



Essential Content Framework

A Beginning-of-Year Success Plan for Educators

HMH Algebra 2, part of the *Go Math!* series, copyright 2015, 2018

As schools enter the 2020–2021 academic year, educators will be challenged with meeting students’ needs for the current school year while addressing learning gaps produced as a result of COVID-19 related school closures from the previous school year.

Working with the International Center for Leadership in Education (ICLE), HMH has identified the highest-priority standards for you to focus on. These priority standards are built from hundreds of projects with thousands of educators around the country, which consistently show that prioritizing standards results in learning gains for ALL students, particularly students who are behind, and regardless of whether they have experienced disrupted learning.

Using these priority standards, HMH has developed this Essential Content Framework as a guidance document that supplements the *Go Math!* planning resources and tools. The Framework allows educators to focus on those standards most critical to a student’s success in achieving grade-level proficiency and above and providing specific content from prior learning that can be used for scaffolding and reteaching.

Use this Essential Content Framework in conjunction with your school or district’s scope-and-sequence documentation to identify critical skills, on-level lessons, and expected prior learning that support the priority standards.

Determine Student Needs


Get to know what skill strengths and challenges your students are bringing to the classroom at the beginning of the year.

- Consult data or feedback from the last academic year. Reach out to the previous grade’s teachers to find out whether they have any advice that you should consider as you start the year.

- The *Assessment Resources* ancillary for Algebra 2 includes a Placement Test that is correlated to Grade 8 standards and allows you to create an Individual Student Profile showing what students know at the start of the school year.
- As you begin each module in Algebra 2, use the **Are You Ready?** quiz to diagnose students' preparedness for the module. The quiz focuses on prerequisite skills for the module, and students who need help with those skills can get it through the *Response to Intervention* ancillary, which includes Tier 1, Tier 2, and Tier 3 interventions.

Response to Intervention



UNIT 1 FUNCTIONS						
Student Edition Lessons	Tier 1 Skills	Pre-Tests	Tier 2 Skills Strategic Intervention	Post-Tests	Tier 3 Skills Intensive Intervention	
Module 1 Analyzing Functions						
1.1 Domain, Range, and End Behavior	Reteach 1-1	Module 1	4 Algebraic Representations of Transformations	Skill 4	 Building Block (Tier 3) worksheets are available online for students who need additional support on prerequisite skills. See the teacher page of each Tier 2 Skill lesson for a list of Building Block skills.	
1.2 Characteristics of Function Graphs	Reteach 1-2		18 Linear Functions	Skill 18		
1.3 Transformations of Function Graphs	Reteach 1-3		25 Properties of Translations, Reflections, and Rotations	Skill 25		
1.4 Inverses of Functions	Reteach 1-4		27 Rate of Change and Slope	Skill 27		
Module 2 Absolute Value Functions, Equations, and Inequalities						
2.1 Graphing Absolute Value Functions	Reteach 2-1	Module 2	18 Linear Functions	Skill 18		
2.2 Solving Absolute Value Equations	Reteach 2-2		19 Linear Inequalities in Two Variables	Skill 19		
2.3 Solving Absolute Value Inequalities	Reteach 2-3		23 One-Step Equations	Skill 23		
			24 One-Step Inequalities	Skill 24		
			31 Slope and Slope-Intercept Form	Skill 31		

- You can use the Personal Math Trainer on my.hrw.com to administer the **Are You Ready?** quizzes and other assessments.

Personal Math Trainer **Mod 1 Analyzing Functions - Are You Ready?**

1 2 3 4 5 6 7 8 9 10

Question **Print All** **Standards**

Find the location of A' given that A is $(9, 1)$.

Rotate 90° clockwise.

The location of A' is .

- Throughout the course, you can use the Personal Math Trainer to give homework assignments that include learning aids such as feedback, worked-out examples, step-by-step interactive solutions, access to a PDF of the textbook, and Math on the Spot videos.
- Special types of homework assignments available with the Personal Math Trainer provide personalized intervention that is delivered either before or after the assignments.

