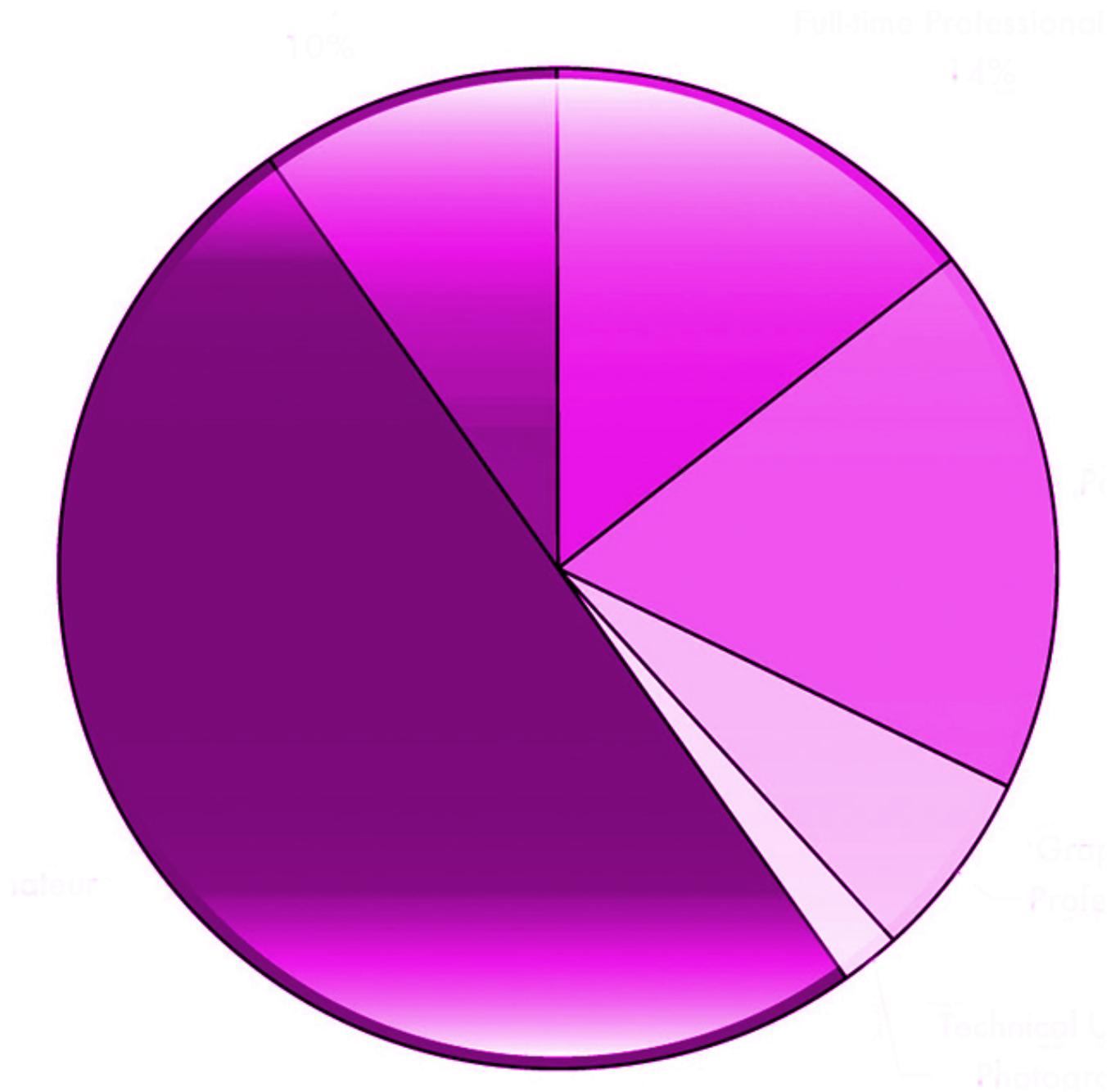


# Grade 6



## *Secondary Mathematics Instructional Guide 2009-2010*

Los Angeles Unified School District  
*Secondary Mathematics Branch*

**Mathematics 6AB**

**(Annual Course – Grade 6)**

**Prerequisite: Mathematics 5AB**

**310101            Mathematics 6A**

**310102            Mathematics 6B**

**Course Description**

The major purpose of this course is to serve as a vehicle by which students will master the four arithmetic operations with whole numbers, positive fractions, positive decimals, and positive and negative integers; and will accurately compute and solve problems. They will apply this knowledge to statistics and probability, and geometry.

In this course, students will understand the concept of mean, median, and mode of data sets and how to calculate the range. They will analyze data and sampling processes for possible bias and misleading conclusions; they will use addition and multiplication of fractions routinely to calculate probabilities. Students will work with ratios and proportions.

Students will continue their study of geometry, including complementary and supplementary angles, the sum of the angles in a triangle, the concept of the constant pi and its applications to the formulas for area and circumference of the circle.

**COURSE SYLLABUS**

**Unit 1**

**Recommended Focus Standards**

- 6 NS 1.1**            Compare and order positive and negative fractions, decimals, and mixed numbers and place them on a number line.
- 6 NS 2.4**            Determine the least common multiple and the greatest common divisor of whole numbers; use them to solve problems with fractions(e.g., to find a common denominator to add two fractions or to find the reduced form for a fraction)

**Scope and Sequence**

As one of the most critical units, the number sense strand requires that students understand the position of the negative numbers and the geometric effect on the numbers on the number line when a number is subtracted from them. Interpreting and using ratios in different contexts will be essential for showing the relative size of two quantities.

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**Unit 2**

**Recommended Focus Standards**

- 6 NS 1.2** Interpret and use ratios in different contexts (e.g., batting averages, miles per hour) to show the relative sizes of two quantities, using appropriate notations ( $a/b$ ,  $a$  to  $b$ ,  $a:b$ ).
- 6 NS 1.3** Use proportions to solve problems (e.g., determine the value of  $N$  if  $\frac{4}{7} = \frac{N}{21}$ ; find the length of a side of a polygon similar to a known polygon). Use cross multiplication as a method to solving such problems, understanding it as the multiplication of both sides of an equation by a multiplicative inverse.
- 6 NS 1.4** Calculate given percentages of quantities and solve problems involving discounts at sales, interest earned, and tips.
- 6 NS 2.3** Solve addition, subtraction, multiplication, and division problems, including those arising in concrete situations, that use positive and negative integers and combinations of these operations.
- 6 AF 1.1** Write and solve one-step linear equations in one variable.
- 6 AF 2.2** Demonstrate an understanding that *rate* is a measure of one quantity per unit value of another quantity.

**Scope and Sequence**

In this unit, the students will learn how to use, write and solve ratios and proportions. Equally important, students will develop an understanding of how to solve simple one-variable equations.

**Unit 3**

**Recommended Focus Standards**

- 6 SDAP 2.2** Identify different ways of selecting a sample (e.g., convenience sampling, responses to a survey, random sampling) and which method makes a sample more representative for a Population.
- 6 SDAP 2.3** Analyze data displays and explain why the way in which the question was asked might have influenced the results obtained and why the way in which the results were displayed might have influenced the conclusions reached.
- 6 SDAP 2.4** Identify data that represent sampling errors and explain why the sample (and the display) might be biased.
- 6 SDAP 2.5** Identify claims based on statistical data and, in simple cases, evaluate the validity of the claims.
- 6 SDAP 3.1** Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome.
- 6 SDAP 3.3** Represent probabilities as ratios, proportions, decimals between 0 and 1, and percentages between 0 and 100 and verify that the probabilities computed are reasonable; know that if  $P$  is the probability of an event,  $1 - P$  is the probability of an event not occurring.
- 6 SDAP 3.5** Understand the difference between independent and dependent events.

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*Secondary Mathematics Branch*

**Scope and Sequence**

Students will learn the concept of mean, median, and mode of data and how to calculate the range. In this unit, students will focus their attention on how to analyze data and sampling processes for possible bias and misleading conclusions.

**Unit 4**

**Recommended Focus Standards**

- 6 MG 1.1** Understand the concept of a constant such as  $\pi$  ; know the formulas for the circumference and area of a circle.
- 6 MG 2.2** Use the properties of complementary and supplementary angles and the sum of the angles of a triangle to solve problems involving an unknown angle.

**Scope and Sequence**

In the final unit, students will learn how to use a constant such as  $\pi$  in formulas to calculate the circumference and area of a circle. Students will learn that the lengths of the sides of a polygon or the diameter of a circle are used to find the distance around the figure. Students will learn that the volumes of three-dimensional figures can often be found by dividing and combining them into figures whose volume are already known.

