

## 6th Grade Mathematics

### Course Description:

The curriculum in the 6th grade mathematics is aligned with the New Jersey Student Learning Standards. Those standards focus on following five areas: ratios and proportional relationships, the number system, equations and expressions, geometry, and statistics and probability. Students will develop their ability to make sense of problems and persevere in solving them, reason abstractly, construct arguments and critique others, model mathematically, attend to precision, and use repeated reasoning. Students will demonstrate understanding of the course material by participating in homework, group and individual class work, quizzes, tests, independent problem solving and Do Now's.

### Course Sequence:

Unit Title	Pacing
Unit 1: The Number System	44 days
Unit 2: Expressions and Equations	43 days
Unit 3: Rates and Ratios	33 days
Unit 4: Geometry	26 days
Unit 5: Statistics and Probability	25 days

\*9 days built in for field trips, class parties, state testing, and end of year promotion activities.

**Pre-requisite: 5th grade math**

**Unit 1 - Overview****Content Area:** Mathematics**Unit Title:** Unit 1: The Number System**Grade Level:** 6th**Unit Summary**

- Whole Number Operations
- Fractions
- Decimals

Students use the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students use these operations to solve problems.

**Unit 1 - Standards****Standards (Content and Technology):**

<b>CPI#:</b>	<b>Statement:</b>
6.NS.B.2	Fluently divide multi-digit numbers using the standard algorithm.
6.NS.B.4	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express $36 + 8$ as $4(9 + 2)$ .
6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for $(2/3) \div (3/4)$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(2/3) \div (3/4) = 8/9$ because $3/4$ of $8/9$ is $2/3$ . (In general, $(a/b) \div (c/d) = ad/bc$ ). How much chocolate will each person get if 3 people share $1/2$ lb of chocolate equally? How many $3/4$ -cup servings are in $2/3$ of a cup of yogurt? How wide is a rectangular strip of land with length $3/4$ mi and area $1/2$ square mi?
6.NS.B.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

**21<sup>st</sup> century themes and skills (standard 9)**

9.1.8.E.1	Explain what it means to be a responsible consumer and the factors to consider when making consumer decisions.
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**Career Ready Practices**

CRP1	Act as a responsible and contributing citizen and employee.
CRP2	Apply appropriate academic and technical skills.
CRP4	Communicate clearly and effectively and with reason.
CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.

**Educational Technology Standards**

8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

**Interdisciplinary Connection**

SL.6.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.
SL.6.2	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.
NJSLSA.L2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

**Unit Essential Question(s):**

- How do you divide multi-digit numbers?
- How do you multiply multi-digit numbers?
- How do you write the prime factorization of a number?

**Unit Enduring Understandings:**

- Estimation is a very useful mathematical tool.
- It is important to extend knowledge from whole numbers to rational numbers in order

<ul style="list-style-type: none"> <li>• How can you find the least common multiple of two whole numbers?</li> <li>• How can you find the greatest common factor of two whole numbers?</li> <li>• How can you compare and order fractions and decimals?</li> <li>• How do you multiply fractions?</li> <li>• How do you divide fractions?</li> <li>• How do you add and subtract multi-digit decimals?</li> <li>• How do you multiply multi-digit decimals?</li> <li>• How do you divide decimals by whole numbers?</li> <li>• How do you divide whole numbers and decimals by decimals?</li> </ul>	to fully understand and solve real world problems.
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**Unit Learning Targets/Objectives:**

*Students will be able to...*

- Fluently divide multi-digit numbers using the standard algorithm.
- Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12.
- Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
- Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions

**Evidence of Learning**

- **Formative Assessments:** Teacher observations, exit slips, homework, participation, communicator white boards
- **Summative/Benchmark Assessment(s):** Lesson quizzes, Unit Test
- **Alternative Assessments:** Modified versions of quizzes and tests
- **Resources/Materials :** Smart Board, curriculum folders, scope and sequence calendar, math textbook, math manipulatives. Online resources such as IXL, xtramath, Think Central, etc

**Modifications:**

- Special Education Student/504 - Allow errors, Rephrase questions, directions, and explanations, Allow use of calculator and extended time on assignments. Consult IEP/504 for specific modifications/accommodations.
- English Language Learners - Allow errors in speaking, rephrase questions, directions, and explanations, extended time on assignments.
- At-Risk Students - Consult with Guidance Counselors and follow I&RS procedures/action plans, extra help, breaking down tasks.
- Gifted and Talented Students – Make Peer Leaders, provide extension activities.

