

Common Core State Standards Pathway Through 2nd edition *Core-Plus Mathematics*

Introduction

For the next few years, schools in many states will be transitioning to the Common Core State Standards for Mathematics (CCSSM) K–12. If your district is currently using *Core-Plus Mathematics* 2nd edition (2008–2011) or considering adopting the program for next year, this document may be used as a guide to a scope and sequence for CCSSM-aligned courses.

It is advisable to collaborate with middle school mathematics teachers from your feeder school(s) to plan articulation between the Grades 6–8 CCSSM and those for high school. Some topics in the CCSSM are introduced in middle school and used or extended in high school. For these standards you may find that some material in *Core-Plus Mathematics* will need fewer days to complete than is suggested in each Unit Planning Guide. Typically, the cognitive demand of the problems in *Core-Plus Mathematics* Course 1 exceeds that of similar content in middle school programs. Thus, it is in students' best interest to complete the CCSSM Courses 1–3 Pathway outlined in this document with careful consideration of their middle school background. If you complete the investigations and problems listed on pages 2–8 of this document, students will be able to complete subsequent units in *Core-Plus Mathematics* and will learn the topics specified in the CCSSM. A detailed correlation of 2nd edition *Core-Plus Mathematics* to the CCSSM can be downloaded from: <http://www.wmich.edu/cmp/2nd/2ndCorrelationCPMP&CCSS.html>

Connecting the CCSS for Mathematics to the English Language Arts

In addition to studying the alignment of *Core-Plus Mathematics* with the CCSS for Mathematics, schools should also consider how *Core-Plus Mathematics* assists in meeting the CCSS for English Language Arts with respect to the standards for reading informational text and for technical reading.

Connecting the Standards for Mathematical Practice to the Standards for Mathematical Content

“The Standards for Mathematical Practice describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter.” (CCSSM p. 8) The *Core-Plus Mathematics* texts regularly provide opportunities for students to develop and reflect on the mathematical dispositions and “habits of mind” described in CCSSM’s Mathematical Practices as an integral part of both class work and homework. *Core-Plus Mathematics* is designed so that students engage in the mathematical behaviors identified in the Standards for Mathematical Practice as the primary vehicle for learning the mathematics and statistics elaborated in the content standards.

Access and Equity

Downloading the *CPMP-Tools* public domain software freely available at <http://www.wmich.edu/cmp/CPMP-Tools> to school and home computers, or using the software online in libraries and other public Internet access sites enables students to develop the mathematical practice of using appropriate tools strategically. This includes selecting and using technology tools to explore and deepen understanding of concepts; to visualize mathematical ideas and view results of varying assumptions; to model and solve problems; to compare predictions from data; and to become sufficiently familiar with technology tools to make sound decisions about when various features of the software might be helpful.

COURSE 1

Unit 1 Patterns of Change

- Lesson 1** Cause and Effect—Optional depending on students middle school background
 - Investigation 1** Physics and Business at Five Star Amusement Park
 - Investigation 2** Taking Chances
 - Investigation 3** Trying to Get Rich Quick
- Lesson 2** Change Over Time
 - Investigation 1** Predicting Population Change
 - Investigation 2** Tracking Change with Spreadsheets Problems 1–4
- Lesson 3** Tools for Studying Patterns of Change
 - Investigation 1** Communicating with Symbols
 - Investigation 2** Quick Tables, Graphs, and Solutions
 - Investigation 3** The Shapes of Algebra—Optional depending on students middle school background
- Lesson 4** Looking Back

Unit 2 Patterns of Data

- Lesson 1** Exploring Distributions
 - Investigation 1** Shapes of Distributions Problems 1–8
 - Investigation 2** Measures of Center
- Lesson 2** Measuring Variability
 - Investigation 1** Measuring Position
 - Investigation 2** Measuring and Displaying Variability: The Five-Number Summary and Box Plots
 - Investigation 3** Identifying Outliers
 - Investigation 4** Measuring Variability: The Standard Deviation
 - Investigation 5** Transforming Measurements
- Lesson 3** Looking Back

Unit 3 Linear Functions

- Lesson 1** Modeling Linear Relationships
 - Investigation 1** Getting Credit
 - Investigation 2** Symbolize It
 - Investigation 3** Fitting Lines
- Lesson 2** Linear Equations and Inequalities
 - Investigation 1** Who Will Be the Doctor?
 - Investigation 2** Using Your Head
 - Investigation 3** Using Your Head ... More or Less
 - Investigation 4** Making Comparisons
- Lesson 3** Equivalent Expressions
 - Investigation 1** Different, Yet the Same
 - Investigation 2** The Same, Yet Different
- Lesson 4** Looking Back

Unit 4 Vertex-Edge Graphs

Lesson 1 Euler Circuits: Finding the Best Path—Focus is on explicit attention to the mathematical practice of, and content standards for, mathematical modeling.

Investigation 1 Planning Efficient Routes

Investigation 2 Making the Circuit
Problems 1–4 and 6

Investigation 3 Graphs and Matrices

Unit 5 Exponential Functions

Lesson 1 Exponential Growth

Investigation 1 Counting in Tree Graphs

Investigation 2 Getting Started

Investigation 3 Compound Interest

Investigation 4 Modeling Data Patterns
Some students do Problem 1 others do Problem 2.

