

Understand congruence and similarity using physical models, transparencies, or geometry software (8.G.1-5)	
<p><b>Standard 8.G.1:</b> Verify experimentally the properties of rotations, reflections, and translations:</p> <ul style="list-style-type: none"> <li>a. Lines are taken to lines, and line segments to line segments of the same length.</li> <li>b. Angles are taken to angles of the same measure.</li> <li>c. Parallel lines are taken to parallel lines.</li> </ul>	
Concepts and Skills to Master (This is student’s first exposure to transformations in the Utah Core)	
<ul style="list-style-type: none"> <li>• Basic understanding of rotation (about a point), reflection (about a line), and translation (in a given direction).</li> <li>• Verify that congruence of line segments and angles is maintained through rotation, reflection, and translation.</li> <li>• Verify that lines remain lines through rotation, reflection, and translation.</li> <li>• Verify that when parallel lines are rotated, reflected, or translated, each in the same way, they remain parallel lines.</li> </ul>	
Related Standards: Current Course	Related Standards: Future Courses
<a href="#">8.G.2</a> , <a href="#">8.G.3</a> , <a href="#">8.G.4</a> , <a href="#">8.G.5</a>	All congruence standards, including: <a href="#">I.G.CO.1</a> , <a href="#">I.G.CO.2</a> , <a href="#">I.G.CO.3</a> , <a href="#">I.G.CO.4</a> , <a href="#">I.G.CO.5</a> , <a href="#">I.G.CO.6</a> , <a href="#">I.G.CO.7</a> , <a href="#">I.G.CO.8</a> , <a href="#">I.G.CO.12</a> , <a href="#">I.G.CO.13</a> , <a href="#">II.G.CO.9</a> , <a href="#">II.G.CO.10</a> , <a href="#">II.G.CO.11</a>

Support for Teachers

Critical Background Knowledge (Access Background Knowledge)
<ul style="list-style-type: none"> <li>• Draw angles, segments, lines, and parallel lines (<a href="#">4.G.1</a>) and measure angles using a protractor (<a href="#">4.MD.6</a>)</li> <li>• Classify two dimensional figures based on parallel lines (<a href="#">4.G.2</a>)</li> <li>• Draw geometric shapes (<a href="#">7.G.2</a>)</li> </ul>
Academic Vocabulary
Transformation, rotation, reflection, translation, angle of rotation, center of rotation, line of reflection, image, pre-image, angle, segment, parallel line
Resources
<a href="http://www.uen.org/core/core.do?courseNum=5180#71440">Curriculum Resources</a> : <a href="http://www.uen.org/core/core.do?courseNum=5180#71440">http://www.uen.org/core/core.do?courseNum=5180#71440</a>

Understand congruence and similarity using physical models, transparencies, or geometry software (8.G.1-5)	
<b>Standard 8.G.2:</b> 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.	
Concepts and Skills to Master (This is student’s first exposure to congruence in the Utah Core)	
<ul style="list-style-type: none"> <li>Understand that the congruency of two dimensional figures is maintained while undergoing rigid transformations.</li> <li>Describe the transformation of a figure as a rotation, reflection, translation or a combination of transformations.</li> <li>Understand congruence via transformations using physical models, transparencies, or geometry software.</li> </ul>	
Related Standards: Current Course	Related Standards: Future Courses
<a href="#">8.G.1</a> , <a href="#">8.G.3</a> , <a href="#">8.G.4</a>	All congruence standards, including: <a href="#">I.G.CO.1</a> , <a href="#">I.G.CO.2</a> , <a href="#">I.G.CO.3</a> , <a href="#">I.G.CO.4</a> , <a href="#">I.G.CO.5</a> , <a href="#">I.G.CO.6</a> , <a href="#">I.G.CO.7</a> , <a href="#">I.G.CO.8</a> , <a href="#">I.G.CO.12</a> , <a href="#">I.G.CO.13</a> , <a href="#">II.G.CO.9</a> , <a href="#">II.G.CO.10</a> , <a href="#">II.G.CO.11</a>