**Suggested Pacing Guide**

<b>Lesson Name/Topic</b>	<b>Lesson Objective(s) <i>Students will...</i></b>	<b>Time frame (day(s) to complete)</b>
Benchmark Testing		2 days
Multiply Multi Digit Numbers	Multiply multi digit numbers.	1 day
Divide multi digit numbers	Divide multi digit numbers.	1 day
Exponents	Evaluate expressions involving exponents.	2 days
Assessment	Demonstrate skills above	1 day
Order of Operations	Use the order of operations to evaluate expressions involving exponents.	3 days
Prime Factorization	Write the prime factorization of numbers.	1 day
Greatest Common Factor	Find the greatest common factor of two whole numbers.	2 days

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Least Common Multiple	Find the least common multiple of two whole numbers.	2 days
Assessment	Demonstrate skills above	1 day
Compare and Order Fractions	Compare and Order Fractions	3 days
Adding Fractions	Add fractions using a common denominator	1 day
Subtracting Fractions	Subtract fractions using a common denominator	1 day
Multiply Fractions	Multiply fractions.	1 day
Divide Fractions	Divide proper fractions and mixed numbers using a common denominator.	3 days
Assessment	Demonstrate skills above	1 day
Order of Operations with fractions	Use the order of operations to evaluate expressions involving fractions	2 days
Unit Test	Demonstrate skills above	2 days
Compare and Order Decimals	Compare and order decimals	2 days
Add and subtract decimals	Add and subtract decimals	1 day
Multiply decimals	Fluently multiply multi digit decimals	1 day
Assessment	Demonstrate skills above	1 day
Dividing Decimals	Divide decimals by decimals and decimals by whole numbers	2 days
Order of Operations with Decimals	Use the order of operations to evaluate expressions involving decimals	2 days
Assessment	Demonstrate skills above	1 day
<p><b>Teacher Notes:</b> Students will use prior knowledge by using the ‘cake method’ for LCM and GCF. Students will be shown 6 ways to compare fractions. Students should use a common denominator to add, subtract and multiply fractions. Students should use the ‘moth method’ to simplify fractions before multiplying them. Use brownie pans to multiply proper fractions. Use of fraction tiles to compare and order fractions.</p>		
<p><b>Additional Resources:</b>  <a href="https://www.ixl.com/">https://www.ixl.com/</a>  <a href="https://www.khanacademy.org/">https://www.khanacademy.org/</a>  <a href="https://xtramath.org">https://xtramath.org</a>  <a href="https://www-k6.thinkcentral.com/ePC/start.do">https://www-k6.thinkcentral.com/ePC/start.do</a></p>		

**Unit 2 - Overview****Content Area:** Mathematics**Unit Title:** Unit 2: Expressions and Equations**Grade Level:** 6th**Unit Summary**

- Algebraic Expressions
- Algebraic Equations and Inequalities
- Integers and the Coordinate Plane

Students understand the use of variables in mathematical expressions. They write expressions and equations that correspond to given situations, evaluate expressions, and use expressions and formulas to solve problems. Students understand that expressions in different forms can be equivalent, and they use the properties of operations to rewrite expressions in equivalent forms. Students know that the solutions of an equation are the values of the variables that make the equation true. Students use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. Students construct and analyze tables, such as tables of quantities that are in equivalent ratios, and they use equations (such as  $3x = y$ ) to describe relationships between quantities.

**Unit 2 - Standards****Standards (Content and Technology):**

<b>CPI#:</b>	<b>Statement:</b>
6.EE.A.1	Write and evaluate numerical expressions involving whole-number exponents.
6.EE.A.2	Write, read, and evaluate expressions in which letters stand for numbers.
6.EE.A.3	Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression $3(2 + x)$ to produce the equivalent expression $6 + 3x$ ; apply the distributive property to the expression $24x + 18y$ to produce the equivalent expression $6(4x + 3y)$ ; apply properties of operations to $y + y + y$ to produce the equivalent expression $3y$ .
6.EE.A.4	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions $y + y + y$ and $3y$ are equivalent because they name the same number regardless of which number $y$ stands for.
6.EE.B.5	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
6.EE.B.7	Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which $p$ , $q$ and $x$ are all nonnegative rational numbers.
6.EE.B.8	Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
6.EE.C.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time
6.NS.C.6	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
6.NS.C.7	Understand ordering and absolute value of rational numbers.
<b>21<sup>st</sup> century themes and skills (standard 9)</b>	
9.1.4.C.1	Explain why people borrow money and the relationship between credit and debt.
9.1.8.E.1	Explain what it means to be a responsible consumer and the factors to consider when making consumer decisions.
<b>Career Ready Practices</b>	
CRP1	Act as a responsible and contributing citizen and employee.

