

Unit 4: Geometry

Content Area: **Mathematics**
Course(s): **Accelerated Math 7**
Time Period: **3rd Marking Period**
Length: **10 weeks**
Status: **Published**

Unit Overview

In this unit, students will use the coordinate plane to explore how figures transform using specific transformations such as reflection, rotation, and translation. Students will explore 2D and 3D geometry including calculation of area and volume.

Transfer

Students will be able to independently use their learning to ...

- Perform transformations on a plane and on a coordinate grid.
- Construct the image of a rigid transformation when given a pre-image and a line of reflection, angle of rotation or vector for translation.
- Analyze the transformation(s) that produced a given image from its pre-image.
- Write the rule in coordinate notation that maps a pre-image onto its image.
- Calculate angle measures formed from parallel lines and transversals
- Define and understand similarity and congruence.
- Find area and volume of figures

Meaning

Understandings

Students will understand that. . .

- Figures can be reflected, rotated, translated or moved by a sequence of transformations.
- Rigid transformations maintain angle measure, side length and parallel lines.

- As transformations are performed, the coordinates of vertices will change.
- There are congruent and supplementary relationships for angles formed by parallel lines and transversals
- The area for 2D and volume of 3D figures can be calculated using specific formulas

Essential Questions

Students will keep considering...

- Chapter 10:
 - In what ways can angles be classified and compared?

- Chapter 11:
 - How can you determine congruence?
 - How do transformations affect a figures placement on the coordinate plane?

- Chapter 12:
 - How can you determine similarity?
 - How can you use and apply the Triangle Sum Theorem?

- Chapter 13:
 - How do you find area, surface area and volume of figures such as circles, composite shapes, cubes, rectangular & triangular prisms and composite 3D figures?
 - How are two-dimensional figures used to solve problems involving three dimensional figures?

- Chapter 14:
 - How do you find and compare the volume of 3D figures such as cylinders, cones, pyramids and spheres?

- Chapter 15
 - How can you apply the Pythagorean Theorem to solve real world problems?

Application of Knowledge and Skill

Students will know...

Students will know...

- How to classify special angle pairs.
- Identify and describe plane sections of given figures and analyze the cross-sections formed.
- After performing certain transformations, the order of the x & y coordinates may be reversed and the sign may be the opposite.
- For congruent figures, angle measures are congruent, side lengths are congruent, parallel lines remain parallel.
- For similar figures, angle measures are congruent, side lengths are proportional, parallel lines remain parallel.
- Figures can be moved on the coordinate plane by adding and subtracting values from the x and y coordinates of the pre-image.
- Hop to properly apply the Pythagorean Theorem in order to solve real world problems.

Students will be skilled at...

Students will be skilled at...

- Identifying Special Angle Pairs
- Triangle Construction
- Using a set of criteria to create Unique Triangles
- Cross Sections of Prisms
- Cross Sections of Pyramids
- Cross Sections on an Angle
- Properties of Translations
- Properties of Reflections
- Properties of Rotations
- Defining Congruence
- Translations on the Coordinate Plane
- Reflections on the Coordinate Plane
- Rotations on the Coordinate Plane
- Angles and Parallel Lines
- Angles & Triangles
- Solving for Missing Angles in Parallel Lines and Triangles
- Defining Similarity
- Angle-Angle Similarity
- Fundamental Theorem of Similarity
- Area and Perimeter of Scale Drawings
- Area and Circumference of Circles
- Solving Problems involving Circles
- Area and Perimeter of Composite Shapes

- Surface Area of Cubes and Rectangular Prisms
- Surface Area of Triangular Prisms
- Surface Area of Composite 3D Solids
- Surface Area of Pyramids
- Volume of Cubes and Prisms
- Volume of Triangular Prisms
- Volume of Composite 3D Solids
- Volume of Cylinders
- Volume of Cones
- Volume of Pyramids
- Volume of Spheres

Academic Vocabulary

acute angle	acute triangle	adjacent angles	alternate exterior angles
alternate interior angles	base	center	center of rotation
circle	circumference	complementary angles	composite figure
composite solids	cone	congruent	congruent segments
converse	coordinate system	coplanar	corresponding angles
corresponding parts	cross section	cube root	cylinder
deductive reasoning	diagonal	diameter	dimension
distance	distance formula	edge	equilateral triangle
exponent	exterior angles	face	formula
height	hemisphere	hypotenuse	image / pre-image
indirect measurement	inductive reasoning	interior angles	Irrational number
isosceles triangle	lateral area	lateral face	lateral surface area
legs of a triangle	length	line of reflection	obtuse angle
obtuse triangle	parallel lines	perfect cube	perfect square
perpendicular lines	π / in terms of π	plane	point
polyhedron	prism	proof	pyramid
Pythagorean theorem	Pythagorean triple	radical	radius
Rational number	reflection	regular pyramid	right angle
right triangle	rotation	scale	scale drawing
scale factor	scale model	scalene triangle	semicircle
similar	similar polygons	similar solids	skew line
slant height	sphere	square root	straight angle
supplementary angles	surface area	total surface area	transformation
translation	transversal	triangle	vertex
volume			

Learning Goal 1

Draw, construct, and describe geometrical figures and describe the relationships between them.

Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Target #1.1 -- DOK: 2 Skill/Concept

SWBAT: Classify angles and identify vertical angles, adjacent angles, and pairs of complementary and supplementary angles.

MA.7.G.B.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
MA.7.EE.B.4a	Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
MA.K-12.1	Make sense of problems and persevere in solving them.
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.

Target #1.2 -- DOK: 2 Skill/Concept

SWBAT: Classify angles and identify vertical angles, adjacent angles, and pairs of complementary and supplementary angles.

MA.7.G.A.2	Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
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-12.7	Look for and make use of structure.

Target #1.3 -- DOK: 3 Strategic Thinking

SWBAT: Determine when a set of criteria will produce a unique triangle.

MA.7.G.A.2	Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.7	Look for and make use of structure.

Target #1.4 -- DOK: 2 Skill/Concept

SWBAT: Identify and describe parallel and perpendicular cross sections of a given prism.

MA.7.G.A.3	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
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-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.

Target #1.5 -- DOK: 2 Skill/Concept

SWBAT: Identify and describe parallel and perpendicular cross sections of a given pyramid.

MA.7.G.A.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
MA.7.G.A.3	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
MA.K-12.1	Make sense of problems and persevere in solving them.
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.

Target #1.6 -- DOK: 2 Skill/Concept

SWBAT: Identify and describe cross sections formed by slicing a given prism or pyramid on an angle.

MA.7.G.A.3	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.7	Look for and make use of structure.

Learning Goal 2

Understand congruence and similarity using physical models, transparencies or geometry software.

Target #2.1 -- DOK: 2 Skill/Concept

SWBAT: Verify that rigid transformations do not affect side lengths.

MA.8.G.A.1a	Lines are transformed to lines, and line segments to line segments of the same length.
MA.8.G.A.1b	Angles are transformed to angles of the same measure.
MA.8.G.A.1c	Parallel lines are transformed to parallel lines.
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-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.

Target #2.2 -- DOK: 3 Strategic Thinking

SWBAT: Understand that rigid transformations produce congruent figures.

MA.8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations:
MA.8.G.A.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.

MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.

Target #2.3 -- DOK: 3 Strategic Thinking

SWBAT: Perform translations on the coordinate plane then identify coordinated of the image and per-image and find side lengths.

MA.8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations:
MA.8.G.A.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
MA.8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
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.

Target #2.4 -- DOK: 3 Strategic Thinking

SWBAT: Use properties to identify and classity types of angles and lines (corresponding, alternate interior, alternate extreior, tranversals).

MA.8.G.A.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.

Target #2.5 -- DOK: 2 Skill/Concept

SWBAT: Explore the relationship among the angles of a triangle.

MA.8.G.A.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
MA.8.EE.A.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

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.

Target #2.6 -- DOK 2 Skill/Concept

SWBAT: Find the missing angles measures in triangles.

MA.8.G.A.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
MA.8.EE.A.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.

Target #2.7 -- DOK: 2 Skill/Concept

SWBAT: Find the sum of the angle measures of a polygon and the measure of one interior angle of a regular polygon.

MA.8.G.A.4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.

Learning Goal 3

Find area and surface area of given shapes and solve real world problems related to surface area.

Target #3.1 -- DOK: 2 Skill/Concept

SWBAT: Solve problems involving scale drawings.

MA.7.G.A.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.7	Look for and make use of structure.

Target #3.2 -- DOK: 2 Skill/Concept

SWBAT: Find the area and circumference of circles.

MA.7.G.B.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
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-12.7	Look for and make use of structure.

Target #3.3 -- DOK: 3 Strategic Thinking

SWBAT: Solve real-world problems involving the area and circumference of circles.

MA.7.G.B.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.7	Look for and make use of structure.

Target #3.4 -- DOK 2 Skill/Concept

SWBAT: Find the area and perimeter of composite figures.

MA.7.G.B.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.7	Look for and make use of structure.

Target #3.5 -- DOK: 2 Skill/Concept

SWBAT: Find the surface area of cubes and rectangular prisms.

MA.7.G.B.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
MA.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
MA.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

Target #3.6 -- DOK: 2 Skill/Concept

SWBAT: Find the surface areas of triangular prisms.

