Geometry Unit 2 Overview: Similarity, Proof, and Trigonometry

Students apply their earlier experience with dilations and proportional reasoning to build a formal understanding of similarity. They identify criteria for similarity of triangles, use similarity to solve problems, and apply similarity in right triangles to understand right triangle trigonometry, with particular attention to special right triangles and the Pythagorean theorem. Students develop the Laws of Sines and Cosines in order to find missing measures of general (not necessarily right) triangles. They are able to distinguish whether three given measures (angles or sides) define 0, 1, 2, or infinitely many triangles.
# Unit 2: Similarity, Proof, and Trigonometry G.SRT.1, G.SRT.1a, G.SRT.1b

**Cluster:** Understand similarity in terms of similarity transformations.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Suggested Learning Targets</th>
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</tr>
</thead>
</table>
| **G.SRT.1** Verify experimentally the properties of dilations given by a center and a scale factor. | - I can define dilation.  
- I can perform a dilation with a given center and scale factor on a figure in the coordinate plane.  
- I can verify that when a side passes through the center of dilation, the side and its image lie on the same line.  
- I can verify that corresponding sides of the pre-image and images are parallel.  
- I can verify that a side length of the image is equal to the scale factor multiplied by the corresponding side length of the pre-image. | | | |
| a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. | | | | |
| b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor. | | | | |

### Standards of Mathematical Practice (SMP’s)

- #1 Make sense of problems and persevere in solving them.  
- #2 Reason abstractly and quantitatively.  
- #3 Construct viable arguments and critique the reasoning of others.  
- #4 Model with mathematics.  
- #5 Use appropriate tools strategically.  
- #6 Attend to precision.  
- #7 Look for and make use of structure.  
- #8 Look for and express regularity in repeated reasoning.

### Essential Questions / Enduring Understandings

- How might the features of one figure be useful when solving problems about a similar figure?  
Dilations, similarity, and the properties of similar triangles allow for the application of trigonometric ratios to real-world situations.

### Assessment

- Assessments align to suggested learning targets.

### Vocabulary

Dilation, center, scale factor, image, slope, parallel, corresponding sides, pre-image, distance, segment, ratio
## Unit 2: Similarity, Proof, and Trigonometry G.SRT.2

### Cluster: Understand similarity in terms of similarity transformations.

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</tr>
</thead>
<tbody>
<tr>
<td><strong>Instructional Notes: none</strong></td>
<td>• I can define similarity as a composition of rigid motions followed by dilations in which angle measure is preserved and side length is proportional.</td>
<td>Content/Skills Included in Textbook <em>(Include page numbers and comments)</em></td>
<td></td>
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<tr>
<td><strong>G.SRT.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.</strong></td>
<td>• I can identify corresponding sides and corresponding angles of similar triangles.</td>
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<tr>
<td></td>
<td>• I can demonstrate that in a pair of similar triangles, corresponding angles are congruent (angle measure preserved) and corresponding sides are proportional.</td>
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<tr>
<td></td>
<td>• I can determine that two figures are similar by verifying that angle measure is preserved and corresponding sides are proportional.</td>
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</tbody>
</table>

### Standards of Mathematical Practice (SMP’s)

- [ ] #1 Make sense of problems and persevere in solving them.
- [ ] #2 Reason abstractly and quantitatively.
- [ ] #3 Construct viable arguments and critique the reasoning of others.
- [ ] #4 Model with mathematics.
- [ ] #5 Use appropriate tools strategically.
- [ ] #6 Attend to precision.
- [ ] #7 Look for and make use of structure.
- [ ] #8 Look for and express regularity in repeated reasoning.

### Essential Questions/ Enduring Understandings

- How might the features of one figure be useful when solving problems about a similar figure?

Dilations, similarity, and the properties of similar triangles allow for the application of trigonometric ratios to real-world situations.

