Math

## Grade 6

## Prepared by:

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## Superintendent of Schools:

Marie C. Cirasella, Ed.D.

# Approved by the Midland Park Board of Education on January 7, 2020 

## 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):

| CPI\#: | Statement: |
| :--- | :--- |
| 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 <br> multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum <br> of two whole numbers $1-100$ with a common factor as a multiple of a sum of two whole numbers with <br> 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 <br> fractions, e.g., by using visual fraction models and equations to represent the problem. For example, <br> create a story context for $(2 / 3) \div(3 / 4)$ and use a visual fraction model to show the quotient; use the <br> relationship between multiplication and division to explain that $(2 / 3) \div(3 / 4)=8 / 9$ because $3 / 4$ of $8 / 9$ is <br> $2 / 3$. . In general, (a/b) $\div(c / d)=$ ad/bc). How much chocolate will each person get if 3 people share $1 / 2$ lb <br> of chocolate equally? How many 3/4- cup servings are in $2 / 3$ of a cup of yogurt? How wide is a <br> 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 <br> operation. |
| 21st 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 <br> decisions. |
| 9.2.8.B.3 | Evaluate communication, collaboration, and leadership skills that can be developed through school, <br> home, work, and extracurricular activities for use in a career. |
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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. | 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 $\quad$ 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 $\quad$ 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
- How can you find the least common multiple of two whole numbers?
- How can you find the greatest common factor of two whole numbers?
- How can you compare and order fractions and decimals?
- How do you multiply fractions?
- How do you divide fractions?
- How do you add and subtract multi-digit decimals?
- How do you multiply multi-digit decimals?
- How do you divide decimals by whole numbers?
- How do you divide whole numbers and decimals by decimals?
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.

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


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

| Unit 2 - Standards |  |
| :---: | :---: |
| Standards (Content and Technology): |  |
| CPI\#: | Statement: |
| 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 $6+3 x$; apply the distributive property to the expression $24 x+18 y$ to produce the equivalent expression $6(4 x+3 y)$; apply properties of operations to $y+y+y$ to produce the equivalent expression $3 y$. |
| 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 $3 y$ 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 $\mathrm{x}+\mathrm{p}=\mathrm{q}$ and $\mathrm{px}=\mathrm{q}$ for cases in which $\mathrm{p}, \mathrm{q}$ and x are all nonnegative rational numbers. |
| 6.EE.B. 8 | Write an inequality of the form $\mathrm{x}>\mathrm{c}$ or $\mathrm{x}<\mathrm{c}$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $\mathrm{x}>\mathrm{c}$ or $\mathrm{x}<\mathrm{c}$ 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 $\mathrm{d}=65$ t 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. |
| 21 ${ }^{\text {st }}$ century themes and skills (standard 9) |  |
| 9.2.8.B.3 | Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career. |
| 9.1.8.E. 1 | Explain what it means to be a responsible consumer and the factors to consider when making consumer 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. |
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| 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 |

- 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


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- 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

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


| Assessment | Demonstrate skills above | 1 day |
| :--- | :--- | :--- |
| Rational <br> Numbers | Compare and Order Integers. | 2 days |
| Absolute Value | Find and interpret the absolute value of <br> integers. | 2 days |
| Intro to the <br> Coordinate Plane | Translate between equations and tables. | 3 days |
| Coordinate Plane | Graph the relationship between two quantities. | 3 days |
| Independent and <br> Dependent <br> Variables | Write an equation to represent the relationship <br> between an independent variable and a <br> dependent variable. | 2 days |
| Graphing Linear <br> Equations | Translate between equations and graphs. | 2 days |
| Assessment | Demonstrate skills above | 1 day |
| Teacher Notes: Use cups and chips to solve one step Algebraic equations. Use geoboards to locate points on the <br> coordinate plane and to graph linear equations. |  |  |
| Additional Resources: <br> https://www.ixl.com/ <br> https://www.khanacademy.org/ <br> $\underline{h t t p s: / / x t r a m a t h . o r g ~}$ <br> https://www-k6.thinkcentral.com/ePC/start.do |  |  |

