Professional development begins with the Big Ideas Math Teaching Edition. On the right hand page, opposite the Chapter Opener is a *Strands Development* chart that enables teachers to see at a glance the development of the ideas leading up to the chapter. Also included on this page are the *Pacing Guide*, the resources available for the chapter, and a short *Math in History* feature.

**Math in History**

The concept of percent dates back to Roman times. However, the percent symbol is more recent.

- Percent has been used since the end of the fifteenth century in business problems such as computing interest, profit and loss, and taxes. However, the idea had to originate much earlier. When the Roman emperor Augustus levied a tax on all goods sold at auction, the rate was \( \frac{10}{100} \).
- In the Middle Ages, as large denominations of money came to be used, 100 became a common base for computations. Italian manuscripts of the fifteenth century contained such expressions as "20 p 100" to indicate 20%. The percentage sign, %, evolved from a symbol introduced in an anonymous Italian manuscript of 1426. Instead of "per 100" or "per mille," which were common at that time, the author used the symbol \( \% \). The current symbol, using a slanted line, is relatively modern.

**Pacing Guide for Chapter 4**

<table>
<thead>
<tr>
<th>Section 1</th>
<th>Activity</th>
<th>Lesson</th>
<th>1 Day</th>
<th>1 Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 2</td>
<td>Activity</td>
<td>Lesson</td>
<td>1 Day</td>
<td>1 Day</td>
</tr>
<tr>
<td>Study Help / Quiz</td>
<td></td>
<td></td>
<td>1 Day</td>
<td></td>
</tr>
<tr>
<td>Section 3</td>
<td>Activity</td>
<td>Lesson</td>
<td>1 Day</td>
<td>1 Day</td>
</tr>
<tr>
<td>Section 4</td>
<td>Activity</td>
<td>Lesson</td>
<td>1 Day</td>
<td>1 Day</td>
</tr>
<tr>
<td>Quiz / Chapter Review</td>
<td></td>
<td></td>
<td>1 Day</td>
<td></td>
</tr>
<tr>
<td>Chapter Test</td>
<td></td>
<td></td>
<td>1 Day</td>
<td></td>
</tr>
<tr>
<td>Standardized Test Practice</td>
<td></td>
<td></td>
<td>1 Day</td>
<td></td>
</tr>
<tr>
<td>Total Chapter 4</td>
<td></td>
<td></td>
<td>12 Days</td>
<td></td>
</tr>
</tbody>
</table>

**Check Your Resources**

- Record and Practice Journal
- Resources by Chapter
- Skills Review Handbook
- Assessment Book
- Worked Out Solutions
When you turn the page, the left hand side is the Teaching Edition page and provides the Math Background Notes, including vocabulary review for the What You Learned Before page in the pupil edition. This review page reinforces the topics covered in the Strands Development chart. The background information discusses specific strategies for reviewing what students already know by referencing what was learned in earlier grades (based on standards).

This page layout design continues throughout the entire teaching edition. Any page you turn to will have a full-size student edition page on one side and a full-size teaching support page on the other. All teaching support pages are beige.
Laurie’s Notes, written by master teacher Laurie Boswell, are opposite the lesson plans. This feature provides insight into her professional training and years of experience to share best practices in teaching and modeling to help teachers guide students to better understanding. Laurie’s Notes provides a daily mentor to any educator, especially novice teachers. Below, Laurie shares her thoughts about this feature.

I have always loved math—even when I was young. And yet, early in my career, I became frustrated with many of the instructional programs for teaching mathematics. In 1992, that frustration led me to accept an offer from Ron Larson to join him and Lee Stiff in writing a high school geometry program for D.C. Heath.

When Ron asked me to join him in implementing the NCTM Focal Points in a new middle school program, I jumped at the opportunity to make changes in the way middle school mathematics is taught and learned.

In Laurie’s Notes in the three Teaching Editions, I describe my “hands on” philosophy for teaching mathematics. Foremost in this philosophy is my belief that students can enjoy and understand mathematics. The secret is to begin each new concept with engaging, visual, tactile activities that ask simple, but deep questions.

During the time I wrote Laurie’s Notes, I was not just imagining what might help middle school students. I was actually teaching middle school students—one class each of grades 6, 7, and 8. In other words, the suggestions I put in the notes are not theoretical suggestions from a math education professor. They represent things that I actually use in class.