### Assessment

- Assessments align to suggested learning targets.
  - Directly Aligned
  - Somewhat Aligned
  - Not Aligned
  - Check all assessment types that address this standard
    - Drill and practice
    - Multiple choice
    - Short answer (written)
    - Performance (verbal explanation)
    - Product / Project

### Vocabulary

- Similarity, composition, rigid motion, dilation, angle measure, side length, proportional, corresponding sides, corresponding angles
### Unit 2: Similarity, Proof, and Trigonometry G.SRT.3

#### Cluster: Understand similarity in terms of similarity transformations.

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Instructional Notes:</strong> none</td>
<td>- I can show and explain that when two angle measures are known (AA), the third angle measure is also known (Third Angle Theorem).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>G.SRT.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.</strong></td>
<td>- I can conclude and explain that AA similarity is a sufficient condition for two triangles to be similar.</td>
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<td></td>
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<tr>
<td></td>
<td><strong>Content/Skills Included in Textbook (Include page numbers and comments)</strong></td>
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**Standards of Mathematical Practice (SMP’s)**

- #1 Make sense of problems and persevere in solving them.
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- #4 Model with mathematics.
- #5 Use appropriate tools strategically.
- #6 Attend to precision.
- #7 Look for and make use of structure.
- #8 Look for and express regularity in repeated reasoning.

**Essential Questions/ Enduring Understandings**

- How might the features of one figure be useful when solving problems about a similar figure?

Dilations, similarity, and the properties of similar triangles allow for the application of trigonometric ratios to real-world situations.

**Assessments align to suggested learning targets.**

- Assessments include:
  - Directly Aligned
  - Somewhat Aligned
  - Not Aligned

- Check all assessment types that address this standard
  - Drill and practice
  - Multiple choice
  - Short answer (written)
  - Performance (verbal explanation)
  - Product / Project

**Vocabulary**

- Similarity transformation, angle measure, similar
### Unit 2: Similarity, Proof, and Trigonometry G.SRT.4

**Cluster: Prove theorems involving similarity.**

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</tr>
</thead>
<tbody>
<tr>
<td><strong>Instructional Notes: none</strong></td>
<td><strong>I can use theorems, postulates, or definitions to prove theorems about triangles, including:</strong></td>
<td><strong>Content/Skills Included in Textbook</strong></td>
<td><strong>Include page numbers and comments</strong></td>
<td></td>
</tr>
<tr>
<td><strong>G.SRT.4 Prove theorems about triangles.</strong></td>
<td><strong>Theorems include:</strong></td>
<td></td>
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<tr>
<td></td>
<td>- A line parallel to one side of a triangle divides the other two proportionally, and conversely; the <strong>Pythagorean Theorem proved using triangle similarity.</strong></td>
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</tbody>
</table>

**Standards of Mathematical Practice (SMP’s)**

- #1 Make sense of problems and persevere in solving them.
- #2 Reason abstractly and quantitatively.
- #3 Construct viable arguments and critique the reasoning of others.
- #4 Model with mathematics.
- #5 Use appropriate tools strategically.
- #6 Attend to precision.
- #7 Look for and make use of structure.
- #8 Look for and express regularity in repeated reasoning.

**Essential Questions/ Enduring Understandings**

- **How might the features of one figure be useful when solving problems about a similar figure?**
  
  Dilations, similarity, and the properties of similar triangles allow for the application of trigonometric ratios to real-world situations.

**Assessment**

- Assessments align to suggested learning targets.

  **Directly Aligned** | **Somewhat Aligned** | **Not Aligned**

  - Check all assessment types that address this standard
  - Drill and practice
  - Multiple choice
  - Short answer (written)
  - Performance (verbal explanation)
  - Product / Project

**Vocabulary**

- Proof, corresponding angles, similarity, segment addition, parallel intersect, Pythagorean Theorem

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**Template created by Region 1 ESA**
# Unit 2: Similarity, Proof, and Trigonometry G.SRT.5

**Cluster: Prove theorems involving similarity.**

<table>
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<tr>
<th>Standard</th>
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<th>Not Aligned</th>
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</thead>
<tbody>
<tr>
<td><strong>Instructional Notes: none</strong></td>
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</tbody>
</table>

**G.SRT.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.**

- I can use triangle congruence and triangle similarity to solve problems (i.e., indirect measure, missing sides/angle measure, side splitting).
- I can use triangle congruence and triangle similarity to prove relationships in geometric figures.

** Standards of Mathematical Practice (SMP’s)**

- #1 Make sense of problems and persevere in solving them.
- #2 Reason abstractly and quantitatively.
- #3 Construct viable arguments and critique the reasoning of others.
- #4 Model with mathematics.
- #5 Use appropriate tools strategically.
- #6 Attend to precision.
- #7 Look for and make use of structure.
- #8 Look for and express regularity in repeated reasoning.

**Essential Questions/ Enduring Understandings**

- **How might the features of one figure be useful when solving problems about a similar figure?**
  - Dilations, similarity, and the properties of similar triangles allow for the application of trigonometric ratios to real-world situations.

