Advanced Math Unit 3: Geometry, Volume, and Measurement

Content Area: **Mathematics**
Course(s): **Mathematics 5**
Time Period: **February**
Length: **12 weeks- 60 Instructional Days**
Status: **Published**

Unit Overview

Students will graph points on the coordinate plane to solve real-world and mathematical problems. Students will analyze patterns and relationships through ratio tables, and these patterns will be displayed in a line graph. Conversions of like measurement units within a given system will also be explored. Students will classify polygons into categories based on their properties. Classification of three-dimensional figures and volume of rectangular prisms will also be explored. Getting Ready lessons will cover concepts of sixth grade. This unit will be covered in 12 weeks.

Priority Standards

MATH.5.OA.B.3	Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.
MATH.6.NS.B.4	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.
MATH.6.NS.C.7.a	Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.
MATH.6.NS.C.7.b	Write, interpret, and explain statements of order for rational numbers in real-world contexts.
MATH.6.EE.A	Apply and extend previous understandings of arithmetic to algebraic expressions
MATH.6.EE.A.1	Write and evaluate numerical expressions involving whole-number exponents.
MATH.6.EE.A.2	Write, read, and evaluate expressions in which letters stand for numbers.
MATH.6.EE.A.2.a	Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as $5 - y$.
MATH.6.EE.A.2.b	Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.
MATH.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).
MATH.5.M.A	Convert like measurement units within a given measurement system
	For example, use the formulas $V = 6s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = 1/2$.
MATH.5.M.A.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
MATH.6.EE.A.3	Apply the properties of operations to generate equivalent expressions.
MATH.5.M.B	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition
MATH.5.M.B.2	Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
MATH.5.M.B.2.a	A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.
MATH.5.M.B.2.b	A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
MATH.5.M.B.3	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and non-standard units.
MATH.5.M.B.4	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
MATH.5.M.B.4.a	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.
MATH.5.M.B.4.b	Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.
MATH.5.M.B.4.c	Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.
MATH.5.G.A	Graph points on the coordinate plane to solve real-world and mathematical problems
MATH.5.G.A.2	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
MATH.5.G.B	Classify two-dimensional figures into categories based on their properties
MATH.5.G.B.3	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.
MATH.5.G.B.4	Classify two-dimensional figures in a hierarchy based on properties.

Unit Learning Goals & Targets

CCS Priority Standards

MA.5.5.G.A Graph points on the coordinate plane to solve real-world and mathematical problems.

MA.5.5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines, ca located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the direction of the second axis (x-axis x coordinate and y-axis y coordinate).

MA.5.5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and int

MA.5.5.G.B Classify two-dimensional figures into categories based on their properties.

MA.5.5.G.B.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that cat

MA.5.5.G.B.4 Classify two-dimensional figures in a hierarchy based on properties.

MA.5.5.MD.A Convert like measurement units within a given measurement system.

MA.5.5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (eg., convert 5 cm. to

MA.5.5.MD.B Represent and interpret data.

MA.5.5.MD.B.2 Make a line plot to represent a data set in measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractio

MA.5.5.MD.C Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

MA.5.5.MD.C.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

MA.5.5.MD.C.3a A cube with side length 1 unit, "called a unit cube," is said to have "one cubic unit" of volume, and can be used to m

MA.5.5.MD.C.3b A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic u

MA.5.5.MD.C.4 Measure volumes by counting unit cubes using cubic cm., cubic in., cubic ft., and non-standard units.

MA.5.5.MD.C.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involv

MA.5.5.MD.C.5a Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volume

MA.5.5.MD.C.5b Apply the formulas $V = l \times w \times h$ and $V = B \times h$ for rectangular prisms to find volumes of right rectangular prisms w problems.

MA.5.5.MD.C.5c Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular pris real world problems.

MA.5.5.OA.B.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. F the ordered pairs on a coordinate plane.

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.

6.NS.B.4 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

6.EE.A.2a Write expressions that record operations with numbers and with letters standing for numbers.