**Representative Performance Outcomes and Skills**

In this course, students will know and be able to:

- Master the four arithmetic operations with whole numbers, positive fractions, positive decimals, and positive and negative integers
- Understand the concept of mean, median, and mode of data sets and how to calculate the range
- Analyze data and sampling processes
- Use addition and multiplication to calculate probabilities
- Interpret and use ratios in different context
- Understand how to solve simple one-variable equations
- Understand how to use a constant such as  $\pi$

**Assessments** will include:

- Teacher designed standards-based quizzes and tests
- Projects and group tasks
- Teacher designed formative assessments
- Periodic Assessments

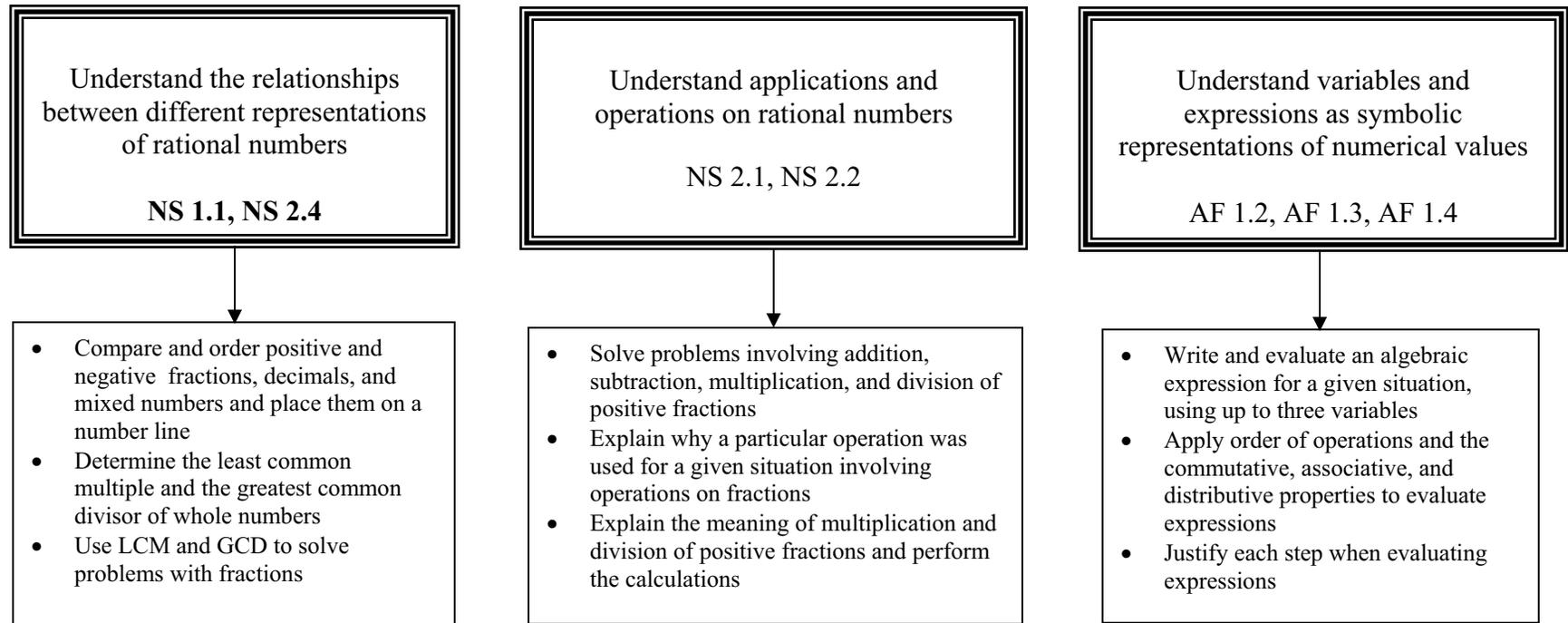
**Texts/Materials**

- LAUSD *Secondary Mathematics Instructional Guide*
- Textbook: District approved materials
- Supplemental materials and resources

# Sixth Grade: Unit Concept Organizer

## Rational numbers: How to Connect Properties and Applications

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	NS 1.1	NS 2.1	NS 2.2	NS 2.4	AF 1.2	AF1.3	AF1.4
<b>KEY Standards - CST Questions</b> <b>Other Standards - CST Questions</b> * 1 / 2 : 1 question every 2 years	3	1/2*	1/2*	3	1	1	1
<b>CONCEPT LESSON:</b> FF - Fraction of a Fraction LF - Linking Fractions BT - Banquet Tables	FF	LF			BT	BT	BT

# Concept Task

## Fraction of a Fraction: Discounting Brownies

*Your task: Read the situation below and use pictures, diagrams, words, numbers, and/or symbols to determine and show how much brownies Mr. Vargas will buy and how much he will pay.*

Paulo and Paula are tending the brownie booth at the school fair. The brownies are baked in square pans, and they are sold as fractional parts of a pan. A whole pan of brownies costs \$24.00. The cost any fractional part of a pan is that fraction of \$24.00. The school fair was almost over. Paulo and Paula wanted to sell all the remaining brownies in a hurry, so they decided to offer discount of 20% on all sales. They had  $2\frac{1}{4}$  pans of brownies left. Remember they originally sold a pan of brownies for \$24.00.

**Part A.** Mr. Vargas offered to buy half of all that they had left.

1. How much will Mr. Vargas purchase?
2. How much should Paulo and Paula charge Mr. Vargas?

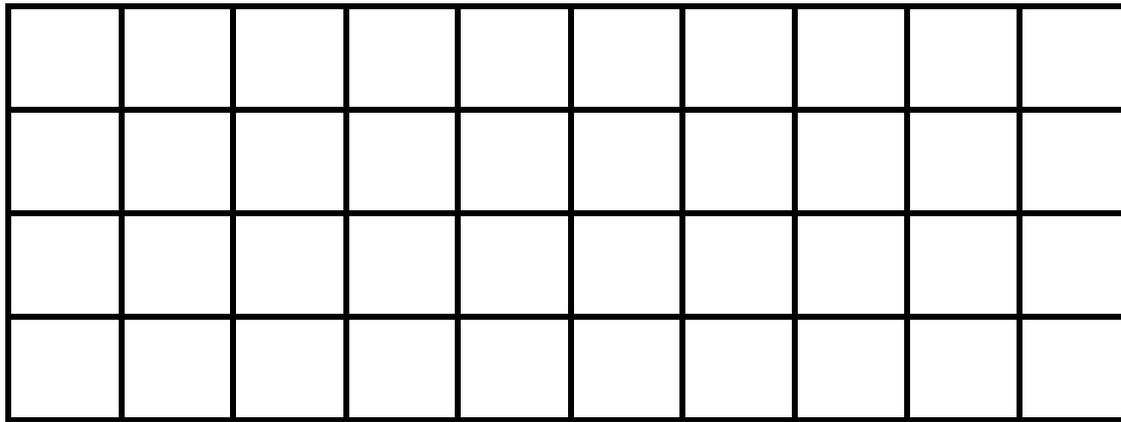
**Part B.** When Mr. Vargas got his bill, he realized he had only \$20.00 in his wallet, so he said, “I guess I’ll only buy  $\frac{1}{3}$  of what you have left.”

1. Now how much will Mr. Vargas buy?
2. Can he afford this much? Explain your reasoning.

# Concept Task

## Linking Fractions, Decimals, and Percents

*Your task: Shade 6 of the small squares in the rectangle shown below.  
Then determine the percent, the decimal, and the fraction represented by the shaded squares.*



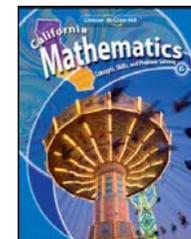
Using the diagram, explain how to determine each of the following:

- The percent of area that is shaded.
- The decimal part of the area that is shaded.
- The fractional part of the area that is shaded.

# Grade 6: Textbook Connections

## California Mathematics: Concept, Skills, and Problem Solving

### UNIT 1

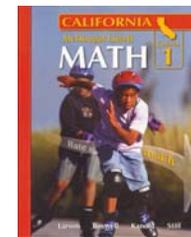


<u>Topic</u>	<u>Standards</u>	<u>Textbook Sections</u>
Understand the relationships between representations of rational numbers	<p><b>NS1.1</b> Compare and order positive and negative fractions, decimals, and mixed numbers and place them on a number line</p> <p><b>NS2.1</b> Solve problems involving addition, subtraction, multiplication, and division of positive fractions and explain why a particular operation was used for a given situation</p> <p><b>NS2.2</b> Explain the meaning of multiplication and division of positive fractions and perform the calculations (e.g., <math>5/8</math> divided by <math>15/16 = 5/8 \times 16/15 = 2/3</math>)</p>	<p><b>4.1</b> Prime Factorization</p> <p><b>4.2</b> Greatest Common Factor</p> <p><b>4.3</b> Problem Solving Investigation</p> <p><b>4.4</b> Simplifying Fractions</p> <p><b>4.5</b> Fractions and Decimals</p> <p><b>4.6</b> Fractions and Percents</p> <p><b>4.7</b> Percents and Decimals</p> <p><b>4.8</b> Least Common Multiple</p> <p><b>4.9</b> Comparing and Ordering rational Numbers</p> <p><b>6.8</b> Fractions, Decimals, and Percent</p>
Understand applications and operations on rational numbers	<p><b>NS 2.4</b> Determine the least common multiple and the greatest common divisor of whole numbers; use them to solve problems with fractions (e.g., to find a common denominator to add two fractions or to find the reduced form for a fraction)</p> <p><b>AF1.2</b> Write and evaluate an algebraic expression for a given situation, using up to three variables</p>	<p><b>5.1</b> Estimating with Fractions</p> <p><b>5.2</b> Adding and Subtracting Fractions</p> <p><b>5.3</b> Adding and Subtracting Mixed Numbers</p> <p><b>5.4</b> Problem Solving Investigation</p> <p><b>5.5</b> Multiplying Fractions</p> <p><b>5.7</b> Dividing Fractions and Mixed Numbers</p>
Understand variables and expressions as symbolic representations of numerical values	<p><b>AF1.3</b> Apply algebraic order of operations and the commutative, associative, and distributive properties to evaluate expressions; and justify each step in the process</p> <p><b>AF1.4</b> Solve problems manually by using the correct order of operations or by using a scientific calculator</p>	<p><b>1.4</b> Order of Operations</p> <p><b>1.5</b> Problem Solving Investigation</p> <p><b>1.6</b> Algebra: Variables and Expressions</p>