**Assessment**

- Assessments align to suggested learning targets.

<table>
<thead>
<tr>
<th></th>
<th>Directly Aligned</th>
<th>Somewhat Aligned</th>
<th>Not Aligned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check all assessment types that address this standard</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
- Drill and practice
- Multiple choice
- Short answer (written)
- Performance (verbal explanation)
- Product / Project

**Vocabulary**

- Congruence, side length, angle measure, proportional, corresponding sides, triangle congruence, triangle similarity

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Template created by Region 1 ESA
### Unit 2: Similarity, Proof, and Trigonometry G.SRT.6

**Cluster:** Define trigonometric ratios and solve problems involving right triangles.

<table>
<thead>
<tr>
<th>Standard</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>G.SRT.6</strong> Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.</td>
<td>• I can demonstrate that within a right triangle, line segments parallel to a leg create similar triangles by angle-angle similarity (e.g., In triangle ABC where C is the right angle, segment DE can be drawn parallel to segment BC. Since angle A is congruent to angle A and angle AED is congruent to angle ACB, triangle AED is similar to triangle ACB).</td>
<td>Content/Skills Included in Textbook (Include page numbers and comments)</td>
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#### Standards of Mathematical Practice (SMP’s)
- #1 Make sense of problems and persevere in solving them.
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- #3 Construct viable arguments and critique the reasoning of others.
- #4 Model with mathematics.
- #5 Use appropriate tools strategically.
- #6 Attend to precision.
- #7 Look for and make use of structure.
- #8 Look for and express regularity in repeated reasoning.

#### Essential Questions/ Enduring Understandings
- • How might the features of one figure be useful when solving problems about a similar figure? Dilations, similarity, and the properties of similar triangles allow for the application of trigonometric ratios to real-world situations.

#### Assessment
- Assessments align to suggested learning targets.
  - Directly Aligned
  - Somewhat Aligned
  - Not Aligned
  - Check all assessment types that address this standard
    - Drill and practice
    - Multiple choice
    - Short answer (written)
    - Performance (verbal explanation)
    - Product / Project

#### Vocabulary
- Similarity, rigid motion, dilation, angle measure, proportional, right triangle, line segment, parallel, leg, hypotenuse, angle-angle similarity, corresponding sides, tangent, sine, cosine, acute angle, ratio, trigonometry, constant
### Unit 2: Similarity, Proof, and Trigonometry G.SRT.6

**Cluster: Define trigonometric ratios and solve problems involving right triangles.**

<table>
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<tr>
<th>Standard</th>
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</thead>
</table>
| G.SRT.6  | Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. | • I can use the characteristics of similar figures to justify trigonometric ratios.  
• I can define trigonometric ratios for acute angles in a right triangle:  
  \[ \tan A = \]  
  \[ \sin A = \]  
  \[ \cos A = \]  
• I can use division and the Pythagorean Theorem \[ a^2 + b^2 = c^2 \] to prove that \[ \sin^2 A + \cos^2 A = 1. \] (R) | | |

**Instructional Notes: none**

**Assessments align to suggested learning targets.**

### Standards of Mathematical Practice (SMP’s)

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### Essential Questions/ Enduring Understandings

- How might the features of one figure be useful when solving problems about a similar figure?  
  Dilations, similarity, and the properties of similar triangles allow for the application of trigonometric ratios to real-world situations.

### Assessment

- Assessments align to suggested learning targets.
- Directly Aligned  
  - Somewhat Aligned  
  - Not Aligned

- Check all assessment types that address this standard
  - Drill and practice
  - Multiple choice
  - Short answer (written)
  - Performance (verbal explanation)
  - Product / Project

### Vocabulary

- Similarity, rigid motion, dilation, angle measure, proportional, right triangle, line segment, parallel, leg, hypotenuse, angle-angle similarity, corresponding sides, tangent, since, cosine, acute angle, ratio, trigonometry, constant
# Unit 2: Similarity, Proof, and Trigonometry G.SRT.7

Cluster: Define trigonometric ratios and solve problems involving right triangles.

