

CURRICULUM

GUIDE

Math - Grade 6

ProVidence
Schools

Background

Providence Schools teachers and administrators worked collaboratively with consultants from the Charles A. Dana Center at the University of Texas at Austin to develop the mathematics and science curriculum frameworks. The curriculum frameworks encompass two critical questions:

- Content Standards that establish clearly defined expectations for all students, helping to answer the question, **What do students have to learn?**
- Performance Standards that determine performance expectations for content standards, helping to answer the question, **How well do the students have to learn it?**

The curriculum framework provides a work plan that directs the instruction delivered in every classroom in every school in the district. Instruction—the way the curriculum is presented to students—will focus on the needs of students.

Purpose and Use of Curriculum Guides

Curriculum Guides for the curriculum for each grade and subject outline the approximate number of days that each unit in the curriculum will be taught; describe the content to be learned; and list the essential questions that students should be able to answer by the end of the unit.

Parents should become familiar with the Curriculum Guides. You should know when your child is being taught different topics. You should also know the essential questions that your child should be able to answer by the end of each unit.

It is important that you understand that you do not have to be familiar with the content that your child is learning in order to help them with their studies. There are basic questions that you can ask to determine if your child understands the content.

Ask your child what she is learning in each subject
*Does she understand the topic? Is the unit exciting or boring?
What specifically does she like or dislike about the topic?
Does she understand how the topic relates to the real world?*

You know your child better than anyone. You will be able to tell if she or he is benefiting from the instruction and understanding the content of the material by the way they answer you. Speak to your child's teacher if you suspect there is a problem.

Ask your child about his assignments

What is the required work? Has he finished the work on time? Is he having difficulty? If he is having difficulty, why?

Encourage your child to talk to her teachers if she is having difficulty understanding a concept or completing an assignment. If your child continues to experience difficulty, speak to the teacher yourself so that the two of you can work together to support your child.

Even if you do not understand the content that your child is learning, the fact that you are showing interest in his or her school work and believe that it is important that he or she does well sends a powerful message.

Sharon Contreras
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QUARTER I

Content students will be learning

Essential questions students should be able to answer by end of unit

Unit 1.1 - Using Factors and Multiples

(8 days)

- Understand relationships among factors, multiples, divisors, and products.
- Recognize and use properties of prime and composite numbers, even and odd numbers, and square numbers.
- Develop strategies for finding factors and multiples, least common multiples, and greatest common factors.
- Develop a variety of strategies for solving problems, such as building models, making lists and tables, drawing diagrams, and solving simpler problems.

- » How can finding the factors of a number or numbers help you in a problem-solving situation?
- » How can you find the factors for a given number?
- » How can finding the multiples of a number or numbers help you in a problem-solving situation?
- » For a given pair or set of numbers, what common factors and common multiples do these numbers have?

Unit 1.2 - Prime Factorization and Exponents

(6 days)

- Develop a systematic strategy for finding prime factorizations.
- Understand that a number may have several different factorizations, but except for order, each whole number > 1 has exactly one factorization into a product of prime numbers (Fundamental Theorem of Arithmetic).
- Develop strategies for using prime factorization to determine common multiples and factors.
- Understand how to order and compare numbers with whole number bases and whole number exponents.

- » How can you find the prime factorization of any number?
- » Why is it important that 1 is not a prime number?
- » How can you express the prime factorization of a number using exponents?
- » How many prime factorizations does a given number have?
- » How can you use the prime factorization of two or more numbers in order to find their least common multiple and greatest common factor?

Unit 1.3 - Understanding and Representing Fractions

(7 days)

- Understand how physical models (fraction strips) can be used to represent, compare, and order fractions.
- Understand and use equivalent fractions to reason about situations.
- Develop meaningful strategies for representing fraction amounts larger than 1 as both mixed numbers and improper fractions.
- Develop strategies for comparing and ordering fractions (including fractions greater than 1) without models.
- Develop benchmarking strategies that can be used to order and compare fractions along a number line.

- » How can you find a fraction equivalent to a given fraction? Describe your strategy.
- » How can you decide whether a fraction is between 0 and $\frac{1}{2}$ or between $\frac{1}{2}$ and 1?
- » How can you decide which of two fractions is greater?
- » How can you write a mixed number as a fraction?
- » How can you write a fraction greater than 1 as a mixed number?

Unit 1.4 - Converting Between Fractions, Decimals, and Percents

(9 days)

- Understand ways to compare, order, and convert rational numbers across number formats.
- Understand how physical models (hundredths strips and hundredths grids) and number lines can be used to represent, compare, and order decimals and percents.
- Develop benchmarking strategies that can be used to order and compare rational numbers and to solve problems involving rational numbers.

