Common Core State Standards Integrated Pathway

Honors Supplement

for Mathematics III

Teacher Resource

BW WALCH

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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Introduction to the Program

The *CCSS Integrated Pathway Honors Supplement for Mathematics III* is a complete set of materials developed around the "additional mathematics that students should learn in order to take advanced courses such as calculus, advanced statistics, or discrete mathematics as indicated by the (+)" in the Common Core State Standards for Mathematics. The materials are designed to support the teaching and learning of these standards and are provided as supplements to Walch's *CCSS Integrated Pathway: Mathematics III* program. The supplement employs a problem-solving approach and includes a variety of resources to provide teachers with instructional options to meet their students' needs. It contains instructional material and student worksheets (with name lines). Teachers may wish to copy certain instructional pages for student use (Standards, Essential Questions, Words to Know, and Recommended Resources). These materials may be used in honors or accelerated courses, or with individuals or groups of students requiring additional challenge.

In addition to a bilingual glossary and a list of useful formulas, the *CCSS Integrated Pathway Honors Supplement for Mathematics III* includes the following components:

For each topic:

- One or more lessons
- An extension activity (Topics 1, 2, 3, 5, and 6)

In each lesson:

- Pre-Assessment
- Standards
- Essential Questions
- Words to Know
- Recommended Resources
- Warm-Up
- Warm-Up Debrief and Connection to the Lesson
- Prerequisite Skills
- Introduction
- Key Concepts
- Common Errors/Misconceptions
- Guided Practice
- Scaffolded Practice
- Problem-Based Task
- Problem-Based Task Coaching Questions
- Problem-Based Task Coaching Questions Sample Responses
- Recommended Closure Activity
- Practice
- Progress Assessment

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Unit Structure

All of the instructional topics have some common features. They are comprised of one or more lessons and an extension activity.

Each lesson begins with pre-assessment problems, followed by the list of standards addressed in the lesson; Essential Questions; vocabulary (titled "Words to Know"); and a list of recommended websites to be used as additional resources. Next comes a warm-up problem, debrief, and connections to the lesson. Then, the lesson features a list of identified prerequisite skills that students need to have mastered in order to be successful with the new material in the Honors lesson. This is followed by an introduction, key concepts, common errors/misconceptions, guided practice examples, a problem-based task with coaching questions and sample responses, a closure activity, and practice. Each lesson ends with progress assessment problems to evaluate students' learning.

Each topic culminates with an extension activity providing students the opportunity to apply the topic in a more sophisticated way. The extension activity includes a problem-based task along with suggestions for introducing, facilitating, and debriefing the activity.

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

Pre-Assessment

These problems can be used to gauge students' prior knowledge and to inform instructional planning. They may be added to a longer pre-assessment or administered independently.

Common Core State Standards for the Lesson

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

Common Core Standards for Mathematical Practice for the Lesson

An "SMP" callout box contains the numbers 1–8, corresponding to each of the eight Standards for Mathematical Practice. Check marks indicate which of the SMPs are addressed in the instruction.

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. The links for these resources are live in the PDF version of the Honors Supplement. (*Note*: These website links will be monitored and repaired or replaced as necessary.)

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Warm-Up

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

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 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.

Identified Prerequisite Skills

Presented at the beginning of each lesson, 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.

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.

Guided Practice

This section provides step-by-step examples of applying the Key Concepts.

Scaffolded Practice

The Guided Practice example problems, without explanations or answers, are provided as worksheets to give students an opportunity to build procedural fluency. The first Scaffolded Practice example provides step-by-step prompts for solving. The remaining examples are presented without prompts.

Problem-Based Task

This activity can be used to walk students through the application of the standard, prior to traditional instruction or at the end of instruction. Addressed Standards for Mathematical Practice are noted.

Problem-Based Task Coaching Questions

These questions scaffold the task and guide students to solving the problem(s) presented in the task.

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Problem-Based Task Coaching Questions Sample Responses

These are the 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 lesson through a journal entry or discussion of one or more of the Essential Questions.

Practice

Each lesson includes practice problems to support students' achievement of the learning objectives. These sheets are written for the student. They can be used in any combination of teacher-led instruction, cooperative learning, or independent application of knowledge.

Progress Assessment

Each lesson ends with three assessment problems that can be used to document the extent to which students grasp the concepts and skills addressed during instruction.

