Unit 7: Solve Area, Surface Area, and Volume Problems

Content Area: **Mathematics**
Course(s):
Time Period: **April**
Length: **4-5 weeks**
Status: **Published**

Essential Questions

- How can I find the area of parallelograms, triangles, trapezoids, and other polygons?
- How can I find the surface area of prisms and pyramids?
- How can I find the volume of prisms?

Enduring Understandings

- 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 = ½ bh, 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 or 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 is the sum of the area of its faces
- The surface area of a pyramid is the sum of the area of its faces
- Unit cubes or formulas can be used to find the volume of rectangular prisms and cubes.

Skills

Vocabulary :

Polygon

Parallelogram

Rhombus

Kite

Triangle

Base

Height

Edge

Face

Net

Solid

Polyhedron

Vertex

Area

Surface Area

Prism

Triangular Prism

Rectangular Prism

Pyramid

Learning Objectives

- 7-1: Find Areas of Parallelograms and Rhombuses
    - Use a formula to find the areas of parallelograms and rhombuses
    - Find the base or height of a parallelogram or rhombus when the area and the base or height are known.
- 7-2: Solve Triangle Area Problems
    - Find the area of triangles, including right triangles.
    - Find the corresponding base or height of a triangle.
- 7-3: Find Areas of Trapezoids and Kites
    - Find the areas of trapezoids and kites
- 7-4: Find Areas of Polygons
    - Find the areas of polygons by composing and decomposing shapes, including polygons on the coordinate plane.
- 7-5: Represent Solid Figures Using Nets
    - Classify solid figures
    - Identify solid figures from nets
    - Draw nets of solid figures
- 7-6: Find Surface Area of Prisms
    - Find the surface area of rectangular prisms, including cubes

- Find the surface area of triangular prisms

- 7-7: Find Surface Area of Pyramids
  - Find the surface area of square and triangular pyramids

- 7-8: Find Volume with Fractional Edge Length
  - Use cubes and a formula to find the volume of a rectangular prism or a cube with fractional edge lengths

Resources

- Lesson Resources
  - Student Edition
  - Additional Practice Workbook
  - Teaching Resources
    - Reteach to Build Understanding, Additional Vocabulary Support, Build Mathematical Literacy, Enrichment
  - Digital Lesson Courseware
    - Today's Challenge, Visual Learning Animation Plus, Key Concepts, Additional Examples, 3-Act Mathematical Modeling, Online Practice powered by MathXL for School, Virtual Nerd Video Tutorials, Animated Glossary, Digital Math Tools, Online Math Games

- Topic Resources
  - Student's Edition
    - Review What You Know, Build Literacy in Mathematics, Mid-Topic Checkpoint and Performance Task, Topic Review, Fluency Practice Activity, STEM Project
  - Digital Topic Support for Students
    - Math Practice Animations, STEM Project, 3-Act Mathematical Modeling Lesson

Standards for Mathematical Practice and Content

CCSS.Math.Practice.MP1	Make sense of problems and persevere in solving them.
CCSS.Math.Practice.MP2	Reason abstractly and quantitatively.
CCSS.Math.Practice.MP4	Model with mathematics.
CCSS.Math.Practice.MP5	Use appropriate tools strategically.
CCSS.Math.Practice.MP6	Attend to precision.

CCSS.Math.Practice.MP7	Look for and make use of structure.
CCSS.Math.Practice.MP8	Look for and express regularity in repeated reasoning.
MA.6.NS.C.6c	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.
MA.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.
MA.6.EE.A.2a	Write expressions that record operations with numbers and with letters standing for numbers.
MA.6.EE.A.2c	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).
MA.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.
MA.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.
MA.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.
MA.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.
MA.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.

Interdisciplinary Connections

NJSLS Companion Standards Grades 6-8

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

NJSLSA.W4. Produce clear and coherent writing in which the development, organization, and style are

appropriate to task, purpose, and audience.

Career Readiness, Life Literacies, & Key Skills (CLKS)

Career Readiness, Life Literacies, and Key Skills Practices describe the habits of the mind that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. These practices should be taught and reinforced in all content areas with increasingly higher levels of complexity and expectation as a student advances through a program of study.

Practices:

Act as a responsible and contributing community members and employee

Attend to financial well-being

Demonstrate creativity and innovation

Utilize critical thinking to make sense of problems and persevere in solving them

Model integrity, ethical leadership and effective management

Use technology to enhance productivity increase collaboration and communicate effectively

Work productively in teams while using cultural/global competence

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option

9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.

9.4.8.IML.2: Identify specific examples of distortion, exaggeration, or misrepresentation of information.

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). • 9.4.8.IML.4: Ask insightful questions to organize different types of data and create meaningful visualizations.

9.4.8.TL.3: Select appropriate tools to organize and present information digitally

Computer Science & Design Thinking (CS & DT)

Computing Systems

Troubleshooting a problem is more effective when knowledge of the specific device along with a systematic process is used to identify the source of a problem.

Data & Analysis

People use digital devices and tools to automate the collection, use, and transformation of data.

8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices.

8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.