Grade 6 Unit 3: Variables, Formulas, and Graphs

Activity	*Everyday Mathematics* Goal for Mathematical Practice	Guiding Questions
Lesson 3-1 Using Variables to Describe Number Patterns		
Describing General Number Patterns with Variables (*Teacher's Lesson Guide,* pages 181 and 182)	**GMP 7.1** Find, extend, analyze, and create patterns *See also:* **GMP 6.1, GMP 8.1**	Describe the pattern in words.* How did you extend the pattern to figure out additional special cases?
Describing General Patterns with Number Sentences (*Teacher's Lesson Guide,* page 182)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also:* **GMP 2.1, GMP 6.1**	What do you look for in special cases that help you identify the general pattern? **How is a general pattern like a rule or shortcut?**
Lesson 3-2 General Patterns (Two Variables)		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 186)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 2.1, GMP 6.1**	How does the general pattern represent each of the special cases? How are the variables used in the general pattern?
Writing Special Cases for General Patterns (*Teacher's Lesson Guide,* page 187)	**GMP 3.1** Explain both what to do and why it works. *See also:* **GMP 3.2, GMP 6.1, GMP 7.1**	Explain what you and your partner did to write the special cases and why you took those steps. **How does explaining your thinking help you become a better problem solver?**

Lesson 3-3 Algebraic Expressions		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 192)	**GMP 2.1** Represent problems and situations mathematically with numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects. *See also:* **GMP 2.2, GMP 4.1, GMP 6.1**	Ask students to propose algebraic expressions to represent verbal expressions.* What are other algebraic expressions you could use to represent the verbal expressions?
Representing Situations with Algebraic Expressions (*Teacher's Lesson Guide,* page 193)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 2.1, GMP 3.1, GMP 4.1, GMP 6.1**	What does the variable represent in each expression? **How is evaluating an algebraic expression similar to writing a special case?**
Lesson 3-4 Formulas		
Evaluating Formulas (*Teacher's Lesson Guide,* pages 198 and 199)	**GMP 6.3** Be accurate when you count, measure, and calculate. *See also:* **GMP 2.2, GMP 4.1**	How can you evaluate a formula if the variables are given in different units? **How are units important when evaluating formulas?**
Using Formulas as Rules for "What's My Rule?" Tables (*Teacher's Lesson Guide,* page 199)	**GMP 3.1** Explain both what to do and why it works. *See also:* **GMP 1.6, GMP 3.2, GMP 8.1**	How did you use the rule to complete the "What's My Rule?" table? How do you know that your strategy works?

Lesson 3-5 Formulas, Tables, and Graphs: Part 1		
Representing Speed with a Table and Line Graph (*Teacher's Lesson Guide,* page 204)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 2.1, GMP 3.1, GMP 4.1**	How can you use the graph to find the time it would take to travel a certain distance? What other questions can be answered using this graph?
Comparing Ways to Represent Rates (*Teacher's Lesson Guide,* page 205)	**GMP 1.6** Connect mathematical ideas and representations to one another. *See also:* **GMP 2.1, GMP 2.2, GMP 3.2, GMP 4.1**	What are the advantages and disadvantages of the different representations of rates (rule in words, formula, table, or graph)? **Why might you need to represent rates in more than one way?**
Lesson 3-6 A Science Experiment		
Math Message Follow-Up (*Teacher's Lesson Guide,* pages 209 and 210)	**GMP 1.3** Try different approaches when your problem is hard. *See also:* **GMP 1.6, GMP 1.4, GMP 2.2, GMP 4.1, GMP 4.2, GMP 8.1**	What distance do you think the ball will fall in 1 second?* **Why is it important to not give up when a problem seems difficult?**
Introducing the Distance Formula for Free-Falling Objects (*Teacher's Lesson Guide,* pages 210 and 211)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 2.1, GMP 4.1, GMP 4.2, GMP 8.1**	How is the shape of this graph different from the shape of the graph you made on journal page 99?* Why are the shapes of the two graphs different?

Lesson 3-7 Variables and Formulas in Spreadsheets: Part 1		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 215)	**GMP 3.2** Work to make sense of others' mathematical thinking. *See also:* **GMP 2.1, GMP 4.1**	Why do accountants use computer spreadsheets rather than paper-and-pencil methods? What types of errors can accountants try to avoid by using a spreadsheet?
Examining Variables and Formulas in Spreadsheets (*Teacher's Lesson Guide,* page 216)	**GMP 5.3** Estimate and use what you know to check the answers you find using tools. *See also:* **GMP 1.5, GMP 2.2, GMP 5.2**	How could you tell if one of the formulas in a spreadsheet was incorrect? **Why is it important to check the answers you get from tools?**
Lesson 3-8 Variables and Formulas in Spreadsheets: Part 2		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 220)	**GMP 5.2** Use mathematical tools correctly and efficiently. *See also:* **GMP 2.1, GMP 3.1, GMP 4.1, GMP 4.2**	How could you use formulas in these spreadsheets? **How can tools help you be more efficient?**
Playing *Spreadsheet Scramble* (*Teacher's Lesson Guide,* page 220)	**GMP 1.2** Make a plan for solving your problem. *See also:* **GMP 2.1, GMP 4.2**	How could you figure out whether there is an advantage to playing first or second in *Spreadsheet Scramble*? **How could you improve your plan to solve a similar problem more efficiently?**

Lesson 3-9 Reading and Drawing Graphs		
Constructing a Graph from a "Time Story" (*Teacher's Lesson Guide,* page 226)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 1.6, GMP 2.1, GMP 4.1, GMP 6.1**	What does a steep upward piece of the graph indicate about that time during Satya's bath? **What other kinds of situations could you represent on a graph that does not show numbers?**
Exploring Time Graphs (*Teacher's Lesson Guide,* page 226)	**GMP 2.1** Represent problems and situations mathematically with numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects. *See also:* **GMP 2.2, GMP 3.1, GMP 3.2, GMP 4.1**	How does your graph show that Monica drank half of her cocoa? What would you change on your graph if she didn't refill her cup?
Lesson 3-10 Formulas, Tables, and Graphs: Part 2		
Comparing the Profits for Summer Jobs (*Teacher's Lesson Guide,* pages 231 and 232)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also:* **GMP 2.1, GMP 2.2, GMP 4.1, GMP 6.1, GMP 7.1, GMP 7.2**	Have students use the table to develop rules for the money earned.* **How could thinking in terms of a "What's My Rule?" table help you develop a rule?**
Graphing Profit Data and Interpreting the Graph (*Teacher's Lesson Guide,* page 232)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 2.1, GMP 4.1, GMP 4.2, GMP 6.1**	Explain why the lines intersect at one point on the graph. What is one conclusion that you can draw about profit data that are represented by a quickly rising graph?*

*denotes a question that is currently in the *Everyday Mathematics* materials.

