

Common Core State Standards
Mathematics I
Integrated Pathway



Program Overview



This program was developed and reviewed by experienced math educators who have both academic and professional backgrounds in mathematics. This ensures: freedom from mathematical errors, grade level appropriateness, freedom from bias, and freedom from unnecessary language complexity.

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Desmos. “Polygraph: Linear Inequalities.”

GeoGebra. “Simple Logic?”

GeoGebra. “Verbal to Algebraic!”

GeoGebra. “Linear Inequality Generator (1A).”

Conceptual Task

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GeoGebra. “Equation of a Line: Dynamic Illustrator.”

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Desmos. “Function Carnival, Part 2.”

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GeoGebra. “Domain and Range.”

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GeoGebra. “Graphs of arithmetic sequences on a coordinate plane.”

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GeoGebra. “Average Rate of Change.”

Conceptual Task

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Desmos. “Match My Line.”

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Desmos. “Game, Set, Flat.”

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GeoGebra. “Function Transformations.”

GeoGebra. “All operations on functions.”

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Desmos. “Solutions to Systems of Linear Equations.”

Desmos. “Systems of Two Linear Equations.”

Conceptual Task

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GeoGebra. “Solving a System of Equations by Elimination.”

GeoGebra. “Solving Systems Using Substitution.”

GeoGebra. “Solving Linear Systems Graphically.”

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Desmos. “Polygraph: Histograms.”

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GeoGebra. “Dot Plot Maker.”

GeoGebra. “Measures of Center.”

GeoGebra. “Visualize Measures of Center and Spread.”

GeoGebra. “Outlier Influence.”

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Desmos. “Predicting Movie Ticket Prices.”

Conceptual Task

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GeoGebra. “Correlation Sliders.”

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GeoGebra. “Draw (a) line of symmetry.”

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GeoGebra. “Reflections, Rotations, Dilations, and Translations.”

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GeoGebra. “Basic Constructions.”

GeoGebra. “Constructing Parallel and Perpendicular Lines.”

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GeoGebra. “Equilateral Triangle Construction (Dynamic Illustration).”

GeoGebra. “Construct Equilateral Triangle Inscribed in a Circle.”

GeoGebra. “Hexagon-Construction.”

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GeoGebra. “Writing the Equation of Line from Graph in Slope-Intercept Form.”

GeoGebra. “Distance Formula.”

GeoGebra. “Parallel Lines.”

Conceptual Task

The Town Square, Parts 1 and 2

Topic B: Lines and Line Segments

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Conceptual Activities

GeoGebra. “Triangle Area Warmup.”

GeoGebra. “Perimeter of Triangles on the Coordinate Grid.”

Unit Review: Connecting Algebra and Geometry Through Coordinates

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PROGRAM OVERVIEW

Introduction to the Program

Introduction

The *Common Core State Standards Integrated Pathway: Mathematics I Program* is a complete set of materials developed around the Common Core State Standards (CCSS), the overview of the Integrated Pathway for the Common Core State Mathematics Standards, and the Mathematics I content map found in Appendix A of the Common Core State Standards. Topics are built around accessible core curricula, ensuring that the *CCSS Integrated Pathway: Mathematics I Program* is useful for striving students and diverse classrooms.

This program realizes the benefits of exploratory and investigative learning and employs a variety of instructional models to meet the learning needs of students with a range of abilities.

The *CCSS Integrated Pathway: Mathematics I Program* includes components that support problem-based learning, instruct and coach as needed, provide practice, and assess students' skills. Instructional tools and strategies are embedded throughout.

The set of unit materials or digital version of the program includes:

- More than 150 hours of lessons, addressing the six units of CCSS IP: Mathematics I
- Essential Questions for each instructional topic
- Vocabulary
- Instruction and Guided Practice
- Problem-based Tasks and Coaching questions
- Step-by-step graphing calculator instructions for the TI-Nspire and the TI-83/84
- Station activities to promote collaborative learning and problem-solving skills

Purpose of Materials

The *CCSS Integrated Pathway: Mathematics I Program* has been organized to coordinate with the CCSS Integrated Pathway: Mathematics I content map and specifications from Appendix A of the Common Core State Standards.

Each lesson includes activities that offer opportunities for exploration and investigation. These activities incorporate concept and skill development and guided practice, then move on to the application of new skills and concepts in problem-solving situations. Throughout the lessons and activities, problems are contextualized to enhance rigor and relevance.