CRP2	Apply appropriate academic and technical skills.		
CRP4	Communicate clearly and effectively and with reason.		
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8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.		
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<b>Interdisciplinary Connection</b>			
SL.6.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.		
SL.6.2	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.		
NJSLSA.L4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.		
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%; vertical-align: top;"> <p><b>Unit Essential Question(s):</b></p> <ul style="list-style-type: none"> <li>• How do you write and find the value of expressions involving exponents?</li> <li>• How do you use the order of operations to evaluate expressions involving exponents?</li> <li>• How do you write an algebraic expression to represent a situation?</li> <li>• How can you describe the parts of an expression?</li> <li>• How do you evaluate an algebraic expression or a formula?</li> <li>• How can you use variables and algebraic expressions to solve problems?</li> <li>• How can you use the strategy use a model to combine like terms?</li> <li>• How can you use properties of operations to write equivalent algebraic expressions?</li> <li>• How can you identify equivalent algebraic expressions?</li> <li>• How do you determine whether a number is a solution of an equation?</li> <li>• How do you write an equation to represent a situation?</li> <li>• How do you solve addition and subtraction equations?</li> <li>• How do you solve multiplication and division equations?</li> <li>• How do you determine whether a number is a solution of an inequality?</li> <li>• How do you write an inequality to represent a situation?</li> <li>• How can you write an equation to represent the relationship between an independent variable and a dependent variable?</li> <li>• How can you translate between equations and tables?</li> <li>• How can you graph the relationship between two quantities?</li> <li>• How can you translate between equations and graphs?</li> </ul> </td> <td style="width: 40%; vertical-align: top;"> <p><b>Unit Enduring Understandings:</b></p> <ul style="list-style-type: none"> <li>• As students write equations to represent situations and solve equations to find solutions to problems, they will recognize that it is important to attend to precision.</li> <li>• Students learn to understand the relationships between variables by examining that relationship and abstracting the general rule from a table of values that relates the variables. This is one way they look for and express regularity in repeated reasoning.</li> </ul> </td> </tr> </table>		<p><b>Unit Essential Question(s):</b></p> <ul style="list-style-type: none"> <li>• How do you write and find the value of expressions involving exponents?</li> <li>• How do you use the order of operations to evaluate expressions involving exponents?</li> <li>• How do you write an algebraic expression to represent a situation?</li> <li>• How can you describe the parts of an expression?</li> <li>• How do you evaluate an algebraic expression or a formula?</li> <li>• How can you use variables and algebraic expressions to solve problems?</li> <li>• How can you use the strategy use a model to combine like terms?</li> <li>• How can you use properties of operations to write equivalent algebraic expressions?</li> <li>• How can you identify equivalent algebraic expressions?</li> <li>• How do you determine whether a number is a solution of an equation?</li> <li>• How do you write an equation to represent a situation?</li> <li>• How do you solve addition and subtraction equations?</li> <li>• How do you solve multiplication and division equations?</li> <li>• How do you determine whether a number is a solution of an inequality?</li> <li>• How do you write an inequality to represent a situation?</li> <li>• How can you write an equation to represent the relationship between an independent variable and a dependent variable?</li> <li>• How can you translate between equations and tables?</li> <li>• How can you graph the relationship between two quantities?</li> <li>• How can you translate between equations and graphs?</li> </ul>	<p><b>Unit Enduring Understandings:</b></p> <ul style="list-style-type: none"> <li>• As students write equations to represent situations and solve equations to find solutions to problems, they will recognize that it is important to attend to precision.</li> <li>• Students learn to understand the relationships between variables by examining that relationship and abstracting the general rule from a table of values that relates the variables. This is one way they look for and express regularity in repeated reasoning.</li> </ul>
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<p><b>Unit Learning Targets/Objectives:</b>  <i>Students will be able to...</i></p> <ul style="list-style-type: none"> <li>• Write and evaluate expressions involving exponents</li> <li>• Write algebraic expressions.</li> <li>• Evaluate algebraic expressions and formulas.</li> <li>• Use the properties of operations to generate equivalent algebraic expressions.</li> <li>• Identify equivalent algebraic expressions.</li> <li>• Determine whether a number is a solution of an equation.</li> <li>• Use algebra to solve addition and subtraction equations.</li> <li>• Use algebra to solve multiplication and division equations.</li> </ul>			

