations that represent real-life problems.	• Identify key words and phrases that indicate equality. • Write word sentences as equations. • Create equations to represent real-life problems.
6.EE.B.5	6.2 Solving equations using Addition or Subtraction	1 block	Write and solve equations using addition or subtraction.	• Determine whether a value is a solution of an equation. • Apply the Addition and Subtraction Properties of Equality to generate equivalent equations. • Solve equations using addition or subtraction. • Create equations involving addition or subtraction to solve real-life problems.
6.EEI.B.5	6.3 Solving Equations Using Multiplication or Division	1.5 blocks	Write and solve equations using multiplication or division.	• Apply the Multiplication and Division Properties of Equality to generate equivalent equations. • Solve equations using multiplication or division. • Create equations involving multiplication or division to solve real-life problems.

6.EEI.C.9a 6.EEI.C.9b	6.4 Writing Equations in Two Variables.	1 block	Write equations in two variables and analyze the relationship between the two quantities.	• Determine whether an ordered pair is a solution of an equation in two variables. • Distinguish between independent and dependent variables. • Write and graph an equation in two variables. • Create equations in two variables to solve real-life problems.
6.EEI.B.8	8.7 Writing and Graphing Inequalities	2 Blocks	Write inequalities and represent solutions of inequalities on number lines.	• Write word sentences as inequalities. • Determine whether a value is a solution of an inequality. • Graph the solutions of inequalities.
6.EEI.B.5	8.8 Solving Inequalities	2 Blocks	Write and solve inequalities.	• Apply the properties of inequality to generate equivalent inequalities. • Solve inequalities using addition or subtraction. • Solve inequalities using multiplication or division. • Write and solve inequalities that represent real-life problems.

Unit 10: Statistical Measures & Data Displays

Subject: Mathematics
Grade: 6th Grade
Name of Unit: Statistical Measures
Length of Unit: 8 blocks
Overview of Unit: Students need to understand what a statistical question is. "What video game did you play last night?" is not a statistical question. "What video games did students in your math class play last night?" is a statistical question about categorical data. You expect a variety of answers. "How many video games were played by students in your math class last night?" is a statistical question about numerical data. You expect a variety of answers and you are interested in the *distribution* and *tendency* of those answers. Data collected can be described by its center spread, and overall shape. A measure of center summarizes all of the values in a data set with a single number and describes the typical value of a data set. Measures of center include mean, median, and mode. A measure of variation describes the variability of a data set with a single number. Measurement of variation include range, interquartile range, and the mean absolute deviation. Overarching goals of the unit are for students to develop an understanding of statistical variability and to be able to summarize and describe and compare the shapes of distributions of a data set.

Priority Standards for unit:
- 6.DSP.A.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.
- 6.DSP.B.5d Summarize numerical data sets in relation to the context. (Analyze the choice of measures of center and variability based on the shape of the data distribution and/or the context of the data.) If students do not have a good understanding of data displays, there are more resources in Chapter 10 available to deepen understanding of dot plots, histograms, and box plots.

Supporting Standards for unit:
- 6.DSP.A.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answer.
- 6.DSP.B4 Display and interpret data.
   - a) Use dot plots, histograms and box plots to display and interpret numerical data.
   - b) Create and interpret circle graphs.
- 6.DSP.B.5 Summarize numerical data sets in relation to the context.
   - a) Report the number of observations.
   - b) Describe the nature of the attribute under investigation, including how it was measured and its units of measurement.

c) Give 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 of the data.

- 6DSP.A.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 from a single number.

Priority Standard	Unwrapped Concepts (Students need to know)	Unwrapped Skills (Students need to be able to do)	Bloom's Taxonomy Levels	Webb's DOK
6.DSP.A.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answer.	Recognize	Knowledge	1
6.DSP.A.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.	Understand	Understand	2
6DSP.A.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 from a single number.	Describe	Knowledge	1
6DSP.A.5	Summarize numerical data sets in relation to the context.	Summarize	Understand	2

Essential Questions:

1. Why would you ask a statistical question?
2. How do you use measures of center?

Enduring Understanding/Big Ideas:

1. Statistical questions are questions that anticipate variability.
2. Use measure of center to summarize all of the values in a data set with a single number, and use measures of variation to summarize how all the values in a data set vary with a single number.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
Average Data Graphs Survey	First quartile Interquartile range Mean Mean absolute deviation Measure of center Measure of variation Median Mode Outlier Quartiles Range Skewed Statistics Statistical question Symmetry Third quartile