PROGRAM OVERVIEW

Introduction to the Program

This program includes all the topics addressed in the CCSS Integrated Pathway: Mathematics I content map. These include:

- Relationships Between Quantities
- Linear and Exponential Relationships
- Reasoning with Equations
- Descriptive Statistics
- Congruence, Proof, and Constructions
- Connecting Algebra and Geometry Through Coordinates

The eight Mathematical Practices described in the Common Core are infused throughout and are as follows:

- CCSS.MP.1: Make sense of problems and persevere in solving them.
- CCSS.MP.2: Reason abstractly and quantitatively.
- CCSS.MP.3: Construct viable arguments and critique the reasoning of others.
- CCSS.MP.4: Model with mathematics.
- CCSS.MP.5: Use appropriate tools strategically.
- CCSS.MP.6: Attend to precision.
- CCSS.MP.7: Look for and make use of structure.
- CCSS.MP.8: Look for and express regularity in repeated reasoning.

Structure of the Teacher Resource

The *CCSS Integrated Pathway: Mathematics I Program* is provided as a collection of unit books and an overview book, or in binder format. The materials are completely reproducible. You may also have purchased the *CCSS Integrated Pathway: Mathematics I Teacher Resource* in digital format. In this case, electronic “bookmarks” allow you to access the sections quickly and easily. The digital format also facilitates printing and copying student pages.

The Program Overview is the first section. Written for you, this section helps you to navigate the materials, offers several graphic organizers and suggested strategies for their use, and shows how the lessons correlate to the Common Core State Standards and the CCSS Integrated Pathway: Mathematics I content map found in Appendix A of the Common Core State Standards.

PROGRAM OVERVIEW

Introduction to the Program

The remaining materials focus on content, knowledge, and application of the 6 units in the CCSS Integrated Pathway Mathematics I curriculum: Relationships Between Quantities; Linear and Exponential Relationships; Reasoning with Equations; Descriptive Statistics; Congruence, Proof, and Constructions; and Connecting Algebra and Geometry Through Coordinates. The units in the *CCSS Integrated Pathway: Mathematics I Program* are designed to be flexible so that you can mix and match activities as the needs of your students and your instructional style dictate.

The Station Activities correspond to the content in the units and provide students with the opportunity to apply concepts and skills, while you have a chance to circulate, observe, speak to individuals and small groups, and informally assess and plan.

Each lesson begins with a pre-assessment and ends with a progress assessment. These allow you to assess students' progress as you move from lesson to lesson, enabling you to gauge how well students have understood the material and to differentiate as appropriate.

Glossary

The Glossary contains vocabulary terms and formulas from throughout the program, organized alphabetically. Each listing provides the term and the definition in both English and Spanish.

PROGRAM OVERVIEW

Unit Structure

All of the instructional units have common features. Each unit begins with a list of all the standards addressed in the lessons and a list of one or more conceptual activities. Each unit also begins with a pre-assessment. Each lesson begins with an overview of the standards addressed in the lesson; Essential Questions; vocabulary (titled “Words to Know”); and a list of recommended websites to be used as additional resources.

Each sub-lesson begins with a list of identified prerequisite skills that students need to have mastered in order to be successful with the new material in the upcoming sub-lesson. This is followed by an introduction, key concepts, common errors/misconceptions, scaffolded practice problems, guided practice examples, a problem-based task with coaching questions and sample responses, a closure activity, and practice. Each lesson ends with a progress assessment to evaluate students’ learning.

All of the components are described below and on the following pages for your reference.

Pre-Assessment

This can be used to gauge students’ prior knowledge and to inform instructional planning.

Common Core State Standards for the Lesson

All standards that are addressed in the entire lesson are listed.

Essential Questions

These are intended to guide students’ thinking as they proceed through the lesson. By the end of each lesson, students should be able to respond to the questions.

Words to Know

Vocabulary terms and formulas are provided as background information for instruction or to review key concepts that are addressed in the lesson.

Recommended Resources

This is a list of websites that can be used as additional resources. Some websites are games; others provide additional examples and/or explanations. (*Note:* Links will be monitored and repaired or replaced as necessary.) Each Recommended Resource is also accessible through Walch’s cloud-based Curriculum Engine Learning Object Repository as a separate learning object that can be assigned to students.