# Grade 6: Textbook Connections

Course 1 McDougal Littell MATH

## UNIT 1



Topic	Standards	Textbook Sections
<p>Understand the relationships between representations of rational numbers</p>	<p><b>NS1.1</b> Compare and order positive and negative fractions, decimals, and mixed numbers and place them on a number line</p> <p>NS2.1 Solve problems involving addition, subtraction, multiplication, and division of positive fractions and explain why a particular operation was used for a given situation</p> <p>NS2.2 Explain the meaning of multiplication and division of positive fractions and perform the calculations (e.g., <math>5/8</math> divided by <math>15/16 = 5/8 \times 16/15 = 2/3</math>)</p>	<p>1.1 Prime Factorization            1.2 Greatest Common Factor            1.3 Equivalent Fractions            1.4 Least Common Multiple            1.5 Comparing and Ordering Fractions            1.6 Comparing Fractions and Mixed Numbers            1.7 Ordering Fractions and Decimals</p>
<p>Understand applications and operations on rational numbers</p>	<p><b>NS 2.4</b> Determine the least common multiple and the greatest common divisor of whole numbers; use them to solve problems with fractions (e.g., to find a common denominator to add two fractions or to find the reduced form for a fraction)</p>	<p>2.1 Adding and Subtracting Fractions            2.2 Using a Common Denominator            2.3 Adding and Subtracting Mixed Numbers            2.4 Multiplying Fractions and Mixed Numbers            2.5 Dividing Fractions and Mixed Numbers            2.6 Adding and Subtracting Decimals            2.7 Multiplying and Dividing Decimals</p>
<p>Understand variables and expressions as symbolic representations of numerical values</p>	<p>AF1.2 Write and evaluate an algebraic expression for a given situation, using up to three variables</p> <p>AF1.3 Apply algebraic order of operations and the commutative, associative, and distributive properties to evaluate expressions; and justify each step in the process</p> <p>AF1.4 Solve problems manually by using the correct order of operations or by using a scientific calculator</p>	<p>4.1 Evaluating Expressions            4.2 Writing Expressions            4.3 Simplifying Expressions</p>

**Grade 6**  
**Assessment 1**  
**Periodic Assessment Blueprint**  
**Secondary Mathematics, 2009 – 2010**

6 <sup>th</sup> Grade Standards		No. of Items on the CST	No. of Multiple Choice Items on the Assessment	No. of Constructed Response Items on the Assessment
NS1.1 	Compare and order positive and negative fractions, decimals, and mixed numbers and place them on a number line.	3	5	1
NS2.1	Solve problems involving addition, subtraction, multiplication, and division of positive fractions and explain why a particular operation was used for a given situation.	1/2	2	
NS2.2	Explain the meaning of multiplication and division of positive fractions and perform the calculations (e.g., $5/8$ divided by $15/16 = 5/8 \times 16/15 = 2/3$ ).	1/2	2	
NS2.4 	Determine the least common multiple and the greatest common divisor of whole numbers; use them to solve problems with fractions (e.g., to find a common denominator to add two fractions or to find the reduced form for a fraction).	3	5	
AF1.2	Write and evaluate an algebraic expression for a given situation, using up to three variables.	1	2	
AF1.3	Apply algebraic order of operations and the commutative, associative, and distributive properties to evaluate expressions; and justify each step in the process.	1	2	
AF1.4	Solve problems manually by using the correct order of operations or by using a scientific calculator.	1	2	

# Sixth Grade: Unit Concept Organizer

## Integers, Algebraic Thinking and Proportional Reasoning

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Understand operations on integers

NS 2.3

- Solve addition, subtraction, multiplication, and division problems that use positive and negative integers
- Solve integer problems that arise in concrete situations
- Solve problems that use a combination of integer operations
- Write verbal expressions using symbolic representations, and vice versa
- Translate between verbal expressions and symbolic representations

Understand and Solve Equations

AF 1.1

- Use inverse operation to solve algebraic equations
- Translate verbal equations to algebraic equations
- Write and solve one-step linear equations in one variable

Understand and use ratios, rates, and proportions,

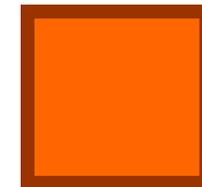
NS 1.2, NS 1.3, AF 2.1, AF 2.2, AF2.3

- Interpret ratios in different contexts to show the relative sizes of two quantities
- Use appropriate notations to denote ratios (e.g.,  $a/b$ ,  $a$  to  $b$ ,  $a:b$ )
- Use proportions to solve problems
- Use cross multiplication as a method for solving proportion problems
- Understand that cross multiplication is the multiplication of both sides of an equation by a multiplicative inverse
- Convert one unit of measurement to another
- Understand that *rate* is a measure of one quantity per unit value of another quantity
- Solve problems involving rates, average speed, and time

	NS1.2	NS1.3	NS2.3	AF1.1	AF2.1	AF2.2	AF2.3
<b>KEY Standards - CST</b>							
<b>Questions</b> Other Standards - CST Questions	1	6	6	6	1	6	1
<b>CONCEPT LESSON:</b> VS-Victor and Sharon's Road Trip CJ-The Candy Jar	VS CJ	CJ	CJ			VS	

# Grade 6: The Banquet Tables

## *Concept Task: Unit 2*



You are helping to plan a big reception for your sister's wedding. The reception hall has square-shaped tables and four people can sit around a table. Unfortunately, you have just found out there is not enough room to spread the tables out.



Your brother has an idea, "What if we push two tables together so that one of the sides from the first table is touching a side from the second table?"

What happens to the number of people when you push two tables together?

Guiding Question: How would you find how many people can sit around *any* number of tables?

Investigation 1: Use the pattern blocks to explore what happens when you place square tables end-to-end. Draw a picture, using colors to show how you count the number of people that can sit down at *any* number of square tables.

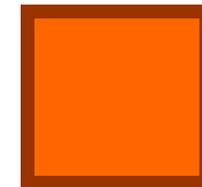
1. Share your picture with a partner.
2. Are they the alike? If they are alike, can you think of another way to determine the number of seats?
3. Are they different? If they are different, do you understand your partner's diagram?

Now complete the t-table, describe your diagram in words, develop an algebraic expression and draw a graph.

4. What patterns do you notice in your graph?
5. Can you see these patterns in your other representations?  
(*The table, the picture, the explanation, and the algebraic expression*)

# Grade 6: The Banquet Tables

## *Concept Task: Unit 2*



Investigation 2: Investigate what happens when you use different shapes for the tables.

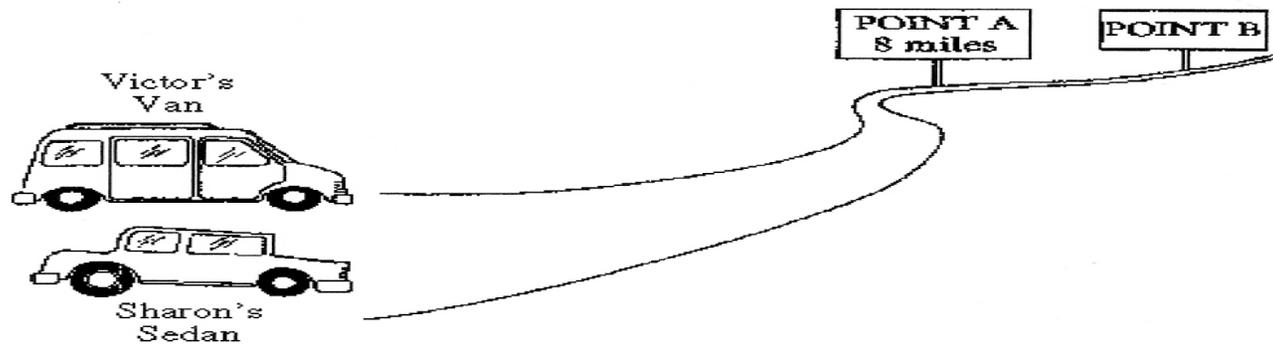


1. What are the similarities between the graphs when you use different shaped tables?
2. What are the differences?
3. Can you see these similarities and differences in your other representations?  
*(The table, the picture, the explanation, and the algebraic expression)*
4. Can you determine the number of people seated at 25 tables from your graph? How?

Extension: Develop an algebraic expression to give the total number of seats depending on the number of tables placed end-to-end and the number of people able to sit around a table of given size.

# Concept Task

## VICTOR AND SHARON'S ROAD TRIP



8. Victor's van travels at a rate of 8 miles every 10 minutes. Sharon's sedan travels at a rate of 20 miles every 25 minutes.

If both cars start at the same time, will Sharon's sedan reach point A, 8 miles away, before, at the same time, or after Victor's van?

Explain your reasoning.

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If both cars start at the same time, will Sharon's sedan reach point B (at a distance further down the road) before, at the same time, or after Victor's van?

Explain your reasoning.

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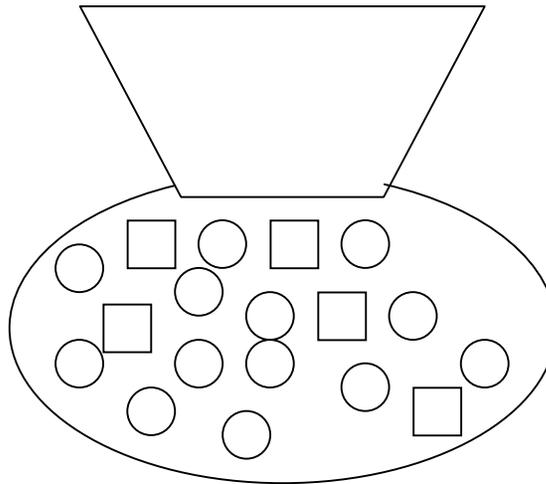
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## *Concept Task*

### THE CANDY JAR TASK

The Candy Jar shown below contains Jolly Ranchers (the rectangles) and Jawbreakers (the circles). Solve each of the following problems:

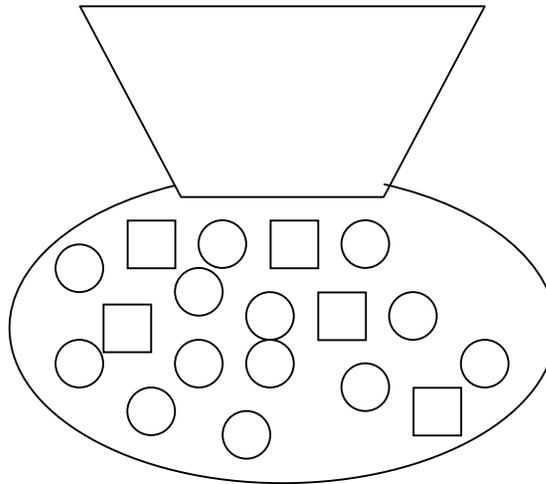


1. What is the ratio of the Jolly Ranchers to Jawbreakers in the candy jar?
2. Write as many ratios as you can that are equivalent to the first ratio that you wrote down.

