

CURRICULUM

GUIDE

Algebra 2

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

Chief Academic Officer
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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 - Probability and Statistics (6 days)

- Develop and use a variety of representations of data to make decisions and predictions.
- Understand and use different models of regression within data sets.
- Explore rules of probability and conditional probability through sets from problem situations.

- » What kinds of questions can be considered using data and probability?
- » What specific characteristics distinguish each kind of representation?
- » What conclusions can be drawn from each graphical representation?
- » What are the limitations of the various representations?

Unit 1.2 - Numbers and Operations (4 days)

- Understand and use rational and irrational numbers and their properties to solve problems.

- » What makes a number rational? Irrational?
- » What implications would there be if the irrational number set did not exist?
- » Why is it important to be able to evaluate the relative magnitude of real numbers?

Unit 1.3 - Linear Relationships (14 days)

- Explore and understand patterns to generalize and make predictions in problem situations.
- Develop procedures for evaluating expressions and analyzing data to make decisions.
- Understand and use a variety of representations of linear functions to solve problems.
- Extend understanding of equality to include inequality and apply the concept in problem situations.

- » What can you determine about a real-life situation through a graphical representation?
- » Why is it important to apply operations according to a common procedure?
- » What does the direction of a line tell you?
- » Why is it important to know the characteristics of linear and nonlinear relationships?
- » Which is used more often in real-life situations—solving equations or inequalities? Explain your thinking.

Unit 1.4 - Systems of Equations and Inequalities (12 days)

- Relate systems of linear equations algebraically and graphically in problem situations.
- Determine whether a system of linear equations is inconsistent, consistent and dependent, or consistent and independent and interpret in real-world applications.
- Investigate systems of equations and systems of inequalities through a variety of representations.
- Determine and interpret the coordinates of the vertices of a region formed by the graph of a system of inequalities.

- » How is the graphical meaning of an algebraic solution to a system of two equations connected to the solutions of two related inequalities?
- » What does the solution to a system mean within a problem-solving situation?
- » How do you distinguish an inconsistent system algebraically and graphically? A dependent system? A consistent and independent system?
- » What is the significance of the feasible region?

QUARTERS 2 & 3

Content students will be learning

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

QUARTER 2

QUARTER 2

Unit 2.1 - Quadratic Functions (30 days)

- Understand and distinguish the characteristics of the graph of a quadratic function.
- Apply quadratic functions and equations to solve problems using a variety of methods.
- Study and use the discriminant to verify information about the zeros of quadratic functions.
- Explore the family of quadratic functions and their related transformations.

- » What are the most important features in the graph of a quadratic function? Which of these features are found on every parabola? Which feature does not occur on some graphs?
- » How is the axis of symmetry related to the x-intercepts of the parabola?
- » What is the connection between factoring a quadratic trinomial and binomial multiplication?
- » How does the process of finding the zeros of a function by any method relate to the zero product property?
- » How is the value of the discriminant related to the number of roots of a quadratic equation?
- » How does the graphical appearance of quadratic functions reveal geometric transformations of the parent function?

Unit 2.2 - Complex Numbers (11 days)

- Describe and understand the set of complex numbers.
- Apply properties of arithmetic operations to the complex number set.
- Investigate closure and its application to complex numbers.
- Create and examine a geometric model for imaginary and complex numbers.

- » How has your interpretation of solutions to quadratic equations changed?
- » When checking these solutions by substituting back into the original equation, what simplifying must be performed?
- » What do imaginary numbers allow you to do that you cannot do when using only real numbers?

QUARTER 3

QUARTER 3

Unit 3.1 - Polynomial Expressions and Functions (21 days)

- Understand and perform operations on polynomial expressions.
- Determine the characteristics of polynomial functions.
- Use polynomial functions to solve problems.

- » What are the different methods for evaluating polynomial functions? How are they alike and different?
- » Why is it important to simplify a polynomial expression?
- » What can you determine from the shapes of graphs of polynomial functions?

QUARTERS 3 & 4

Content students will be learning

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

Unit 3.2 - Rational Expressions and Functions (20 days)

- Apply proportional reasoning and rational equations to solve problems.
- Learn and understand characteristics of rational functions, their graphs, and transformations of the graphs.
- Perform operations using rational expressions in problem situations.

- » How are the rules for operating with rational expressions symbolically similar to those for operating with strictly numerical rational numbers?
- » How are the general properties of the graph of a rational function revealed in the transformations of the graph?
- » Which general features can be determined about rational functions from their graphical representations?
- » When is it useful to factor a polynomial when operating with rational expressions?
- » How can additions and subtractions of rational expressions be applied in real-world situations?

QUARTER 4

QUARTER 4

Unit 4.1 - Radical Expressions and Functions (10 days)

- Understand and use radical and exponential expressions and functions to solve problems.
- Describe the relationship between the quadratic function and its inverse, the square root function, using a variety of representations.
- Use properties of equality and inequality in problem situations involving radical expressions.

- » What types of problem situations require an exact answer versus an approximate answer?
- » Why are some radical expressions subject to simplification, while others do not require simplification?
- » How are functions and their inverses similar to arithmetic operations and their inverses?
- » Why are extraneous solutions sometimes encountered in problems involving radical equations? Can you describe any other situation where such solutions present themselves at the conclusion of the solving process?

Unit 4.2 - Exponential and Logarithmic Expressions and Functions (12 days)

- Understand and use the relationship between exponential functions and logarithmic functions to solve problems.
- Explore the properties of logarithms and apply them in problem situations.
- Describe the patterns in exponential and logarithmic functions and connect them to applications in solving problems.

- » What characteristics of the exponential function are unique such that you can always identify the graph?
- » What are the advantages of using logarithmic properties to solve problems?
- » Why is the change of base formula important, and when is it most effectively used?
- » What is *common* about common logarithms?

QUARTER 4 (CONTINUED)

Content students will be learning

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

Unit 4.3 - Matrices (8 days)

- Understand and use matrices as tools for organizing and solving problems.

- » How can you describe a matrix?
- » How are matrix operations the same or different from numerical operations?
- » What about matrices makes them so useful for solving problems?

Unit 4.4 - Circles (5 days)

- Describe and use the characteristics of a circle to create equations.
- Apply the equation of a circle to solve problems.
- Connect angle measure within a circle to both degrees and radians in problem situations.

- » What do you need to know to write an equation of a circle from its graph?
- » How are angles designated within a circle?
- » What are the advantages and disadvantages of having two types of angle measure?

Unit 4.5 - Trigonometry (6 days)

- Understand and use trigonometric ratios in problem situations.
- Apply proportional reasoning to solve problems.

- » How are trigonometric functions related to ratios and proportions?
- » What makes some trigonometric ratios easier to use than their corresponding reciprocal ratios?



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