6.EE.A.2b Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coeffi cient); view one or mo

6.EE.A.2c Evaluate expressions at specifi c values of their variables. Include expressions that arise from formula those involving whole-number exponents, in the conventional order when there are no parentheses to specify a pa

Essential Questions

- How can a line plot help you find an average with data given in fractions?
- How can you apply the properties of operations to generate equivalent expressions?
- How can you identify when two expressions are equivalent ?
- How can you classify and compare quadrilaterals?
- How can you classify triangles?
- How can you compare and convert customary units of capacity?
- How can you compare and convert customary units of length?
- How can you compare and convert customary units of weight?
- How can you compare and convert metric units?
- How can you find the volume of a rectangular prism?
- How can you find the volume of rectangular prisms that are combined?
- How can you identify a relationship between two numerical patterns?
- How can you identify and classify polygons?
- How can you identify and plot points on a coordinate grid?
- How can you identify, describe, and classify three-dimensional figures?
- How can you solve elapsed time problems by converting units of time?
- How can you solve multistep problems that include measurement conversions?
- How can you use a coordinate grid to display data collected in an experiment?
- How can you use a formula to find the volume of a rectangular prism?
- How can you use a line graph to display and analyze real-world data?
- How can you use an everyday object to estimate the volume of a rectangular prism?

- How can you use the strategy "act it out" to approximate whether the sides of a figure are congruent?
- How can you use the strategy "make a table" to compare different rectangular prisms with the same volume?
- How can you use the strategy "make a table" to help you solve problems about customary and metric conversions?
- How can you use the strategy "solve a simpler problem" to help you solve a problem with patterns?
- How can you use unit cubes to find the volume of a rectangular prism?
- How can you write and graph ordered pairs on a coordinate grid using two numerical patterns?
- What is a unit cube, and how can you use it to build a solid figure?

Materials and Resources

- Assessment Guide
- LinkIt! Standards Assessments
- Think Central Access

Unit Assessments (Required)

- Big Ideas Grade 5 and 6 Assessments
- I ready

Strategies for Multilingual learners

For Spanish speaking, students can use the EdConnect Spanish book. Others need one on one support, vocabulary flashcards, elimination of word problems, picture clues, Google Translate, peer buddy ELL

- Big Ideas Spanish edition
- Big Ideas Spanish letters
- Multilingual Dictionary

Strategies for Enrichment

Big ideas Enrichment and Extension Pages	G&T
Big Ideas Differentiating the lesson Pages	G&T

- Big Ideas Enrichment and extension Pages
- Desmos
- Iready pathway
- Kahn Academy

Technology Integration

Math Playground	http://www.mathplayground.com/grade_5_games.html
Khan Academy	http://www.khanacademy.org/math/cc-fifth-grade-math
Illustrative Mathematics	http://www.illustrativemathematics.org
Prodigy	http://www.prodigygame.com
Learn Zillion	http://www.learnzillion.com
aamath	http://www.aaamath.com/grade5.html
Math is Fun	https://www.mathsisfun.com/
Sheppard Software	http://www.sheppardsoftware.com/math.htm
Adapted Mind	http://adaptedmind.com
Internet 4 Classrooms	http://internet4classrooms.com
Academic Skill Builders	http://arcademicskillbuilders.com
Math Play	http://www.math-play.com
Class K-12	https://www.classk12.com
Freckle Education	https://www.freckle.com
Woot Math	https://ed.wootmath.com/adaptive-learning
Greg Tang Math	https://gregtangmath.com
Figure This	figurethis.nctm.org/challenges/math_index.htm
Math Games	https://www.mathgames.com/algebra

- 8.1.5.A.1 Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
- 8.1.5.A.3 Use a graphic organizer to organize information about problem or issue.
- 8.1.5.A.4 Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.
- 8.1.5.A.5 Create and use a database to answer basic questions.
- 8.1.5.A.6 Export data from a database into a spreadsheet; analyze and produce a report that explains the analysis of the data.

Cross Curricular Connections

- • Next Gen Science Standards (5. Earth's Systems Unit have connections to 5.G.2)
- • Next Gen Science Standards (5. Matter and Energy in Organisms and Ecosystems Unit have connections to 5.MD.A.1)
- • Next Gen Science Standards (5. Space Systems: Stars and the Solar System Unit have connections to 5.NBT.A.2 and 5.G.A.2)
- • Next Gen Science Standards (5. Structure and Properties of Matter Unit have connections to

5.NBT.A.1; 5.NF.B.7; 5.MD.A.1; 5.MD.C.3; 5.MD.C.4)

21st Century Life & Career Ready Practices

- CRP11. Use technology to enhance productivity.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.