Grade 6 Unit 4: Rational Number Uses and Operations

Activity	*Everyday Mathematics* Goal for Mathematical Practice	Guiding Questions
Lesson 4-1 Equivalent Fractions		
Reviewing Equivalent Fractions (*Teacher's Lesson Guide,* pages 255 and 256)	**GMP 1.6** Connect mathematical ideas and representations to one another. *See also:* **GMP 3.1, GMP 3.2, GMP 6.1, GMP 8.1**	How are these two methods (paper folding and the multiplication rule) for finding equivalent fractions alike and different? **What are other examples of problems that you represented in different ways?**
Finding Equivalent Fractions (*Teacher's Lesson Guide,* pages 257 and 258)	**GMP 3.1** Explain both what to do and why it works. *See also:* **GMP 2.2, GMP 6.1, GMP 8.1**	What does it mean to say that two fractions are equivalent? How would you explain to another student how you find equivalent fractions and why your method works?
Lesson 4-2 Comparing Fractions		
Math Message Follow-Up (*Teacher's Lesson Guide,* pages 261 and 262)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 2.2, GMP 3.1, GMP 3.2**	How do you know your fraction is the least possible fraction made from two digits that is greater than 0? Why isn't 8/9 the greatest possible fraction that you can make with two digits?
Using Number Sense to Compare Fractions (*Teacher's Lesson Guide,* page 262)	**GMP 1.5** Check whether your solution makes sense. *See also:* **GMP 8.1, GMP 8.3**	What are different strategies for comparing fractions? **Why do we learn multiple strategies to solve problems?**

Lesson 4-3 Adding and Subtracting Fractions		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 267)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 1.5, GMP 2.1, GMP 3.1**	How would you show that Parallelogram *G* covers the same area as Square *A*?***** How do you know that Square *A* and Parallelogram *G* each cover 1/4 of the large square?
Practicing Addition and Subtraction of Fractions (*Teacher's Lesson Guide,* page 269)	**GMP 1.5** Check whether your solution makes sense. *See also:* **GMP 3.1, GMP 6.1**	How did you decide on your estimates for the sums of the fractions? **How does finding estimates help you compute accurately?**
Lesson 4-4 Adding and Subtracting Mixed Numbers with Like Denominators		
Writing Mixed Numbers in Simplest Form (*Teacher's Lesson Guide,* pages 273 and 274)	**GMP 1.6** Connect mathematical ideas and representations to one another. *See also:* **GMP 2.1, GMP 2.2, GMP 6.1**	How can pictures of fractional parts help you check whether a fraction is in simplest form? How can you use a picture of fractional parts to simplify a mixed number?
Subtracting Mixed Numbers with Like Denominators (*Teacher's Lesson Guide,* page 275)	**GMP 3.2** Work to make sense of others' mathematical thinking. *See also:* **GMP 3.1, GMP 6.1**	How would you explain how to subtract a mixed number from a whole number in your own words? **How does studying examples of problems and explaining the solutions in your own words help you understand the problem better?**

Lesson 4-5 Adding and Subtracting Mixed Numbers with Unlike Denominators		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 279)	**GMP 3.1** Explain both what to do and why it works. *See also:* **GMP 2.2, GMP 6.1**	Why are the sums equal for Problems 5 and 6 and the differences equal for Problems 7 and 8? How can you make up additional problems that would give you the same answers?
Adding and Subtracting Mixed Numbers with Unlike Fractions (*Teacher's Lesson Guide,* pages 279 and 280)	**GMP 5.3** Estimate and use what you know to check the answers you find using tools. *See also:* **GMP 1.5, GMP 5.1, GMP 5.2, GMP 6.3**	How could estimating first help you add mixed numbers mentally or with a calculator? **How does estimation help you check the answers you get to exact calculations?**
Lesson 4-6 Fraction Multiplication		
Math Message Follow-Up (*Teacher's Lesson Guide,* pages 284 and 285)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 2.1, GMP 5.2, GMP 8.1**	How are the problems in Column 1 like their partner problems in Column 2?* **Why are symbols used in mathematics?**
Using the Fraction Multiplication Algorithm (*Teacher's Lesson Guide,* page 285)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also:* **GMP 2.2, GMP 6.1, GMP 7.1**	Describe the general pattern in words.* How did the special cases help you describe the general pattern?

Lesson 4-7 Multiplication of Mixed Numbers		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 290)	**GMP 3.1** Explain both what to do and why it works. *See also:* **GMP 3.2, GMP 8.1**	Explain how you found your answer when you multiplied the mixed numbers.* Why do you think your method works?
Multiplying with Mixed Numbers (*Teacher's Lesson Guide,* pages 290 and 291)	**GMP 3.2** Work to make sense of others' mathematical thinking. *See also:* **GMP 8.1**	Which method of multiplying mixed numbers do you prefer? Why? **Why is it helpful to have more than one method for an operation?**
Lesson 4-8 Fractions, Decimals, and Percents		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 295)	**GMP 1.6** Connect mathematical ideas and representations to one another. *See also:* **GMP 2.1, GMP 2.2, GMP 6.1**	How does your shaded grid represent the 2 out of 5, or 2/5? How do the shaded grid and the decimal 0.40 represent the same quantity?*
Converting Between Fractions, Decimals, and Percents (*Teacher's Lesson Guide,* page 296)	**GMP 5.2** Use mathematical tools correctly and efficiently. *See also:* **GMP 1.6, GMP 6.3**	How can you use the Probability Meter to convert among fractions, decimals, and percents? **How do you decide when it is useful and efficient to use a tool?**
Lesson 4-9 More Difficult Conversions		
Math Message Follow-Up (*Teacher's Lesson Guide*, page 301)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also*: **GMP 1.6, GMP 3.1, GMP 3.2, GMP 7.1**	Justify each step in converting a decimal to a percent. **Why is it important to understand why a shortcut works?**

Using Division to Rename Fractions as Percents (*Teacher's Lesson Guide,* page 303)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 5.2, GMP 5.3, GMP 6.2**	When might you choose to use division to rename a fraction as a percent? What mathematical tools and methods are appropriate when using division to rename fractions as percents?
Lesson 4-10 Graphing Garbage		
Constructing Circle Graphs (*Teacher's Lesson Guide,* page 309)	**GMP 5.3** Estimate and use what you know to check the answers you find using tools. *See also:* **GMP 1.4, GMP 1.5, GMP 2.1, GMP 3.1, GMP 4.1, GMP 5.2, GMP 6.2**	How can you use estimation to check whether the sizes of the sectors are reasonable? **Why is it important to check the answers you get with tools?**
Weighing Garbage (*Teacher's Lesson Guide,* page 310)	**GMP 4.1** Apply mathematical ideas to real-world problems. *See also:* **GMP 2.1, GMP 2.2, GMP 4.2, GMP 5.1, GMP 5.2, GMP 6.2**	How are the two graphs alike and different? Describe the changes that took place in the composition of garbage from 1960 to 2000.*
Lesson 4-11 Percent of a Number		
Math Message Follow-Up (*Teacher's Lesson Guide,* pages 314 and 315)	**GMP 3.2** Work to make sense of others' mathematical thinking. *See also:* **GMP 2.2, GMP 3.1, GMP 6.1**	Explain why you prefer one method over another.* Did you learn anything new by calculating percents with a partner? If so, what did you learn?