PROGRAM OVERVIEW

Unit Structure

Conceptual Activities

Conceptual understanding serves as the foundation on which to build deeper understanding of mathematics. In an effort to build conceptual understanding of mathematical ideas and to provide more than procedural fluency and application, links to interactive open education and Desmos resources are included. (*Note:* These website links will be monitored and repaired or replaced as necessary.) These and many other open educational resources (OERs) are also accessible through the Learning Object Repository as separate objects that can be assigned to students.

Warm-Up

Each warm-up takes approximately 5 minutes and addresses either prerequisite and critical-thinking skills or previously taught math concepts.

Common Core State Standards for the Sub-lesson

When lessons are broken down into sub-lessons, the specific standard or standards that are addressed are presented at the beginning of the instructional portion of the sub-lesson.

Warm-Up Debrief

Each debrief provides the answers to the warm-up questions, and offers suggestions for situations in which students might have difficulties. A section titled Connection to the Sub-lesson is also included in the debrief to help answer students' questions about the relevance of the particular warm-up activity to the upcoming instruction. Warm-Ups with debriefs are also provided in PowerPoint presentations.

Identified Prerequisite Skills

This list cites the skills necessary to be successful with the new material.

Introduction

This brief paragraph gives a description of the concepts about to be presented and often contains some Words to Know.

Key Concepts

Provided in bulleted form, this instruction highlights the important ideas and/or processes for meeting the standard.

Graphing Calculator Directions

Step-by-step instructions for using a TI-Nspire and a TI-83/84 are provided whenever graphing calculators are referenced.

PROGRAM OVERVIEW

Unit Structure

Common Errors/Misconceptions

This is a list of the common errors students make when applying Key Concepts. This list suggests what to watch for when students arrive at an incorrect answer or are struggling with solving the problems.

Scaffolded Practice (Printable Practice)

This set of 10 printable practice problems provides introductory level skill practice for the sub-lesson. This practice set can be used during instruction time.

Guided Practice

This section provides step-by-step examples of applying the Key Concepts. The three to five examples are intended to aid during initial instruction, but are also for individuals needing additional instruction and/or for use during review and test preparation.

Enhanced Instructional PowerPoint (Presentation)

Each sub-lesson includes an instructional PowerPoint presentation with the following components: Warm-Up, Key Concepts, and Guided Practice. Selected Guided Practice examples include GeoGebra applets. These instructional PowerPoints are downloadable and editable.

Problem-Based Task

This activity can serve as the centerpiece of a problem-based sub-lesson, or it can be used to walk students through the application of the standard, prior to traditional instruction or at the end of instruction. The task makes use of critical-thinking skills.

Optional Problem-Based Task Coaching Questions with Sample Responses

These questions scaffold the task and guide students to solving the problem(s) presented in the task. They should be used at the discretion of the teacher for students requiring additional support. The Coaching Questions are followed by answers and suggested appropriate responses to the coaching questions. In some cases answers may vary, but a sample answer is given for each question.

Recommended Closure Activity

Students are given the opportunity to synthesize and reflect on the sub-lesson through a journal entry or discussion of one or more of the Essential Questions.

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Unit Structure

Problem-Based Task Implementation Guide

This instructional overview, found with selected Problem-Based Tasks in each unit, highlights connections between the task and the sub-lesson's key concepts and Mathematical Practices. The Implementation Guide also offers suggestions for facilitating and monitoring, and provides alternative solutions.

Printable Practice (Sets A and B) and Interactive Practice (Set A)

Each sub-lesson includes two sets of practice problems to support students' achievement of the learning objectives. They can be used in any combination of teacher-led instruction, cooperative learning, or independent application of knowledge. Each Practice A is also available as an interactive Learnosity activity with Technology-Enhanced Items.

Progress Assessment

Each sub-lesson ends with 10 multiple-choice questions, as well as one extended-response question that incorporates critical thinking and writing components. This can be used to document the extent to which students grasp the concepts and skills addressed during instruction.

Unit Assessment

Each unit ends with 12 multiple-choice questions and three extended-response questions that incorporate critical thinking and writing components. This can be used to document the extent to which students grasped the concepts and skills of each unit.

Answer Key

Answers for all of the Warm-Ups and practice problems are provided at the end of each unit.

Station Activities

Most units include a collection of station-based activities to provide students with opportunities to practice, reinforce, and apply mathematical skills and concepts. The debriefing discussions after each set of activities provide an important opportunity to help students reflect on their experiences and synthesize their thinking.