- Determine whether a number is a solution of an inequality.
- Write algebraic inequalities.
- Write an equation to represent the relationship between an independent variable and a dependent variable.
- Compare and Order Integers.
- Find and interpret the absolute value of integers.
- Translate between equations and tables.
- Graph the relationship between two quantities.
- Translate between equations and graphs.

### Evidence of Learning

- **Formative Assessments:** Teacher observations, exit slips, Do Nows, homework, participation, communicator white boards
- **Summative/Benchmark Assessment(s):** Lesson quizzes, Unit Test
- **Alternative Assessments:** Modified versions of quizzes and tests
- **Resources/Materials :** Smart Board, curriculum folders, scope and sequence calendar, math textbook, math manipulatives. Online resources such as IXL, xtramath, Think Central, etc

### Modifications:

- Special Education Student/504 - Allow errors, Rephrase questions, directions, and explanations, Allow use of calculator and extended time on assignments. Consult IEP/504 for specific modifications/accommodations.
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- Gifted and Talented Students – Make Peer Leaders, provide extension activities.

### Suggested Pacing Guide

Lesson Name/Topic	Lesson Objective(s) <i>Students will...</i>	Time frame (day(s) to complete)
Intro to expressions	Write and evaluate expressions involving exponents	1 day
Expressions	Write algebraic expressions.	2 days
Translating and Writing Expressions	Evaluate algebraic expressions and formulas.	3 days
Assessment	Demonstrate skills above	1 day
Properties	Use the properties of operations to generate equivalent algebraic expressions.	3 days
Combine Like Terms	Identify equivalent algebraic expressions.	2 days
Assessment	Demonstrate skills above	1 day
Intro to Equations	Determine whether a number is a solution of an equation.	1 day
Addition and Subtraction Equations	Use algebra to solve addition and subtraction equations.	2 days
Multiplication and Division Equations	Use algebra to solve multiplication and division equations.	2 days
Mixed Practice	Use algebra to solve addition, subtractions, multiplication and division equations.	1 day
Assessment	Demonstrate skills above	1 day
Intro to Inequalities	Determine whether a number is a solution of an inequality.	2 days
Inequalities	Write algebraic inequalities.	2 days

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Inequality Word Problems	Write and solve algebraic inequalities.	1 day
Assessment	Demonstrate skills above	1 day
Rational Numbers	Compare and Order Integers.	2 days
Absolute Value	Find and interpret the absolute value of integers.	2 days
Intro to the Coordinate Plane	Translate between equations and tables.	3 days
Coordinate Plane	Graph the relationship between two quantities.	3 days
Independent and Dependent Variables	Write an equation to represent the relationship between an independent variable and a dependent variable.	2 days
Graphing Linear Equations	Translate between equations and graphs.	2 days
Assessment	Demonstrate skills above	1 day
<b>Teacher Notes:</b> Use cups and chips to solve one step Algebraic equations. Use geoboards to locate points on the coordinate plane and to graph linear equations.		
<b>Additional Resources:</b> <a href="https://www.ixl.com/">https://www.ixl.com/</a> <a href="https://www.khanacademy.org/">https://www.khanacademy.org/</a> <a href="https://xtramath.org">https://xtramath.org</a> <a href="https://www-k6.thinkcentral.com/ePC/start.do">https://www-k6.thinkcentral.com/ePC/start.do</a>		



**Unit 3 - Overview****Content Area:** Mathematics**Unit Title:** Unit 3: Ratios and Proportional Relationships**Grade Level:** 6th**Unit Summary**

- Rates, Ratios and Unit Rates
- Units of Measure
- Percents

Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates.