Please choose an assignment type:

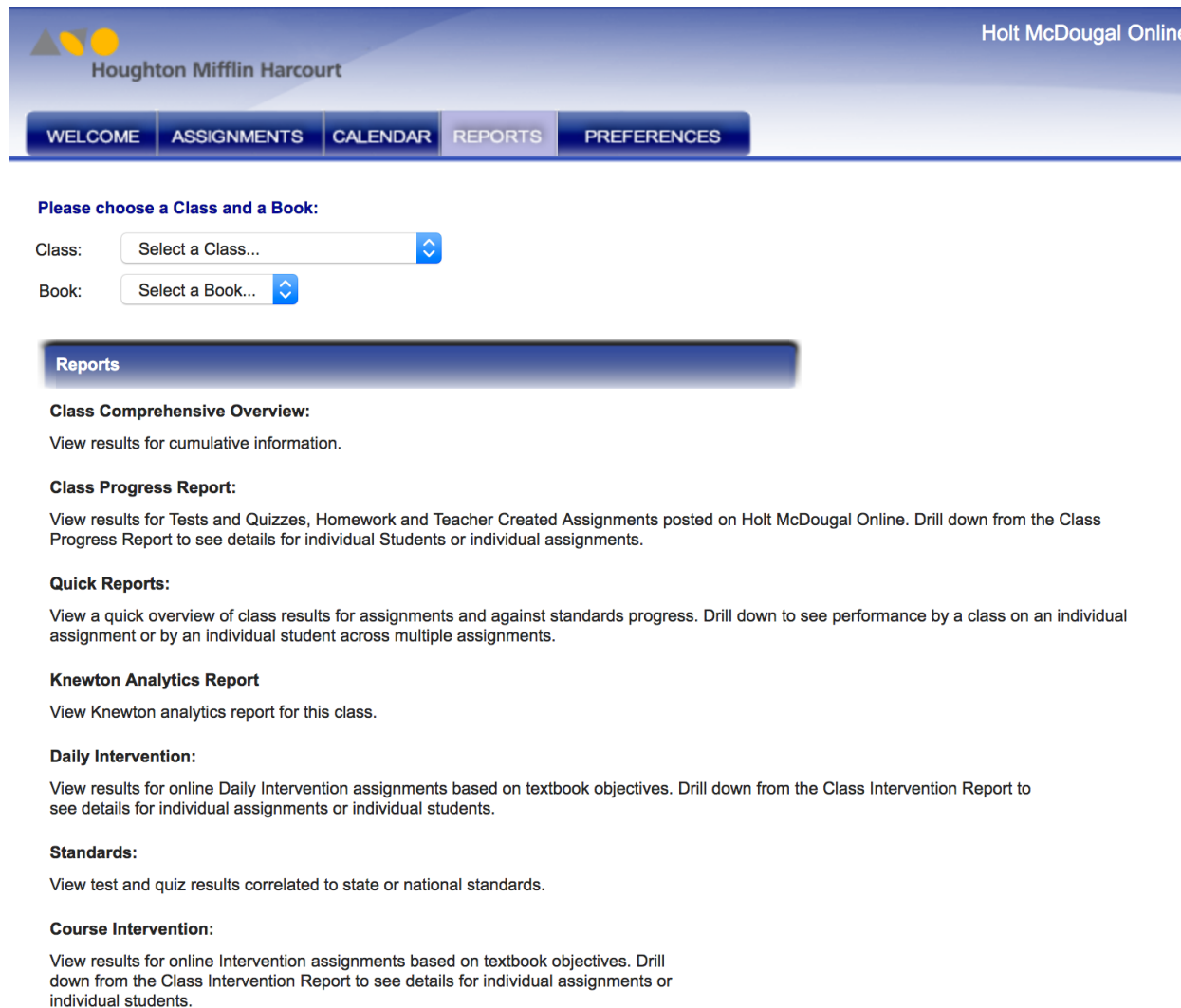
Category: Daily Intervention
 Standard-Based Intervention

Grade: Course Intervention
 Tests and Quizzes
 Homework

Show c

Submit
Create

- When students use the Personal Math Trainer, you can generate a variety of reports of student performance.



Holt McDougal Online

Houghton Mifflin Harcourt

WELCOME ASSIGNMENTS CALENDAR **REPORTS** PREFERENCES

Please choose a Class and a Book:

Class:

Book:

Reports

Class Comprehensive Overview:
View results for cumulative information.

Class Progress Report:
View results for Tests and Quizzes, Homework and Teacher Created Assignments posted on Holt McDougal Online. Drill down from the Class Progress Report to see details for individual Students or individual assignments.

Quick Reports:
View a quick overview of class results for assignments and against standards progress. Drill down to see performance by a class on an individual assignment or by an individual student across multiple assignments.

Knewton Analytics Report
View Knewton analytics report for this class.

Daily Intervention:
View results for online Daily Intervention assignments based on textbook objectives. Drill down from the Class Intervention Report to see details for individual assignments or individual students.

Standards:
View test and quiz results correlated to state or national standards.

Course Intervention:
View results for online Intervention assignments based on textbook objectives. Drill down from the Class Intervention Report to see details for individual assignments or individual students.

Focus on the Priority Standards

Organized in a way to supplement the Pacing Guides found at the beginning of each unit in the Algebra 2 Teacher Edition, this Essential Content Framework is intended to provide instructional plans and access to interventions that will allow for students' learning gaps to be addressed throughout the school year.