Investigation 5 Properties of Exponents I

Lesson 2 Exponential Decay

Investigation 1 More Bounce to the Ounce

Investigation 2 Medicine and Mathematics

Investigation 3 Modeling Decay
Some groups do Problem 1, others do Problem 2, and all do Problem 3.

Investigation 4 Properties of Exponents II

Investigation 5 Square Roots and Radicals

Lesson 3 Looking Back

Unit 6 Patterns in Shape

Lesson 1 Two-Dimensional Shapes

Investigation 1 Shape and Function
Problems 1–5

Investigation 2 Congruent Shapes

Investigation 3 Reasoning with Shapes

Investigation 4 Getting the Right Angle

Lesson 2 Polygons and Their Properties

Investigation 1 Patterns in Polygons

Investigation 2 The Triangle Connection

Investigation 3 Patterns with Polygons
Problems 1–4 and 6

Lesson 3 Three-Dimensional Shapes

Investigation 1 Recognizing and Constructing Three-Dimensional Shapes

Investigation 2 Visualizing and Sketching Three-Dimensional Shapes

Investigation 3 Patterns in Polyhedra
Problems 1–5

Lesson 4 Looking Back

Unit 7 Quadratic Functions**Lesson 1** Quadratic Patterns**Investigation 1** Pumpkins in Flight**Investigation 2** Golden Gate Quadratics**Investigation 3** Patterns in Tables, Graphs, and Rules**Lesson 2** Equivalent Quadratic Expressions**Investigation 1** Finding Expressions for Quadratic Patterns**Investigation 2** Reasoning to Equivalent Expressions**Lesson 3** Solving Quadratic Equations**Investigation 1** Solving $ax^2 + c = d$ and $ax^2 + bx = 0$ **Investigation 2** The Quadratic Formula**Lesson 4** Looking Back**Unit 8 Patterns in Chance****Lesson 1** Calculating Probabilities**Investigation 1** Probability Distributions**Investigation 2** The Addition Rule**Lesson 2** Modeling Chance Situations**Investigation 1** When It's a 50-50 Chance**Investigation 2** Simulation Using Random Digits
Problems 1–6**Lesson 3** Looking Back**COURSE 2****Unit 1 Functions, Equations, and Systems****Lesson 1** Direct and Inverse Variation**Investigation 1** On a Roll**Investigation 2** Power Models**Lesson 2** Multivariable Functions**Investigation 1** Combining Direct and Inverse Variation**Investigation 2** Linear Functions and Equations**Lesson 3** Systems of Linear Equations**Investigation 1** Solving with Graphs and Substitution**Investigation 2** Solving by Elimination**Investigation 3** Systems with Zero and Infinitely Many Solutions**Lesson 4** Looking Back

Unit 2 Matrix Methods

Lesson 1 Constructing, Interpreting, and Operating on Matrices

Investigation 1 There's No Business Like Shoe Business

Investigation 3 Combining Matrices
Problems 3–6

Lesson 2 Multiplying Matrices

Investigation 1 Brand Switching

Investigation 2 More Matrix Multiplication

Lesson 3 Matrices and Systems of Linear Equations

Investigation 1 Properties of Matrices

Unit 3 Coordinate Methods

Lesson 1 A Coordinate Model of a Plane

Investigation 1 Representing Geometric Ideas with Coordinates

Investigation 2 Reasoning with Slopes and Lengths

Investigation 3 Representing and Reasoning with Circles

Lesson 2 Coordinate Models of Transformation

Investigation 1 Modeling Rigid Transformations

Investigation 2 Modeling Size Transformations

Investigation 3 Combining Transformations

Lesson 4 Looking Back

Unit 4 Regression and Correlation

Lesson 1 Bivariate Relationships

Investigation 1 Rank Correlation
Problems 1–2

Investigation 2 Shapes of Clouds of Points
Problems 1–3

Lesson 2 Least Squares Regression and Correlation

Investigation 1 How Good Is the Fit?

Investigation 2 Behavior of the Regression Line

Investigation 3 How Strong Is the Association?