**Unit 3 - Standards****Standards (Content and Technology):**

<b>CPI#:</b>	<b>Statement:</b>
6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.”
6.RP.A.2	Understand the concept of a unit rate $a/b$ associated with a ratio $a:b$ with $b \neq 0$ , and use rate language in the context of a ratio relationship. For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $3/4$ cup of flour for each cup of sugar.” “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.”
6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
6.RP.A.3.a	Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
6.RP.A.3.b	Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?
6.RP.A.3.c	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means $30/100$ times the quantity); solve problems involving finding the whole, given a part and the percent.
6.RP.A.3.d	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

**21<sup>st</sup> century themes and skills (standard 9)**

9.1.8.E.6	Compare the value of goods or services from different sellers when purchasing large quantities and small quantities.
9.1.4.E.2	Apply comparison shopping skills to purchasing decisions.

**Career Ready Practices**

CRP1	Act as a responsible and contributing citizen and employee.
CRP2	Apply appropriate academic and technical skills.
CRP4	Communicate clearly and effectively and with reason.
CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.

**Educational Technology Standards**

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**Interdisciplinary Connection**

SL.6.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others’ ideas and expressing their own clearly.
SL.6.2	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

**Unit Essential Question(s):****Unit Enduring Understandings:**

- How can you model ratios?
- How do you write ratios and rates?
- How can you use a multiplication table to find equivalent ratios?
- How can you use tables to solve problems involving equivalent ratios?
- How can you use unit rates to make comparisons?
- How can you solve problems using unit rates?
- How can you use a graph to represent equivalent ratios?
- How can you use ratio reasoning to convert from one unit of length to another?
- How can you use ratio reasoning to convert from one unit of capacity to another?
- How can you use ratio reasoning to convert from one unit of weight or mass to another?
- How can you transform units to solve problems?
- How can you use the strategy use a formula to solve problems involving distance, rate, and time?
- How can you use a model to show a percent?
- How can you write percents as fractions and decimals?
- How can you write fractions and decimals as percents?
- How do you find a percent of a quantity?
- How can you find the whole given a part and the percent?

- Working with ratios, rates, and solving problems involving equivalent ratios, provides students many opportunities to reason abstractly and quantitatively.
- Students should make sense of problems and persevere in solving them.
- Percents help students see the power of mathematics to model and solve problems in their everyday life.

### Unit Learning Targets/Objectives:

*Students will be able to...*

- Model ratios.
- Write ratios and rates.
- Use a multiplication table to find equivalent ratios.
- Use tables to solve problems involving equivalent ratios.
- Use unit rates to make comparisons.
- Solve problems using unit rates.
- Use a graph to represent equivalent ratios.
- Use ratio reasoning to convert from one unit of length to another.
- Use ratio reasoning to convert from one unit of capacity to another.
- Use ratio reasoning to convert from one unit of weight mass to another.
- Use a model to show a percent as a rate per 100.
- Write percents as fractions and decimals.
- Write fractions and decimals as percents.
- Find a percent of a quantity.
- Find the whole given a part and the percent.

### Evidence of Learning

- **Formative Assessments:** Teacher observations, exit slips, homework, participation, communicator white boards
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### Suggested Pacing Guide

Lesson Name/Topic	Lesson Objective(s) <i>Students will...</i>	Time frame (day(s) to complete)
Intro to Ratios	Model ratios.	1 day
Ratios and Rate	Write ratios and rates.	2 days
Unit Rate	Use unit rates to make comparisons. Solve problems using unit rates.	2 days
Equivalent Ratios	Use a multiplication table to find equivalent ratios. Use tables to solve problems involving equivalent ratios.	1 day
Graphing Ratios	Use a graph to represent equivalent ratios.	1 day
Assessment	Demonstrate skills above	1 day
Proportion	Use tables to solve problems involving equivalent ratios.	3 days
Scale Drawings	Use tables to solve problems involving equivalent ratios.	3 days
Intro to Linear Measurements	Use ratio reasoning to convert from one unit of length to another.	2 days
Units of Capacity	Use ratio reasoning to convert from one unit of capacity to another.	1 day
Units of Weight and Mass	Use ratio reasoning to convert from one unit of weight mass to another.	2 days
Assessment	Demonstrate skills above	1 day
Intro to Percents	Use a model to show a percent as a rate per 100. Write percents as fractions and decimals. Write fractions and decimals as percents.	2 days
Percents multiples of 10	Find a percent of a quantity. Find the whole given a part and the percent.	1 day
Percents multiples of 20/25	Find a percent of a quantity. Find the whole given a part and the percent.	1 day
All other percents	Find a percent of a quantity. Find the whole given a part and the percent.	1 day
Sales Tax and Discount	Find a percent of a quantity. Find the whole given a part and the percent.	2 days
Assessment	Demonstrate skills above	1 day

**Teacher Notes:** Use half inch grid paper to discover and remember units of capacity. Use feet and yard stick for units of measure. Cube lesson for intro to percents. Use percent bars for 10, 20 and 25%.