Extension Activity

Some topics end with an extension activity, providing students with the opportunity to apply the skills and concepts from the lessons in a meaningful real-world context that reflects a more sophisticated application. Guides for introducing, facilitating, and debriefing the activity are included.

Answer Key

Answers for all of the warm-ups, assessment problems, practice problems, and extension activities are provided at the end of the Teacher Resource.

Graphing Calculators

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

Digital Warm-Ups

These PowerPoint versions of the warm-ups and debriefs each include a video clip for student engagement. The video clip can be played as students enter the classroom. The answer key slides can be used as you debrief the warm-up.

Digital Instruction

Delivered via PowerPoint, this instruction adds interactive applets to selected examples in the lessons and guided practice to illuminate and illustrate key concepts. This can be used in preparation for the class, for teaching, or for helping students catch up after missing class.

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Standards Correlations

Each lesson in the *CCSS Integrated Pathway Honors Supplement for Mathematics III* was written specifically to address the Common Core State Standards designated with a (+). In this section, you'll find a comprehensive list mapping the Honors resources to these standards.

Guide to Common Core State Standards Annotation

As you use this program, you will come across symbols 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

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Topic 1: Matrices			
Lesson	**Lesson number**	**Title**	**Standard(s)**
Lesson 1	1.1	Operations with Matrices	N–VM.7 (+) N–VM.8 (+) N–VM.9 (+)
Lesson 2	1.2	Using Operations on Matrices	N–VM.6 (+) N–VM.12 (+)
Lesson 3	1.3	Zero, Identity, Inverse, and Transformation Matrices	N–VM.10 (+) N–VM.11 (+)
Topic 1 Extension Activity		Computer Animation with Matrices	N–VM.6 (+) N–VM.7 (+) N–VM.8 (+) N–VM.9 (+) N–VM.12 (+)

Topic 2: Using Matrices to Solve Systems of Equations			
Lesson	**Lesson number**	**Title**	**Standard(s)**
Lesson 1	2.1	Representing a System of Linear Equations as a Matrix Equation	A–REI.8 (+)
Lesson 2	2.2	Finding the Inverse of a Matrix and Using It to Solve a System of Equations	A–REI.9 (+)
Topic 2 Extension Activity		Problem Solving with Matrices	A–REI.8 (+) A–REI.9 (+)

Topic 3: Rational Functions			
Lesson	**Lesson number**	**Title**	**Standard(s)**
Lesson 1	3.1	Graphing Rational Functions and Identifying Key Features	F–IF.7d★ (+)
Topic 3 Extension Activity		Milk Cartons	F–IF.7d★ (+)

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Topic 4: Polar Coordinates and Parametric Equations			
Lesson	**Lesson number**	**Title**	**Standard(s)**
Lesson 1	4.1	Parametric Equations	CA F–IF.10★ (+)
Lesson 2	4.2	Polar Coordinates and Graphing in the Polar Plane	N–CN.4 (+) CA F–IF.11★ (+)

Topic 5: Trigonometry			
Lesson	**Lesson number**	**Title**	**Standard(s)**
Lesson 1	5.1	Proving Trigonometric Identities	F–TF CA F–TF.10
Lesson 2	5.2	Proving the Addition and Subtraction Formulas	F–TF.9 (+)
Lesson 3	5.3	Symmetry, Periodicity, and Infinite Domain of Trigonometric Functions	F–TF.3 (+) F–TF.4 (+)
Lesson 4	5.4	Restricting the Domain to Find Inverse Trigonometric Functions	F–BF.4d (+) F–TF.6 (+)
Lesson 5	5.5	Using Inverse Trigonometric Functions to Solve Problems	F–TF.7★ (+)
Topic 5 Extension Activity		Modeling Climate	F–TF.4d (+) F–TF.3 (+) F–TF.6 (+) F–TF.7★ (+)

Topic 6: Building Functions			
Lesson	**Lesson number**	**Title**	**Standard(s)**
Lesson 1	6.1	Composition of Functions	F–BF.1c★ (+)
Lesson 2	6.2	Verifying Function Inverses by Composition	F–BF.4b (+)
Lesson 3	6.3	Finding Inverse Functions in Various Forms	F–BF.4c (+)
Lesson 4	6.4	Inverses of Exponential and Logarithmic Functions	F–BF.5 (+)
Topic 6 Extension Activity		Exploring Group Theory	F–BF.1c★ (+) F–BF.4c (+) F–BF.5 (+)

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