



Marietta City Schools

District Unit Planner

Everything on the unit planner must be included on the unit curriculum approval statement.

Grade 8 Mathematics

Unit title	Unit 3: Geometric Applications of Exponents	MYP year	3	Unit duration (hrs)	20 Hours
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Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GSE Standards

Standards

Understand and apply the Pythagorean Theorem.

MGSE8.G.6 Explain a proof of the Pythagorean Theorem and its converse.

MGSE8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

MGSE8.G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

MGSE8.G.9 Apply the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Work with radicals and integer exponents.

MGSE8.EE.2 Use square root and cube root symbols to represent solutions to equations. Recognize that $x^2 = p$ (where p is a positive rational number and $|x| < 25$) has 2 solutions and $x^3 = p$ (where p is a negative or positive rational number and $|x| < 10$) has one solution. Evaluate square roots of perfect squares < 625 and cube roots of perfect cubes > -1000 and < 1000 .

Concepts/Skills to be Mastered by Students

- Distinguish between rational and irrational numbers.
- Find or estimate the square and cubed root of non-negative numbers, including 0.
- Interpret square and cubed roots as both points of a line segment and lengths on a number line.
- Use the properties of real numbers (commutative, associative, distributive, inverse, and identity) and the order of operations to simplify and evaluate numeric and algebraic expressions involving integer exponents, square and cubed roots.
- Work with radical expressions and approximate them as rational numbers.

- Solve problems involving the volume of a cylinder, cone, and sphere.
- Determine the relationship between the hypotenuse and legs of a right triangle.
- Use deductive reasoning to prove the Pythagorean Theorem and its converse.
- Apply the Pythagorean Theorem to determine unknown side lengths in right triangles.
- Determine if a triangle is a right triangle, Pythagorean triple.
- Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
- Solve problems involving the Pythagorean Theorem.

Vocabulary

- **Altitude of a Triangle** - The altitude of a triangle is the height of the triangle. It forms a right triangle with the base.
- **Base (of a Polygon)** - A base is a side or face of a polygon that is perpendicular to the height. It is considered the bottom of the figure.
- **Coordinate Plane** - A coordinate plane is a 2-dimensional plane formed by the intersection of a vertical line (y-axis) and horizontal line (x-axis). These perpendicular lines intersect at (0, 0), or the origin.
- **Coordinate Point of a Plane** - A point on a coordinate plane is named by its ordered pair in the form of (x, y).
- **Cone** - A cone is a 3-dimensional figure with a flat base and curved surface.
- **Converse of Pythagorean Theorem** - The Converse of the Pythagorean Theorem states that if the square of the length of the longest side of a triangle equals the sum of the squares of the other 2 sides, then the triangle is a right triangle.
- **Cube Root** - The cube root of a number is the factor that is multiplied 3 times to get that number.
- **Cylinder** - A cylinder is a 3-dimensional shape that has 2 circular bases and a curved surface.
- **Diameter** - Diameter is the distance from one point on a circle through the center to another point on the circle.
- **Geometric Solid** - A geometric solid is a 3-dimensional figure made up of polygons.
- **Hypotenuse** - The hypotenuse is the longest side of a right triangle. It is opposite from the right angle.
- **Leg of a Triangle** - The leg of a triangle is one of the sides of a triangle that is not the hypotenuse.
- **Literal Equation** - A literal equation is an equation consisting primarily of variables (letters).
- **Perfect Squares** - A perfect square is the product of an integer and itself.
- **Perfect Cubes** - A perfect cube is the product of an integer multiplied by itself 3 times.
- **Pythagorean Theorem** - The Pythagorean Theorem states that the sum of the squares of the legs of a right triangle equals the square of the hypotenuse. The theorem is represented by the formula $a^2 + b^2 = c^2$.
- **Pythagorean Triples** - Pythagorean Triples are a set of three integers that satisfy the Pythagorean Theorem.
- **Sphere** - A sphere is a 3-dimensional figure shaped like a ball.
- **Square Root** - The square root of a number is the factor that is multiplied by itself twice to get that number.

Key concept	Related concept(s)	Global context
Relationships	Measurement and Space	Orientation in space and time

Statement of inquiry		
People can explore relationships through measurement.		
Inquiry questions		
<p>Factual—What is the volume? What is the Pythagorean Theorem?</p> <p>Conceptual— How has the discovery of the Pythagorean Theorem shaped the world in which we live? What does it mean to cube or square a number? Why is the square root of 2 irrational?</p> <p>Debatable— Can the Pythagorean Theorem be applied to any polygon? Explain</p>		
MYP Objectives	Assessment Tasks	
<i>What specific MYP objectives will be addressed during this unit?</i>	<i>Relationship between summative assessment task(s) and statement of inquiry:</i>	<i>List of common formative and summative assessments.</i>
Criterion A: Knowledge and Understanding	Students will explore relationships through measurement.	<p><u>Formative Assessment(s):</u></p> <p>Unit 3 CFA</p> <p><u>Summative Assessment(s):</u></p> <p>Unit 3: Geometric Applications of Exponents MYP: Pythagorean Theorem Choice Board</p>
Approaches to learning (ATL)		
Give and receive meaningful feedback.		
Draw reasonable conclusions and generalizations.		

Category:
Cluster:
Skill Indicator:

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
<p>MGSE8.G.6 Explain a proof of the Pythagorean Theorem and its converse.</p>	<p>Pythagorean Theorem He Said She Said activity</p>	<p>This activity is designed to engage students as they apply their knowledge of Pythagorean Theorem. This is an error analysis activity in which students will work in collaborative partnerships or small groups in order to communicate using appropriate math vocabulary.</p>
<p>MGSE8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.</p>	<p>Desmos Taco Truck Activity - https://teacher.desmos.com/activitybuilder/custom/5d23bd86cbc7a96547fb27ca?collection_s=featured-collections%2C5e6fe60ba5ff3e0aca46ba6a</p>	<p>While completing this activity, students will apply their knowledge of Pythagorean Theorem to solve real-world problems in order to find the distance between 2 locations. Students will use reasoning skills to make daily life decisions, such as taking short cuts, and determining the best path to get from one location to another.</p>
<p>MGSE8.G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.</p>	<p>Pythagorean Theorem Distances New York Monuments Map Activity or Pythagorean Theorem London Distances on a Coordinate Plane Activity</p>	<p>Both learning experiences provide an opportunity for interdisciplinary learning. Students will be able to see how the coordinate plane is used on maps. With both activities, students will use their understanding of finding distance on a coordinate plane using Pythagorean</p>

		Theorem.
MGSE8.G.9 Apply the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	Volume Of Cylinders, Cones, and Spheres Discovery Lab	This activity is designed for students to complete before the instruction of volume. Students will be given the opportunity to make observations of the formulas and draw conclusions after completing a trial. It is best that students work in groups in order to discuss and collaborate. In this way, productive struggle takes place so that conclusions can be made.
MGSE8.EE.2 Use square root and cube root symbols to represent solutions to equations. Recognize that $x^2 = p$ (where p is a positive rational number and $ x < 25$) has 2 solutions and $x^3 = p$ (where p is a negative or positive rational number and $ x < 10$) has one solution. Evaluate square roots of perfect squares < 625 and cube roots of perfect cubes > -1000 and < 1000 .	Savvas Lesson 7-3 Practice and Problem Solving	The use of square root and cube root symbols and equations are actually embedded in learning experiences throughout the unit. This Savvas activity is one that enables students to set up equations and solve using square and cube roots. The beginning of the assignment provides support for students who struggle with setting up the equations before having them work to set them up independently.
Content Resources		