Unit 1: Using Measurement Tools with Area, Perimeter, Surface Area and Volume

Content Area: **Mathematics**
Course(s): **Math 3, Math 4, Math 5, Math 6**
Time Period: **September**
Length: **4 weeks**
Status: **Published**

Unit Summary

The goal for this unit is to develop students' understanding of the connections between geometry and measurements, and its applications to real life problem solving. Students will use their prior knowledge of geometric shapes to solve computational and real world problems involving area of two-dimensional shapes. Students will calculate the perimeter, area volume and surface area of rectangular and triangular prisms. Students will determine the area of irregular polygons by decomposing them into rectangles and or triangles.

This unit will be taught in two separate sections. September-October students will work on using various measurement tools (cross-curricular connection with science). To work on this students will explore perimeter, area, and volume concepts. During this time, students will work on adding and subtracting mixed numbers and fractions with unlike denominators. Then in January, students will work on determining surface area.

Standards

MA.5.NF.B.4b	Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.
MA.4.MD.A	Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.
MA.4.MD.A.1	Know relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table.
MA.4.MD.A.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
MA.5.MD.C	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.
MA.4.MD.A.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems.
MA.5.MD.C.5a	Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.
MA.6.G.A	Solve real-world and mathematical problems involving area, surface area, and volume.
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.
PFL.9.1.8.A.5	Relate how the demand for certain skills determines an individual's earning power.
PFL.9.1.8.E.3	Compare and contrast product facts versus advertising claims.
PFL.9.1.8.E.6	Compare the value of goods or services from different sellers when purchasing large quantities and small quantities.
PFL.9.1.8.E.8	Recognize the techniques and effects of deceptive advertising.
CAEP.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.
CAEP.9.2.8.B.4	Evaluate how traditional and nontraditional careers have evolved regionally, nationally, and globally.
CAEP.9.2.8.B.7	Evaluate the impact of online activities and social media on employer decisions.
TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.8.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.A.2	Create a document (e.g., newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
TECH.8.1.8.A.CS1	Understand and use technology systems.
TECH.8.1.8.A.CS2	Select and use applications effectively and productively.
TECH.8.1.8.C	Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
TECH.8.1.8.C.1	Collaborate to develop and publish work that provides perspectives on a global problem for discussions with learners from other countries.
TECH.8.1.8.C.CS1	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.
TECH.8.1.8.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.8.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.1.8.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.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.
TECH.8.1.8.D.5	Understand appropriate uses for social media and the negative consequences of misuse.
TECH.8.1.8.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.
TECH.8.1.8.D.CS2	Demonstrate personal responsibility for lifelong learning.
TECH.8.1.8.D.CS3	Exhibit leadership for digital citizenship.
TECH.8.1.8.F	Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
TECH.8.1.8.F.1	Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

TECH.8.1.8.F.CS1	Identify and define authentic problems and significant questions for investigation.
TECH.8.1.8.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.8.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.

Student Learning Objectives

- Students will learn the difference between metric and standard units.
- Students will learn how to properly use measuring tools.
- Students will learn the process for calculating the perimeter and area of regular and irregular polygons.
- Students will learn the process for calculating the volume and surface area of a three dimensional figure.

Essential Questions

- What are the differences among perimeter, area, volume, and surface area?
- When do you use formulas to solve problems?
- What is dimension?
- How can the inside of a two dimensional figure be measured?
- How can the surcase area and volume of a three dimensional figure be measured?
- How does measurement of two dimensional figures connect with the measurement of three dimensional figures?

Enduring Understandings

- The students will understand that a dimension is a measure of length, width, or height of a figure.
- The students will understand that the perimeter of a two-dimensional figure can be measured by determining the units around a two-dimensional figure.
- The students will understand that area of a two-dimensional figure can be measured by determining the square units that cover the inside of the figure.
- The students will understand that surface area of three-dimensional figures is found by finding the number of square units of all its sides.
- The students will understand that the volume of a three-dimensional figure is found by determining the number of cubic units that fill the space.

Skills

The students will be skilled at...

- Properly lining up a ruler and reading it to the nearest 1/4 unit (standard) or to the nearest centimeter with decimal (4.5 cm).
- Utilizing rulers to measure dimensions of figures and calculate the perimeter, area, volume, and surface area.
- Differentiating between area, perimeter, volume, and surface area
- Utilizing formulas to calculate perimeter, area, volume, and surface area of two and three-dimensional figures.
- Calculating the perimeter of regular and irregular polygons.
- Adding decimals, mixed numbers and fractions with unlike denominators when calculating perimeter. (keep decimals and fractions separate)
- Calculating the area of a regular quadrilateral.
- Utilizing the formula for calculating the area of a triangle. (work with whole numbers, decimals with a calculator)

- Categorizing squares, rectangles, triangles, parallelograms, cubes, prisms, and pyramids.
- Decomposing an irregular/compound figures to determine the area.
- Utilizing a triple beam balance to determine the mass of an object.
- Measuring liquid volume to the nearest whole unit in both metric and standard units.
- Utilizing the formula for determining linear volume. (work with whole numbers)
- Utilizing a net to determine the surface area of prism or pyramid.
- Utilizing area concepts when deconstructing a rectangular prism and pyramid to determine surface area. (work with whole numbers)