Solving Percent Problems (*Teacher's Lesson Guide,* page 315)	**GMP 5.1** Choose appropriate tools for your problem. *See also:* **GMP 5.2, GMP 6.2**	What tools or methods did you use to solve the percent problems? **How do you decide what tools or methods to use?**

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Grade 6 Unit 5: Geometry: Congruence, Constructions, and Parallel Lines

Activity	*Everyday Mathematics* Goal for Mathematical Practice	Guiding Questions
Lesson 5-1 Measuring and Drawing Angles		
Measuring and Drawing Angles (*Teacher's Lesson Guide,* pages 337 and 338)	**GMP 5.3** Estimate and use what you know to check the answers you find using tools. *See also:* **GMP 1.5, GMP 5.1, GMP 5.2, GMP 6.2**	How does classifying an angle as acute, right, obtuse, straight, or reflex help you check your measurements? **How does estimating help you measure accurately?**
Playing *Angle Tangle* (*Teacher's Lesson Guide,* page 338)	**GMP 5.2** Use mathematical tools correctly and efficiently. *See also:* **GMP 3.1, GMP 5.3, GMP 6.2**	What were your strategies for estimating angles while playing *Angle Tangle*? Did your partner's and your estimates and measurements improve as you continued playing? If so, why?
Lesson 5-2 Reasoning with Angle Measures		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 342)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also:* **GMP 5.2, GMP 8.3**	What did you notice about the angle measures?* How could you figure out if this is a general rule or if it is just a coincidence?
Solving Problems about Angle Relationships (*Teacher's Lesson Guide,* pages 342 and 343)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 3.1, GMP 6.3**	Explain how to use angle relationships to find the missing angle measures without a protractor. **How does explaining your thinking to others improve your understanding?**

Lesson 5-3 Using a Protractor to Make Circle Graphs		
Calculating the Degree Measure of a Sector (*Teacher's Lesson Guide,* pages 347–349)	**GMP 1.5** Check whether your solution makes sense. *See also:* **GMP 1.6, GMP 2.1, GMP 4.1, GMP 5.2, GMP 5.3**	How could you use your circle graph to check whether your calculations make sense? **Why do good problem solvers check whether their answers make sense?**
Drawing a Circle Graph (*Teacher's Lesson Guide,* page 349)	**GMP 1.1** Work to make sense of your problem. *See also:* **GMP 1.5, GMP 1.6, GMP 2.1, GMP 3.1, GMP 4.1, GMP 6.1**	What decisions did you need to make to complete the table? What information did you use from the table to complete the circle graph?
Lesson 5-4 Coordinate Geometry		
Applying Polygon Properties (*Teacher's Lesson Guide,* page 353)	**GMP 1.4** Solve your problem in more than one way. *See also:* **GMP 1.1, GMP 6.1, GMP 6.3**	Describe two ways you can figure out the answer to one of the polygon problems. **Why is it important to consider the different ways we can solve problems?**
Finding Midpoints of Line Segments (*Teacher's Lesson Guide,* pages 353 and 354)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also:* **GMP 1.6, GMP 6.1, GMP 8.2**	Look for a pattern in your answers to Problem 2. If you know the coordinates of the endpoints of a line segment, how can you find the coordinates of the midpoint of the segment without plotting the line segment on a coordinate grid?*
Lesson 5-5 Isometry Transformations		
Translating Geometric Figures (*Teacher's Lesson Guide,* page 358)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 6.1, GMP 8.2**	How is the translated image different from the preimage? How is it the same? How can you use the coordinates for A to find the coordinates of A' without graphing the image?

Reflecting Geometric Figures (*Teacher's Lesson Guide,* pages 358 and 359)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also:* **GMP 1.6, GMP 2.1, GMP 3.1, GMP 6.1, GMP 7.1**	Describe a pattern you notice about the coordinates of figures that are reflected across an axis.* **How can you improve your explanations?**
Lesson 5-6 Congruent Figures		
Math Message Follow-Up (*Teacher's Lesson Guide*, pages 364 and 365)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 2.2, GMP 3.2**	**What are the characteristics of a good definition in mathematics?** How does your definition of congruent polygons compare to the one in the *Student Reference Book*?
Constructing Congruent Figures (*Teacher's Lesson Guide,* page 364)	**GMP 5.1** Choose appropriate tools for your problem. *See also:* **GMP 1.4, GMP 3.1, GMP 3.2, GMP 5.2, GMP 5.3, GMP 6.3**	Did you choose to use the same tools for each problem? Why or why not? What tools could help you check the accuracy of the your constructions?
Lesson 5-7 Compass-and-Straightedge Constructions Part 1		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 370)	**GMP 5.2** Use mathematical tools correctly and efficiently. *See also:* **GMP 5.1, GMP 6.1**	How did you use a compass to make concentric circles? What are good surfaces to work on when using a compass? Why?
Constructing Line Segments and Triangles (*Teacher's Lesson Guide,* page 371)	**GMP 6.3** Be accurate when you count, measure, and calculate. *See also:* **GMP 5.2**	How can you make sure your line segments and triangles are accurate copies of the given figures? **What are examples of everyday situations or professions where it is important to accurately draw segments and angles?**

Lesson 5-8 Compass-and-Straightedge Constructions Part 2		
Copying Angles and Constructing Perpendicular Bisectors (*Teacher's Lesson Guide,* page 376)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 1.4, GMP 3.1, GMP 5.2, GMP 6.3**	Explain how you copied your angle.* **What makes an explanation clear and precise?**
Solving Construction Problems (*Teacher's Lesson Guide,* pages 377 and 378)	**GMP 3.2** Work to make sense of others' mathematical thinking. *See also:* **GMP 1.1, GMP 1.2, GMP 1.4, GMP 5.2**	What strategies did you and your group use to solve these construction problems? Explain a strategy that you learned from another member of your group.
Lesson 5-9 Parallel Lines and Angle Relationships		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 381)	**GMP 3.1** Explain both what to do and why it works. *See also:* **GMP 1.5, GMP 6.1**	Explain how to solve one of the missing angle measure problems and tell why it works. **How will you know if you explained your method well enough for someone else to use it to solve a similar problem?**
Exploring Angle Relationships (*Teacher's Lesson Guide,* pages 381–383)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also:* **GMP 1.1, GMP 6.1, GMP 7.1**	Which pairs of lines on journal page 195 appear to be parallel? What do you observe about these pairs of lines? The angles formed by two parallel lines and a transversal have special properties. Refer to the picture of parallel lines below [in Problem 7] to describe one of these properties.*

Lesson 5-10 Parallelograms		
Exploring Relationships between Angles of a Parallelogram (*Teacher's Lesson Guide,* page 388)	**GMP 8.3** Reflect on your thinking before, during, and after you solve a problem. *See also:* **GMP 3.2, GMP 6.1, GMP 6.3, GMP 8.1**	What do you think is true about opposite angles in a parallelogram?* What do you think is true about consecutive angles in a parallelogram?* Should we revise the list of parallelogram properties we made in the Math Message? If so, how?*
Solving Problems Involving Parallelograms (*Teacher's Lesson Guide,* pages 388 and 389)	**GMP 8.2** Use properties, rules, and shortcuts to solve problems. *See also:* **GMP 1.4, GMP 3.1, GMP 6.1, GMP 6.3**	What properties of angles and parallelograms did you use to solve these problems? **How do you best learn about properties in geometry?**

*denotes a question that is currently in the *Everyday Mathematics* materials.