Support for Teachers

Critical Background Knowledge (Access Background Knowledge)
<ul style="list-style-type: none"> <li>Verify experimentally the properties of rotations, reflections, and translations (<a href="#">8.G.1</a>)</li> <li>Draw geometric shapes (<a href="#">7.G.2</a>)</li> </ul>
Academic Vocabulary
Congruent, rotation, reflection, translation, rigid motion, center of rotation, line of reflection, angle of rotation, image, pre-image
Resources
<a href="http://www.uen.org/core/core.do?courseNum=5180#71440">Curriculum Resources</a> : <a href="http://www.uen.org/core/core.do?courseNum=5180#71440">http://www.uen.org/core/core.do?courseNum=5180#71440</a>

Understand congruence and similarity using physical models, transparencies, or geometry software (8.G.1-5)	
<b>Standard 8.G.3:</b> Observe that orientation of the plane is preserved in rotations and translations, but not with reflections. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>Observe that orientation of the plane is preserved in rotations and translations, but not with reflections.</li> <li>Understand characteristics of dilations, translations, rotations, and reflections of two-dimensional figures on the coordinate plane (describing transformations as functions takes place in Secondary Mathematics I).</li> <li>Effects of transformations might include: size/shape does not change in translations, reflections and rotations; orientation changes with reflections.</li> </ul>	
Related Standards: Current Course	Related Standards: Future Courses
<a href="#">8.G.1</a> , <a href="#">8.G.2</a> , <a href="#">8.G.4</a>	All congruence standards, including: <a href="#">I.G.CO.1</a> , <a href="#">I.G.CO.2</a> , <a href="#">I.G.CO.3</a> , <a href="#">I.G.CO.4</a> , <a href="#">I.G.CO.5</a> , <a href="#">I.G.CO.6</a> , <a href="#">I.G.CO.7</a> , <a href="#">I.G.CO.8</a> , <a href="#">I.G.CO.12</a> , <a href="#">I.G.CO.13</a> , <a href="#">II.G.CO.9</a> , <a href="#">II.G.CO.10</a> , <a href="#">II.G.CO.11</a>

Support for Teachers

Critical Background Knowledge (Access Background Knowledge)
<ul style="list-style-type: none"> <li>Plot or identify points on the coordinate plane (<a href="#">6.G.3</a>)</li> <li>Scale drawings (<a href="#">7.G.1</a>)</li> <li>Verify experimentally the properties of rotations, reflections, and translations (<a href="#">8.G.1</a>)</li> </ul>
Academic Vocabulary
transformation, coordinate, dilation, rotation, reflection, translation, image, center of rotation, line of reflection, angle of rotation
Resources
<a href="http://www.uen.org/core/core.do?courseNum=5180#71440">Curriculum Resources</a> : <a href="http://www.uen.org/core/core.do?courseNum=5180#71440">http://www.uen.org/core/core.do?courseNum=5180#71440</a>

Understand congruence and similarity using physical models, transparencies, or geometry software (8.G.1-5)	
<b>Standard 8.G.4:</b> 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.	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>• Understand that any combination of rotations, reflections, translations, and dilations will result in a similar figure.</li> <li>• Describe the sequence of transformations needed to show how one figure is similar to another.</li> <li>• Perform transformations using physical models, transparencies, or geometry software. (Rigid motion transformations will be addressed in Secondary Mathematics I.)</li> <li>• Understand similarity using physical models, transparencies, or geometry software. (Properties of dilations given by a center and a scale factor will be addressed in Secondary Mathematics II).</li> </ul>	
Related Standards: Current Course	Related Standards: Future Courses
<a href="#">8.G.1</a> , <a href="#">8.G.2</a> , <a href="#">8.G.3</a> , <a href="#">8.G.5</a>	<a href="#">II.G.SRT.1</a> , <a href="#">II.G.SRT.2</a> , <a href="#">II.G.SRT.3</a> , <a href="#">II.G.SRT.4</a> , <a href="#">II.G.SRT.5</a> , <a href="#">II.G.SRT.6</a> , <a href="#">II.G.C.1</a> , and <a href="#">I.G.CO.1</a> , <a href="#">I.G.CO.2</a> , <a href="#">I.G.CO.12</a>

