Area, Volume, and Data

Content Area: **Math**
Course(s): **Math Grade 6**
Time Period: **MP4**
Length: **45**
Status: **Published**

Unit Overview

Unit Summary	Unit Rationale
In unit 4, students will solve real-world and mathematical problems involving area, surface area, and volume. Students will also develop understanding of statistical variability, summarize and describe distributions, Finally, students will apply and extend previous understandings of numbers to the system of rational numbers.	Unit 4 helps students relate proportional relationships to problems that can be solved using geometry. In this unit students also develop conceptual understanding related to using geometry to solve problems. Unit 4b develops procedural skills and fluency related to the topics of data analysis, modeling, and probability. In this unit students also develop conceptual understanding related to these topics. Developing skills related to data allows students to analyze situations through a mathematical lense and draw informed conclusions based on that data.

NJSLS

6.NS.C.6.c	Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
6.NS.C.8	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
6.EE.A.2.a	Write expressions that record operations with numbers and with letters standing for numbers.
6.EE.A.2.c	Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
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.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 □ = □□□ and □ = □□ 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 (e.g., pyramid, triangular prism, rectangular prism) 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.
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.
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:
6.SP.B.5.a	Reporting the number of observations.
6.SP.B.5.b	Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
6.SP.B.5.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.
6.SP.B.5.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.

Standards for Mathematical Practice

1	Make sense of problems and persevere in solving them
2	Reason abstractly and quantitatively
3	Construct viable arguments and critique the reasoning of others
4	Model with mathematics
5	Use appropriate tools strategically
6	Attend to precision
7	Look for and make use of structure
8	Look for and express regularity in repeated reasoning

Unit Focus

Enduring Understandings	Essential Questions

• The formula for the area of a parallelogram, A=bh, can be derived from the formula for the area of a rectangle. • The formula for the area of a triangle, A=1/2bh, can be derived from the formula for the area of a parallelogram. • The areas of trapezoids and kites can be found by decomposing the trapezoids and kites into shapes for which the area formulas are known. • The areas of polygons, including polygons on the coordinate plane, can be found by composing or decomposing the polygons into shapes for which the area formulas are known. • A solid figure can be classified based on the number of bases, the shape of the base(s), and the shape of the other faces. A net can be used to represent a polyhedron. • The surface area of a prism or a pyramid is the sum of the areas of its faces. • Unit cubes or formulas can be used to find the volume of rectangular prisms, including cubes. • Many real-world problem situations can be represented with a mathematical model, but that model may not represent the situations exactly • A statistical question anticipates variability in responses and can be answered by collecting and analyzing data. • A set of numerical data collected to answer a statistical question has a distribution described by its center, spread and overall shape. • The mean, median and mode are measures of center of a data set. • The range, interquartile range (IQR) and mean absolute deviation (MAD) are measures of variability. Measures of variability describe the spread and clustering of data. • Different measures of center and variability best describe different data sets. • A box plot displays the distribution of numerical data values on a number line. • A frequency table or histogram organizes data values into equal intervals. • Many real-world problem situations can be represented with a mathematical model, but that model may not represent the situations	• How can the areas of certain shapes be found? • What are the meanings of surface area and volume, and how can surface area and volume be found? • How can data be described by a single number? • How can tables and graphs be used to represent data and to answer questions?

exactly.	

Instructional Focus

Learning Targets

● Use a formula to compute the areas of parallelograms and rhombuses. Find the base or height of a parallelogram or rhombus when the area and the height or base are known.

● Find the areas of triangles. Find the corresponding base or height of a triangle.

● Find the areas of trapezoids. Find the areas of kites.

● Find the areas of polygons by composing and decomposing shapes, including polygons on the coordinate plane.

● Classify solid figures.

● Identify solid figures from nets.

● Draw nets of solid figures.

● Find the surface areas of rectangular prisms, including cubes. Find the surface areas of triangular prisms.

● Find the surface areas of square pyramids and of triangular pyramids.

● Use cubes and a formula to find the volume of a rectangular prism or the volume of a cube with fractional edge lengths

● Identify statistical questions. Write statistical questions and display the collected data.

● Determine the mean, median, mode and range of a data set.

● Display data in a box plot. Interpret and analyze a box plot.

● Organize data into equal intervals and display data in a frequency table or histogram. Interpret and analyze a histogram.

● Calculate the interquartile range (IQR) and mean absolute variation (MAD) of a data set. Summarize data using measures of variability

. ● Select the most appropriate measure of center and measure of variability for a data set. Use measures of center and measures of variability to describe and compare data sets.

● Describe the center, spread and overall shape of a data set.

Summarize numerical data sets by using measures of center and related measures of variability.

Prerequisite Skills

- Multiply mixed numbers.
- Identify polygons, especially quadrilaterals, trapezoids, parallelograms, rectangles, rhombuses and squares.
- Classify two-dimensional figures into categories based on the figures' properties.
- Represent polygons on the coordinate plane.
- Apply the formula for the area of a rectangle to solve problems.
- Apply steps to solve multiplication and division equations Solve real-world and mathematical problems by writing and solving equations
- Find volumes of prisms with whole-number edge lengths by using unit cubes and formulas. Add, subtract, multiply and divide decimals, including dividing whole numbers and decimals.
- Solve real-world and mathematical problems by writing and solving equations.
- Use line plots to represent and interpret numerical data.
- Recognize and analyze quantitative relationships between dependent and independent variables.
- Add, subtract, multiply and divide decimals, including dividing whole numbers and decimals.
- Understand and represent rational numbers on the number line.

Common Misconceptions

- Confusing base and height
- formula memorization without conceptual understanding and choosing the wrong formula
- Substitution and evluation errors
- Computation errors that mask geometry knowledge
- Changing orientation of a shape may highlight lack of understanding of shapes/ formulas
- Failure to recognize that statistical questions should anticipate variability
- Data is viewed as a list of numbers and not a distribution
- Assuming there is one best measure of center
- view statitstical models as a graphing procedure and struggle use the display to interpret the data
- identifying measures of center as a procedural skill and not interpreting data through the lens of the statistical question and/or data collected

Spiraling For Mastery

Current Unit Content/Skills	Spiral Focus	Activity
• Area • Surface Area • Volume	• Area • Volume • Data Display	• Math Diagnostic and Intervention System (MDIS)

• Statistics & Probability		

Assessment

Formative Assessment	Summative Assessment
Homework • Lesson Checks • MathXL • Quizzes • Exit Tickets • Lesson Reflections • Performance Tasks	• Topic Tests (Common Assessments) • Unit 4 Benchmark (Link-It)

Resources

Key Resources	Supplemental Resources
• Savvas EnVision Math 6 • Pacing Guide	IXL Delta Math Desmos Khan Academy Manuevering the Middle

Career Readiness, Life Literacies, and Key Skills

9.4.8.CI.3	Examine challenges that may exist in the adoption of new ideas (e.g., 2.1.8.SSH, 6.1.8.CivicsPD.2).
9.4.8.GCA.2	Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.
9.4.8.IML.3	Create a digital visualization that effectively communicates a data set using formatting

	techniques such as form, position, size, color, movement, and spatial grouping (e.g., 6.SP.B.4, 7.SP.B.8b).

Interdisciplinary Connections

L.KL.6.2.A	Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases.
SL.PE.6.1.A	Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
SL.PE.6.1.C	Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.
SL.PE.6.1.D	Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
6-8.MS-ETS1-3.4.1	Analyze and interpret data to determine similarities and differences in findings.