Unit 09: Three-Dimensional Geometry

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **3 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

In this unit, students will build an understanding of what it means to find the surface area and volume of three-dimensional figures. They will develop strategies and formulas for finding the volume of rectangular prisms and the surface area of rectangular prisms, triangular prisms and square pyramids.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives:

- Use the base of a prism/pyramid to name the 3D figure
- Draw nets of a unit cube
- Find the volume and surface area of rectangular prisms
- Find the surface area of prisms & pyramids made up of rectangles and triangles

Essential Questions:

- How do I utilize given formulas to calculate surface area and volume?
- How can I determine the surface area of a prism from a net or a three-dimensional representation of the prism?
- What is the difference between the area of a two-dimensional figure and surface area of a prism?

Essential Understandings:

- Measurement of surface area and volume for solid figures is used in many practical, scientific and engineering problems.
- Volume and surface area can be found using a variety of strategies.
- How to solve practical problems using surface area and volume formulas.

CONTENT AREA STANDARDS

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.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.
MA.6.EE.A.2	Write, read, and evaluate expressions in which letters stand for numbers.
MA.6.EE.A.3	Apply the properties of operations to generate equivalent expressions.
MA.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).
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.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.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

CS.K-12.3	Recognizing and Defining Computational Problems
CS.K-12.3.a	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
CS.K-12.3.b	Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures.
CS.K-12.3.c	Evaluate whether it is appropriate and feasible to solve a problem computationally.
LA.K-12.NJSLSA.R10	Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.
LA.K-12.NJSLSA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

| WRK.K-12.P.4 | Demonstrate creativity and innovation. |
| WRK.K-12.P.5 | Utilize critical thinking to make sense of problems and persevere in solving them. |

STUDENT LEARNING TARGETS

Refer to the 'Declarative Knowledge' and 'Procedural Knowledge sections.

Declarative Knowledge

Students will understand that:

- Content-specific vocabulary: base, face, height, net, prism, oblique prism, pyramid, rectangular prism, surface area, unit cube, vertex, volume, width
- Volume can be found by filling a three- dimensional figure with unit cubes as well as applying a formula.
- A net is a two-dimensional representation of a three-dimensional figure.
- How to recognize nets of three-dimensional figures.

Procedural Knowledge

Students will be able to:

- Apply formulas to find the volume of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
- Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of appropriate unit fractional edge lengths.
- Use nets made up of rectangles and triangles to find the surface area of three-dimensional figures.
- Represent three-dimensional figures using nets made up of rectangles and triangles.
- Apply techniques using nets in the context of solving real-world or mathematical problems.

EVIDENCE OF LEARNING

Refer to the 'Formative Assessments' and 'Summative Assessments' sections.

Formative Assessments

- Observations

- Classwork
- Homework Assignments
- Do Now Questions
- Exit Tickets
- Self Assessment Questions
- Proficiency Scale

Summative Assessments

- Quizzes

- Unit Assessments

- Graded Assignments

- Projects

RESOURCES (Instructional, Supplemental, Intervention Materials)

- *CMP3 Covering & Surrounding (Investigation 4)*
- [Savvas Realize](#) (teacher and student resources)
- Additional Resources linked [HERE](#)
- Math 6 Enriched Covering & Surrounding folder linked [HERE](#)
- [Khan Academy](#)
- [Delta Math](#)
- Illustrative Math Performance Tasks:

  - [6.G.A.2 Computing Volume Progression 1](#)

  - [6.G.A.2 Computing Volume Progression 2](#)

  - [6.G.A.2 Computing Volume Progression 4](#)

  - [6.G.A.2 Banana Bread](#)

  - [6.G.A.2 Computing Volume Progression 2](#)

- [IXL - Recommended](#) Skills Practice
  - FF.18 Volume of Cubes and Rectangular Prisms
  - FF.19 Volume of Cubes and Rectangular Prisms with Fractional Side Lengths
  - FF.20 Volume of Cubes and Rectangular Prisms: Word Problems
  - FF.21 Surface Area of Cubes and Rectangular Prisms
  - FF.23 Surface Area of Triangular Prisms

INTERDISCIPLINARY CONNECTIONS

- Computations
- Financial/Economic/Business/Entrepreneurial Literacy

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.