Conceptual Tasks

These engaging tasks provide opportunities for students to deepen their understanding and develop their conceptual knowledge of math concepts. These tasks provide multiple entry points and are accessible for ALL learners.

PROGRAM OVERVIEW

Standards Correlations

Each lesson in this Integrated Pathway: Mathematics I program was written specifically to address the Common Core State Standards. Each lesson lists the standards covered in all the sub-lessons, and each sub-lesson lists the standards addressed in that particular section. In this section, you'll find a comprehensive list mapping the sub-lessons to the CCSS.

Guide to Common Core State Standards Annotation

As you use this program, you will come across a symbol included with the Common Core standards for some of the lessons and activities. These symbols are explained below.

Symbol: ★

Denotes: Modeling Standards

Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★).

From <http://www.walch.com/CCSS/00003>

Symbol: (+)

Denotes: College and Career Readiness Standards

Advanced mathematics standards that are required in higher-level courses such as advanced statistics may also be included in lower-level courses. These additional standards are denoted by (+). According to the Common Core State Standards Initiative, “the evidence concerning college and career readiness shows clearly that the knowledge, skills, and practices important for readiness include a great deal of mathematics prior to the boundary defined by (+) symbols in these standards. Indeed, some of the highest priority content for college and career readiness comes from Grades 6–8.”

From <http://www.walch.com/CCSS/00004>

PROGRAM OVERVIEW

Standards Correlations

Unit 1: Relationships Between Quantities			
Lesson	Sub-lesson number	Title	Standard(s)
Lesson 1	Interpreting Structure in Expressions		
	1.1.1	Identifying Terms, Factors, and Coefficients	A–SSE.1a [★]
	1.1.2	Interpreting Linear and Exponential Expressions	A–SSE.1b [★]
Lesson 2	Creating Equations and Inequalities in One Variable		
	1.2.1	Creating Linear Equations in One Variable	A–CED.1 [★] N–Q.2 [★] N–Q.3 [★]
	1.2.2	Creating Linear Inequalities in One Variable	A–CED.1 [★]
	1.2.3	Creating Exponential Equations	A–CED.1 [★]
Lesson 3	Creating and Graphing Equations in Two Variables		
	1.3.1	Creating and Graphing Linear Equations in Two Variables	A–CED.2 [★] N–Q.1 [★]
	1.3.2	Creating and Graphing Exponential Equations	A–CED.2 [★] N–Q.1 [★]
Lesson 4	Representing Constraints		
	1.4.1	Representing Constraints	A–CED.3 [★]
Lesson 5	Rearranging Formulas		
	1.5.1	Rearranging Formulas	A–CED.4 [★]

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Standards Correlations

Unit 2: Linear and Exponential Relationships			
Lesson	Sub-lesson number	Title	Standard(s)
Lesson 1	Graphs As Solution Sets and Function Notation		
	2.1.1	Graphing the Set of All Solutions	A–REI.10
	2.1.2	Intersecting Graphs	A–REI.11★
	2.1.3	Domain and Range	F–IF.1
	2.1.4	Function Notation and Evaluating Functions	F–IF.2
Lesson 2	Solving Linear Inequalities in Two Variables and Systems of Inequalities		
	2.2.1	Solving Linear Inequalities in Two Variables	A–REI.12
	2.2.2	Solving Systems of Linear Inequalities	A–REI.12
Lesson 3	Sequences As Functions		
	2.3.1	Sequences As Functions	F–IF.3
Lesson 4	Interpreting Graphs of Functions		
	2.4.1	Identifying Key Features of Linear and Exponential Graphs	F–IF.4★ F–IF.5★
	2.4.2	Average Rate of Change	F–IF.6★ F–LE.1a★
	2.4.3	Recognizing Average Rate of Change	F–IF.6★ F–LE.1b★ F–LE.1c★
Lesson 5	Analyzing Linear and Exponential Functions		
	2.5.1	Graphing Linear Functions	F–IF.7a★
	2.5.2	Graphing Exponential Functions	F–IF.7e★
Lesson 6	Comparing Functions		
	2.6.1	Comparing Linear Functions	F–IF.9
	2.6.2	Comparing Exponential Functions	F–IF.9
	2.6.3	Comparing Linear to Exponential Functions	F–LE.3★
Lesson 7	Building Functions		
	2.7.1	Building Functions from Context	F–BF.1a★
	2.7.2	Constructing Functions from Graphs and Tables	F–LE.2★