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</tr>
</thead>
<tbody>
<tr>
<td>G.SRT.7 Explain and use the relationship between the sine and cosine of complementary angles.</td>
<td>- I can define complimentary angles.</td>
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<tr>
<td></td>
<td>- I can calculate sine and cosine ratios for acute angles in a right triangle when given two side lengths.</td>
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<tr>
<td></td>
<td>- I can use a diagram of a right triangle to explain that for a pair of complimentary angles A and B, the sine of angle A is equal to the cosine of angle B and the cosine of angle A is equal to the sine of angle B.</td>
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### Standards of Mathematical Practice (SMP’s)

- #1 Make sense of problems and persevere in solving them.
- #2 Reason abstractly and quantitatively.
- #3 Construct viable arguments and critique the reasoning of others.
- #4 Model with mathematics.
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- #7 Look for and make use of structure.
- #8 Look for and express regularity in repeated reasoning.

### Essential Questions/ Enduring Understandings

- How might the features of one figure be useful when solving problems about a similar figure? Dilations, similarity, and the properties of similar triangles allow for the application of trigonometric ratios to real-world situations.

### Assessment

Assessments align to suggested learning targets.

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<table>
<thead>
<tr>
<th>Drills and practice</th>
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<th>Short answer (written)</th>
<th>Performance (verbal explanation)</th>
<th>Product / Project</th>
</tr>
</thead>
</table>

### Vocabulary

Complimentary angles, acute angle, cosine ratio, right triangle
# Unit 2: Similarity, Proof, and Trigonometry G.SRT.8

Cluster: Define trigonometric ratios and solve problems involving right triangles.

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<thead>
<tr>
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<th>Directly Aligned</th>
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</tr>
</thead>
<tbody>
<tr>
<td>G.SRT.8</td>
<td>I can use angle measures to estimate side lengths (e.g., The side across from a 33° angle will be shorter than the side across from the 57° angle).</td>
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<tr>
<td></td>
<td>I can use side lengths to estimate angle measures (e.g., The angle opposite of a 10 cm side will be larger than the angle across from the 9 cm side).</td>
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<tr>
<td></td>
<td>I can solve right triangles by finding the measures of all sides and angles in the triangle.</td>
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<tr>
<td></td>
<td>I can use sine, cosine, tangent, and their inverses to solve for the unknown side lengths and angle measures of a right triangle.</td>
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</tbody>
</table>

**Instructional Notes:** none

G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. ★

**Standards of Mathematical Practice (SMP’s)**

- #1 Make sense of problems and persevere in solving them.
- #2 Reason abstractly and quantitatively.
- #3 Construct viable arguments and critique the reasoning of others.
- #4 Model with mathematics.
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- #6 Attend to precision.
- #7 Look for and make use of structure.
- #8 Look for and express regularity in repeated reasoning.

**Essential Questions/ Enduring Understandings**

- How might the features of one figure be useful when solving problems about a similar figure?

Dilations, similarity, and the properties of similar triangles allow for the application of trigonometric ratios to real-world situations.

**Assessment**

- Assessments align to suggested learning targets.

**Vocabulary**

Sine ratio, cosine ratio, tangent ratio, right triangle, inverse trigonometric ratio, acute angle, Pythagorean Theorem, side, angle, triangle
# Unit 2: Similarity, Proof, and Trigonometry G.SRT.8 continued

**Cluster: Define trigonometric ratios and solve problems involving right triangles.**

<table>
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</tr>
</thead>
</table>
| **G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.★** | • I can use the Pythagorean Theorem to solve for an unknown side length of a right triangle.  
• I can draw right triangles that describe real-world problems and label the sides of the angles with their given measures.  
• I can solve application problems involving right triangles, including angle of elevation and depression, navigation, and surveying. | | | |

### Standards of Mathematical Practice (SMP’s) |

- #1 Make sense of problems and persevere in solving them.
- #2 Reason abstractly and quantitatively.
- #3 Construct viable arguments and critique the reasoning of others.
- #4 Model with mathematics.
- #5 Use appropriate tools strategically.
- #6 Attend to precision.
- #7 Look for and make use of structure.
- #8 Look for and express regularity in repeated reasoning.

### Essential Questions/ Enduring Understandings

- How might the features of one figure be useful when solving problems about a similar figure?

Dilations, similarity, and the properties of similar triangles allow for the application of trigonometric ratios to real-world situations.

### Assessment

Assessments align to suggested learning targets.

- Directly Aligned
- Somewhat Aligned
- Not Aligned

Check all assessment types that address this standard:
- Drill and practice
- Multiple choice
- Short answer (written)
- Performance (verbal explanation)
- Product / Project

### Vocabulary

Sine ratio, cosine ratio, tangent ratio, right triangle, inverse trigonometric ratio, acute angle, Pythagorean Theorem, side, angle, triangle
**Unit 2: Similarity, Proof, and Trigonometry G.MG.1**

Cluster: Apply geometric concepts in modeling situations.