- » How can you change a percent to a decimal and to a fraction?
- » What techniques can be used to find fraction, decimal, or percent names for the same quantity?
- » How is a percent like a fraction?
- » How are percents useful in making comparisons?
- » How can you find what percent one number is of another number? For example, what percent of 200 is 75?

QUARTERS 1 & 2

Content students will be learning

Essential questions students should be able to answer by end of unit

Unit 1.5 - Symmetries, Polygons, and Angles (7 days)

- Understand how geometric properties can be used to classify triangles and quadrilaterals.
- Investigate the symmetries of a shape—rotation, reflection, and translation.
- Develop strategies for estimating angle measures using reference to a right angle and other benchmark angles.
- Understand when precision in measurement is important.

- » What kinds of shapes/polygons will cover a flat surface?
- » What does the measure of angle tell you? Give an example.
- » How can you estimate an angle measure? Give an example.
- » What does it mean for a figure to have reflection symmetry?
- » What does it mean for a figure to have rotation symmetry?

QUARTER 2

QUARTER 2

Unit 2.1 - Adding and Subtracting Fractions (9 days)

- Understand how to use benchmarks and other strategies to estimate the reasonableness of results of operations with fractions.
- Develop models to represent sums and differences of fractions.
- Apply number properties in problem-solving situations that require the adding and subtracting of fractions.
- Develop algorithms for adding and subtracting fractions.
- Understand when to apply addition and subtraction of fractions in problem-solving situations.
- Understand how to represent the inverse relationship between addition and subtraction of fractions by generating fact families.

- » What kinds of models can be used to show computation with fractions?
- » How can you use estimation to determine if your answer is reasonable when adding or subtracting fractions?
- » What do whole number operations reveal about the meaning of operations with fractions?

Unit 2.2 - Multiplying with Fractions (7 days)

- Develop and use strategies and models for multiplying combinations of fractions, whole numbers, and mixed numbers to solve problems.
- Understand the effect of multiplying a given number by a whole number, fraction, or mixed number.
- Understand when multiplication is an appropriate operation in problem-solving situations.
- Understand how the multiplicative identity applies to fractions.
- Explore the relationships among two numbers and their product.
- Develop and use an efficient algorithm for fraction multiplication in problem solving.

- » What kinds of models can be used to show computation with fractions?
- » How do you describe your algorithm for multiplying fractions?
- » What does the word *of* mean when you find a fraction *of* another number? What operation is implied by the word?
- » When you multiply a fraction less than 1 by another fraction less than 1, your answer is always less than either factor. Why is that true?

Unit 2.3 - Dividing with Fractions (6 days)

- Develop and use strategies and models for dividing combinations of fractions, whole numbers, and mixed numbers to solve problems.
- Understand the effect of dividing a given number by a whole number, fraction, or mixed number.
- Understand when division is an appropriate operation in problem-solving situations that involve fractions.

- » How do you describe your algorithms for dividing fractions?
- » How do you decide that division is the correct operation needed to solve a given problemsolving situation?
- » How can you use estimation to verify that your answers are correct?
- » How is the reciprocal used in fraction division?

QUARTERS 2 & 3

Content students will be learning

Essential questions students should be able to answer by end of unit

UNIT 2.3 - DIVIDING WITH FRACTIONS (CONTINUED)

- Understand how the reciprocal is used in fraction division.
- Explore the relationships among two numbers and their quotient.
- Explore the inverse of operations of multiplication and division.

UNIT 2.3 - DIVIDING WITH FRACTIONS (CONTINUED)

- » Why is it true that when dividing two fractions, it is possible to have an answer that is larger than the original two fractions? Give an example.

Unit 2.4 - Area and Perimeter of Quadrilaterals (6 days)

- Understand how area is related to covering a figure and perimeter is related to surrounding a figure.
- Develop strategies for finding areas and perimeters of rectangles and irregular figures.
- Develop formulas and procedures, stated in words and/or symbols, for finding areas and perimeters of rectangles.
- Explore situations in which measuring perimeter or area will help answer practical questions.

- » If you know about a set of rectangles that all have a given area, how can you describe the rectangle that will have the least perimeter?
- » What are you finding when determining area and perimeter?
- » How can you find area or perimeter of a rectangle?

Unit 2.5 - Area and Perimeter of Triangles and Other Polygons (8 days)

- Develop strategies for finding areas and perimeters of triangles and parallelograms.
- Develop formulas and procedures, stated in words and/or symbols, for finding areas and perimeters of triangles and parallelograms.
- Explore situations in which measuring perimeter or area will help answer practical questions.
- Understand how to solve problems involving scale factor and its effect on linear dimensions in polygons and circles.

