



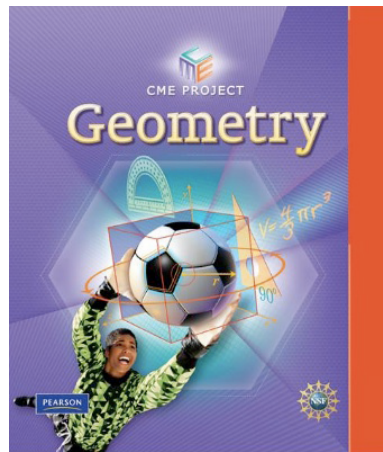
## Implementation and Assessment

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### Introduction

This guide looks at a typical CME Project chapter and investigation. It discusses program implementation issues, such as organization, planning, and differentiation. The guide also looks at assessment tips and resources.

In order to model these features, this guide uses examples from the Geometry Teacher's Edition. However, the concepts discussed will apply to all the CME Project course textbooks.



### Organization

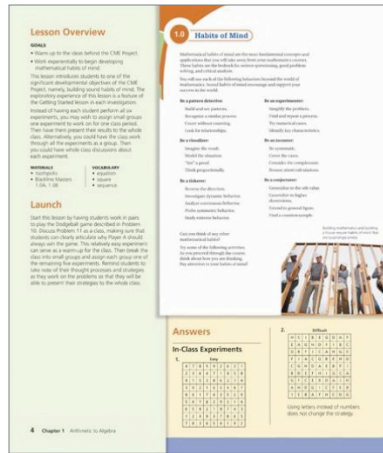
The authors of the CME Project recognize that teachers are the best people to make judgments about what is most appropriate for their classes. They understand that what is good for one class, may not be appropriate for another. For this reason, the authors do not mandate specific classroom organization plans or uses of technology.

However, the authors do provide teachers with many implementation tips in the Teacher's Edition that will help them make informed instructional choices.

These implementation tips include the following:

- Student groupings
- Teaching pointers
- Descriptions of possible errors
- Optional exercises

Take a look at Chapter 1, page 4 in the Teacher's Edition.

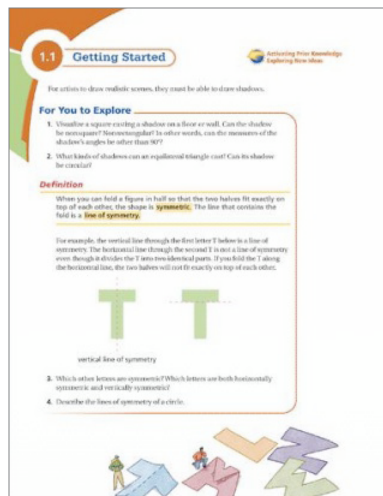


## Grouping Students

The authors make student grouping suggestions in various places throughout the Teacher's Edition. One place to look for these suggestions is in the Lesson Overview section, which is located in the margin of the book. Grouping suggestions can also be found in the Launch and Explore sections.

## Differentiation

The CME Project uses a low-threshold, high ceiling pedagogical approach to learning. Each investigation begins with activities that are accessible to all students. Investigations end with activities that challenge even the most advanced students. For example, at the beginning of Geometry Investigation 1, students create models and experiment with shadows.



By the end of the investigation, they will advance to visualizing instructions to draw complex geometric figures.

Struggling students will benefit from the small group and large group activities. They will also gain proficiency through concrete, hands-on activities, which provide them with the background knowledge they need to dive into more abstract concepts.

## Teaching Pointers

One strategy is to use the teaching pointers throughout the Teacher's Edition to target specific student needs.

For Problem 2, the authors suggest that teachers use a blackline master to help students visually represent the problem. Students who struggle with visualization will benefit from having this concrete representation of the problem.

**PROBLEM 2** You may wish to provide students with Blackline Master MC.1 to help them find the number of diagonals in various regular polygons. This problem is essentially a pictorial variation of the handshake problem from Problem 1.