- Starting on the next page is a list of the HMH Priority Standards for Algebra 2. The lessons in *HMH Algebra 2* that address each standard are also listed. Note that Modules 17, 19, and 20 do not address any HMH Priority Standards. You should consider your own school's or district's scope and sequence for an Algebra 2 course to decide whether and when to teach those modules.
- When you teach a lesson, you can use the formative assessment built into the lesson to gauge student understanding of the lesson's concepts and skills. The formative assessment includes Reflect questions and Your Turn problems after each Explore and Explain section in the lesson as well as the Elaborate questions after the last Explain section.
- The *Differentiated Instruction* ancillary provides leveled practice that allows you to tailor homework to the needs of your students. Each lesson ends with a Lesson Performance Task that takes students beyond routine practice and provides an opportunity for them to work collaboratively.
- If students encounter difficulties mastering the Priority Standards, it may be due to inadequate prior learning of prerequisite concepts and skills. The list of Priority Standards starting on the next page identifies one or more prerequisite standards for each Priority Standard as well as earlier lessons within the *Go Math!* series that address the prerequisite standards. You may want to revisit those earlier lessons to help students succeed with the current lesson. One way to do this is to use the Reteach worksheets for the lessons that address prerequisite standards.
 - For high school lessons, the Reteach worksheets can be found in the *Response to Intervention* ancillaries.
 - For middle school lessons, the Reteach worksheets can be found in the *Differentiated Instruction* ancillaries.

Algebra 2 Priority Standards and Prerequisite Standards

Priority Standards for Algebra 2 (An asterisk denotes a modeling standard.)	Algebra 2 Lessons that Address the Priority Standards	Prerequisite Middle School or High School Standards for the Algebra 2 Priority Standards	Go Math Lessons or Modules that Address the Prerequisite Standards
Solve quadratic equations with real coefficients that have complex solutions.*	3.1, 3.3	Solve quadratic equations in one variable. <ul style="list-style-type: none"> Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b. 	Algebra 1: Module 22: Using Square Roots to Solve Quadratic Equations

Priority Standards for Algebra 2 (An asterisk denotes a modeling standard.)	Algebra 2 Lessons that Address the Priority Standards	Prerequisite Middle School or High School Standards for the Algebra 2 Priority Standards	Go Math Lessons or Modules that Address the Prerequisite Standards
<p>Use the structure of an expression to identify ways to rewrite it. <i>For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.</i></p>	<p>6.4, 9.1, 9.2, 12.3</p>	<p>The Priority Standard is introduced in Algebra 1 and extended in Algebra 2.</p>	<p>Algebra 1: Lesson 18.3: Special Products of Binomials Lesson 21.1: Solving Quadratic Equations by Factoring $x^2 + bx + c$ Lesson 21.2: Solving Quadratic Equations by Factoring $ax^2 + bx + c$ Lesson 21.3: Using Special Factors to Solve Quadratic Equations</p>
<p>Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.</p>	<p>6.1, 6.2, 6.3, 6.5</p>	<p>Know and apply the properties of integer exponents to generate equivalent numerical expressions. <i>For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.</i></p> <p>Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</p>	<p>Go Math, Grade 8: Lesson 2.1: Integer Exponents Go Math, Grade 7: Lesson 6.1: Algebraic Expressions</p>

Priority Standards for Algebra 2 (An asterisk denotes a modeling standard.)	Algebra 2 Lessons that Address the Priority Standards	Prerequisite Middle School or High School Standards for the Algebra 2 Priority Standards	Go Math Lessons or Modules that Address the Prerequisite Standards
Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	5.2, 6.4, 7.1, 7.2	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* • Factor a quadratic expression to reveal the zeros of the function it defines.	Algebra 1: Lesson 20.3: Applying the Zero Product Property to Solve Equations Lesson 21.2: Solving Quadratic Equations by Factoring $ax^2 + bx + c$
Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.	6.5, 8.1, 8.2	Use the structure of an expression to identify ways to rewrite it. <i>For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.</i>	Algebra 2: Lesson 6.4: Factoring Polynomials

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Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*	1.1, 1.2, 1.3, 2.1, 4.1, 4.2, 4.4, 5.1, 5.2, 12.1, 12.2, 14.1, 14.2, 15.2, 18.4	The Priority Standard is introduced in Algebra 1 and extended in Algebra 2.	Algebra 1: Lesson 6.3: Standard Form
Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. <i>For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*</i>	4.1, 4.2, 4.4, 7.1, 9.3	The Priority Standard is introduced in Algebra 1 and extended in Algebra 2.	Algebra 1: Module 2: Algebraic Models Lesson 7.3: Linear Inequalities in Two Variables Module 12: Modeling with Linear Systems