Grade 6 Unit 6: Number Systems and Algebra Concepts

Activity	*Everyday Mathematics* Goal for Mathematical Practice	Guiding Questions
Lesson 6-1 Multiplication of Fractions and Mixed Numbers		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 531)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also:* **GMP 2.2, GMP 7.1**	Write the general patterns in words.* **How can general patterns or rules help you compute with fractions?**
Defining the Reciprocal of a Number (*Teacher's Lesson Guide,* page 532)	**GMP 7.1** Find, extend, analyze, and create patterns. *See also:* **GMP 2.2, GMP 8.1**	What patterns did you notice in the last four fraction multiplication problems? What are additional examples of reciprocals?* How do you know they are reciprocals?
Lesson 6-2 Division of Fractions and Mixed Numbers		
Math Message Follow-Up (*Teacher's Lesson Guide,* pages 538 and 539)	**GMP 4.2** Use mathematical models such as graphs, drawings, tables, symbols, numbers, and diagrams to solve problems. *See also:* **GMP 1.4, GMP 1.6, GMP 2.1, GMP 2.2, GMP 4.1**	How can you use a number line to model the situation and solve the problem? How can you use a division sentence to model the situation and solve the problem?
Dividing Fractions and Mixed Numbers (*Teacher's Lesson Guide,* page 540)	**GMP 6.3** Be accurate when you count, measure, and calculate. *See also:* **GMP 1.4, GMP 5.1, GMP 5.3**	What could you and your partner do to check that you have used the algorithm correctly? **Why is it important to carefully check your work when you are practicing new algorithms?**

Lesson 6-3 Review: Addition and Subtraction of Positive and Negative Numbers		
Developing a Rule for Subtraction of Positive and Negative Numbers (*Teacher's Lesson Guide,* pages 545 and 546)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also:* **GMP 1.6, GMP 2.1, GMP 2.2, GMP 7.1**	Discuss patterns in each set of problems with a partner. Share your findings.* How can you use the patterns to write a rule for subtracting positive and negative numbers?
Practicing Subtraction of Positive and Negative Numbers (*Teacher's Lesson Guide,* page 546)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 1.6, GMP 3.1, GMP 8.1**	Explain how you solved Problem 9.* **How can you improve your explanation?**
Lesson 6-4 Multiplication and Division of Positive and Negative Numbers		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 549)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also:* **GMP 7.1**	How did you use the patterns to determine rules for multiplying with positive and negative numbers? Does the turn-around rule work when multiplying with negative numbers? If so, write some examples.*
Multiplying and Dividing Positive and Negative Numbers (*Teacher's Lesson Guide,* page 550)	**GMP 4.1** Apply mathematical ideas to real-world situations. *See also:* **GMP 6.1**	What real-life situations could be modeled by some of the problems on journal page 216? (Offer students the example on TLG, page 550)* **When do people use negative numbers in their everyday lives?**

Lesson 6-4a Absolute Value		
Absolute Value as a Magnitude (*Teacher's Lesson Guide,* page 552C)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 1.6, GMP 2.1, GMP 4.1, GMP 6.1**	How can you use a number line, words, or a real-life situation to explain what $\|-5\|$ means? How do the absolute values of numbers help you compare negative numbers?
Absolute Value and Distance (*Teacher's Lesson Guide,* page 552D)	**GMP 1.6** Connect mathematical ideas to one another. *See also:* **GMP 1.5, GMP 2.1, GMP 2.2, GMP 3.1, GMP 4.1, GMP 4.2**	How is using the graph similar to using the formula to find the taxi distances? How does using the graph differ from using the formula? **How are representations such as graphs and symbols useful in understanding new ideas?**
Lesson 6-5 The Properties of Number Systems		
Presenting an Overview of Our Number System (*Teacher's Lesson Guide,* pages 554–556)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 2.2**	Which sets of numbers that we have shown on the number line include the number 4? How do you know that 4 is in each of the sets?
Taking Part in a Mathematical Scavenger Hunt (*Teacher's Lesson Guide,* pages 556 and 557)	**GMP 8.2** Use properties, rules, and shortcuts to solve problems. *See also:* **GMP 1.1, GMP 3.1, GMP 6.1, GMP 7.2**	Explain how you found the answer to Problem 13 on journal page 219.* **Which properties of numbers did you use to solve the problems on journal page 219? Give examples.**

Lesson 6-6 Order of Operations		
Reviewing Order of Operations (*Teacher's Lesson Guide,* page 562)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 5.2, GMP 6.1, GMP 6.3**	Explain to a partner how to use PEMDAS to evaluate the expressions in the examples in the *Student Reference Book*. **Why do we follow an order of operations?**
Evaluating Expressions (*Teacher's Lesson Guide,* page 563)	**GMP 3.2** Work to make sense of others' mathematical thinking. *See also:* **GMP 5.2, GMP 6.1, GMP 6.3**	Compare results with a partner. Justify your thinking when you disagree about an answer.*****
Lesson 6-7 Review: Number Sentences		
Math Message Follow-Up (*Teacher's Lesson Guide,* pages 567 and 568)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 2.2**	How are number sentences different from expressions? What are "false" number sentences?
Solving Problems Involving Number Sentences (*Teacher's Lesson Guide,* page 568)	**GMP 3.2** Work to make sense of others' mathematical thinking. *See also:* **GMP 2.2, GMP 3.1, GMP 6.3, GMP 8.2**	Did you and your partner agree about which number sentences were true and which were false? Why or why not? **How does listening to what another student thinks about a problem help you better understand it?**

Lesson 6-8 Solving Simple Equations		
Finding Solutions by Trial and Error (*Teacher's Lesson Guide,* page 573)	**GMP 8.3** Reflect on your thinking before, during, and after you solve a problem. *See also:* **GMP 1.2, GMP 1.5, GMP 6.1, GMP 6.3, GMP 7.2**	Share your strategies for limiting the number of solutions that you needed to try.***** How is using trial and error different from random guessing?
Writing and Solving Equations (*Teacher's Lesson Guide,* page 574)	**GMP 1.5** Check whether your solution makes sense. *See also:* **GMP 1.2, GMP 1.4, GMP 6.3, GMP 7.2, GMP 8.2, GMP 8.3**	How did you make sure your solutions made sense? **Why is it important to look back at your work after you have solved an equation?**
Lesson 6-9 Review: Pan-Balance Problems		
Reviewing Pan-Balance Problems (*Teacher's Lesson Guide,* pages 578 and 579)	**GMP 3.1** Explain both what to do and why it works. *See also:* **GMP 1.4, GMP 1.6, GMP 2.2, GMP 3.2, GMP 7.2**	Share your strategies for solving the pan-balance problems.***** Why did your strategies work?
Solving Pan-Balance Problems (*Teacher's Lesson Guide,* pages 579–581)	**GMP 2.2** Represent problems and situations mathematically with numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects. *See also:* **GMP 1.5, GMP 1.6, GMP 7.2**	How are the pan-balance representations like an equation? **How do visual representations like pan balances help you solve problems?**