I love working with other teachers. One of my favorite things to do is to conduct workshops. If you are interested in setting up a workshop with me or with one of the math consultants at Big Ideas Learning, drop us a note. We will be delighted to customize a session that is tailored to your needs.

Biography

Laurie Boswell is a mathematics teacher at the Riverside School in Lyndonville, Vermont. She is a recipient of the Presidential Award for Excellence in Mathematics Teaching. Laurie has taught math to students at all levels, elementary through college. In addition, Laurie was a Tandy Technology Scholar, and served on the NCTM Board of Directors from 2002 to 2005. She currently serves on the board of NCSM, and is a popular national speaker. Along with Dr. Ron Larson, Laurie has co-authored numerous math programs including the Big Ideas Math series.
Laurie’s Notes identifies the goal of the Activity and offers motivating ideas to show mathematical relevance. Comprehensive Activity Notes, such as FYI, Representation, Summarize, and Extension, are provided on a teacher-to-teacher basis to help guide the activities and discovery process.

Laurie provides insights she has gained through years of teaching experience.
Various ideas for Differentiated Instruction are also provided to address the visual, kinesthetic, and auditory learners, as well as the below-level and advanced learners.

Strategies are provided that help students avoid common errors.

Teachers are offered suggestions for questioning that help guide students toward better understanding.
Ideas for connecting the lesson with the activity are included in Connect. Key Ideas are also connected to material learned in previous grades. Comprehensive Lesson Notes, such as Connection, FYI, Estimate, and Common Error, are provided on a teacher-to-teacher basis to help guide the lesson and discussion about the examples.

Student-friendly and teacher-tested motivation activities start each lesson.
The *English Language Learners* (ELL) feature provides a brief description of how a teacher can assist an ELL. This feature will focus on defining vocabulary or explaining a concept in more detail, with simplified terminology. Laurie uses the *Closure* feature to wrap up an activity or lesson. This feature is used as a general concept check for the students.

Each example in the pupil edition is accompanied by teaching suggestions from Laurie.
The Assignment Guide and Homework Check provides suggested exercises to use for homework. Three assignment levels are given for each day: basic, average, and advanced. The Homework Check is a list of exercises that the teacher can use as a quick check to determine if students understand the key concepts of the lesson. It also provides teachers with a small list of exercises to discuss or go over in order to review the homework, rather than the entire assignment. The Common Errors feature is included at least once per exercise set. This feature identifies exercises where students may be more likely to make a mistake or perform a common error. Proven strategies of what to look for and how to address and/or fix them are provided.

<table>
<thead>
<tr>
<th>Level</th>
<th>Day 1 Activity Assignment</th>
<th>Day 2 Lesson Assignment</th>
<th>Homework Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>4-5, 21-36</td>
<td>1-3, 1-17 odd, 18-22, 28</td>
<td>11, 15, 20, 28</td>
</tr>
<tr>
<td>Average</td>
<td>4-5, 21-36</td>
<td>1-3, 11-19 odd, 22-28, 29</td>
<td>11, 15, 23, 28</td>
</tr>
<tr>
<td>Advanced</td>
<td>4-5, 22-36</td>
<td>1-3, 18, 19, 22-27, 28-31</td>
<td>24, 28, 27, 30</td>
</tr>
</tbody>
</table>

Common Errors
- Exercises 1-17 Students may not know what number to substitute for each variable. Walk through each type of equation with the students. Emphasize that the word means equals, and to solve for each variable, one must divide both sides of the equation by the number that is to be divided. In Exercise 14, students may overestimate the value of the given variable and not divide by the correct number. Students may not realize that the sum of the parts of a circle graph equals 100.
- Exercise 22 Students may not realize that the sum of the parts of a circle graph equals 100.

