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

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

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.

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?

Content

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 $V = lwh$ and $V = Bh$ 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.

21st Century Life and Careers

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP11. Use technology to enhance productivity.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

9.1.8.C.1 Compare and contrast credit cards and debit cards and the advantages and disadvantages of using each.

9.1.8.B.1 Distinguish among cash, check, credit card, and debit card.

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.

9.2.8.B.7 Evaluate the impact of online activities and social media on employer decisions.

Technology

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

8.1.8.D.1 Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.

8.2.8.C.1 Explain how different teams/groups can contribute to the overall design of a product.

8.2.8.C.8 Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.