Support for Teachers

Critical Background Knowledge (Access Background Knowledge)
<ul style="list-style-type: none"> <li>• Verify experimentally the properties of rotations, translations, reflections, and dilations (<a href="#">8.G.1</a>)</li> <li>• Understand congruence using rotations, reflections, and translations (<a href="#">8.G.2</a>)</li> <li>• Describe effect of dilations, rotations, reflections, and translations (<a href="#">8.G.3</a>)</li> <li>• Understand proportions (<a href="#">7.RP</a>)</li> </ul>
Academic Vocabulary
similar, similarity, dilation, rotation, reflection, translation, transformation
Resources
<a href="http://www.uen.org/core/core.do?courseNum=5180#71440">Curriculum Resources</a> : <a href="http://www.uen.org/core/core.do?courseNum=5180#71440">http://www.uen.org/core/core.do?courseNum=5180#71440</a>

Understand congruence and similarity using physical models, transparencies, or geometry software (8.G.1-5)	
<b>Standard 8.G.5:</b> 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. <i>For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.</i>	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>• Use informal arguments (proofs occur in Secondary Mathematics II) to establish facts about:                             <ul style="list-style-type: none"> <li>○ the angle sum of triangles.</li> <li>○ exterior angle of triangles.</li> <li>○ about the angles created when parallel lines are cut by a transversal.</li> <li>○ the angle-angle criterion for similarity of triangles.</li> </ul> </li> </ul>	
Related Standards: Current Course	Related Standards: Future Courses
<a href="#">8.G.2</a> , <a href="#">8.G.4</a> , <a href="#">8.EE.6</a>	<a href="#">II.G.CO.9</a> , <a href="#">II.G.CO.10</a> , <a href="#">II.G.SRT.3</a> , <a href="#">II.G.SRT.4</a> , <a href="#">II.G.SRT.5</a> , <a href="#">II.G.SRT.6</a>

Support for Teachers

Critical Background Knowledge (Access Background Knowledge)
<ul style="list-style-type: none"> <li>• Understand that a two dimensional figure is congruent/similar to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations/and dilations (<a href="#">8.G.2</a>: congruence/<a href="#">8.G.4</a>: similarity)</li> <li>• Use facts about supplementary, complementary, adjacent, and vertical angles (<a href="#">7.G.5</a>)</li> <li>• Know how to measure angles (<a href="#">4.MD.6</a>)</li> </ul>
Academic Vocabulary
Transversal, corresponding angles, alternate interior angles, alternate exterior angles, consecutive interior angles, supplementary pairs, vertical pairs, linear pairs, adjacent, non-adjacent, exterior angle of a triangle, remote interior angles of a triangle
Resources
<a href="#">Curriculum Resources</a> : <a href="http://www.uen.org/core/core.do?courseNum=5180#71440">http://www.uen.org/core/core.do?courseNum=5180#71440</a>

Understand and apply the Pythagorean Theorem and its converse (8.G.6-8)	
<b>Standard 8.G.6:</b> Explore and explain proofs of the Pythagorean Theorem and its converse.	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>• Know that in a right triangle <math>a^2 + b^2 = c^2</math> (the Pythagorean Theorem).</li> <li>• Explore proofs of the Pythagorean Theorem (for example, by decomposing a square in different ways) and be able to explain a proof of the Pythagorean Theorem.</li> <li>• Understand and explain a proof of the converse of the Pythagorean Theorem.</li> </ul>	
Related Standards: Current Course	Related Standards: Future Courses
<a href="#">8.NS.1</a> , <a href="#">8.NS.2</a> , <a href="#">8.NS.3</a> , <a href="#">8.EE.2</a> , <a href="#">8.EE.6</a> , <a href="#">8.G.7</a> , <a href="#">8.G.8</a>	<a href="#">I.G.GPE.4</a> , <a href="#">I.G.GPE.7</a> , <a href="#">II.G.GPE.1</a> , <a href="#">II.G.SRT.4</a> , <a href="#">II.G.SRT.8</a> , <a href="#">II.F.TF.8</a> , <a href="#">III.A.APR.4</a>