Big Ideas Chapter 9: Statistical Measures & Chapter 10: Data Displays

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
6.DSP.A.1	9.1 Introduction to Statistics	1 Block	Identify statistical questions and use data to answer statistical questions.	• Recognize questions that anticipate a variety of answers. • Construct and interpret a dot plot. • Use data to answer a statistical question.
6.DSP.A.2	9.2 Mean	½ Block	Find and interpret the mean of a data set.	• Explain how the mean summarizes a data set with a single number. • Find the mean of a data set. • Use the mean of a data set to answer a statistical question.
6.DSP.A.3	9.3 Measures of Center	½ Block	Find and interpret the median and mode of a data set.	• Explain how the median and mode summarize a data set with a single number. • Find the median and mode of a data set. • Explain how changes to a data set affect the measures of center. • Use a measure of center to answer a statistical question.

6.DSP.B.5	9.4 Measures of Variation	1 Block	Find and interpret the range and interquartile range of a data set.	• Explain how the range and interquartile range describe the variability of a data set with a single number. • Find the range and interquartile range of a data set. • Use the interquartile range to identify outliers.
6.DSP.B.5	9.5 Mean Absolute Deviation	1 Block	Find and interpret the mean absolute deviation of a data set.	• Explain how the mean absolute deviation describes the variability of a data set with a single number. • Find the mean absolute deviation of a data set. • Compare data sets using the mean absolute deviation to draw conclusions.
6.DSP.B.5	10-3 Shapes of Distributions	1 Block	Describe and compare shapes of distributions.	• Explain what it means for a distribution to be skewed left, skewed right, or symmetric. • Use data displays to describe shapes of distributions. • Use shapes of distributions to compare data sets.
6.DSP.B.5	10-4 Choosing Appropriate Measures	1 Block	Determine which measures of center and variation best describe a data set.	• Describe the shape of a distribution. • Use the shape of a distribution to determine which measure of center best describes the data. • Use the shape of a distribution to determine which measure of variation best describes the data.

Unit 11: Area, Surface Area, and Volume.

Subject: Mathematics
Grade: 6th Grade
Name of Unit: Area, Surface Area, and Volume
Length of Unit: 8 blocks
Overview of Unit: This unit is not tied to any priority standards, but these supporting standards are concepts that students will use once they get to Algebra. This unit was placed at the end because this would provide an opportunity to do some authentic projects with students surrounding these standards. Students will extend measurement concepts in this unit by deriving various area, surface area, and volume formulas. The three types of measurement associated with two- and three-dimensional figures each have particular units associated with them. As you work through the chapter, be intentional in mentioning the units and ask what a square centimeter looks like or a cubic foot? What do students visualize when they hear these words? Each of the area formulas can be derived from the formula of the area of a rectangle. You want students to make sense of the formulas, not just memorize them. Students apply their understanding of area when they find the surface area of prisms and pyramids. The approach used to develop an understanding of surface area is to recognize the two-dimensional net that can be folded to form the prism of the pyramid. All of the faces will be polygons. It is very important that the students have the tactile experience of drawing, cutting, and folding nets.

Supporting Standards for unit:
- 6.GM.A.1 Find the area of polygons by composing or decomposing the shapes into rectangles or triangles
- 6.GM.A.4 Solve problems using nets.
    - Represent three-dimensional figures using nets made up of rectangles and triangles.
    - Use nets to find the surface area of three-dimensional figures whose sides are made up of rectangles and triangles.
- 6.GM.A.2 Find the volume of right rectangular prisms.
    - Understand that the volume of a right rectangular prism can be found by filling.
    - Apply V=l * w * h and V= Bh to find the volume of right rectangular prisms.

Essential Questions:

1. How can you rearrange shapes to makes other shapes? Why would you want to?
2. If you want to compare boxes, what do you compare?

<u>Enduring Understanding/Big Ideas</u>:

1. Making connections between shapes and their area formulas. The ability to decompose shapes into basic polygons
2. Utilizing nets of three-dimensional figures to finding surface areas and then to finding volumes. Breaking three-dimensional figures into surface pieces for finding surface areas.