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Lesson	Sub-lesson number	Title	Standard(s)
Lesson 8	Operating on Functions and Transformations		
	2.8.1	Operating on Functions	F–BF.1b★
	2.8.2	Transformations of Linear and Exponential Functions	F–BF.3
Lesson 9	Arithmetic and Geometric Sequences		
	2.9.1	Arithmetic Sequences	F–BF.2★
	2.9.2	Geometric Sequences	F–BF.2★
Lesson 10	Interpreting Parameters		
	2.10.1	Interpreting Parameters	F–LE.5★

Unit 3: Reasoning with Equations			
Lesson	Sub-lesson number	Title	Standard(s)
Lesson 1	Solving Equations and Inequalities		
	3.1.1	Properties of Equality	A–REI.1
	3.1.2	Solving Linear Equations	A–REI.3
	3.1.3	Solving Linear Inequalities	A–REI.3
	3.1.4	Solving Exponential Equations	A–REI.1
Lesson 2	Solving Systems of Equations		
	3.2.1	Solving Systems of Linear Equations by Substitution and Elimination	A–REI.5 A–REI.6
	3.2.2	Solving Systems of Linear Equations by Graphing	A–REI.6

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Standards Correlations

Unit 4: Descriptive Statistics			
Lesson	Sub-lesson number	Title	Standard(s)
Lesson 1	Working with a Single Measurement Variable		
	4.1.1	Representing Data Sets	S-ID.1★
	4.1.2	Comparing Data Sets	S-ID.2★
	4.1.3	Interpreting Data Sets	S-ID.3★
Lesson 2	Working with Two Categorical and Quantitative Variables		
	4.2.1	Summarizing Data Using Two-Way Frequency Tables	S-ID.5★
	4.2.2	Solving Problems Given Functions Fitted to Data	S-ID.6a★
	4.2.3	Analyzing Residuals	S-ID.6b★
	4.2.4	Fitting Linear Functions to Data	S-ID.6c★
Lesson 3	Interpreting Linear Models		
	4.3.1	Interpreting Slope and y -intercept	S-ID.7★
	4.3.2	Calculating and Interpreting the Correlation Coefficient	S-ID.8★
	4.3.3	Distinguishing Between Correlation and Causation	S-ID.9★

PROGRAM OVERVIEW

Standards Correlations

Unit 5: Congruence, Proof, and Constructions			
Lesson	Sub-lesson number	Title	Standard(s)
Lesson 1	Introducing Transformations		
	5.1.1	Defining Terms	G-CO.1
	5.1.2	Transformations As Functions	G-CO.2
	5.1.3	Applying Lines of Symmetry	G-CO.3
Lesson 2	Defining and Applying Rotations, Reflections, and Translations		
	5.2.1	Defining Rotations, Reflections, and Translations	G-CO.4
	5.2.2	Applying Rotations, Reflections, and Translations	G-CO.5
Lesson 3	Constructing Lines, Segments, and Angles		
	5.3.1	Copying Segments and Angles	G-CO.12
	5.3.2	Bisecting Segments and Angles	G-CO.12
	5.3.3	Constructing Perpendicular and Parallel Lines	G-CO.12
Lesson 4	Constructing Polygons		
	5.4.1	Constructing Equilateral Triangles Inscribed in Circles	G-CO.13
	5.4.2	Constructing Squares Inscribed in Circles	G-CO.13
	5.4.3	Constructing Regular Hexagons Inscribed in Circles	G-CO.13
Lesson 5	Exploring Congruence		
	5.5.1	Describing Rigid Motions and Predicting the Effects	G-CO.6
	5.5.2	Defining Congruence in Terms of Rigid Motions	G-CO.6
Lesson 6	Congruent Triangles		
	5.6.1	Triangle Congruency	G-CO.7
	5.6.2	Explaining ASA, SAS, and SSS	G-CO.8

Unit 6: Connecting Algebra and Geometry Through Coordinates			
Lesson	Sub-lesson number	Title	Standard(s)
Lesson 1	Slope and Distance		
	6.1.1	Using Coordinates to Prove Geometric Theorems with Slope and Distance	G-GPE.4 G-GPE.5
	6.1.2	Working with Parallel and Perpendicular Lines	G-GPE.5
Lesson 2	Lines and Line Segments		
	6.2.1	Calculating Perimeter and Area	G-GPE.7*