- » How can you find the area of a triangle?
- » How does the method for finding the area of a triangle relate to the method for finding the area of a rectangle?
- » How can you find the area of a parallelogram?
- » How can you find the perimeter of a triangle?
- » How can you find the perimeter of a parallelogram?

Unit 2.6 - Circle Measures and 3-D Geometry (7 days)

- Develop strategies for finding areas and circumference of circles.
- Develop formulas and procedures, stated in words and/or symbols, for finding areas and circumference of circles.
- Understand the relationship among circumference, radius, and diameter in circles.
- Understand the properties and attributes of three-dimensional shapes.
- Build conceptual knowledge of volume by using models and formulas.
- Understand the relationship between the area of the base of a rectangular prism and the volume of that prism.

- » How can you determine the circumference of a circle?
- » How can you determine the area of a circle?
- » How can you determine the volume of a three-dimensional shape?
- » What are the properties of three-dimensional shapes?
- » How can you identify, compare, and describe a shape?

QUARTER 3

QUARTER 3

Unit 3.1 - Adding and Subtracting Decimals (6 days)

- Understand how to use benchmarks and other strategies to estimate the reasonableness of results of operations with decimals.
- Develop models to represent sums and differences of decimals.

- » How can you estimate sums and differences with decimals?
- » How are decimals related to fractions?

QUARTER 3 (CONTINUED)

Content students will be learning

Essential questions students should be able to answer by end of unit

UNIT 3.1 - ADDING AND SUBTRACTING DECIMALS (CONTINUED)

- Apply number properties in problem-solving situations that require the adding and subtracting of decimals.
- Develop algorithms for adding and subtracting decimals.
- Understand when to apply addition and subtraction of decimals in problem-solving situations.

UNIT 3.1 - ADDING AND SUBTRACTING DECIMALS (CONTINUED)

- » How would you explain to someone how to use fractions to add and subtract decimals?

Unit 3.2 - Multiplying Decimals (8 days)

- Develop and use strategies and models for multiplying decimals to solve problems.
- Understand the effect of multiplying a given number by a whole number or decimal.
- Understand when multiplication is an appropriate operation in problem-solving situations.
- Explore the relationships between two numbers and their product.
- Develop and use an efficient algorithm for decimal multiplication in problem-solving situations.
- Develop strategies for estimating the relative size of a decimal product prior to finding an exact answer.

- » What is one strategy for estimating decimal products?
- » How can fractions be used to multiply decimals?
- » What is your algorithm for multiplying decimals?

Unit 3.3 - Dividing Decimals (7 days)

- Develop and use strategies and models for dividing decimals to solve problems.
- Understand the effect of dividing a given number by a whole number or decimal.
- Understand when division is an appropriate operation in problem-solving situations.
- Explore the relationships between two numbers and their quotient.
- Develop and use an efficient algorithm for decimal division in problem-solving situations.
- Develop strategies for estimating the relative size of a decimal quotient prior to finding an exact answer.
- Understand how to predict the decimal form of a rational number (terminating or repeating).

- » What is one strategy for estimating decimal quotients?
- » How can fractions be used to divide decimals?
- » What is your algorithm for dividing decimals?

Unit 3.4 - Experimental and Theoretical Probabilities (9 days)

- Understand the differences between experimental and theoretical probability.
- Explore ways to test predictions through experimentation in problem-solving situations.
- Develop strategies for finding experimental and theoretical probabilities for both one- and two-stage events.
- Understand what it means for an event to have equally likely outcomes.
- Develop strategies for finding sample space in probability problem solving.

- » How can you find the theoretical probability of an outcome?
- » What does it mean for results to be equally likely?
- » How can I use the probabilities to answer questions or make decisions?
- » How can you determine if a probability event has equally likely outcomes?

Unit 3.5 - Making Decisions with Probability (7 days)

- Develop strategies for finding both experimental and theoretical probabilities for a variety of contexts and problem-solving situations.

- » How can you determine the theoretical probabilities for a game that involves a spinner or spinners?
- » What is the fundamental counting principle?

UNIT CONTINUES ON NEXT PAGE

UNIT CONTINUES ON NEXT PAGE

QUARTERS 3 & 4

Content students will be learning

Essential questions students should be able to answer by end of unit

UNIT 3.5 - MAKING DECISIONS WITH PROBABILITY (CONTINUED)

- Develop strategies for analyzing probability situations and for using probability to make decisions in problem-solving situations.