**Additional Resources:**

<https://www.ixl.com/>

<https://www.khanacademy.org/>

<https://xtramath.org>

<https://www-k6.thinkcentral.com/ePC/start.do>

**Unit 4 - Overview****Content Area:** Mathematics**Unit Title:** Unit 4: Geometry**Grade Level:** 6th**Unit Summary**

- Area of two dimensional figures
- Surface area of two dimensional figures
- Volume of three dimensional figures

Students in build on their work with area by reasoning about relationships among shapes to determine area, surface area, and volume. They find areas of right triangles, other triangles, and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating the shapes to rectangles. Students find areas of polygons and surface areas of prisms and pyramids by decomposing them into pieces whose area they can determine. They reason about right rectangular prisms with fractional side lengths to extend formulas for the volume of a right rectangular prism to fractional side lengths.

**Unit 4 - Standards****Standards (Content and Technology):**

<b>CPI#:</b>	<b>Statement:</b>
6.G.A.1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
6.G.A.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l w h$ and $V = B h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
6.G.A.3	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
6.G.A.4	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

**21<sup>st</sup> century themes and skills (standard 9)**

9.1.8.E.1	Explain what it means to be a responsible consumer and the factors to consider when making consumer decisions.
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**Career Ready Practices**

CRP1	Act as a responsible and contributing citizen and employee.
CRP2	Apply appropriate academic and technical skills.
CRP4	Communicate clearly and effectively and with reason.
CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.

**Educational Technology Standards**

8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

**Interdisciplinary Connection**

SL.6.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.
SL.6.2	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.
NJSLSA.L2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

<p><b>Unit Essential Question(s):</b></p> <ul style="list-style-type: none"> <li>• How can you find the area of parallelograms?</li> <li>• What is the relationship among the areas of triangles, rectangles, and parallelograms?</li> <li>• How can you find the area of triangles?</li> <li>• What is the relationship between the areas of trapezoids and parallelograms?</li> <li>• How can you find the area of trapezoids?</li> <li>• How can you find the area of regular polygons?</li> <li>• How can you find the area of composite figures?</li> <li>• How can you plot polygons on a coordinate plane and find their side lengths?</li> <li>• How do you use nets to represent three-dimensional figures?</li> <li>• What is the relationship between a net and the surface area of a prism?</li> <li>• How can you find the surface area of prisms?</li> <li>• How can you find the surface area of a pyramid?</li> <li>• How can you find volumes of rectangular prisms with fractional edge lengths?</li> </ul>	<p><b>Unit Enduring Understandings:</b></p> <ul style="list-style-type: none"> <li>• Students reason abstractly and quantitatively when they make sense of area formulas. They do this by using their prior knowledge to derive formulas and represent them symbolically. This reasoning helps students to explain problems, the problem-solving process, and justify their solutions.</li> <li>• Modeling solid figures can help students make sense of problems and persevere in solving them. Filling spaces with cubes provides an image for students to relate to the formula for the volume of a rectangular prism. Knowing such strategies will encourage students to persevere until they can find a reasonable solution.</li> </ul>
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<p><b>Unit Learning Targets/Objectives:</b>  <i>Students will be able to...</i></p> <ul style="list-style-type: none"> <li>• Find the area of parallelograms.</li> <li>• Find the area of triangles.</li> <li>• Find the area of trapezoids.</li> <li>• Find the area of regular polygons.</li> <li>• Find the area of composite figures.</li> <li>• Plot polygons on a coordinate plane, and use coordinates to find side lengths.</li> <li>• Use nets to represent three-dimensional figures.</li> <li>• Use nets to recognize that the surface area of a prism is equal to the sum of the areas of its faces.</li> <li>• Find the surface area of prisms.</li> <li>• Find the surface area of pyramids.</li> <li>• Investigate the volume of rectangular prisms with fractional edge lengths.</li> <li>• Use formulas to find the volume of rectangular prisms with fractional edge lengths.</li> </ul>
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<p><b>Evidence of Learning</b></p>
<ul style="list-style-type: none"> <li>• <b>Formative Assessments:</b> Teacher observations, exit slips, homework, participation, communicator white boards, Do Nows</li> <li>• <b>Summative/Benchmark Assessment(s):</b> Lesson quizzes</li> <li>• <b>Alternative Assessments:</b> Modified versions of quizzes</li> <li>• <b>Resources/Materials :</b> Smart Board, curriculum folders, scope and sequence calendar, math textbook, math manipulatives. Online resources such as IXL, xtramath, Think Central, etc</li> </ul>