## ***Concept Task***

### **THE CANDY JAR TASK**

The Candy Jar shown below contains Jolly Ranchers (the rectangles) and Jawbreakers (the circles). Solve each of the following problems:

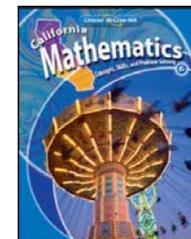


- 3. Suppose you had a new candy jar with the same ratio of Jolly Ranchers to Jawbreakers as shown above, but it contained 100 jolly Ranchers. How many Jawbreakers would you have?**
- 4. Suppose you had a candy jar with the same ratio of Jolly Ranchers to Jawbreakers as shown above, but it contained 720 candies. How many of each kind of candy would you have?**

# Grade 6: Textbook Connections

## California Mathematics: Concept, Skills, and Problem Solving

### UNIT 2

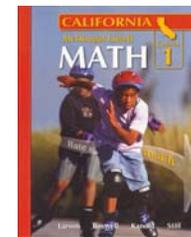


<u>Topic</u>	<u>Standards</u>	<u>Textbook Sections</u>
Understand operations on integers	<p><b>NS1.2</b> Interpret and use ratios in different contexts (e.g., batting averages, miles per hour) to show the relative sizes of two quantities, using appropriate notations (<math>a/b</math>, <math>a</math> to <math>b</math>, <math>a:b</math>)</p> <p><b>NS1.3</b> Use proportions to solve problems (e.g., determine the value of <math>N</math> if <math>4/7 = N/21</math>, find the length of a side of a polygon similar to a known polygon). Use cross-multiplication as a method for solving such problems, understanding it as the multiplication of both sides of an equation by a multiplicative inverse</p>	<p><b>2.1</b> Integers and Absolute Value  <b>2.2</b> Comparing and Ordering Fractions  <b>2.3</b> The Coordinate Plane  <b>2.4</b> Adding Integers  <b>2.5</b> Subtracting Integers  <b>2.6</b> Multiplying Integers  <b>2.7</b> Problem Solving Investigation  <b>2.8</b> Dividing Integers</p>
Understand and solve equations	<p><b>NS2.3</b> Solve addition, subtraction, multiplication, and division problems, including those arising in concrete situations, that use positive and negative integers and combinations of these operations</p> <p><b>AF1.1</b> Write and solve one-step linear equations in one variable</p> <p>AF2.1 Convert one unit of measurement to another (e.g., from feet to miles, from centimeters to inches)</p>	<p><b>1.7</b> Algebra: Equations  <b>1.8</b> Properties  <b>3.1</b> Writing Expressions and Equations  <b>3.2</b> Solving Addition and Subtraction Equation  <b>3.3</b> Solving Multiplication Equations  <b>3.4</b> Problem Solving Investigation  <b>3.5</b> Solving Two-Step Equations  <b>3.6</b> Measurement: Perimeter and Area</p>
Understand and use ratios, rates, and proportions	<p><b>AF2.2</b> Demonstrate an understanding that <i>rate</i> is a measure of one quantity per unit value of another quantity</p> <p>AF2.3 Solve problems involving rates, average speed, distance, and time</p>	<p><b>6.1</b> Ratios  <b>6.2</b> Rates  <b>6.3</b> Measurement: Changing Customary Units  <b>6.4</b> Measurement: Changing Metric Units  <b>6.5</b> Solving Proportions  <b>6.6</b> Problem Solving Investigation  <b>6.7</b> Scale Drawing  <b>6.8</b> Fractions, Decimals, and Percents  <b>6.9</b> Percents Greater Than 100% and Percents Less Than 1%</p>

# Grade 6: Textbook Connections

Course 1 McDougal Littell MATH

## UNIT 2



<u>Topic</u>	<u>Standards</u>	<u>Textbook Sections</u>
Understand operations on integers	<p><b>NS1.2</b> Interpret and use ratios in different contexts (e.g., batting averages, miles per hour) to show the relative sizes of two quantities, using appropriate notations (<math>a/b</math>, <math>a</math> to <math>b</math>, <math>a:b</math>)</p> <p><b>NS1.3</b> Use proportions to solve problems (e.g., determine the value of <math>N</math> if <math>4/7 = N/21</math>, find the length of a side of a polygon similar to a known polygon). Use cross-multiplication as a method for solving such problems, understanding it as the multiplication of both sides of an equation by a multiplicative inverse</p>	<p><b>3.1</b> Ordering Integers on a Number Line</p> <p><b>3.2</b> Adding Integers</p> <p><b>3.3</b> Subtracting Integers</p> <p><b>3.4</b> Multiplying Integers</p> <p><b>3.5</b> Dividing Integers</p> <p><b>3.6</b> Order of Operations</p> <p><b>3.7</b> Rational Numbers and their Properties</p> <p><b>3.8</b> The Distributive Properties</p>
Understand and solve equations	<p><b>NS2.3</b> Solve addition, subtraction, multiplication, and division problems, including those arising in concrete situations, that use positive and negative integers and combinations of these operations</p> <p><b>AF1.1</b> Write and solve one-step linear equations in one variable</p>	<p><b>4.5</b> Equations and Mental Math</p> <p><b>4.6</b> Solving Addition and Subtraction Equations</p> <p><b>4.7</b> Solving Multiplication and Division Equations</p>
Understand and use ratios, rates, and proportions	<p><b>AF2.1</b> Convert one unit of measurement to another (e.g., from feet to miles, from centimeters to inches)</p> <p><b>AF2.2</b> Demonstrate an understanding that <i>rate</i> is a measure of one quantity per unit value of another quantity</p> <p><b>AF2.3</b> Solve problems involving rates, average speed, distance, and time</p>	<p><b>5.1</b> Ratios</p> <p><b>5.2</b> Rates</p> <p><b>5.3</b> Writing and Solving Proportions</p> <p><b>5.4</b> Solving Proportions Using Cross Products</p> <p><b>5.5</b> Scale Drawings and Models</p> <p><b>10.1</b> Converting Metric Units</p> <p><b>10.2</b> Converting Customary Units</p> <p><b>10.3</b> Converting Between Systems</p>

*Standards in bold are key standards as defined by the Mathematics Framework for California Public Schools*

**Grade 6**  
**Assessment 2**  
**Periodic Assessment Blueprint**  
**Secondary Mathematics, 2009 – 2010**

6 <sup>th</sup> Grade Standards		No. of Items on the CST	No. of Multiple Choice Items on the Assessment	No. of Constructed Response Items on the Assessment
NS1.2 	Interpret and use ratios in different contexts (e.g., batting averages, miles per hour) to show the relative sizes of two quantities, using appropriate notations ( $a/b$ , $a$ to $b$ , $a:b$ ).	1	1	
NS1.3 	Use proportions to solve problems (e.g., determine the value of $N$ if $4/7 = N/21$ , find the length of a side of a polygon similar to a known polygon). Use cross-multiplication as a method for solving such problems, understanding it as the multiplication of both sides of an equation by a multiplicative inverse.	6	5	1
AF1.1 	Write and solve one-step linear equations in one variable.	6	4	
NS2.3 	Solve addition, subtraction, multiplication, and division problems, including those arising in concrete situations that use positive and negative integers and combinations of these operations.	6	3	
AF2.1	Convert one unit of measurement to another (e.g., from feet to miles, from centimeters to inches).	1	1	
AF2.2 	Demonstrate an understanding that <i>rate</i> is a measure of one quantity per unit value of another quantity.	6	5	
AF2.3	Solve problems involving rates, average speed, distance, and time.	1	1	

# Sixth Grade: Unit Concept Organizer

## Percentages, Statistics, Data Analysis and Probability

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3

Understand applications of percentages

**NS 1.4**

- Calculate given percentages of quantities
- Solve problems involving discounts at sales, interest earned, and tips

Understand data analysis and population sampling

**SDAP 1.1, SDAP 1.2, SDAP 1.3, SDAP2.2, SDAP2.5**

- Compute the range, mean, median, and mode of data sets
- Recognize outliers and their effect on measures of central tendency
- Identify different ways of selecting a sample, and which method makes a sample more representative for a population
- Analyze and evaluate the validity of claims based on statistical data

Understand theoretical and experimental probabilities

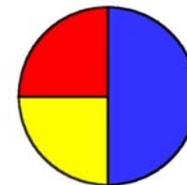
**SDAP 3.1, SDAP 3.2, SDAP3.3, SDAP 3.4, SDAP3.5**

- Represent all possible outcomes for compound events in an organized way, and express the theoretical probability of each outcome
- Represent probabilities as ratios, proportions, decimals and percentages and verify that the probabilities computed are reasonable
- Know that if  $P$  is the probability of an event,  $1-P$  is the probability of an event not occurring
- Understand the difference between independent and dependent events
- Understand that the probability of two disjoint (mutually exclusive) events occurring can be expressed as  $P(A \text{ or } B) = P(A) + P(B)$
- Understand that the probability of one event following another, in independent trials, can be expressed as  $P(A \text{ and } B) = P(A) \cdot P(B)$

	<b>NS1.4</b>	<b>SDAP 1.1</b>	<b>SDAP 1.2</b>	<b>SDAP 1.3</b>	<b>SDAP 2.2</b>	<b>SDAP 2.5</b>	<b>SDAP 3.1</b>	<b>SDAP 3.3</b>	<b>SDAP 3.4</b>	<b>SDAP 3.5</b>
<b>KEY Standards - CST Questions</b> Other Standards - CST Questions * 1 / 3 : means 1 question every 3 years	5	1/3*	1/3*	1/3*	3	1/3*	3	3	1/3*	1/3*
<b>CONCEPT LESSON:</b> CW – Conserving Water WS – Winning Spinners		CW	CW		CW		WS	WS		WS

# Spinner Investigation 1: When is a game fair?

## Grade 6 Concept Task: Unit 3



In pairs, play a game with the spinner that has three colors, blue, yellow and red. One person will spin the spinner, and the other will put a check mark in the table below every time the spinner lands on the color of each row; either blue, yellow or red. When one color has been landed on 10 times, the game stops and that color “wins”.