- 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): |  |  |
| CPI\#: | Statement: |  |
| 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 $\mathrm{a} / \mathrm{b}$ associated with the context of a ratio relationship. For example, "This sugar, so there is $3 / 4$ cup of flour for each cup of sugar rate of $\$ 5$ per hamburger." | tio a:b with $\mathrm{b} \neq 0$, and use rate language in has a ratio of 3 cups of flour to 4 cups of e paid $\$ 75$ for 15 hamburgers, which is a |
| 6.RP.A. 3 | Use ratio and rate reasoning to solve real-world and $m$ tables of equivalent ratios, tape diagrams, double num | atical problems, e.g., by reasoning about diagrams, or equations. |
| 6.RP.A.3.a | Make tables of equivalent ratios relating quantities with values in the tables, and plot the pairs of values on the | le number measurements, find missing nate plane. Use tables to compare ratios. |
| 6.RP.A.3.b | Solve unit rate problems including those involving unit took 7 hours to mow 4 lawns, then at that rate, how m rate were lawns being mowed? | ng and constant speed. For example, if it wns could be mowed in 35 hours? At what |
| 6.RP.A.3.c | Find a percent of a quantity as a rate per 100 (e.g., $30 \%$ solve problems involving finding the whole, given a p | quantity means $30 / 100$ times the quantity); the percent. |
| 6.RP.A.3.d | Use ratio reasoning to convert measurement units; ma multiplying or dividing quantities. | e and transform units appropriately when |
| 21 ${ }^{\text {st }}$ century themes and skills (standard 9) |  |  |
| 9.1.8.E. 6 | Compare the value of goods or services from different small quantities. | when purchasing large quantities and |
| 9.2.8.B.3 | Evaluate communication, collaboration, and leadership home, work, and extracurricular activities for use in a | that can be developed through school, |
| Career Ready Practices |  |  |
| CRP1 | Act as a responsible and contributing citizen and empl |  |
| CRP2 | Apply appropriate academic and technical skills. |  |
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| CRP8 | Utilize critical thinking to make sense of problems and | ere in solving them. |
| Educational Technology Standards |  |  |
| 8.1.8.A. 1 | Demonstrate knowledge of a real world problem using | 1 tools. |
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| Interdisciplinary Connection |  |  |
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| SL.6.2 | Interpret information presented in diverse media and f explain how it contributes to a topic, text, or issue und | (e.g., visually, quantitatively, orally) and y. |
| 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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- 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 |  |
| Lesson <br> Name/Topic | Lesson Objective(s) <br> Students will... | 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. <br> Find the whole given a part and the percent. | 1 day |
| Sales Tax and Discount | Find a percent of a quantity. <br> 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 Resou https://www.ixl.c https://www.kha https://xtramath. https://www-k6.t | ces: <br> m/ <br> cademy.org/ <br> g <br> nkcentral.com/ePC/start.do |  |

## 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):

| CPI\#: | Statement: |
| :---: | :---: |
| 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 $V=1 \mathrm{wh}$ and $\mathrm{V}=\mathrm{Bh}$ 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 ${ }^{\text {st }}$ century themes and skills (standard 9) |  |
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| 9.2.8.B. 3 | Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career. |
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| 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 can you find the area of parallelograms?
- What is the relationship among the areas of triangles, rectangles, and parallelograms?
- How can you find the area of triangles?
- What is the relationship between the areas of trapezoids and parallelograms?
- How can you find the area of trapezoids?
- How can you find the area of regular polygons?
- How can you find the area of composite figures?
- How can you plot polygons on a coordinate plane and find their side lengths?
- How do you use nets to represent three-dimensional figures?
- What is the relationship between a net and the surface area of a prism?
- How can you find the surface area of prisms?
- How can you find the surface area of a pyramid?
- How can you find volumes of rectangular prisms with fractional edge lengths?


## Unit Enduring Understandings:

- 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.
- 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.


## Unit Learning Targets/Objectives:

Students will be able to...

- Find the area of parallelograms.
- Find the area of triangles.
- Find the area of trapezoids.
- Find the area of regular polygons.
- Find the area of composite figures.
- Plot polygons on a coordinate plane, and use coordinates to find side lengths.
- Use nets to represent three-dimensional figures.
- Use nets to recognize that the surface area of a prism is equal to the sum of the areas of its faces.
- Find the surface area of prisms.
- Find the surface area of pyramids.
- Investigate the volume of rectangular prisms with fractional edge lengths.
- Use formulas to find the volume of rectangular prisms with fractional edge lengths.


## Evidence of Learning

- Formative Assessments: Teacher observations, exit slips, homework, participation, communicator white boards, Do Nows
- Summative/Benchmark Assessment(s): Lesson quizzes
- Alternative Assessments: Modified versions of quizzes
- 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 |  |  |
| :---: | :---: | :---: |
| Lesson <br> Name/Topic | Lesson Objective(s) Students will... | Time frame (day(s) to complete) |
| 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 Pryamids | 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 <br> Prisms with <br> Fractional Side <br> 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: <br> https://www.ixl.com/ <br> https://www.khanacademy.org/ <br> https://xtramath.org <br> https://www-k6.thinkcentral.com/ePC/start.do |  |  |

## 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): |  |
| CPI\#: | Statement: |
| 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 ${ }^{\text {st }}$ 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. |
| 9.2.8.B.3 | Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career. |
| 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 teacherled) 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
- At-Risk Students - Consult with Guidance Counselors and follow I\&RS procedures/action plans, extra help, breaking down tasks.
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.

| Suggested Pacing Guide |  |  |
| :---: | :---: | :---: |
| Lesson <br> Name/Topic | Lesson Objective(s) <br> Students will... | 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. <br> Understand the mean as a fair share and as a balance point. | 2 days |
| Choosing <br> 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. <br> 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. <br> 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: <br> https://www.ixl.com/ <br> https://www.khanacademy.org/ <br> https://xtramath.org |  |  |