Lesson 6-10 Pan-Balance Equations		
Generating Equivalent Equations (*Teacher's Lesson Guide,* page 586)	**GMP 2.1** Represent problems and situations mathematically with numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects. *See also:* **GMP 2.2, GMP 8.2**	How can you confirm that the new equations you create are equivalent to the original equation? How do you maintain balance between the pans when you include new numbers, variables, and operations?
Inventing and Solving Equations (*Teacher's Lesson Guide,* page 587)	**GMP 3.2** Work to make sense of others' mathematical thinking. *See also:* **GMP 1.4, GMP 1.5**, **GMP 3.1, GMP 8.2**	Were any of the equations your classmates created difficult for you to solve? Why or why not? **When is it important to be able to understand others' mathematical thinking?**
Lesson 6-11 The Equivalent-Equations Method		
Math Message Follow-Up (*Teacher's Lesson Guide,* pages 591 and 592)	**GMP 1.1** Work to make sense of your problem. *See also:* **GMP 1.5, GMP 6.3**	When solving equations, what are you trying to figure out? Does knowing which terms are variables and which are constants help you make sense of an equation? How?
Practicing Equation Solving (*Teacher's Lesson Guide,* page 593)	**GMP 1.5** Check whether your solution makes sense. *See also:* **GMP 3.1, GMP 6.1**	How can you check solutions to equations? **When should you check that your solutions make sense?**
Lesson 6-12 Inequalities		
Introducing Solution Sets to Inequalities (*Teacher's Lesson Guide,* pages 597 and 598)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 1.4, GMP 2.1, GMP 6.1**	What does a graph of a solution set represent? What do the closed and open circles on a number line mean when graphing solution sets?

Using Inequalities to Describe Real-World Situations (*Teacher's Lesson Guide,* pages 599–599B)	**GMP 4.1** Apply mathematical ideas to real-world situations. *See also:* **GMP 1.6, GMP 2.1, GMP 2.2**	Do the values represented on the graph make sense in the situation? Explain your answer.* **How can your real-world knowledge help you check answers to math problems?**

*denotes a question that is currently in the *Everyday Mathematics* materials.

Grade 6 Unit 7: Probability and Discrete Mathematics

Activity	*Everyday Mathematics* Goal for Mathematical Practice	Guiding Questions
Lesson 7-1 Probabilities When Outcomes Are Equally Likely		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 621)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 2.2**	What are ways you can rephrase, "There is a 1/4 chance that this spinner will land on blue"?* **How is it helpful to explain the probability of events in multiple ways?**
Finding the Probability of an Event (*Teacher's Lesson Guide,* page 623)	**GMP 2.1** Represent problems and situations mathematically with numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects. *See also:* **GMP 2.2, GMP 6.1**	What are different ways to represent the probability of an event? How do you represent the probability of an event as a fraction?
Lesson 7-2 Generating Random Numbers		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 628)	**GMP 4.1** Apply mathematical ideas to real-world situations. *See also:* **GMP 2.2, GMP 6.1**	**When have you used random numbers in school or everyday life?** How do you know your examples from everyday life are random numbers?
Increasing the Number of Trials (*Teacher's Lesson Guide,* page 629)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 1.5, GMP 2.1, GMP 5.3**	Compare the single-group results to the combined-group results.* What do you think would happen to the percents if the class continued to generate random numbers?

Lesson 7-3 A Random-Number Simulation		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 633)	**GMP 1.2** Make a plan for solving your problem. *See also:* **GMP 7.1, GMP 7.2**	How would you organize a list of all 3-digit whole numbers that can be made using the digits 1, 2, and 3?* **Why is good planning an important part of problem solving?**
Using Random Numbers to Simulate a Tournament (*Teacher's Lesson Guide,* page 634)	**GMP 4.2** Use mathematical models such as graphs, drawings, tables, symbols, numbers, and diagrams to solve problems. *See also:* **GMP 2.1, GMP 2.2, GMP 6.1**	How can you use your data table to estimate the chance of a tournament lasting 3, 4, or 5 games? Did other teams make similar estimates based on their data? Why or why not?
Lesson 7-4 Tree Diagrams		
Simulating Results with a Tree Diagram (*Teacher's Lesson Guide,* page 641)	**GMP 2.1** Represent problems and situations mathematically with numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects. *See also:* **GMP 2.2, GMP 6.1**	Compare expected outcomes to actual results for 80 random walks through the maze.* **When do you expect the actual results to be similar to the expected results?**
Solving Maze Problems (*Teacher's Lesson Guide,* page 642)	**GMP 1.1** Work to make sense of your problem. *See also:* **GMP 1.6, GMP 2.1, GMP 2.2, GMP 3.1, GMP 4.2**	Compare the paths of each maze on journal page 258 to the branches of its corresponding tree diagram.* How can this information help you solve these problems?

Lesson 7-5 Using Tree Diagrams to Calculate Probabilities		
Revisiting Probability Tree Diagrams (*Teacher's Lesson Guide,* pages 646–648)	**GMP 4.2** Use mathematical models such as graphs, drawings, tables, symbols, numbers, and diagrams to solve problems. *See also:* **GMP 1.5, GMP 1.6, GMP 2.1, GMP 2.2, GMP 6.3**	How does the tree diagram help you calculate a probability for each endpoint? How does the tree diagram help you calculate the probabilities of entering Room A and of entering Room B?
Calculating Probabilities with Tree Diagrams (*Teacher's Lesson Guide,* page 648)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 2.1, GMP 4.1, GMP 4.2, GMP 6.1**	How does the tree diagram represent all the pant and shirt combinations Josh can make? **How do the numerator and denominator in a fraction work together to represent a probability?**
Lesson 7-6 Venn Diagrams		
Reading Venn Diagrams (*Teacher's Lesson Guide,* page 653)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 2.1, GMP 6.1**	What do the numbers 21, 5, and 19 represent in the Venn diagram?***** How were the numbers 21 and 19 were obtained?*****
Solving Venn Diagram Problems (*Teacher's Lesson Guide,* page 653)	**GMP 3.1** Explain both what to do and why it works. *See also:* **GMP 2.1, GMP 2.2, GMP 4.1, GMP 6.1**	Explain how you used the Venn diagrams to answer the questions. **What other types of information can be presented in Venn diagrams?**

Lesson 7-7 Fair and Unfair Games		
Math Message Follow-Up (*Teacher's Lesson Guide,* pages 659 and 660)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 4.1**	Explain why you thought each game was fair or unfair. **Why do we analyze data collected by individuals *and* the whole class?**
Determining the Probabilities of Winning the Games (*Teacher's Lesson Guide,* pages 660–662)	**GMP 1.4** Solve your problem in more than one way. *See also:* **GMP 1.6, GMP 2.1, GMP 4.2, GMP 6.1**	Compare the two different methods you used to determine if the games are fair—actual experience and tree diagrams. How are these methods alike and different?
Lesson 7-8 Strategies for Multiple-Choice Tests		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 666)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 2.1, GMP 2.2**	What does it mean to say that a particular penalty for guessing on a multiple-choice test is "fair"? What would be an example of an unfair penalty for guessing on a multiple-choice test?
Raising or Lowering Scores by Guessing (*Teacher's Lesson Guide,* pages 668 and 669)	**GMP 4.1** Apply mathematical ideas to real-world situations. *See also:* **GMP 2.1, GMP 2.2, GMP 5.2, GMP 6.1, GMP 6.3**	Based on the class data, what are the advantages or disadvantages of guessing on multiple-choice tests? **How can mathematics help you make decisions in your life?**

*denotes a question that is currently in the *Everyday Mathematics* materials.

