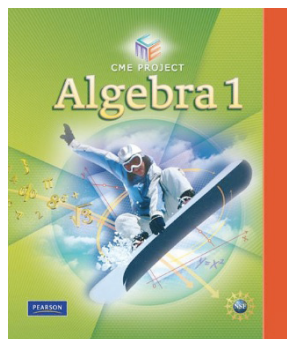




Investigation and Chapter Structure

Introduction This guide examines a typical CME Project chapter and investigation. As an example, it will use Algebra I Chapter 5. However, the information in this guide is applicable to other chapters and texts as well.



Daily Planner In the Teacher’s Edition, each chapter begins with a Daily Planner.

In the left margin there is an introduction to the chapter and a brief overview of the chapter investigations and chapter project.

The information in the right margin details the mathematics background of the chapter.

The Daily Planner also provides pacing suggestions and materials for the chapter.

DAY	LESSON	HOMEWORK	NOTES
1	5.1 Getting Started Core: 1, 2, 3, 4, 5 Optional: none	Core: 7, 8, 9, 10 Optional: 6, 11, 12, 13	
2	5.2 Building Functions Core: 1, 2, 3 Optional: 4, 5	Core: 6, 7, 8, 12, 14 Optional: 9, 10, 11; Extension: 13	Assign roles for the Minds in Action dialog.
3	5.3 Is It a Function? Core: 2, 3, 4 Optional: 1	Core: 5, 6, 8, 10, 11, 12 Optional: 7, 9, 13, 14	
4	5.4 Naming Functions Core: 2, 3, 4 Optional: 1, 5	Core: 6, 8, 9, 10, 11, 12 Optional: 7	You can combine Lessons 5.4 and 5.5 for advanced classes.
5	5.5 Function Inputs and Outputs Core: 1, 3, 4 Optional: 2; Extension: 5, 6	Core: 7, 8, 9, 10, 12 Optional: none; Extension: 11	
6	5.6 Graphing Functions Core: 2, 3, 4, 5, 6 Optional: 1, 7	Core: 8, 9, 12, 13, 16, 17, 18 Optional: 10, 14, 15; Extension: 11	Assign roles for the Minds in Action dialog.

For example, Investigation 5A should take six days to complete. Many high schools use block scheduling, so be aware that these pacing suggestions are based on a traditional 50–60 minute daily schedule.

This particular investigation consists of six lessons. The Lesson and Homework columns introduce teachers to the core and optional exercises available for each lesson.

The Notes column suggests role assignments, implementation strategies, or grouping ideas.

Chapter Introduction

Each textbook contains eight chapters, and each chapter is organized around a large mathematical theme. The theme for Chapter 5 is functions.

One of the major goals of the CME Project is for students to think like mathematicians. This is accomplished through the study of Mathematical Habits of Mind. The Teacher's Edition outlines specific habits that will be addressed in the current chapter.

This chapter introduction also introduces the chapter vocabulary and lists the page numbers where each word is introduced. This section lists the types of technology that are needed for this chapter.

A Chapter Road Map is also included in the chapter introduction. This road map summarizes each investigation.

In the Student Edition, the Investigations at a Glance section lists the main idea of each investigation.



Chapter Introductions build background that helps students connect to mathematical concepts in their everyday lives. This section relates the use of functions to everyday tasks such as weekly and hourly pay or car fuel economy.

Students are then given a chance to preview the chapter vocabulary.

Vocabulary and Notation

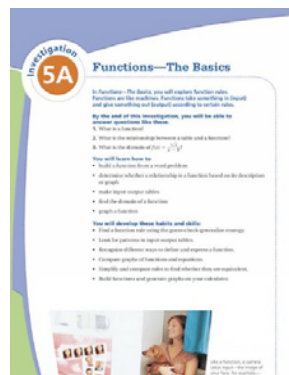
- base case
- closed form
- composition
- domain
- exponential function
- fixed point
- function, $f(x)$
- graph of a function
- Koch snowflake
- linear function
- period
- periodic function
- range
- recursive rule

Investigations

Next, turn the page and look at the first investigation. Most chapters contain three or four investigations. The goal of each investigation is to develop the chapter theme.

Each investigation begins with an introduction page. Here, students are introduced to the following:

- The investigation concept
- Guiding questions
- Learning goals
- Habits and skills they will be using during the course of the investigation



The Teacher’s Edition provides the same information, but it also suggests tips for launching the investigation in the Investigation Overview. In addition, an Investigation Road Map provides a lesson outline for the investigation.

Lessons

Each investigation consists of several lessons. The first lesson is always Getting Started. This lesson is designed as an exploratory lesson. The goals of this lesson are to

- preview the main ideas of the investigation;
- activate prior knowledge; and
- introduce experiments that students will use throughout the investigation.

Lesson Model

Each lesson follows the same lesson model: Launch, Explore, and Wrap Up. In this lesson, introduce students to a game called Guess My Rule. Explain the rules and model the game for the students.