Once your group has finished the game, add up the total number of times the spinner landed on each color.

Start

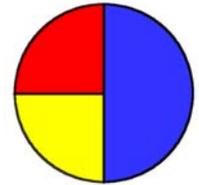
Finish

Total number of  
times the  
spinner landed  
on each color

	1	2	3	4	5	6	7	8	9	10
Blue										
Yellow										
Red										


Now turn to page 2 and use your data and observations to answer questions 1 through 4.

# Spinner Investigation 1: When is a game fair?



## *Grade 6 Concept Task: Unit 3*

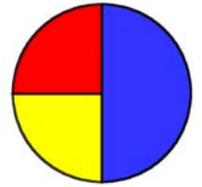
1. Based on your experiment, what is the probability of the spinner landing on red? Explain.
2. Based on your experiment, what is the probability of the spinner landing on blue? Explain.
3. If you had not actually played the game, and had to guess, what do you think is the probability of the spinner landing on red? Explain how you got this answer.
4. Is your answer to question 3 different from your answer to question 1? Why might this be?

Now add your group's data to the overall class data recording sheet.

5. Based upon the whole groups' data, what is the probability of the spinner landing on red?
6. Is your answer to question 5 different from your answers to questions 1 and 3? If so, explain why this might be the case.

# Spinner Investigation 1: When is a game fair?

## *Grade 6 Concept Task: Unit 3*



Answer questions 7, 8 and 9 using the theoretical probability of the spinner landing on blue, red or yellow.

7. How many times would you expect to have to spin the spinner for it to land on red 12 times? Explain.

8. If this is a game in which each player is assigned a color, will it be a fair game? Discuss why or why not?

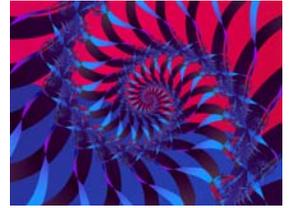
9. If not fair, how could you change the game to make it fair?

## Group Recording Sheet Fair Game

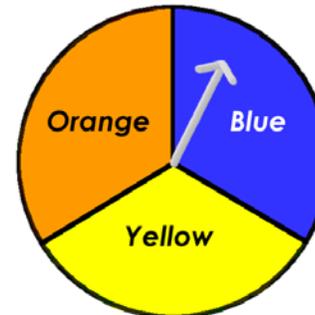
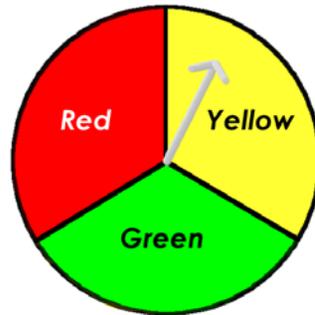
Groups	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Group Total
Blue																
Yellow																
Red																
															Overall Total	

# Spinner Investigation 2: Making Purple

## *Grade 6 Concept Task: Unit 3*



A science club hosts a carnival to raise money. A game called *Making Purple* at the carnival involves using both spinners shown. If the player gets red on spinner A and blue on spinner B, the player wins because mixing red and blue makes purple.



Make a chart of your answers to questions 1, 2, and 3, making sure that you clearly show how your answers to questions 2 and 3 are related to your answer to question 1

1. List the outcomes that are possible when you spin both pointers. Are these outcomes equally likely? Explain your reasoning.
2. What is the theoretical probability that a player “makes purple”? Explain.
3. What is the theoretical probability of a player getting only one yellow? Explain.

# Spinner Investigation 2: Making Purple

---

## *Grade 6 Concept Task: Unit 3*



Complete questions 4, 5, and 6 on the sheet below, making sure you provide clear explanations for each answer.

4. If 100 people play the *Making Purple* game, how many people do you expect to win? Explain your reasoning.
  
  
  
  
  
  
  
  
  
  
5. If 100 people play the *Making Purple* game, how many people will get only one yellow? Explain.
  
  
  
  
  
  
  
  
  
  
6. The club charges \$1 per turn. A player who makes purple wins \$5. Suppose 100 people play. How much money do you expect the club to make?

# Concept Task

## Conserving Water: Which Community Will Win the Water Conservation Challenge?



The Mayor of the town of Crystal Springs wants to encourage families to conserve water. In April, he found that households in the communities of Oak Park and Fern Woods used a lot of water – the typical household in each community used 6,300 gallons of water per month. On May 1st the mayor made a challenge – the community that uses less water over the summer will be able to host the fall carnival.

The newspaper stated that Oak Park cut their monthly household water consumption to 5,900 gallons of water during the month of May. Miguel, Sam, Mary and Tamara live in Fern Woods and their school asked them each to poll households in their community to find out how they are doing. Unfortunately, they don't have enough time or money to visit every home to gather their data. How could they collect information from a sample of homes in Fern Woods to find out whether they are on the way to winning the challenge, or whether they have to work harder to catch up with Oak Park?

Miguel decided to use systematic sampling, Sam decided to use convenience sampling, and Tamara decided to use random sampling to gather their data, but they need your help. With your team, select a task card to find out whom you will help. Work together to decide how you will use their method to collect your data to decide whether families in Fern Woods used less water than families in Oak Park during the month of May. Once you have selected the homes that will be in your sample, consult the "Home Visit" sheet to collect your data. Calculate the range, mean, median, and mode of your sample.

- Which of these results best represents the "typical" household water consumption in your sample?
- Do you think this result represents the "typical" water consumption in Fern Woods?
- Which community do you think uses less water, Fern Woods or Oak Park?
- Produce a poster that describes your methods and shows your results and conclusions.
- Explain your reasoning.

## COMPARISON:

Mary collected her data using a self-selected sample. She placed a notice on Broad Street, but only five families responded. Her data was: 4,800, 5,300, 4,300, 6,400, and 4,300 gallons. She performed her calculations and put her findings in the summary chart. Add your team's results and conclusions to the summary chart.

- Compare your findings to those of the other teams.
- What do you think is the best way to determine *which community conserved more water?*
- Be prepared to explain your recommendations.



Extension Questions, if students need additional challenge:

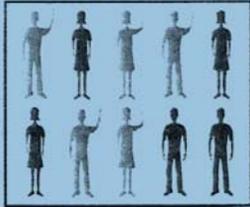
- Would it be important to find out whether Oak Park reported their median or mean water consumption? Explain.
- Will it always be true that mean water consumption is higher than median water consumption? Explain.
- Why do you think some households use a lot more water than others?
- What can you do to make sure you are not wasting water at home?

Homework: Prepare a letter to send to the Mayor of Crystal Springs to recommend the best sampling procedure to use to collect water consumption data from Fern Woods. Be sure to mention the suggested sample size, sampling method, possible bias, and the measure you should use to determine the “typical” household water consumption. Justify your recommendations.

Project: Find out how much your utility company charges for water. Figure out how much money your family would save over a month, and over a year, if your family can use 1000 less gallons of water per month.

## TASK CARDS

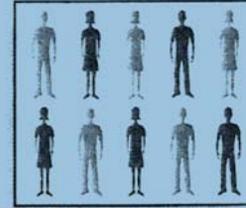
With *self-selected sampling*, you let people volunteer to be part of the sample.



**MARY**

(Mary has already used self-selected sampling to collect her data so you won't need to help her.)

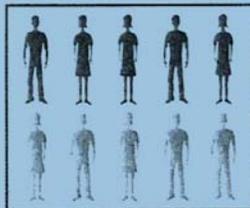
With *systematic sampling*, you use a pattern to select people, such as choosing every other person.



**MIGUEL**

(Systematic Sampling)

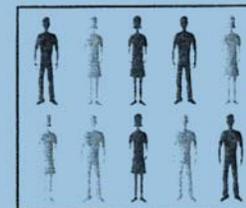
With *convenience sampling*, you choose easy-to-reach people, such as those in the first row.