Grade 6 Unit 8: Rates and Ratios

Activity	*Everyday Mathematics* Goal for Mathematical Practice	Guiding Questions
Lesson 8-1 Rates, Rate Tables, and Unit Rates		
Introducing Two Methods for Solving Rate Problems (*Teacher's Lesson Guide,* pages 691–693)	**GMP 1.4** Solve your problem in more than one way. *See also:* **GMP 1.2, GMP 2.1, GMP 2.2, GMP 4.1, GMP 4.2**	What advantages or disadvantages are there to using the per-unit-rate or rate-table methods? **Does knowing multiple methods for finding a solution make you a better problem solver? Why or why not?**
Solving Rate Problems (*Teacher's Lesson Guide,* page 693)	**GMP 2.1** Represent problems and situations mathematically with numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects. *See also:* **GMP 2.2, GMP 4.2, GMP 7.1, GMP 7.2, GMP 8.1**	How did you use the rate table to calculate equivalent rates? What information does the rate table give you that the per-unit-rate method does not?
Lesson 8-2 Solving Rate Problems with Proportions		
Introducing Simplified Rate Tables and Open Proportions (*Teacher's Lesson Guide,* pages 698–700)	**GMP 1.6** Connect mathematical ideas and representations to one another. *See also:* **GMP 2.1, GMP 2.2, GMP 4.1, GMP 4.2, GMP 6.1**	How is solving an open proportion similar to finding equivalent fractions? **What other connections can you make between proportions, fractions, and rate tables?**

Using Proportions to Solve Rate Problems (*Teacher's Lesson Guide,* page 700)	**GMP 3.1** Explain both what to do and why it works. *See also:* **GMP 1.5, GMP 2.1, GMP 2.2, GMP 4.1, GMP 4.2**	Explain how you found the value of the variable in your proportion and why your method works.
Lesson 8-3 Solving Problems by Cross Multiplication		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 704)	**GMP 7.1** Find, extend, analyze, and create patterns. *See also:* **GMP 6.1**	What patterns can you find in Parts a and b on the journal page?* How can this pattern help you decide whether two fractions are equivalent?
Solving Problems Using Cross Multiplication (*Teacher's Lesson Guide,* pages 706 and 707)	**GMP 6.3** Be accurate when you count, measure, and calculate. *See also:* **GMP 1.5, GMP 2.1, GMP 8.2**	**Why should you pay attention to units when you solve word problems?**
Lesson 8-4 Calorie Use		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 712)	**GMP 1.6** Connect mathematical ideas and representations to one another. *See also:* **GMP 2.2, GMP 4.1, GMP 6.1**	How are the rate tables and number models alike and different? **Which representation helps you understand the ideas in the problem better?**
Estimating Total Daily Calorie Consumption (*Teacher's Lesson Guide,* pages 713 and 714)	**GMP 4.1** Apply mathematical ideas to real-world situations. *See also:* **GMP 1.5, GMP 2.1, GMP 2.2**	How did you estimate your calorie use for activities that did not appear in the table? Did anything surprise you when you looked at the data in your table? If so, what?

Lesson 8-5 Using Nutrition Information		
Discussing Food Labels and Calculating Calories (*Teacher's Lesson Guide,* page 718)	**GMP 6.2** Use the level of precision you need for your problem. *See also:* **GMP 1.5, GMP 2.2, GMP 4.1**	Did you notice any discrepancies between the total calories on the label and your calculated totals? What might explain any difference? **Can you think of a situation in which the same data might be rounded one way for one group (such as consumers), but expressed more precisely for another group (such as scientists)?**
Planning a Healthful Lunch (*Teacher's Lesson Guide,* pages 718 and 719)	**GMP 8.3** Reflect on your thinking before, during, and after you solve a problem. *See also:* **GMP 1.2, GMP 4.1, GMP 4.2**	What did you think about as you planned your second lunch, so that you would meet the recommendations? If you did not meet the recommendations with your second lunch plan, what changes do you still need to make?
Lesson 8-6 Ratios		
Math Message Follow-Up (*Teacher's Lesson Guide,* pages 723–725)	**GMP 2.1** Represent problems and situations mathematically with numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects. *See also:* **GMP 2.2, GMP 4.1**	What are different ways to represent ratios? **How does expressing ratios in different ways help you understand them?**
Solving Ratio Problems (*Teacher's Lesson Guide,* pages 725 and 726)	**GMP 4.1** Apply mathematical ideas to real-world situations. *See also:* **GMP 2.1, GMP 2.2, GMP 4.2**	Give real-life examples of ratios.* Provide examples of part-to-part and part-to-whole ratios.*

Lesson 8-7 Using Proportions to Solve Percent Problems		
Using Proportions to Solve Percent Problems (*Teacher's Lesson Guide,* pages 731 and 732)	**GMP 1.1** Work to make sense of your problem. *See also:* **GMP 1.2, GMP 1.5, GMP 2.1, GMP 2.2, GMP 3.1, GMP 3.2**	How did you represent the information given in each problem so that you could solve them? How did you decide what you needed to find out to answer the question?
Using Proportions to Solve Percent Problems (*Teacher's Lesson Guide,* page 732)	**GMP 1.5** Check whether your solution makes sense. *See also:* **GMP 1.4, GMP 2.1, GMP 4.2**	What strategies could you use to estimate the answers to the problems? **When else have you used estimates to check whether your exact answers make sense?**
Lesson 8-8 Calculating the Fat Content of Foods		
Estimating Percent Equivalents for Fractions (*Teacher's Lesson Guide,* pages 737 and 738)	**GMP 6.2** Use the level of precision you need for your problem. *See also:* **GMP 1.4, GMP 1.5, GMP 2.1, GMP 5.3**	**When might you choose to estimate a percent equivalent for a fraction instead of finding an exact answer?**
Finding the Fat Content in Foods (*Teacher's Lesson Guide,* page 738)	**GMP 5.3** Estimate and use what you know to check the answers you find using tools. *See also:* **GMP 1.5, GMP 2.1, GMP 4.1, GMP 5.2**	What strategies did you use to estimate the percent calories from fat? How do your estimates compare with the calculated fat percents?

Lesson 8-9 Using Ratios to Describe Size Changes		
Math Message Follow-Up (*Teacher's Lesson Guide,* pages 742 and 743)	**GMP 3.2** Work to make sense of others' mathematical thinking. *See also:* **GMP 2.2, GMP 4.1**	Why did Zach think the two 8-inch pizzas were a better deal than the 12-inch pizza and why did Regina disagree? **How can understanding and correcting other people's errors help you learn?**
Solving Size-Change Problems (*Teacher's Lesson Guide,* page 745)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 2.1, GMP 4.2, GMP 6.1, GMP 6.2**	What does a 3.5X enlargement mean?* How does a ratio represent the size change?
Lesson 8-10 Similar Polygons		
Using Pattern Blocks to Explore Similar Polygons (*Teacher's Lesson Guide,* pages 750 and 751)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also:* **GMP 1.6, GMP 6.1, GMP 7.1, GMP 8.2**	How many triangles would you need to construct a triangle with sides 5 times as long as the small green triangle?* Explain a rule for finding the number of triangles it will take to construct the triangle when you know the length (l) of one side of a triangle made of pattern blocks.
Investigating Similar Polygons (*Teacher's Lesson Guide,* page 751)	**GMP 5.1** Choose appropriate tools for your problem. *See also:* **GMP 1.6, GMP 5.2, GMP 6.1**	Which tools did you use?* How can you solve Problem 2 using only one trapezoid and a compass and straightedge?