MA.7.G.B.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
MA.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
MA.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

Target #3.7 -- DOK: 2 Skill/Concept

SWBAT: Find the surface area of 3D composite solids.

MA.7.G.B.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
MA.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
MA.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

Learning Goal 4

Calculate the volume of given figures and solve real world problems.

Target #4.1 -- DOK: 2 Skill/Concept

SWBAT: Find the volume of cubes and prisms.

MA.7.G.B.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
MA.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
MA.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
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-12.6	Attend to precision.

Target #4.2 -- DOK: 2 Skill/Concept

SWBAT: Find the volume of triangular prisms.

MA.7.G.B.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
MA.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
MA.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

Target #4.3 -- DOK: 2 Skill/Concept

SWBAT: Find the volume of a composite 3D solids.

MA.7.G.B.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
MA.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
MA.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
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.

Target #4.4 -- DOK: 2 Skill/Concept

SWBAT: Find the volume of cylinders.

MA.8.G.C.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
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.

Target #4.5 -- DOK: 2 Skill/Concept

SWBAT: Find the volume of cones.

MA.8.G.C.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
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.

Target #4.6 -- DOK: 2 Skill/Concept

SWBAT: Find the volume pyramids.

MA.8.G.C.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
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.

Target #4.7 -- DOK: 2 Skill/Concept

SWBAT: Find the volume of spheres.

MA.8.G.C.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
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.

Learning Goal 5

Prove, apply and solve real world problems using the Pythagorean Theorem.

Target #5.1 -- DOK: 2 Skill/Concept

SWBAT: Understand the special relationship between the legs and hypotenuse of right triangles.

MA.8.G.B.6	Explain a proof of the Pythagorean Theorem and its converse.
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-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.

Target # 5.2 -- DOK: 3 Strategic Thinking

SWBAT: Prove that the Pythagorean Theorem holds true for all right triangles.

MA.8.G.B.6	Explain a proof of the Pythagorean Theorem and its converse.
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-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.

Target # 5.3 -- DOK: 3 Strategic Thinking

SWBAT: Prove the converse of the Pythagorean Theorem and identify right triangles given side lengths.

MA.8.G.B.6	Explain a proof of the Pythagorean Theorem and its converse.
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-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.

Target # 5.4 -- DOK: 3 Strategic Thinking

SWBAT: Solve problems using the Pythagorean Theorem.

MA.8.G.B.6	Explain a proof of the Pythagorean Theorem and its converse.
MA.8.G.B.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
MA.8.EE.A.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
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-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.

Target #5.5 -- DOK: 3 Strategic Thinking

SWBAT: Find the distance between two points on the coordinate plane.

MA.8.G.B.6	Explain a proof of the Pythagorean Theorem and its converse.
MA.8.G.B.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
MA.8.G.B.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
MA.8.EE.A.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
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-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.

Formative Assessment and Performance Opportunities

- Exit/Admit ticket
- Journal
- Kahoot
- Small group instruction
- Student-Teacher conference
- Think-Pair-Share

- Whiteboard Activities

Summative Assessment

- LinkIt!
- Project
- Quiz
- Test

21st Century Life and Careers

See 21st Century Career activities in chapter.

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP7.1	Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP9.1	Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP10.1	Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
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.6	Demonstrate understanding of the necessary preparation and legal requirements to enter the workforce.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
TECH.8.1.8.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.1.8.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.8.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.8.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.8.D.CS2	Demonstrate personal responsibility for lifelong learning.
TECH.8.1.8.E	Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
TECH.8.1.8.E.CS1	Plan strategies to guide inquiry.
TECH.8.1.8.F.CS1	Identify and define authentic problems and significant questions for investigation.

Accommodations & Modifications

- Adaptive Practice (cK-12 modality)
- Calculators

- Centers
- Document Cameras
- Geo-Solids
- Graphing Calculators
- Lesson Extensions
- Manipulatives
- Modifications as per IEP/504
- Pattern Blocks
- PLIX (cK-12 modality)
- Review and Practice
- Small Group Instruction

Unit Resources

See also *Unit 4: Geometry* Folder in Curriculum Portal

<http://learnzillion.com/>

<https://www.khanacademy.org/>

<http://illuminations.nctm.org/LessonsList.aspx?grade=3&standard=all>

- cK-12.org
- NJCTL - New Jersey Center for Teaching & Learning
- NJSLA released items
- NJSLS
- OpenUp resources

Interdisciplinary Connections

Have students design a net for a box (or another shape) in which to ship a specific item. Have students consider factors such as volume needed and minimizing surface area (material) to protect the environment and minimize waste.

SCI.MS-ESS3-3

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.