Support for Teachers

Critical Background Knowledge (Access Background Knowledge)
<ul style="list-style-type: none"> <li>• Understand concepts of area and relate area to multiplication and addition (<a href="#">3.MD.5-7</a>)</li> <li>• Recognize right triangles (<a href="#">4.G.2</a>)</li> <li>• Solve and model problems with area (<a href="#">4.MD.3</a>, <a href="#">5.NBT.6</a>, <a href="#">5.NF.4</a>, <a href="#">6.G.1</a>, <a href="#">6.G.2</a>, <a href="#">7.G.4</a>, <a href="#">7.G.6</a>)</li> <li>• Write and evaluate expressions involving whole number exponents (<a href="#">6.EE.1</a>)</li> <li>• Evaluate expressions at specific values of their variables, including those involving whole number exponents (<a href="#">6.EE.2c</a>)</li> </ul>
Academic Vocabulary
leg, hypotenuse, square, Pythagorean Theorem, converse
Resources
<a href="http://www.uen.org/core/core.do?courseNum=5180#71440">Curriculum Resources</a> : <a href="http://www.uen.org/core/core.do?courseNum=5180#71440">http://www.uen.org/core/core.do?courseNum=5180#71440</a>

Understand and apply the Pythagorean Theorem and its converse (8.G.6-8)	
<b>Standard 8.G.7:</b> Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>• Use the Pythagorean Theorem to solve for a missing side of a right triangle given the other two sides.</li> <li>• Use the Pythagorean Theorem to solve and model problems in real-world and mathematical problems.</li> <li>• Use the Pythagorean Theorem to solve and model problems involving three-dimensional contexts (cones, diagonals of rectangular prisms, etc.).</li> <li>• Recognize that applying the Pythagorean Theorem can result in rational and irrational numbers (this could be the first time students encounter irrational numbers).</li> </ul>	
Related Standards: Current Course	Related Standards: Future Courses
<a href="#">8.NS.1</a> , <a href="#">8.NS.2</a> , <a href="#">8.NS.3</a> , <a href="#">8.EE.1</a> , <a href="#">8.EE.2</a> , <a href="#">8.EE.6</a> , <a href="#">8.G.6</a> , <a href="#">8.G.8</a> , <a href="#">8.G.9</a>	<a href="#">I.G.GPE.4</a> , <a href="#">I.G.GPE.7</a> , <a href="#">II.G.GPE.1</a> , <a href="#">II.G.SRT.4</a> , <a href="#">II.G.SRT.8</a> , <a href="#">II.F.TF.8</a> , <a href="#">III.A.APR.4</a> , <a href="#">III.G.GMD.4</a>

### Support for Teachers

Critical Background Knowledge (Access Background Knowledge)
<ul style="list-style-type: none"> <li>• Recognize right triangles (<a href="#">4.G.2</a>)</li> <li>• Write and evaluate expressions involving whole number exponents (<a href="#">6.EE.1</a>)</li> <li>• Evaluate expressions at specific values of their variables, including those involving whole number exponents (<a href="#">6.EE.2c</a>)</li> <li>• Explore the Pythagorean Theorem (<a href="#">8.G.6</a>)</li> <li>• Identify right triangles in 3-D objects (cross sections) (<a href="#">7.G.3</a>)</li> </ul>
Academic Vocabulary
leg, hypotenuse, Pythagorean Theorem, square, square root
Resources
<a href="http://www.uen.org/core/core.do?courseNum=5180#71440">Curriculum Resources</a> : <a href="http://www.uen.org/core/core.do?courseNum=5180#71440">http://www.uen.org/core/core.do?courseNum=5180#71440</a>