UNIT 3.5 - MAKING DECISIONS WITH PROBABILITY (CONTINUED)

- » What does it mean for a probability situation to be fair?
- » How is the fundamental counting principle used to solve problems?

Unit 3.6 - Ratios and Algebraic Reasoning (8 days)

- Develop understanding of ratios and rates by representing relationships described in problem-solving situations through verbal descriptions, algebraic rules, tables, and graphs.
- Develop strategies and procedures for identifying, representing, and extending patterns.
- Write rules with words and symbols that can be used to answer questions or find specific cases for linear and nonlinear relationships.

- » How can you represent relationships with a graph?
- » How are ratios used in the real world?
- » How can the relationship be displayed and analyzed with tables and equations?
- » How can the representations be used to solve problems and answer questions?

QUARTER 4

QUARTER 4

Unit 4.1 - Linear Relationships (8 days)

- Develop understandings of linear relationships and constant rate of change.
- Explore ways that linear relationships occur in the real world through problem solving.
- Develop strategies for representing linear relationship with tables, graphs, and equations.
- Develop strategies for solving equations with models and with symbols.

- » How can you determine the rate of change by looking at a table?
- » What process do you use to determine an algebraic rule?
- » How can you use models to solve equations?
- » How can you use input values to determine output values?
- » How can you determine the rate of change by looking at a graph?

Unit 4.2 - Organizing and Interpreting Data (8 days)

- Interpret representations of data.
- Develop strategies for analyzing patterns and trends in distributions in order to solve problems.
- Understand ways to organize and display data.
- Develop strategies for testing hypotheses using data collection and data analysis.

- » What organization of a set of data can be used to help analyze the data?
- » What statistical measures will provide useful information about the distribution of the data?
- » What do mode and median tell you about the distribution of a set of data?
- » Why is it helpful to give the range when you describe the distribution of a set of data?
- » How can you describe what is typical about the distribution of a set of data?

Unit 4.3 - Using Graphs to Explore Data, Measures of Central Tendency, and Range (6 days)

- Interpret representations of data.
- Develop strategies for analyzing patterns and trends in distributions in order to solve problems.
- Understand that the mean represents a balance point in the data.

- » What types of data sets are best displayed using a stem-and-leaf plot?

UNIT CONTINUES ON NEXT PAGE

UNIT CONTINUES ON NEXT PAGE

QUARTER 4 (CONTINUED)

Content students will be learning

Essential questions students should be able to answer by end of unit

UNIT 4.3 - USING GRAPHS TO EXPLORE DATA, MEASURES OF CENTRAL TENDENCY, AND RANGE (CONTINUED)

- Organize and display data.
- Develop strategies for testing hypotheses using data collection and data analysis.

UNIT 4.3 - USING GRAPHS TO EXPLORE DATA, MEASURES OF CENTRAL TENDENCY, AND RANGE (CONTINUED)

- » How can you locate the median and range of a data set using a stem-and-leaf plot?
- » What does each measure of center (mode, median, and mean) tell you about a set of data?
- » Knowing that numerical data can be represented in multiple ways, how do you decide when to use a line plot, a bar graph, or a stem-and-leaf plot?
- » In what situations is it helpful to use range and measures of center to describe a data set?

Unit 4.4 - Extending the Number System: Integers (5 days)

- Understand integers as extensions of the number system.
- Develop strategies for ordering and comparing integers.
- Explore number line and chip model representations of integer addition and subtraction.
- Use models to add and subtract integers in problem-solving situations.

- » How do you decide which of two numbers is greater when both numbers are positive?
- » How do you decide which of two numbers is greater when both numbers are negative?
- » How do you decide which of two numbers is greater when one number is positive and one is negative?
- » What does comparing locations of numbers on a number line tell you about the numbers?

Unit 4.5 - Adding and Subtracting Integers (7 days)

- Develop and use algorithms for adding and subtracting integers.
- Understand strategies for modeling addition and subtraction of integers using distance/direction on a number line and a chip model.
- Understand that the commutative property holds for addition of rational numbers but not for subtraction of rational numbers.
- Understand and use the relationship between addition and subtraction to simplify computations.
- Understand how integers can be used in graphing contexts involving all four quadrants.
- Solve problems involving integer addition and subtractions.

- » How can you decide if the sum of two numbers is positive, negative, or 0 without actually calculating the sum?
- » How can you decide if the difference of two numbers is positive, negative, or 0 without actually calculating the sum?
- » How can any difference of two numbers be restated as an equivalent addition statement?
- » What is an algorithm (procedure) you can use for adding and subtracting integers?