Lesson 8-11 Comparing Ratios		
Comparing Ratios Based on Study Link 8.8 Data (*Teacher's Lesson Guide,* page 757)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 2.1, GMP 3.1, GMP 3.2, GMP 4.1, GMP 5.2, GMP 8.2**	What does it mean when the *n* in the *n*-to-1 ratio is larger than 1? Less than 1? Equal to 1?
Sharing the Ratio Comparisons (*Teacher's Lesson Guide,* pages 758 and 759)	**GMP 4.1** Apply mathematical ideas to real-world situations. *See also:* **GMP 2.1, GMP 2.2, GMP 6.1, GMP 7.1, GMP 8.1, GMP 8.2**	Why might someone need to calculate the rise-to-run ratio of stairs? **Why do you think some objects have standard ratios?**
Lesson 8-12 The Golden Ratio		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 762)	**GMP 2.1** Represent problems and situations mathematically with numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects. *See also:* **GMP 5.2, GMP 6.3**	Are the ratios you calculated in Problems 2 and 5 equal?* How could you create a rectangle that has the same length-to-width ratio as your large rectangle?
Introducing the Golden Ratio (*Teacher's Lesson Guide,* pages 762 and 763)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 5.2, GMP 6.2, GMP 6.3, GMP 8.1**	How could you show that a rectangle is a Golden Rectangle if you did not know the Golden Ratio? **What can you use besides words to make your explanations clear and precise?**

*denotes a question that is currently in the *Everyday Mathematics* materials.

Grade 6 Unit 9: More About Variables, Formulas, and Graphs

Activity	*Everyday Mathematics* Goal for Mathematical Practice	Guiding Questions
Lesson 9-1 Area Models for the Distributive Property		
Math Message Follow-Up (*Teacher's Lesson Guide,* pages 787 and 788)	**GMP 7.1** Find, extend, analyze, and create patterns. *See also:* **GMP 2.1, GMP 2.2**	Look for patterns in the number sentences. Describe the patterns.* How are Methods 1 and 2 alike and different?
Representing Area Problems with Number Sentences (*Teacher's Lesson Guide,* page 788)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 2.1, GMP 8.1**	How do your number sentences represent the areas of these rectangles? **What could these rectangles represent in the real world?**
Lesson 9-2 The Distributive Property		
Math Message Follow-Up (*Teacher's Lesson Guide,* pages 793 and 794)	**GMP 7.1** Find, extend, analyze and create patterns. *See also:* **GMP 3.1, GMP 6.1, GMP 8.1**	Look for patterns in the number sentences. Describe the patterns.* **How can you use these patterns to mentally calculate products?**
Using the Distributive Property (*Teacher's Lesson Guide,* page 795)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also:* **GMP 3.1, GMP 6.1, GMP 7.1**	How did you use the distributive property to find the missing numbers?

Lesson 9-3 Simplifying Expressions: Combining Like Terms		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 799)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 2.1**	What objects or amounts could these expressions represent? **Why is equivalence important in math?**
Combining Like Terms (*Teacher's Lesson Guide,* pages 799–801)	**GMP 1.5** Check whether your solution makes sense. *See also:* **GMP 6.1, GMP 6.3, GMP 8.2**	How can you check whether your simplified expressions are correct? Why do the directions tell you to check using *several* values for the variable?
Lesson 9-4 Simplifying Expressions: Removing Parentheses		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 805)	**GMP 3.1** Explain both what to do and why it works. *See also:* **GMP 1.4, GMP 1.5, GMP 2.1, GMP 2.2**	How did you know what to write in the expressions for the areas of the rectangles? **Why is it helpful to explain how a solution strategy works?**
Simplifying Equations (*Teacher's Lesson Guide,* page 806)	**GMP 8.2** Use properties, rules, and shortcuts to solve problems. *See also:* **GMP 1.5, GMP 2.1, GMP 6.1**	How did you use the distributive property to simplify these equations? What other properties did you use?

Lesson 9-5 Simplifying and Solving Equations		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 811)	**GMP 3.1** Explain both what to do and why it works. *See also:* **GMP 1.5, GMP 6.3, GMP 8.2**	How can you show that the equations are equivalent? Why does this show that they are equivalent equations?
Simplifying and Solving Equations (*Teacher's Lesson Guide,* pages 812 and 813)	**GMP 8.3** Reflect on your thinking before, during, and after you solve a problem. *See also:* **GMP 1.5, GMP 8.2**	How can you show that the equations in Problem 2 are equivalent? **What can you do during and after solving an equation to be sure your solution is correct?**
Lesson 9-6 Using Equations to Solve Mobile Problems		
Math Message Follow-Up (*Teacher's Lesson Guide,* pages 817 and 818)	**GMP 1.2** Make a plan for solving your problem. *See also:* **GMP 2.1, GMP 2.2, GMP 4.1, GMP 8.2**	Why do you list the values of variables before substituting them in a formula? **How does organizing the given information help you to solve a problem?**
Solving Mobile Problems (*Teacher's Lesson Guide,* page 818)	**GMP 4.1** Apply mathematical ideas to real-world situations. *See also:* **GMP 2.1, GMP 4.2, GMP 8.2**	How could these balancing principles apply to a seesaw?
Lesson 9-7 Computer Spreadsheets		
Discussing Computer Spreadsheets (*Teacher's Lesson Guide,* pages 823–825)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 4.1, GMP 5.2, GMP 6.1**	How can you use formulas in spreadsheets? **How are spreadsheets useful?**

Solving Spreadsheet Problems (*Teacher's Lesson Guide,* page 825)	**GMP 5.2** Use mathematical tools correctly and efficiently. *See also:* **GMP 2.1, GMP 4.1, GMP 5.3**	What advantages are there to using a spreadsheet to plan a class picnic? How can you make sure the formulas in spreadsheets are correct?
Lesson 9-8 Area Formulas with Applications		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 829)	**GMP 6.2** Use the level of precision you need for your problem. *See also:* **GMP 2.2, GMP 5.1, GMP 5.2, GMP 6.3**	Why do you think the directions tell you measure to the nearest tenth of a centimeter and round your answers to the nearest square centimeter? **Why would it not make sense to give your answers to the nearest hundredth of a square centimeter?**
Using Perimeter, Circumference, and Area Formulas (*Teacher's Lesson Guide,* page 830)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 1.4, GMP 2.2, GMP 8.2**	Which path is longer: once around the figure 8—from *A* to *B* to *C* and back to *A*—or once around the large circle?* Explain how you solved Problem 6.
Lesson 9-9 Volume Formulas with Applications		
Study Link 9.8 Follow-Up (*Teacher's Lesson Guide,* page 835)	**GMP 1.1** Work to make sense of your problem. *See also:* **GMP 1.4, GMP 6.3**	What dimensions were not needed to find the areas of the figures in Problems 1–6? **How does identifying unnecessary information help you solve problems?**