**SAM**

(Convenience Sampling)

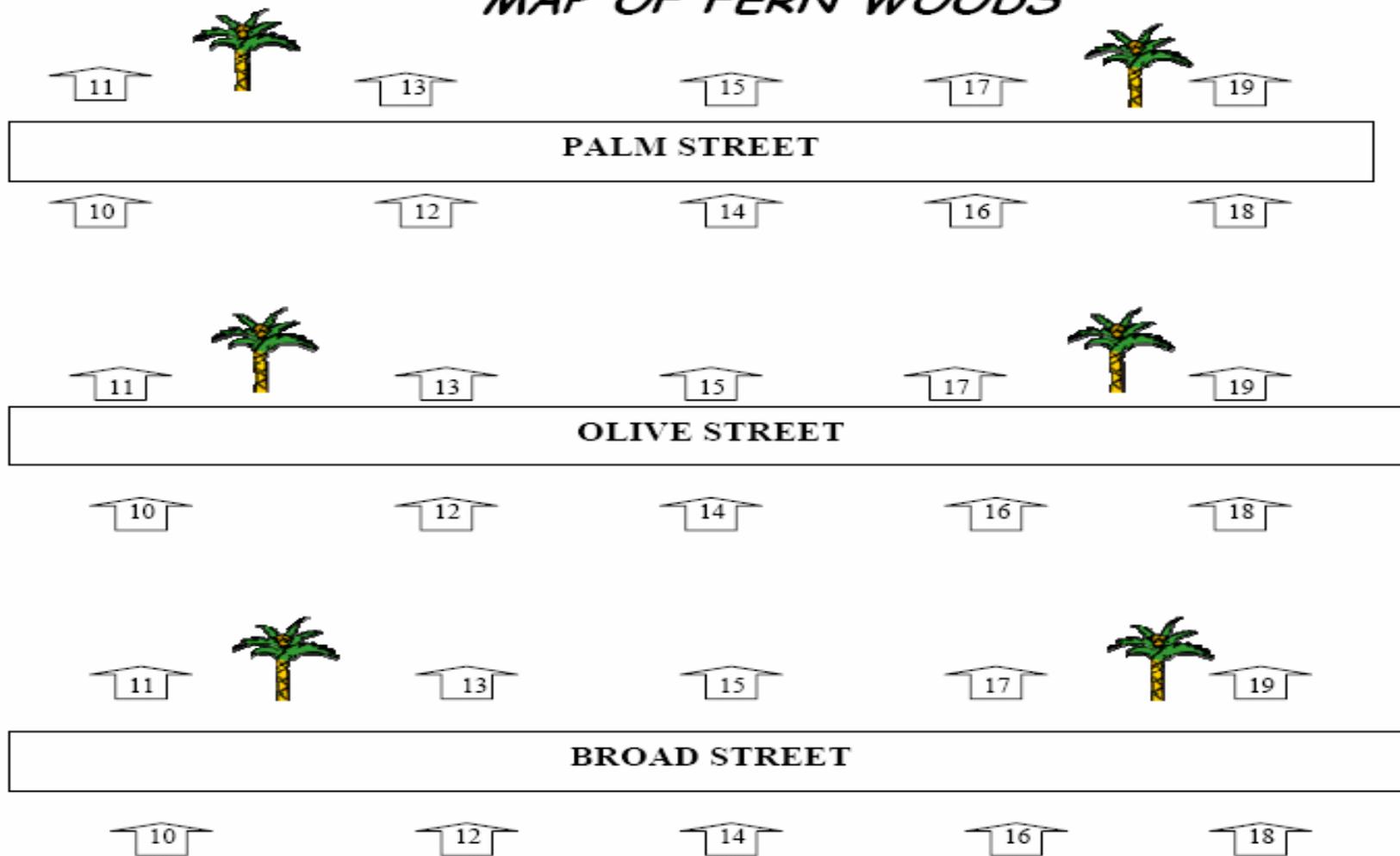
With *random sampling*, each person has an equally likely chance of being chosen.



**TAMARA**

(Random Sampling)

# MAP OF FERN WOODS



## HOME VISIT SHEET FOR FERN WOODS\*

WATER CONSUMPTION FOR MAY

BROAD STREET		OLIVE STREET		PALM STREET	
House #	Water consumption (gallons per month)	House #	Water consumption (gallons per month)	House #	Water consumption (gallons per month)
10	4,300	10	5,300	10	5,900
11	4,900	11	8,300	11	5,800
12	4,800	12	4,700	12	6,200
13	6,900	13	9,300	13	13,000
14	4,300	14	5,300	14	5,600
15	8,300	15	6,800	15	10,400
16	5,300	16	5,100	16	6,300
17	6,400	17	7,600	17	10,400
18	5,100	18	5,100	18	5,700
19	7,100	19	5,200	19	11,400

\*(to be consulted by teams ONLY AFTER they have decided which homes are in their sample)

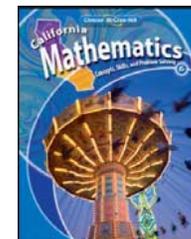
### CLASS SUMMARY DATA *WHICH COMMUNITY USES LESS WATER?*

Team	Sample Size	Sampling Method	Range	Median	Mean	Mode	Oak Park or Fern Woods?
MARY	5	Self-Selected	2,100 gallons	4,800 gallons	5,020 gallons	4,300 gallons	Fern Woods

# Grade 6: Textbook Connections

## California Mathematics: Concept, Skills, and Problem Solving

### UNIT 3

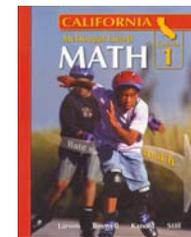


<u>Topic</u>	<u>Standards</u>	<u>Textbook Sections</u>
Understand applications of percentages	<p><b>NS1.4</b> Calculate given percentages of quantities and solve problems involving discounts at sales, interest earned, and tips</p> <p><b>SDAP1.1</b> Compute the range, mean, median, and mode of data sets</p> <p><b>SDAP1.2</b> Understand how additional data added to data sets may affect these computations of measures of central tendency</p> <p><b>SDAP1.3</b> Understand how the inclusion or exclusion of outliers affect measures of central tendency</p>	<p><b>7.1</b> Percent of a Number</p> <p><b>7.2</b> The Percent Proportion</p> <p><b>7.3</b> Percent and Estimation</p> <p><b>7.4</b> The Percent Equation</p> <p><b>7.5</b> Problem Solving Investigation</p> <p><b>7.6</b> Percent of Change</p> <p><b>7.7</b> Sales Tax Discount</p> <p><b>7.8</b> Simple Interest</p>
Understand data analysis and population sampling	<p><b>SDAP2.2</b> Identify different ways of selecting a sample (e.g., convenience sampling, responses to a survey, random sampling) and which method makes a sample more representative for a population</p> <p><b>SDAP2.5</b> Identify claims based on statistical data and, in simple cases, evaluate the validity of the claims</p> <p><b>SDAP3.1</b> Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome</p> <p><b>SDAP3.3</b> Represent probabilities as ratios, proportions, decimals between 0 and 1, and percentages between 0 and 100 and verify that the probabilities computed are reasonable; know that if <math>P</math> is the probability of an event, <math>1 - P</math> is the probability of an event not occurring</p> <p><b>SDAP3.4</b> Understand that the probability of either of two disjoint events occurring is the sum of the two individual probabilities and that the probability of one event following another, in independent trials, is the product of the two probabilities</p> <p><b>SDAP3.5</b> Understand the difference between independent and dependent events</p>	<p><b>8.1</b> Line Plots</p> <p><b>8.2</b> Measures of Central Tendency and Range</p> <p><b>8.3</b> Stem-and-Leaf Plots</p> <p><b>8.4</b> Bar Graphs and Histograms</p> <p><b>8.5</b> Problem Solving Investigation</p> <p><b>8.6</b> Using Graph to Predict</p> <p><b>8.7</b> Using Data to Predict</p> <p><b>8.8</b> Using Sampling to Predict</p> <p><b>8.9</b> Misleading Statistics</p>
Understand theoretical and experimental probability	<p><b>SDAP3.4</b> Understand that the probability of either of two disjoint events occurring is the sum of the two individual probabilities and that the probability of one event following another, in independent trials, is the product of the two probabilities</p> <p><b>SDAP3.5</b> Understand the difference between independent and dependent events</p>	<p><b>9.1</b> Simple Events</p> <p><b>9.2</b> Sample Spaces</p> <p><b>9.3</b> The fundamental Counting Principle</p> <p><b>9.4</b> Permutations</p> <p><b>9.5</b> Combinations</p> <p><b>9.6</b> Problem Solving Investigation</p> <p><b>9.7</b> Theoretical and Experimental Probability</p> <p><b>9.8</b> Compound Events</p>

# Grade 6: Textbook Connections

Course 1 McDougal Littell MATH

## UNIT 3



Topic	Standards	Textbook Sections
Understand applications of percentages	<p><b>NS1.4</b> Calculate given percentages of quantities and solve problems involving discounts at sales, interest earned, and tips</p> <p>SDAP1.1 Compute the range, mean, median, and mode of data sets</p> <p>SDAP1.2 Understand how additional data added to data sets may affect these computations of measures of central tendency</p>	<p><b>6.1</b> Percents and Fractions</p> <p><b>6.2</b> Percents and Proportions</p> <p><b>6.3</b> Percents and Decimals</p> <p><b>6.4</b> The Percent Equations</p> <p><b>6.5</b> Discount, Markups, Tips, and Sales Tax</p> <p><b>6.6</b> Simple Interest</p>
Understand data analysis and population sampling	<p>SDAP1.3 Understand how the inclusion or exclusion of outliers affect measures of central tendency</p> <p><b>SDAP2.2</b> Identify different ways of selecting a sample (e.g., convenience sampling, responses to a survey, random sampling) and which method makes a sample more representative for a population</p> <p><b>SDAP2.5</b> Identify claims based on statistical data and, in simple cases, evaluate the validity of the claims</p>	<p><b>7.1</b> Sampling Methods</p> <p><b>7.2</b> Sampling Errors</p> <p><b>7.3</b> Mean, Median, and Mode</p> <p><b>7.4</b> Range and Outliers</p> <p><b>7.5</b> Histograms</p> <p><b>7.6</b> Circle Graphs</p> <p><b>7.7</b> Choosing and Analyzing Data Displays</p>
Understand theoretical and experimental probability	<p><b>SDAP3.1</b> Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome</p> <p><b>SDAP3.3</b> Represent probabilities as ratios, proportions, decimals between 0 and 1, and percentages between 0 and 100 and verify that the probabilities computed are reasonable; know that if <math>P</math> is the probability of an event, <math>1 - P</math> is the probability of an event not occurring</p> <p>SDAP3.4 Understand that the probability of either of two disjoint events occurring is the sum of the two individual probabilities and that the probability of one event following another, in independent trials, is the product of the two probabilities</p> <p><b>SDAP3.5</b> Understand the difference between independent and dependent events</p>	<p><b>8.1</b> Introduction to Probability</p> <p><b>8.2</b> Experimental Probability</p> <p><b>8.3</b> Disjointed Events</p> <p><b>8.4</b> Compound Events</p> <p><b>8.5</b> Independent and Dependent Events</p>