There are many ways to write rules for the number of diagonals of a regular polygon. Here is one theorem for the number of diagonals: An  $n$ -gon has  $\frac{n(n-1)}{2} - n$ , or equivalently,  $\frac{n(n-3)}{2}$ , diagonals. Here is another rule for the number of diagonals: For an  $n$ -sided polygon, find the sum of the first  $n - 3$  terms in the series  $2 + 3 + 4 + 5 + 6 + \dots$

Students can derive a similar rule by experimenting with a polygon in a systematic way and noting the pattern. For octagon  $ABCDEFGH$ , students can draw five diagonals from vertex  $A$  and five additional diagonals from vertex  $B$ .

## Potential Errors

Teachers will also find sections that point out potential student errors. The Error Prevention section shows a potential error that students frequently make. These Error Prevention sections are based on misconceptions that the authors encountered in classrooms across the United States.

As teachers observe students making these mistakes, they will clarify or redirect the task with questioning techniques.

## Optional Exercises

Next, look at the Lesson Overview on page 9. Here there are suggested activities for this lesson. Many of them are tagged as core exercises, while others are tagged as optional.

### Lesson Overview

**GOALS**

- Warm up to the ideas of the investigation.
- Use a visual approach to develop mathematical habits of mind.

This lesson gives students a taste of the visualizing and analyzing techniques they will use in this investigation. For many students, this may be the first time they have analyzed 2- and 3-dimensional shapes so closely. They need to see, hold, and manipulate shapes whenever possible. Do not ask students to visualize, unless there is no alternative. Students who have trouble visualizing a figure need you to help them see it, so that in the future, they can visualize objects on their own. The lesson also introduces the term *line of symmetry* for use in Problems 3 and 4. This term will come up again in Lessons 1.2 and 1.3.

<p><b>FOR YOU TO EXPLORE</b></p> <ul style="list-style-type: none"> <li>• Core: 1, 2, 3, 4</li> <li>• Optional: none</li> </ul> <p><b>MATERIALS</b></p> <ul style="list-style-type: none"> <li>• flashlights or lamps</li> <li>• scissors</li> <li>• stiff paper or cardboard</li> <li>• Blackline Master 1.1</li> </ul>	<p><b>HOMEWORK</b></p> <ul style="list-style-type: none"> <li>• Core: 5, 6, 7</li> <li>• Optional: 8, 9, 10, 11</li> </ul> <p><b>VOCABULARY</b></p> <ul style="list-style-type: none"> <li>• line of symmetry</li> <li>• quadrilateral</li> <li>• symmetric</li> </ul>
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Take a look at the homework exercises. Exercises 5 through 7 are tagged as Core. Core exercises are imperative for students as they meet and build toward the goals of a lesson. These exercises also prepare students for concepts in future lessons.

Exercises 8 through 11 are tagged as optional. Optional exercises provide students with extra practice on a concept. In this case these exercises were designed to help students maintain skills, and not to reinforce the main concepts of this lesson. Teachers may choose to eliminate these problems if they have time constraints or if they see that students have grasped the material.

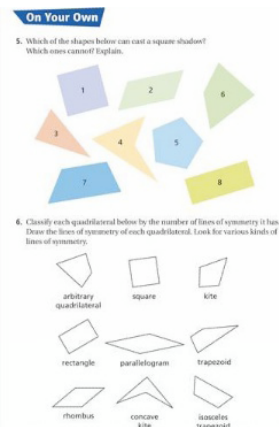


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## Assessment

The main goals of assessment for the CME Project are the correctness and completeness of mathematical solutions, the quality of the student's mathematical thought, and the student's mathematical growth.

CME Project assessment tools range from classroom discussions to formal test and projects.



According to the authors, problems and exercises that are embedded in the text should be the backbone of student assessment. Students will benefit from sharing and discussing each other's answers.

Journals give students the opportunity to reveal their understanding and misconceptions. Teachers can use these as a launching point for intervention and further practice.

They can also assign presentations and projects to students. These assessment tools help them organize their thoughts and clearly communicate their ideas with the rest of the class. This will also give them the opportunity to practice their math research skills.

In addition, there are Mid-Chapter Tests, chapter reviews, in-text tests, as well as formal tests that are located in the program's assessment resources.

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## Review

This guide examined implementation suggestions for the CME Project. It discussed organization and student groupings. It also looked at ways in which teachers can differentiate instruction for their struggling learners, as well as their advanced learners. Finally, it explained the assessment suggestions that are recommended by the authors.

For more information on topics covered in this tutorial, be sure to read the CME Project *Implementing and Teaching Guide*.