<p><b>Modifications:</b></p> <ul style="list-style-type: none"> <li>• Special Education Student/504 - Allow errors, Rephrase questions, directions, and explanations, Allow use of calculator and extended time on assignments. Consult IEP/504 for specific modifications/accommodations.</li> <li>• English Language Learners - Allow errors in speaking, rephrase questions, directions, and explanations, extended time on assignments.</li> </ul>	<ul style="list-style-type: none"> <li>• At-Risk Students - Consult with Guidance Counselors and follow I&amp;RS procedures/action plans, extra help, breaking down tasks.</li> <li>• Gifted and Talented Students – Make Peer Leaders, provide extension activities.</li> </ul>
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<p><b>Suggested Pacing Guide</b></p>		
<p><b>Lesson Name/Topic</b></p>	<p><b>Lesson Objective(s)</b>  <i>Students will...</i></p>	<p><b>Time frame (day(s) to complete)</b></p>

Midland Park Public Schools

Intro to Geometry	Demonstrate prior knowledge of polygons	1 day
Area of Polygons	Find the area of rectangles, squares, parallelograms, triangles, and trapezoids.	3 days
Area of Regular Polygons	Find the area of regular polygons.	1 day
Area of Composite Figures	Find the area of composite figures.	2 day
Polygons on the Coordinate Plane	Plot polygons on a coordinate plane, and use coordinates to find side lengths.	1 day
Assessment	Demonstrate skills above	1 day
Intro to 3D shapes	Use nets to represent three-dimensional figures.	2 days
Intro to Surface Area	Use nets to recognize that the surface area of a prism is equal to the sum of the areas of its faces.	1 day
Surface Area of Prisms	Find the surface area of prisms.	2 days
Surface Area of Pyramids	Find the surface area of pyramids.	2 days
Volume of Rectangular Prisms	Investigate the volume of rectangular prisms with fractional edge lengths.	2 days
Volume of Prisms with Fractional Side Lengths	Use formulas to find the volume of rectangular prisms with fractional edge lengths.	2 days
Assessment	Demonstrate skills above	1 day

**Teacher Notes:** Use Quadrilateral Hierarchy when introducing Geometry. Use Geomodels to draw nets of 3D shapes. Use paper nets to discover the nets of a cube.

**Additional Resources:**

<https://www.ixl.com/>

<https://www.khanacademy.org/>

<https://xtramath.org>

<https://www-k6.thinkcentral.com/ePC/start.do>

**Unit 5 - Overview****Content Area:** Mathematics**Unit Title:** Unit 5: Statistics and Probability**Grade Level:** 6th**Unit Summary**

- Measures of Center
- Data Displays

Students begin to develop their ability to think statistically. Students recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. Students recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different sets of data can have the same mean and median yet be distinguished by their variability. Students learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data were collected.

**Unit 5 - Standards****Standards (Content and Technology):**

<b>CPI#:</b>	<b>Statement:</b>
6.SP.A.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.
6.SP.A.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
6.SP.A.3	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
6.SP.B.5	Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

**21<sup>st</sup> century themes and skills (standard 9)**

9.1.8.E.1	Explain what it means to be a responsible consumer and the factors to consider when making consumer decisions.
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**Career Ready Practices**

CRP1	Act as a responsible and contributing citizen and employee.
CRP2	Apply appropriate academic and technical skills.
CRP4	Communicate clearly and effectively and with reason.
CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.