*Standards in bold are key standards as defined by the Mathematics Framework for California Public Schools*

**Grade 6**  
**Assessment 3**  
**Periodic Assessment Blueprint**  
**Secondary Mathematics, 2009 – 2010**

6 <sup>th</sup> Grade Standards		No. of Items on the CST	No. of Multiple Choice Items on the Assessment	No. of Constructed Response Items on the Assessment
NS1.4 	Calculate given percentages of quantities and solve problems involving discounts at sales, interest earned, and tips.	5	5	
SDAP1.1	Compute the range, mean, median, and mode of data sets.	1/3	1	
SDAP1.2	Understand how additional data added to data sets may affect these computations of measures of central tendency.	1/3	0	
SDAP1.3	Understand how the inclusion or exclusion of outliers affect measures of central tendency.	1/3	0	
SDAP2.2 	Identify different ways of selecting a sample (e.g., convenience sampling, responses to a survey, random sampling) and which method makes a sample more representative for a population.	3	4	1
SDAP2.5 	Identify claims based on statistical data and, in simple cases, evaluate the validity of the claims.	1/3	1	
SDAP3.1 	Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome.	3	4	
SDAP3.3 	Represent probabilities as ratios, proportions, decimals between 0 and 1, and percentages between 0 and 100 and verify that the probabilities computed are reasonable; know that if $P$ is the probability of an event, $1 - P$ is the probability of an event not occurring.	3	4	
SDAP3.5 	Understand the difference between independent and dependent events.	1/3	1	

 Denotes key standards as defined by the Mathematics Framework for California Public Schools

# Sixth Grade: Unit Concept Organizer

## Plane and Solid Figures

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Understand angles and geometric figures

MG 2.1, **MG 2.2**, MG 2.3

- Identify angles as vertical, adjacent, complementary, or supplementary, and describe these terms
- Use the properties of complementary and supplementary angles and the sum of the angles in a triangle to solve problems involving an unknown angle
- Draw quadrilaterals and triangles from given information about them

Understand measurement and area

**MG1.1**, MG 1.2

- Understand the concept of a constant such as  $\pi$
- Know the formulas for the circumference and area of a circle
- Know common estimates of  $\pi$  (3.14, 22/7)
- Use common estimates of  $\pi$  to estimate and calculate the circumference and the area of circles
- Compare calculations with actual measurements of circumference and area

C  
S  
T

Understand the properties of three-dimensional figures

MG 1.3, AF 3.1, AF 3.2

- Know and use the formulas for the volume of triangular prisms and cylinders
- Compare the formulas for triangular prisms and cylinders with the formula for the volume of a rectangular solid
- Explain the similarities between the volume formulas for triangular prisms, cylinders and rectangular solids
- Use variables in expressions describing geometric quantities
- Express simple geometric relationships using symbols

	MG 1.3	MG 2.1	<b>MG2.2</b>	MG2.3	AF 3.1	AF 3.2	<b>MG1.1</b>	MG1.2
<p><b>KEY Standards - CST Questions</b></p> <p>Other Standards - CST Questions</p> <p>* 1/2 means 1 question every 2 years</p>	1/2*	1	<b>4</b>	1	1	1	<b>3</b>	1/2*
<p><b>CONCEPT LESSON:</b></p> <p>MR – Magic Rectangle</p> <p>SP – Surround the Pool</p> <p>IP – Investigating Pi</p>		MR	MR		SP	SP	IP	IP

# Concept Task

## Investigating $\pi$

Your task is to explore the relationship between the circumference of a circle and the diameter.

1. Form a group with a partner. You will need several different-sized circular objects.
  - Use a tape measure to find the distance around each circular object (the circumference).
  - Then measure the distance across the objects through the center (the diameter).
  - Record your measurements in the table.

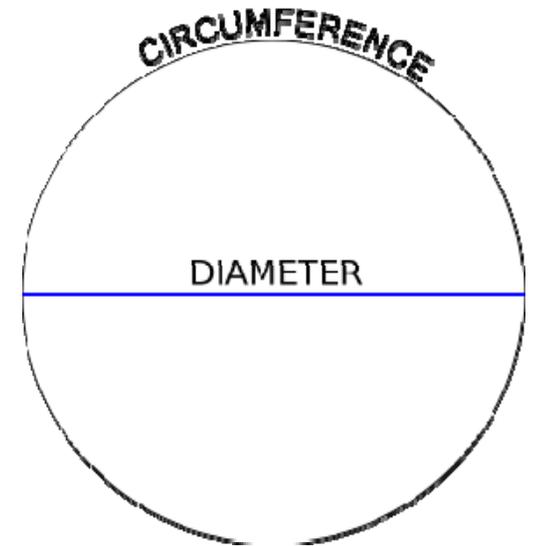
Complete the table and discuss with your partner any patterns that you see.

Now answer questions 2, 3, and 4 using complete sentences:

2. Describe in words the relationship you see between the circumference of a circle and the diameter.
3. What do you notice about the ratio in the last column?
4. Write a formula that describes the relationship between the circumference and the diameter of a circle.

Use the formula you found in question 4 to answer questions 5 and 6.

5. What is the circumference of a tire that has a diameter of 18 inches?
6. If a soccer ball has a circumference of 44 inches, how big is the diameter?



# Investigating $\pi$

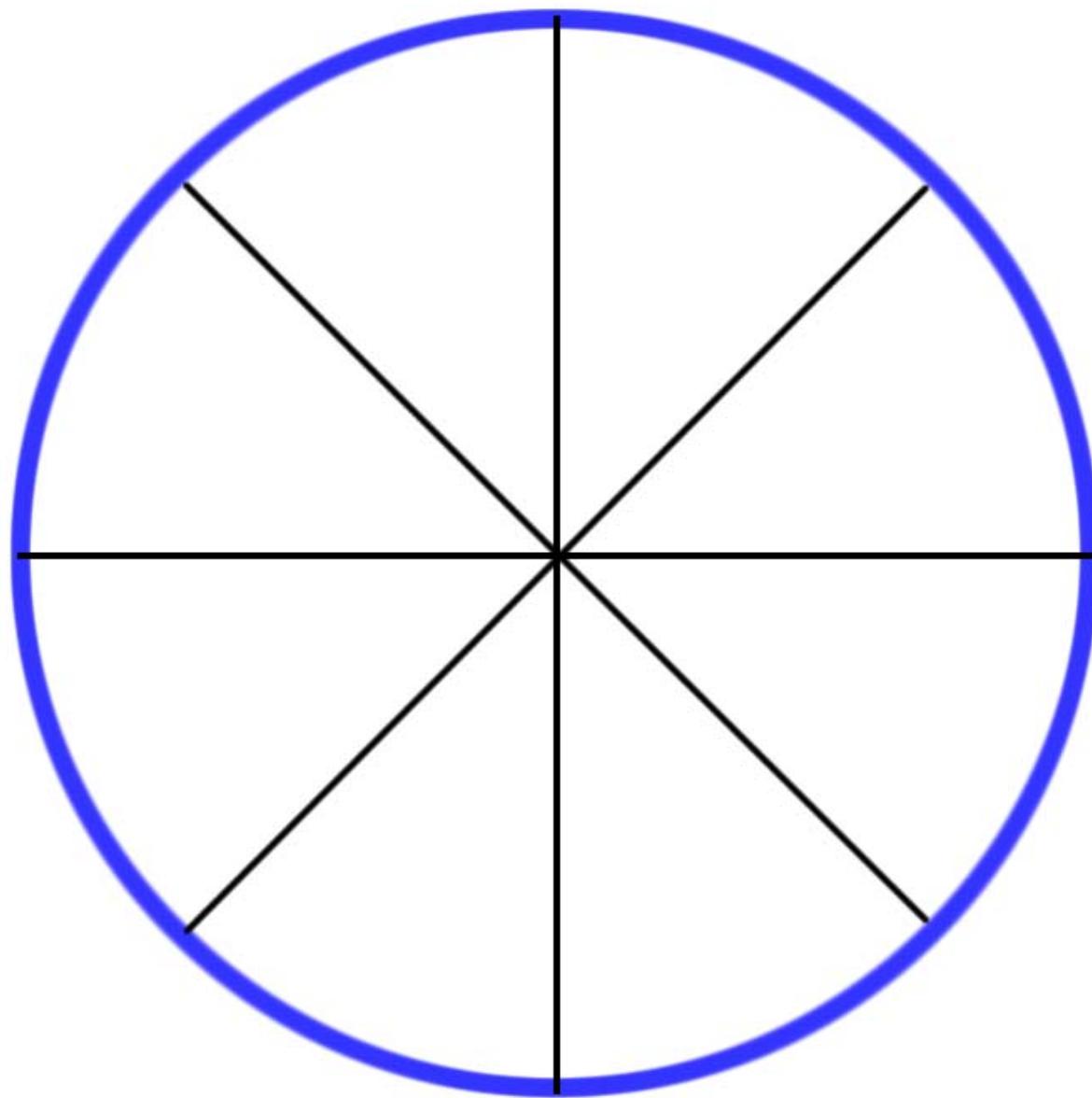
Use this table to record your measurements of different-sized circular objects

Object Name	Circumference C	Diameter d	Ratio of Circumference to Diameter C/d

## Area of a Circle Investigation

Carefully cut out the circle. Cut the circle into the 8 separate segments. Rearrange these segments into any other shape you choose. Use your knowledge of area formulas for other shapes to approximate the area of the circle.