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<p>Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*</p>	<p>2.2, 2.3, 7.2, 11.3, 13.1, 13.2, 13.4, 16.2, 18.4</p>	<p>The Priority Standard is introduced in Algebra 1 and extended in Algebra 2.</p>	<p>Algebra 1: Lesson 7.2: Using Functions to Solve One-Variable Equations Lesson 16.1: Using Graphs and Properties to Solve Equations with Exponents</p>

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<p>For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*</i></p>	<p>1.2, 2.1, 5.2, 10.2, 10.3, 14.1, 14.2, 15.2, 18.1, 18.2, 18.3, 18.4</p>	<p>The Priority Standard is introduced in Algebra 1 and extended in Algebra 2.</p>	<p>Algebra 1: Lesson 3.1: Graphing Relationships</p>
<p>Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*</p> <ul style="list-style-type: none"> Graph linear and quadratic functions and show intercepts, maxima, and minima. 	<p>1.2, 1.3, 1.4, 4.3, 10.1, 14.2</p>	<p>The Priority Standard is taught in Algebra 1 and reviewed in Algebra 2.</p>	<p>Algebra 1: Lesson 6.1: Slope-Intercept Form Lesson 19.1: Understanding Quadratic Functions</p>

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<p>Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*</p> <ul style="list-style-type: none"> Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. 	1.3, 2.1, 10.2, 10.3, 11.2, 11.3	The Priority Standard is taught in Algebra 1 and reviewed in Algebra 2.	<p>Algebra 1:</p> <p>Module 12: Piecewise-Defined Functions</p> <p>Lesson 24.3: Graphing Square Root Functions</p> <p>Lesson 24.4: Graphing Cube Root Functions</p>
<p>Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*</p> <ul style="list-style-type: none"> Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. 	5.1, 5.2, 7.2	The Priority Standard is taught in Algebra 1 and extended in Algebra 2.	<p>Algebra 1: Lesson 24.1: Graphing Polynomial Functions</p>

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<p>Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*</p> <ul style="list-style-type: none"> Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. 	<p>8.1, 8.2</p>	<p>Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*</p> <ul style="list-style-type: none"> Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. 	<p>Algebra 2: Module 5: Polynomial Functions</p>
<p>Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*</p> <ul style="list-style-type: none"> Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. 	<p>12.2, 13.1, 13.2, 13.3, 13.4, 14.1, 14.2, 15.1, 15.2, 16.2, 18.1, 18.2, 18.3</p>	<p>Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.</p> <p>Exponential functions are taught in Algebra 1 and reviewed in Algebra 2.</p>	<p>Go Math, Geometry: Lesson 13.1: Tangent Ratio Lesson 13.2: Sine and Cosine Ratios Algebra 1: Lesson 15.4: Graphing Exponential Functions</p>

Priority Standards for Algebra 2 (An asterisk denotes a modeling standard.)	Algebra 2 Lessons that Address the Priority Standards	Prerequisite Middle School or High School Standards for the Algebra 2 Priority Standards	Go Math Lessons or Modules that Address the Prerequisite Standards
<p>Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.</p>	<p>18.1, 18.2</p>	<p>The Priority Standard is introduced in Algebra 1 and extended in Algebra 2.</p>	<p>Algebra 1: Lesson 6.5: Comparing Properties of Linear Functions</p>
<p>Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. <i>Include recognizing even and odd functions from their graphs and algebraic expressions for them.</i></p>	<p>1.3, 2.1, 5.1, 8.1, 10.2, 10.3, 13.1, 13.2, 13.3, 15.2, 18.1, 18.2, 18.3</p>	<p>The Priority Standard is introduced in Algebra 1 and extended in Algebra 2.</p>	<p>Algebra 1: Lesson 6.4: Transforming Linear Functions Lesson 15.5: Transforming Exponential Functions Lesson 19.2: Transforming Quadratic Functions</p>

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<p>For exponential models, express as a logarithm the solution to $ab^{ct} = d$, where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.*</p>	<p>16.2</p>	<p>Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*</p> <ul style="list-style-type: none"> Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. 	<p>Algebra 2: Lesson 15.2: Graphing Logarithmic Functions</p>
<p>Understand statistics as a process for making inferences about population parameters based on a random sample from that population.*</p>	<p>22.1</p>	<p>Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.</p>	<p>Go Math, Grade 7: Lesson 10.1: Populations and Samples</p>

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<p>Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.*</p>	<p>23.3, 24.1</p>	<p>Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. <i>For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.</i></p>	<p>Go Math, Grade 7: Lesson 10.2: Making Inferences from a Random Sample Lesson 10.3: Generating Random Samples</p>