<u>Unit Vocabulary:</u>

Academic Cross-Curricular Words	**Content/Domain Specific**
Compose Decompose Evaluate Solid Volume	Composite Figure Cube Edges Faces Kite Net Parallelogram Prism Polygon Polyhedron Pyramid Prism Pyramid Rectangle Rectangular Prism Solid Square Surface area Trapezoid Triangle Vertices Vertex Volume

Big Ideas Chapter 7: Area, Surface Area, and Volume

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
6.GM.A.1	7.1 Areas of Parallelograms	½ block	Find areas and missing dimensions of parallelograms.	• Explain how the area of a rectangle is used to find the area of a parallelogram. • Use the base and the height of a parallelogram to find its area. • Use the area of a parallelogram and one of its dimensions to find the other dimension.
6.GM.A.1	7.2 Areas of Triangles	½ block	Find areas and missing dimensions of triangles and find areas of composite figures.	• Explain how the area of a parallelogram is used to find the area of a triangle. • Use the base and the height of a triangle to find its area. • Use the area of a triangle and one of its dimensions to find the other dimension. • Use decomposition to find the area of a figure.
6.GM.A.1	7.3 Areas of Trapezoids and Kites	1 block	Find areas of trapezoids, kites, and composite figures.	• Explain how the area of a parallelogram is used to find the area of a trapezoid. • Decompose trapezoids and kites into smaller shapes. • Use decomposition to find the area of a figure. • Use the bases and the height of a trapezoid to find its area.

6.GM.A.4	7.4 Three-Dimensional Figures	1 block	Describe and draw three-dimensional figures.	• Find the numbers of faces, edges, and vertices of a three-dimensional figure. • Draw prisms and pyramids. • Draw the front, side, and top views of a three-dimensional figure.
6.GM.A.4	7.5 Surface Areas of Prisms	1 block	Represent prisms using nets and use nets to find surface areas of prisms.	• Draw nets to represent prims. • Use nets to find surface areas of prisms • Use a formula to find the surface area of a cube. • Apply surface areas of prisms to solve real-life problems.
6.GM.A.4	7.6 Surface Areas of Pyramids	1 block	Represent pyramids using nets and use nets to find surface areas of pyramids.	• Draw nets to represent pyramids. • Use nets to find surface areas of pyramids. • Apply surface areas of pyramids to solve real-life problems.
6.GM.A.2	7.7 Volumes of Rectangular Prisms	1 block	Find volumes and missing dimensions of rectangular prisms.	• Use a formula to find the volume of a rectangular prism. • Use a formula to find the volume of a cube. • Use the volume of a rectangular prism and two of its dimensions to find the other dimension. • Apply volumes of rectangular prisms to solve real-life problems.

Unit of Study Terminology

Appendices: All Appendices and supporting material can be found in this course's shell course in the District's Learning Management System.

Assessment Leveling Guide: A tool to use when writing assessments in order to maintain the appropriate level of rigor that matches the standard.

Big Ideas/Enduring Understandings: Foundational understandings teachers want students to be able to discover and state in their own words by the end of the unit of study. These are answers to the essential questions.

Engaging Experience: Each topic is broken into a list of engaging experiences for students. These experiences are aligned to priority and supporting standards, thus stating what students should be able to do. An example of an engaging experience is provided in the description, but a teacher has the autonomy to substitute one of their own that aligns to the level of rigor stated in the standards.

Engaging Scenario: This is a culminating activity in which students are given a role, situation, challenge, audience, and a product or performance is specified. Each unit contains an example of an engaging scenario, but a teacher has the ability to substitute with the same intent in mind.

Essential Questions: Engaging, open-ended questions that teachers can use to engage students in the learning.

Priority Standards: What every student should know and be able to do. These were chosen because of their necessity for success in the next course, the state assessment, and life.

Supporting Standards: Additional standards that support the learning within the unit.

Topic: These are the main teaching points for the unit. Units can have anywhere from one topic to many, depending on the depth of the unit.

Unit of Study: Series of learning experiences/related assessments based on designated priority standards and related supporting standards.

Unit Vocabulary: Words students will encounter within the unit that are essential to understanding. Academic Cross-Curricular words (also called Tier 2 words) are those that can be found in multiple content areas, not just this one. Content/Domain Specific vocabulary words are those found specifically within the content.