Explain your reasoning:



# Concept Task

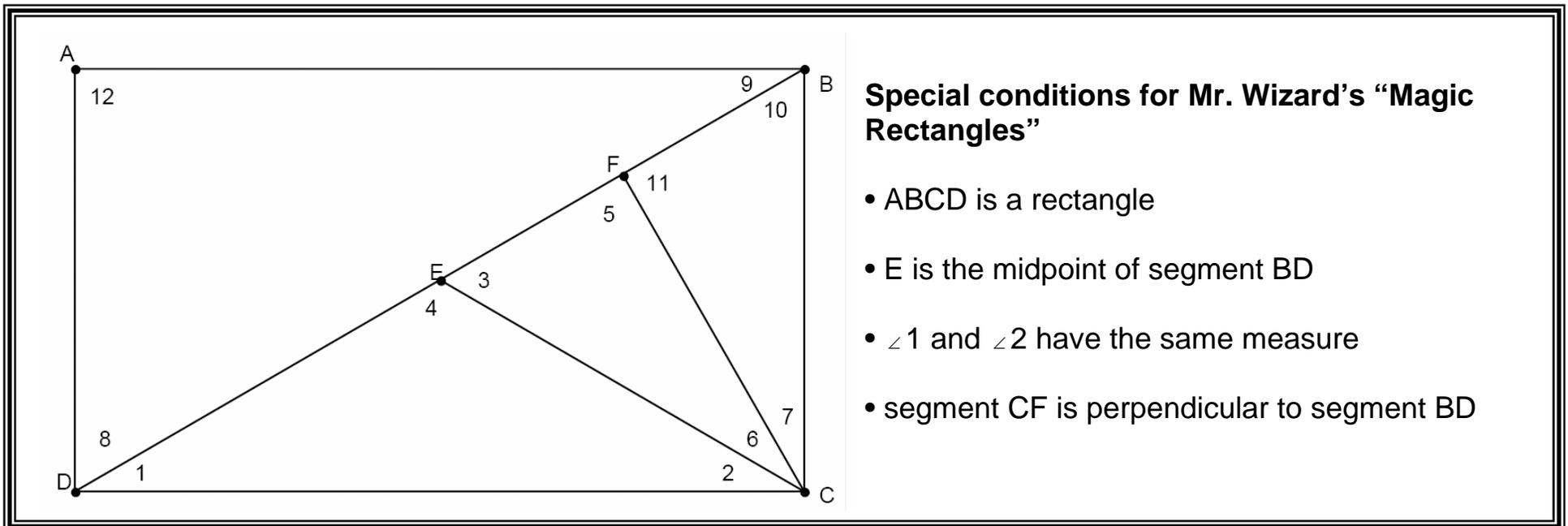
## The “Magic Rectangle

Mr. Wizard claims that he can perform “magic” with the rectangle shown below. He says that by measuring just one angle in the diagram that is not a right angle, he can use the magic to figure out all of the remaining angles. Your task is to:

1. find out if it is possible to figure out the measures of all of the angles in the diagram by just measuring one angle that is not a right angle.
2. explain to Mr. Wizard why his “magic trick” works. Be certain to use correct mathematical properties and vocabulary in your explanation.

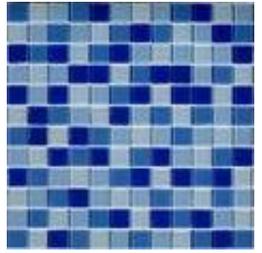
Explore:

3. determine if this trick will work for all other “magic rectangles” that Mr. Wizard could draw (remember, a “magic rectangle” has to meet the special conditions).



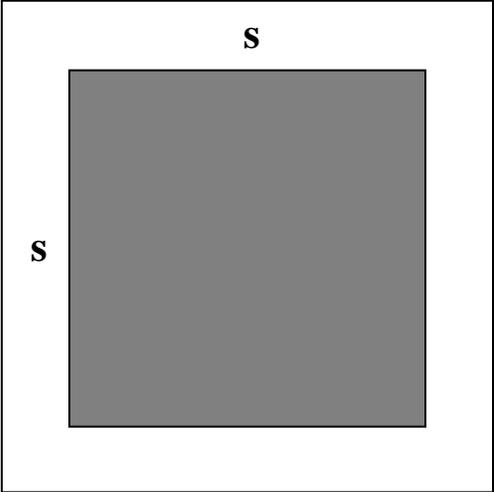


# Concept Task



## Surround the Pool

Hot tubs and in-ground swimming pools are sometimes surrounded by borders of tiles. This drawing shows a square swimming pool surrounded by a border of square tiles. Each tile measures 1 foot on each side.

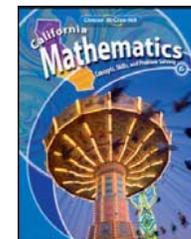


1. Write an expression describing the total number of 1-foot square tiles needed for the border of the pool. Show how your expression can be seen in the drawing.
  
2. Solve the problem again using a different expression and explain how the second expression can be seen in the drawing.

# Grade 6: Textbook Connections

## *California Mathematics: Concept, Skills, and Problem Solving*

### UNIT 4

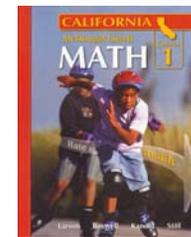


<u>Topic</u>	<u>Standards</u>	<u>Textbook Sections</u>
Understand angles and geometric figures	<p><b>MG1.1</b> Understand the concept of a constant such as <math>\pi</math>; know the formulas for the circumference and area of a circle</p> <p>MG1.2 Know common estimates of <math>\pi</math> (3.14; 22/7) and use these values to estimate and calculate the circumference and the area of circles; compare with actual measurements</p> <p>MG1.3 Know and use the formulas for the volume of triangular prisms and cylinders (area of base <math>\times</math> height; compare these formulas and explain the similarity between them and the formula for the volume of a rectangular solid</p>	<p><b>10.1</b> Angle Relationships</p> <p><b>10.2</b> Complementary and Supplementary Angles</p> <p><b>10.3</b> Statistics: Display Data in a Circle Graph</p> <p><b>10.4</b> Triangles</p> <p><b>10.5</b> Problem Solving Investigation</p> <p><b>10.6</b> Quadrilaterals</p> <p><b>10.7</b> Similar Figures</p>
Understand measurement and area AND Understand the properties of three-dimensional figures	<p>MG2.1 Identify angles as vertical, adjacent, complementary, or supplementary and provide descriptions of these terms</p> <p><b>MG2.2</b> Use the properties of complementary and supplementary angles and the sum of the angles of a triangle to solve problems involving an unknown angle</p> <p>MG2.3 Draw quadrilaterals and triangles from given information about them (e.g., a quadrilateral having equal sides but no right angles, a right isosceles triangle)</p> <p>AF3.1 Use variables in expressions describing geometric quantities (e.g., <math>P = 2w + 2l</math>, <math>A = \frac{1}{2}bh</math>, <math>C = \pi d</math> – the formulas for the perimeter of a rectangle, the area of a triangle, and the circumference of a circle, respectively)</p> <p>AF3.2 Express in symbolic form simple relationships arising from geometry</p>	<p><b>11.1</b> Area Parallelograms</p> <p><b>11.2</b> Triangles and Trapezoids</p> <p><b>11.3</b> Circles and Circumference</p> <p><b>11.4</b> Area of Circles</p> <p><b>11.5</b> Problem Solving Investigation</p> <p><b>11.6</b> Area of Complex Figures</p> <p><b>11.7</b> Three- Dimensional Figures</p> <p><b>11.8</b> Drawing Three-Dimensional Figures</p> <p><b>11.9</b> Volume of Prisms</p> <p><b>11.10</b> Volumes of Cylinders</p>

# Grade 6: Textbook Connections

Course 1 McDougal Littell MATH

## UNIT 4



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Understand measurement and area AND Understand the properties of three-dimensional figures	<p><b>MG1.1</b> Understand the concept of a constant such as <math>\pi</math>; know the formulas for the circumference and area of a circle</p> <p>MG1.2 Know common estimates of <math>\pi</math> (3.14; 22/7) and use these values to estimate and calculate the circumference and the area of circles; compare with actual measurements</p> <p>MG1.3 Know and use the formulas for the volume of triangular prisms and cylinders (area of base <math>\times</math> height; compare these formulas and explain the similarity between them and the formula for the volume of a rectangular solid</p> <p>MG2.1 Identify angles as vertical, adjacent, complementary, or supplementary and provide descriptions of these terms</p> <p><b>MG2.2</b> Use the properties of complementary and supplementary angles and the sum of the angles of a triangle to solve problems involving an unknown angle</p> <p>MG2.3 Draw quadrilaterals and triangles from given information about them (e.g., a quadrilateral having equal sides but no right angles, a right isosceles triangle)</p> <p>AF3.1 Use variables in expressions describing geometric quantities (e.g., <math>P = 2w + 2l</math>, <math>A = \frac{1}{2}bh</math>, <math>C = \pi d</math> – the formulas for the perimeter of a rectangle, the area of a triangle, and the circumference of a circle, respectively)</p> <p>AF3.2 Express in symbolic form simple relationships arising from geometry</p>	<p>10.4 Area of Parallelogram</p> <p>10.5 Areas of Triangles and Trapezoids</p> <p>10.6 Circumference of a Circle</p> <p>10.7 Area of a Circle</p> <p>4.4 Using Familiar Formulas</p> <p>11.1 Visualizing Area of Prisms</p> <p>11.2 Surface Area of Prisms</p> <p>11.3 Surface Area of Cylinders</p> <p>11.4 Volume of Prisms</p> <p>11.5 Volume of Cylinders</p>