Launch

Model how to play the Guess My Rule game by playing a few rounds with the class. Before beginning, give students a record sheet or have them make their own. Students choose inputs, and you tell them the outputs, until someone guesses the rule. You may want to play a few rounds as a class, giving different students the chance to be the Rule Maker. (Be sensitive in choosing Rule Makers—the Rule Maker must be able to do the calculations quickly. Choose simple rules to avoid embarrassment for anyone who cannot compute the output on the spot.)

During the Explore phase, students will complete the exercises in the For You to Explore section. In Exercises 1 and 2, students will actually play the game. In Exercises 3–5 they will use what they have learned in the game to answer questions about related situations.

3. In Round 1, Sasha is the Rule Maker.

Tony's Input	Sasha's Response
1	1 produces 5.
2	2 produces 3.
3	3 produces 25.
1	1 produces 11.

Tony says, "That rule's not fair!" What makes Tony say that?

4. In the next game, Tony is the Rule Maker. For a few of the inputs, Tony responds with a letter instead of a number.

Sasha's Input	Tony's Response
1	1 returns a.
2	2 returns c.
5	5 returns 11.
1	1 returns b.
2	2 returns c.

- When Tony uses a fair rule, what is the value of c ?
- How are the variables a and b related?
- Do you have enough information to find the value of a ? Explain.

5. Sasha uses the rule "After each input, I flip a coin. When it shows heads, I write, 'x produces $x + 2$.' When it shows tails, I write, 'x produces $x + 3$.'" Sasha's responses are left blank below.

Tony's Input	Sasha's Response
1	1 produces \square .
3	3 produces \square .
-3	-3 produces \square .
2	2 produces \square .
1	1 produces \square .

- Can you know for certain Sasha's responses? Explain.
- Will Tony complain that Sasha's rule isn't fair? Explain.

The Wrap Up phase consists of a class discussion based on fair and unfair rules. This discussion eventually leads students to an understanding of the importance of rules in defining functions.

Then, students are given further practice in the On Your Own and Maintain Your Skills Exercises.

Lesson Features

The remaining lessons in the investigation help students build a deeper understanding of the investigation theme. These lessons incorporate a variety of features to accomplish this goal. To introduce a few of the features teachers will encounter in a lesson, look at Lesson 5.2.

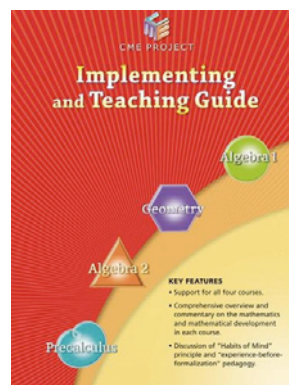
The first feature is called Minds in Action. Here, students get to eavesdrop on mathematical conversations. In these conversations, fictional students talk about their problem solving strategies. These strategies model good use of the habits of mind.

The For You to Do feature usually follows Minds in Action. This feature allows students to try and solve the problem discussed by the fictional students.

Developing Habits of Mind is a feature that allows students to think about the lesson content in a variety of ways.

The last feature, For Discussion, presents questions or problems for whole group discussion. The purpose of this activity is to make sure that students have read and understood the material.

Other features are available throughout the program as well. For a complete list and description, consult the CME Project Implementing and Teaching Guide.



Assessments

At the end of each investigation is a mathematical reflections page. In this activity, the exercises help students summarize what they have learned in the investigation. This exercise may be used as a quiz or a notebook entry.

Students will encounter the Mid-Chapter Test in their textbook. This test consists of multiple-choice and open response test items.

After the class has completed all of the investigations in a chapter, the Chapter Project is introduced. In this project, students will explore the use of functions with spreadsheets. They will relate to this project because it involves saving money and calculating financing options for a car.

The chapter concludes with review exercises for each investigation and a chapter test.

Like the Mid-Chapter Test, this assessment contains multiple-choice and open response exercises. Many chapters provide challenge items that may be used to further test above-level students.

Review

This guide examined the structure of a typical CME Project chapter.

Each textbook contains eight chapters. Each chapter is organized by a large mathematical theme. Chapters are provided with a Chapter Planner and Road Map. Assessments occur mid-chapter and at the end of the chapter. Chapter Projects are also available for each chapter.

Each chapter contains several investigations. The goal of each investigation is to develop the main theme of the chapter. At the end of each investigation, students are given the opportunity to summarize what have they learned in the Mathematical Reflections exercises.

Each investigation contains a series of lessons. Each lesson builds a deeper understanding of the goals of the investigation. The first lesson in an investigation is always an exploratory lesson. The lesson structure is based on a Launch, Explore, and Wrap Up model. Lesson features include modeled mathematical dialogs, individual practice, and discussion topics. Lessons conclude with practice exercises.

For more information, look for the other CME Project tutorials and product guides on myPearsonTraining.com.