Investigation 4 Association and Causation

Lesson 3 Looking Back

Unit 5 Nonlinear Functions and Equations**Lesson 1** Quadratic Functions, Expressions, and Equations**Investigation 1** Functions and Function Notation**Investigation 2** Designing Parabolas**Investigation 3** Expanding and Factoring**Investigation 4** Solving Quadratic Equations**Lesson 2** Nonlinear Systems of Equations**Investigation 1** Supply and Demand**Investigation 2** Making More by Charging Less**Lesson 3** Common Logarithms and Exponential Functions**Investigation 1** How Loud Is Too Loud?**Investigation 2** Solving for Exponents**Lesson 4** Looking Back**Unit 6 Network Optimization****Lesson 2** Scheduling Projects Using Critical Paths – Focus is explicitly on attention to the mathematical practice of, and content standards for, mathematical modeling and optimization.**Investigation 1** Building a Model**Investigation 2** Critical Paths and the Earliest Finish Time
Problems 1–6**Unit 7 Trigonometric Methods****Lesson 1** Trigonometric Functions**Investigation 1** Connecting Angle Measures and Linear Measures**Investigation 2** Measuring Without Measuring**Investigation 3** What's the Angle?**Lesson 2** Using Trigonometry with Any Angle**Investigation 1** The Law of Sines**Investigation 2** The Law of Cosines**Lesson 3** Looking Back**Unit 8 Probability Distributions****Lesson 1** Probability Models**Investigation 1** The Multiplication Rule for Independent Events**Investigation 2** Conditional Probability**Investigation 3** The Multiplication Rule When Events Are Not Independent**Lesson 2** Expected Value**Investigation 1** What's a Fair Price?**Investigation 2** Expected Value of a Probability Distribution**Lesson 4** Looking Back

COURSE 3**Unit 1 Reasoning and Proof**

Lesson 1 Reasoning Strategies

Investigation 1 Reasoned Arguments

Investigation 2 Reasoning with If-Then Statements

Lesson 2 Geometric Reasoning and Proof

Investigation 1 Reasoning about Intersecting Lines and Angles

Investigation 2 Reasoning about Parallel Lines and Angles

Lesson 3 Algebraic Reasoning and Proof

Investigation 1 Reasoning with Algebraic Expressions
Problems 1–2 and 4–9

Investigation 2 Reasoning with Algebraic Equations

Lesson 4 Statistical Reasoning

Investigation 1 Design of Experiments

Investigation 2 By Chance or from Cause?

Investigation 3 Statistical Studies

Lesson 5 Looking Back

Unit 2 Inequalities and Linear Programming

Lesson 1 Inequalities in One Variable

Investigation 1 Getting the Picture

Investigation 2 Quadratic Inequalities

Investigation 3 Complex Inequalities

Lesson 2 Inequalities in Two Variables

Investigation 1 Solving Inequalities

Investigation 2 Linear Programming—A Graphic Approach
Problems 1–2

Investigation 3 Linear Programming—Algebraic Methods
Problems 1–5

Lesson 3 Looking Back

Unit 3 Similarity and Congruence

Lesson 1 Reasoning about Similar Triangles

Investigation 1 When Are Two Polygons Similar?

Investigation 2 Sufficient Conditions for Similarity of Triangles

Investigation 3 Reasoning with Similarity Conditions

Lesson 2 Reasoning about Congruent Triangles

Investigation 1 Congruence of Triangles Revisited

Investigation 2 Congruence in Triangles

Investigation 3 Congruence in Quadrilaterals

Investigation 4 Congruence-Preserving Transformations

Lesson 3 Looking Back

Unit 4 Samples and Variation**Lesson 1** Normal Distributions**Investigation 1** Characteristics of a Normal Distribution**Investigation 2** Standardized Values**Investigation 3** Using Standardized Values to Find Percentiles**Lesson 2** Binomial Distributions**Investigation 1** Shapes, Center, and Spread**Investigation 2** Binomial Distributions and Making Decisions**Lesson 4** Looking Back**Unit 5 Polynomial and Rational Functions****Lesson 1** Polynomial Expressions and Functions**Investigation 1** Modeling with Polynomial Functions**Investigation 2** Addition, Subtraction, and Zeroes**Investigation 3** Zeroes and Products of Polynomials**Lesson 2** Quadratic Polynomials**Investigation 1** Completing the Square**Investigation 2** The Quadratic Formula and Complex Numbers**Lesson 3** Rational Expressions and Functions**Investigation 1** Domains and Graphs of Rational Functions**Investigation 2** Simplifying Rational Expressions**Investigation 3** Adding and Subtracting Rational Expressions**Investigation 4** Multiplying and Dividing Rational Expressions**Lesson 4** Looking Back**Unit 6 Circles and Circular Functions****Lesson 1** Properties of Circles**Investigation 1** Tangents to a Circle**Investigation 2** Chords, Arcs, and Central Angles**Investigation 3** Angles Inscribed in a Circle**Lesson 2** Circular Motion and Periodic Functions**Investigation 1** Angular and Linear Velocity
Problems 1–3**Investigation 2** Modeling Circular Motion**Investigation 3** Angular Revolutions, Degrees, and Radians**Investigation 4** Patterns of Periodic Change
Problems 1–7**Lesson 3** Looking Back

Unit 7 Recursion and Iteration

Lesson 1 Modeling Sequential Change Using Recursion and Iteration

Investigation 1 Modeling Population Change

Investigation 2 The Power of Notation and Technology

Lesson 2 A Recursive View of Functions

Investigation 1 Arithmetic and Geometric Sequences

Unit 8 Inverse Functions

Lesson 1 What Is an Inverse Function?

Investigation 1 Coding and Decoding Messages

Investigation 2 Finding and Using Inverse Functions

Lesson 2 Common Logarithms and Their Properties

Investigation 1 Common Logarithms Revisited

Investigation 2 Covering All the Bases

Investigation 3 Properties of Logarithms

Lesson 4 Looking Back