Practice and Problem Solving
1. 1/2: 5. 37.5%
2. 6/7: 8. 4/4
3. a = 0.5 * 150.30
4. 65 = p * 60: 75%
5. c = 32 + 25.6
6. 32 = p - 20: 150%
7. 12 = 0.005 - 24.00
8. 51 = p - 36.17%
9. 102 = 1.5 * 65
10. The percent was not converted to a decimal or fraction. a = p + b
    = 0.35 + 20
    = 7
11. 30 represents the part of the whole.
    $30 = 0.6 + 15$
    50 = w
12. 54 strikes
13. 84
14. 5%
In each section, Ron Larson has written a complete solution for one of the problem-solving exercises. *Taking Math Deeper* gives detailed suggestions for taking the mathematics deeper.

**Exercise 29**

Any problem that has this much given information is difficult for students. Encourage students to begin by organizing the information with a table or a diagram. When organizing the information, it is a good idea to add as much other information as you can find . . . before looking at the questions.

1. Organize the given information.
2. Add other information.

![Diagram of tanks with capacities and water levels]

3. Now the questions are easy:
   a. Tank A has 360 gallons of water.
   b. The capacity of tank B is 769 gallons.
   c. Tank B has 367.5 gallons of water.

**Project**

Use your school library or the Internet to research how a water tower works. How does the water get into the tower? How long does it take for the water to drain out? How often is the water completely exchanged? In other words, if a gallon goes in today when will that gallon be draining out? What other interesting things did you discover?

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**Mini-Assessment**

Write and solve an equation to answer the question.

1. 12 is what percent of 90? 44%
2. 26 is 25% of what number? 104
3. What number is 25% of 927? 232
4. What percent of 250 is 201? 80%
5. A new laptop computer costs $800. The sales tax on the computer is $48. What is the percent of sales tax? 6%

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**Reteaching and Enrichment Strategies**

<table>
<thead>
<tr>
<th>If students need help</th>
<th>If students get it</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resources by Chapter</td>
<td>Resources by Chapter</td>
</tr>
<tr>
<td>Practice A and Practice B</td>
<td>Enrichment and Extension</td>
</tr>
<tr>
<td>Puzzle Time</td>
<td>Start the next section</td>
</tr>
</tbody>
</table>

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**Fair Game Review**

32. 0.88
33. 0.88
34. 0.25
35. 0.36
36. A
A strategy for how teachers may want to use graphic organizers is provided in each chapter. For example, some organizers may be great to introduce vocabulary, others may be nice summary tools, others may be nice to look at numerous cases in one place, and others may be good for students to complete in pairs or could be used as an assessment tool.

Many graphic organizers are used throughout the program. They are available at BigIdeasMath.com.
Alternative Quiz Ideas are provided for teachers who want to try something other than the traditional quiz given in the pupil edition.

A detailed description of the highlighted alternative quiz is provided.
Alternative Assessment Options are provided for teachers who want to try something other than the traditional quiz given at the end of a chapter in the pupil edition.

A detailed description of the highlighted alternative assessment option is provided.
The technology package offered by Big Ideas Math provides *Additional Review Options* that make chapter review and studying fun! Check out QuizShow, the Game Closet, or Puzzle Builder.

**Review of Common Errors**

**Exercises 1-5**
- Students may not know what number to substitute for each variable. We suggest giving the students a hint when writing the question with the students. Emphasize that the word "times" means "multiplied by." Students may use the whole and the part when trying to write the problem. Ask students to identify each part of the equation before writing it in the equation format.

**Exercises 6-9**
- Students may mix up where to place the numbers in the equation to find percent of change. When students do not put the numbers in the right place, they might find a negative number in the numerator. Each student must know if it is increasing or decreasing before they are doing anything else. The numerator should never have a negative number. If students get a negative number then they need to switch the order of the numbers in the problem and then subtract.

**Exercises 10 and 11**
- Students may find the markup and not the selling price. Remind them that they must add the markup onto the cost to store price.
- Remind students that the sale price is not the percent of discount multiplied by the original price.

**Exercises 12-18**
- Students may forget to change the percent to a decimal. Remind them that before they can put the percent into the equation they must change the percent to a fraction or a decimal.

**NGSSS that were covered and their corresponding section.**

**For the Teacher**

**Additional Review Options**
- QuizShow
- Big Ideas Test Generator
- Game Closet at BigIdeasMath.com
- Vocabulary Puzzle Builder
- Resources by Chapter
- Puzzle Thru Study Help

**Answers**
1. \( a = 0.24 	imes 25.0 \)
2. \( 9 = p - 20 \times 0.45 \)
3. \( 10.2 = 0.65 \times a; 12 \)
4. \( a = 0.05 \times 201.66 \)
5. 120 parking spaces
A Review Game from the Big Ideas Game Closet is listed at the end of every chapter.