Understand and apply the Pythagorean Theorem and its converse (8.G.6-8)	
<b>Standard 8.G.8:</b> Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>Calculate the distance between two points in a coordinate system using the Pythagorean Theorem.</li> </ul>	
Related Standards: Current Course	Related Standards: Future Courses
<a href="#">8.NS.1</a> , <a href="#">8.NS.2</a> , <a href="#">8.NS.3</a> , <a href="#">8.EE.1</a> , <a href="#">8.EE.2</a> , <a href="#">8.EE.6</a> , <a href="#">8.G.6</a> , <a href="#">8.G.8</a> , <a href="#">8.G.9</a>	<a href="#">I.G.GPE.4</a> , <a href="#">I.G.GPE.7</a> , <a href="#">II.G.GPE.1</a> , <a href="#">II.G.SRT.4</a> , <a href="#">II.G.SRT.8</a> , <a href="#">II.F.TF.8</a> , <a href="#">III.A.APR.4</a> , <a href="#">III.G.GMD.4</a>

Support for Teachers

Critical Background Knowledge (Access background knowledge)
<ul style="list-style-type: none"> <li>Recognize right triangles (<a href="#">4.G.2</a>)</li> <li>Graph ordered pairs on the coordinate plane (5.OA.3) in all four quadrants (<a href="#">6.NS.8</a>)</li> <li>Write and evaluate expressions involving whole number exponents (<a href="#">6.EE.1</a>)</li> <li>Evaluate expressions at specific values of their variables, including those involving whole number exponents (<a href="#">6.EE.2c</a>)</li> <li>Find horizontal and vertical distances on a coordinate plane (<a href="#">6.NS.8</a>) and draw polygons on coordinate plane and find horizontal and vertical side lengths (<a href="#">6.G.3</a>)</li> <li>Explore the Pythagorean Theorem (<a href="#">8.G.6</a>) and find unknown side lengths (<a href="#">8.G.7</a>)</li> </ul>
Academic Vocabulary
leg, hypotenuse, Pythagorean Theorem, square, square root
Resources
<a href="http://www.uen.org/core/core.do?courseNum=5180#71440">Curriculum Resources</a> : <a href="http://www.uen.org/core/core.do?courseNum=5180#71440">http://www.uen.org/core/core.do?courseNum=5180#71440</a>



Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres (8.G.9)	
<b>Standard 8.G.9:</b> Know the formulas for the volumes of cones, cylinders, and spheres, and use them to solve real-world and mathematical problems.	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>• Understand when and how to use formulas for volume of cones, cylinders, and spheres.</li> <li>• Use the Pythagorean Theorem to find heights of oblique and right cones and cylinders.</li> <li>• Apply volume formulas to real-world problems.</li> </ul>	
Related Standards: Current Course	Related Standards: Future Courses
<a href="#">8.NS.1</a> , <a href="#">8.NS.2</a> , <a href="#">8.NS.3</a> , <a href="#">8.EE.2</a> , <a href="#">8.G.6</a> , <a href="#">8.G.7</a>	<a href="#">II.G.GMD.1</a> , <a href="#">II.G.GMD.3</a> , <a href="#">III.G.GMD.4</a> , <a href="#">III.G.MG.1</a> , <a href="#">III.G.MG.2</a> , <a href="#">III.G.MG.3</a> , <a href="#">IIH.G.GMD.2</a>

### Support for Teachers

Critical Background Knowledge (Access Background Knowledge)
<ul style="list-style-type: none"> <li>• Represent rational approximations of irrational numbers (<a href="#">8.NS.1</a> and <a href="#">8.NS.2</a>)</li> <li>• Use the Pythagorean Theorem to find unknown side lengths in three dimensions (<a href="#">8.G.7</a>)</li> <li>• Understand that volume is measured in cubic units (<a href="#">5.MD.3a</a> and <a href="#">8.EE.1</a>)</li> <li>• Find the area of a circle (<a href="#">7.G.4</a>)</li> <li>• Evaluate expressions at specific values of their variables, including those involving whole number exponents (<a href="#">6.EE.2</a>)</li> </ul>
Academic Vocabulary
slant height, oblique, sphere, Base area
Resources
<b>Curriculum Resources:</b> <a href="http://www.uen.org/core/core.do?courseNum=5180#71440">http://www.uen.org/core/core.do?courseNum=5180#71440</a>