**Educational Technology Standards**

8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
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**Interdisciplinary Connection**

SL.6.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others’ ideas and expressing their own clearly.
SL.6.2	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.
NJSLSA.L2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

**Unit Essential Question(s):**

- How do you divide multi-digit numbers?
- How do you identify a statistical question?
- How can you describe how a data set was collected?
- How can you use dot plots and frequency tables to display data?
- How can you use histograms to display data?
- How does the mean represent a fair share and balance point?
- How can you describe a set of data using mean, median, and mode?
- How does an outlier affect measures of center?
- How can you describe overall patterns in a data set?
- How can you use box plots to display data?
- How do you calculate the mean absolute deviation of a data set?
- How can you summarize a data set by using range, interquartile range, and mean absolute deviation?
- How can you choose appropriate measures of center and variability to describe a data set?
- What do measures of center and variability indicate about a data set?
- How can you describe the distribution of a data set collected to answer a statistical question?

**Unit Enduring Understandings:**

- Finding the mean, median, and mode of a set of data and discussing which measure is most appropriate to answer a statistical question provide students an opportunity to construct viable arguments and critique the reasoning of others.
- As students work with data, they model with mathematics through dot plots, histograms, and box plots. The models reinforce given numerical information visually and help students analyze and interpret measures of center and dispersion to draw conclusions.

**Unit Learning Targets/Objectives:**

*Students will be able to...*

- Recognize statistical questions.
- Describe a data set by stating what quantity was measured and how it was measured.
- Use frequency tables and dot plots to organize data.
- Display data in histograms.
- Understand the mean as a fair share and as a balance point.
- Summarize a data set by using mean, median, and mode.
- Determine the effects of outliers on measures of center
- Describe overall patterns in data, including clusters, peaks, gaps, and symmetry.
- Display data in box plots.
- Understand mean absolute deviation as a measure of variability from the mean.
- Summarize a data set by using range, interquartile range, and mean absolute deviation.
- Choose appropriate measures of center and variability to describe data, and justify the choice.
- Recognize what measures of center and variability indicate about a data set.
- Describe the distribution of a data set collected to answer a statistical question.

**Evidence of Learning**

- **Formative Assessments:** Teacher observations, Do Now's exit slips, homework, participation, communicator white boards
- **Summative/Benchmark Assessment(s):** Lesson quizzes, Unit Test
- **Alternative Assessments:** Modified versions of quizzes and tests
- **Resources/Materials :** Smart Board, curriculum folders, scope and sequence calendar, math textbook, math manipulatives. Online resources such as IXL, xtramath, Think Central, etc

**Modifications:**

- Special Education Student/504 - Allow errors, Rephrase questions, directions, and explanations, Allow use of calculator and extended time on assignments. Consult IEP/504 for specific modifications/accommodations.
- At-Risk Students - Consult with Guidance Counselors and follow I&RS procedures/action plans, extra help, breaking down tasks.



- English Language Learners - Allow errors in speaking, rephrase questions, directions, and explanations, extended time on assignments.
- Gifted and Talented Students – Make Peer Leaders, provide extension activities.

### Suggested Pacing Guide

Lesson Name/Topic	Lesson Objective(s) <i>Students will...</i>	Time frame (day(s) to complete)
Statistical Questions	Recognize statistical questions.	1 day
Mean, Median, and Mode	Summarize a data set by using mean, median, and mode. Understand the mean as a fair share and as a balance point.	2 days
Choosing Measures of Center	Choose appropriate measures of center and variability to describe data, and justify the choice.	2 days
Outliers	Determine the effects of outliers on measures of center.	1 day
Describe Data	Describe a data set by stating what quantity was measured and how it was measured. Describe overall patterns in data, including clusters, peaks, gaps, and symmetry.	2 days
Dot Plots and Histograms	Use frequency tables and dot plots to organize data. Display data in histograms.	2 days
Box Plots	Display data in box plots.	2 days
Mean Absolute Deviation	Understand mean absolute deviation as a measure of variability from the mean.	2 days
Summarize Data	Summarize a data set by using range, interquartile range, and mean absolute deviation.	1 day
Distribution of Data	Recognize what measures of center and variability indicate about a data set. Describe the distribution of a data set collected to answer a statistical question.	2 days
Assessment	Demonstrate skills above	2 days
Benchmark Testing		2 days

**Teacher Notes:** Use chips to find mean as a balance point. Also, use ruler and half paper towel tube to find mean as a balance point and to help explain mean absolute deviation. Use inch cubes for volume of rectangular prisms.

**Additional Resources:**

<https://www.ixl.com/>

<https://www.khanacademy.org/>

<https://xtramath.org>

<https://www-k6.thinkcentral.com/ePC/start.do>