Estimating the Volume of a Human Body (*Teacher's Lesson Guide,* pages 836 and 837)	**GMP 6.2** Use the level of precision you need for your problem. *See also:* **GMP 1.3, GMP 2.1, GMP 2.2, GMP 4.1, GMP 4.2, GMP 8.2**	How did you estimate the volume of the "cylindrical" body parts? Why should you round the volumes of the body parts you calculated?
Lesson 9-10 Solving Equations with Trial and Error		
Using a Trial-and-Error Method to Solve Equations (*Teacher's Lesson Guide,* pages 841–843)	**GMP 1.2** Make a plan for solving your problem. *See also:* **GMP 1.3, GMP 1.4, GMP 1.5, GMP 6.2, GMP 7.1, GMP 7.2**	How did you choose a good number to try first? How is the trial-and-error method of solving equations different from guessing?
Using a Trial-and-Error Method to Approximate Solutions (*Teacher's Lesson Guide,* page 843)	**GMP 7.2** Use patterns and structures to solve problems. *See also:* **GMP 1.2, GMP 6.2, GMP 7.1**	How did you use patterns in your test numbers and calculations to get very close to the solution? **What mathematical thinking is necessary to solve problems using trial and error and patterns?**
Lesson 9-11 Formula Equations		
Using Formulas to Solve Problems (*Teacher's Lesson Guide,* page 848)	**GMP 4.1** Apply mathematical ideas to real-world situations. *See also:* **GMP 1.5, GMP 2.1, GMP 2.2, GMP 4.2, GMP 8.2**	Why can't you apply the formula in Problem 1 to children younger than 2 years?***** **Why is thinking about whether applying a formula in a real-world situation makes sense important?**

Solving Volume Problems (*Teacher's Lesson Guide,* page 849)	**GMP 1.5** Check whether your solution makes sense. *See also:* **GMP 2.1, GMP 2.2, GMP 4.1, GMP 8.2**	How did you use substitution to check your answers? If you found that one of your answers was wrong, what did you do to correct it?
Lesson 9-12 The Pythagorean Theorem		
Math Message Follow-Up (*Teacher's Lesson Guide,* pages 853 and 854)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 2.1, GMP 2.2**	What does the symbol $\sqrt{\ }$ mean? Explain why the square root of a negative number does not exist in the real number system.*
Introducing and Verifying the Pythagorean Theorem (*Teacher's Lesson Guide,* page 855)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also:* **GMP 2.1, GMP 2.2, GMP 6.2, GMP 7.1, GMP 8.3**	What do you notice when you compare $a^2 + b^2$ and c^2 in your data table? **How can studying patterns in many examples help to explain mathematical rules?**
Lesson 9-13 Indirect Measurement Problems		
Finding Lengths and Volumes in Similar Figures (*Teacher's Lesson Guide,* pages 860 and 861)	**GMP 4.2** Use mathematical models such as graphs, drawings, tables, symbols, numbers, and diagrams to solve problems. *See also:* **GMP 1.5, GMP 2.1, GMP 2.2, GMP 3.1, GMP 8.2**	How did you use the diagram to determine the size-change factor for the similar figures? **How can diagrams help you solve problems?**

Solving Indirect Measurement Problems (*Teacher's Lesson Guide,* page 861)	**GMP 8.2** Use properties, rules, and shortcuts to solve problems. *See also:* **GMP 2.1, GMP 2.2, GMP 4.1, GMP 4.2**	How did you use similar triangles to solve these problems? How could you apply the Pythagorean theorem to solve Problem 3?

*denotes a question that is currently in the *Everyday Mathematics* materials.

Grade 6 Unit 10: Geometry Topics

Activity	*Everyday Mathematics* Goal for Mathematical Practice	Guiding Questions
Lesson 10-1 Semiregular Tessellations		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 881)	**GMP 6.1** Communicate your mathematically thinking clearly and precisely. *See also:* **GMP 2.2**	Which pattern-block shapes on your Geometry Template are regular polygons? Explain your answer.* Explain why the pattern-block trapezoid and two rhombuses are not regular.*
Identifying Regular and Semiregular Tessellations (*Teacher's Lesson Guide,* pages 881 and 882)	**GMP 7.1** Find, extend, analyze, and create patterns. *See also:* **GMP 5.2, GMP 6.1**	Use your geometry template to create regular tessellations of triangles, squares, and hexagons.* **Where have you seen tessellations in everyday life?**
Lesson 10-2 Escher-Type Translation Tessellations		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 887)	**GMP 3.1** Explain both what to do and why it works. *See also:* **GMP 3.2, GMP 4.1, GMP 8.1**	Share the isometry transformation that moves one sea horse to another.* How can you check whether your transformation(s) will work?
Creating an Escher-Type Translation Tessellation (*Teacher's Lesson Guide,* page 887)	**GMP 1.3** Try different approaches when your problem is hard. *See also:* **GMP 1.1, GMP 1.2, GMP 8.3**	How did you experiment with the tessellations and decide on your final tessellation? **What do you think about Escher's tessellations after doing this activity?**

Lesson 10-3 Rotation Symmetry		
Exploring Rotation Symmetry (*Teacher's Lesson Guide,* pages 891 and 892)	**GMP 6.1** Communicate your mathematical thinking clearly and precisely. *See also:* **GMP 3.1**	How did you decide whether the parallelogram has symmetry? **What do you need to include in an explanation so that it is clear and concise?**
Determining the Order of Rotation Symmetry (*Teacher's Lesson Guide,* pages 892 and 893)	**GMP 8.1** Use patterns and structures to create and explain rules and shortcuts. *See also:* **GMP 3.1, GMP 5.2**	Can you tell that a figure will have rotation symmetry just by looking at it? Why or why not? What patterns do you notice in figures that have more than one order of rotation symmetry?
Lesson 10-4 Introduction to Topology		
Math Message Follow-Up (*Teacher's Lesson Guide,* page 897)	**GMP 1.3** Try different approaches when your problem is hard. *See also:* **GMP 1.1, GMP 1.2, GMP 3.1**	What did you learn each time you tried to pass the quarter through the dime-size hole that helped you finally solve the problem? **What makes a problem hard?**
Exploring Topological Transformations (*Teacher's Lesson Guide,* page 900)	**GMP 8.2** Use properties, rules, and shortcuts to solve problems. *See also:* **GMP 1.6, GMP 5.2, GMP 6.1**	How did the rubber models allow you to recognize topologically equivalent figures? What is the same about the groups of topologically equivalent figures?

Lesson 10-5 Möbius Strips		
Making a Möbius Strip (*Teacher's Lesson Guide,* page 904)	**GMP 2.2** Explain the meanings of the numbers, words, pictures, symbols, gestures, tables, graphs, and concrete objects you and others use. *See also:* **GMP 1.1, GMP 2.1**	How is the Möbius strip different from the simple loop?*
Experimenting with Möbius Strips (*Teacher's Lesson Guide,* page 905)	**GMP 8.3** Reflect on your thinking before, during, and after you solve a problem. *See also:* **GMP 1.1**	How do your predictions about Möbius strips compare to what you learned by coloring and cutting them? **Why is it helpful to make predictions before solving a problem?**

*denotes a question that is currently in the *Everyday Mathematics* materials.