Detailed directions and rules of the review game are provided.

For the Student
Additional Practice
- Lesson Tutorials
- Study Help (textbook)
- Student Website
  Multi-Language Glossary
  Practice Assessments

Answers
6. Increase: 500%
7. decrease: 50%
8. decrease: 56.7%
9. Increase: 220.6%
10. $42.50
11. $93.75
12. a. $36
   b. $39
13. a. $280
   b. $290
14. 1.7%
15. 7.1%
16. 3 years
17. 6 years
18. 4%

Additional practice is suggested for students that need it.
The **Test-Taking Strategies** feature relates to the chapter test. Teachers can encourage their students to use various strategies depending on the kind of test they are taking.

### Test-Taking Strategies

- **Common Assessment Errors**
  - Exercises 5-8: Students may not know what numbers to substitute for the variables. Review each type of question with students. Emphasize that the word "is" means "equals" and "of" means "multiplied by." Ask students to identify the whole, the part of the whole, and the percent.
  - Exercises 9 and 10: Students might place the numbers in the percent of change formulas incorrectly. Remind them that they should have the difference between the greater amount and the lesser amount in the numerator, so the numerator should never be negative. Also note that the original amount should always be in the denominator.
  - Exercises 11 and 12: Students may write the discount or markup amount as the new price instead of subtracting it from or adding it to the original price. Remind them to subtract or add as appropriate to find the sale or selling price.
  - Exercises 13 and 14: Students may treat the difference in the prices as the percent of discount or markup. Remind students that the discount or markup should be a percent, and that this percent is found by using the original price and the difference in prices in the percent equation.
  - Exercises 15-16: Students may forget to write the percent as a decimal, forget to convert it to a percentage if necessary, or use the wrong inverse operation to solve for the unknown value. Review the simple interest formula and the Division Property of Equality.

### Reteaching and Enrichment Strategies

**If students need help...**
- Practice A and Practice B
- Puzzle Time
- Rescore and Practice Journal Practice
- Differentiated Instruction: Lesson Tutorials
- Pretest from the Test Generator

**If students get it...**
- Enrichment and Extension
- School-to-Work
- Base Case at BigIdeasMath.com
- Start the next chapter.
At the end of every chapter there is a Standardized Test Practice. *Item Analysis* is used to examine student’s responses to individual questions. Each wrong answer is analyzed and assigned a common error that is most likely.

**List of Test Taking Strategies**
Available at BigIdeasMath.com

1. After Answering Easy Questions, Relax
2. Answer Every Question First
3. Read All Choices Before Answering
4. Real Question Before Answering

- Solve Directly or Eliminate Choices
- Solve Problem before Looking at Choices
- Use Intelligent Guessing
- Work Backwards

**About this Strategy**
When taking a multiple choice test, be sure to read each question carefully and thoroughly. It is also very important to read each answer choice carefully. Do not pick the first answer you think is correct. If two answer choices are the same, eliminate them both. There can only be one correct answer.

**Answers**
1. C
2. G
3. 152 lb
4. D

**Item Analysis**

1. A. The student finds 30% of $6.50 but does not subtract this amount from $8.50.
   - Correct answer
   - The student thinks that 30% is equivalent to $0.60 and subtracts this amount from $8.50.
2. B. The student divides incorrectly or converts an incorrect measure.
   - Correct answer
   - The student divides incorrectly or converts an incorrect measure.
3. C. The student solves an equation incorrectly.
   - Correct answer
   - The student solves an equation incorrectly.
4. D. The student chooses a proportion that will find the sum.
   - Correct answer
   - The student chooses a proportion that will find the sum.
5. E. The student chooses a proportion that will find the sum.
   - Correct answer
   - The student chooses a proportion that will find the sum.
6. F. The student chooses a proportion that will find the sum.
   - Correct answer
   - The student chooses a proportion that will find the sum.

**Description of the highlighted test taking strategy.**

[Image of a page from a math textbook with a focus on item analysis and test-taking strategies.]