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</thead>
<tbody>
<tr>
<td><em>Instructional Notes: Focus on situations well modeled by trigonometric ratios for acute angles.</em></td>
<td>• I can represent real-world objects as geometric figures.</td>
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<tr>
<td>G.MG.1</td>
<td>• I can estimate measures (circumference, area, perimeter, volume) of real-world objects using comparable geometric shapes or three-dimensional figures.</td>
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<tr>
<td></td>
<td>• I can apply the properties of geometric figures to comparable real-world objects (e.g., The spokes of a wheel of a bicycle are equal lengths because the represents the radii of a circle.)</td>
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</tbody>
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**Standards of Mathematical Practice (SMP’s)**

- #1 Make sense of problems and persevere in solving them.
- #2 Reason abstractly and quantitatively.
- #3 Construct viable arguments and critique the reasoning of others.
- #4 Model with mathematics.
- #5 Use appropriate tools strategically.
- #6 Attend to precision.
- #7 Look for and make use of structure.
- #8 Look for and express regularity in repeated reasoning.

**Essential Questions/ Enduring Understandings**

- **In what ways can geometric figures be used to understand real-world situations?**
  Geometric definitions, properties and theorems allow one to describe, model, and analyze situations in the real-world.

**Assessment**

Assessments align to suggested learning targets.

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<tr>
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<tr>
<td>Check all assessment types that address this standard</td>
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<tr>
<td>Drill and practice</td>
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<tr>
<td>Product / Project</td>
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</table>

**Vocabulary**

Circumference, area, perimeter, volume
### Standard: Apply geometric concepts in modeling situations.

**Instructional Notes:** Focus on situations well modeled by trigonometric ratios for acute angles.

**G.MG.2** Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).*

**Suggested Learning Targets**

- I can decide whether it is best to calculate or estimate the area or volume of a geometric figure and perform the calculation or estimation.
- I can break composite geometric figures into manageable pieces.
- I can convert units of measure (e.g., convert square feet to square miles).
- I can apply area and volume to situations involving density (e.g., determine the population in an area, the weight of water given its density, or the amount of energy in a three-dimensional figure).

**Standards of Mathematical Practice (SMP’s)**

<table>
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<tr>
<th>SMP’s</th>
<th>Essential Questions/ Enduring Understandings</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 Make sense of problems and persevere in solving them.</td>
<td><strong>In what ways can geometric figures be used to understand real-world situations?</strong> Geometric definitions, properties and theorems allow one to describe, model, and analyze situations in the real-world.</td>
<td>Assessments align to suggested learning targets.</td>
</tr>
<tr>
<td>#2 Reason abstractly and quantitatively.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#3 Construct viable arguments and critique the reasoning of others.</td>
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</tr>
<tr>
<td>#4 Model with mathematics.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#5 Use appropriate tools strategically.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#6 Attend to precision.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#7 Look for and make use of structure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#8 Look for and express regularity in repeated reasoning.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Vocabulary**

Area, volume, unit of measure, convert, density, composite figures
## Unit 2: Similarity, Proof, and Trigonometry G.MG.3

Cluster: Apply geometric concepts in modeling situations.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Suggested Learning Targets</th>
<th>Directly Aligned</th>
<th>Somewhat Aligned</th>
<th>Not Aligned</th>
</tr>
</thead>
</table>
| Instructional Notes: Focus on situations well modeled by trigonometric ratios for acute angles. | • I can create a visual representation of a design problem.  
• I can solve design problems using a geometric model (graph, equation, table, formula).  
• I can interpret the results and make conclusions based on the geometric model. | Content/Skills Included in Textbook (Include page numbers and comments) |

### G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*

### Standards of Mathematical Practice (SMP’s)

- #1 Make sense of problems and persevere in solving them.
- #2 Reason abstractly and quantitatively.
- #3 Construct viable arguments and critique the reasoning of others.
- #4 Model with mathematics.
- #5 Use appropriate tools strategically.
- #6 Attend to precision.
- #7 Look for and make use of structure.
- #8 Look for and express regularity in repeated reasoning.

### Essential Questions/ Enduring Understandings

- In what ways can geometric figures be used to understand real-world situations? Geometric definitions, properties and theorems allow one to describe, model, and analyze situations in the real-world.

### Assessment

- Assessments align to suggested learning targets.
- Directly Aligned
- Somewhat Aligned
- Not Aligned

- Check all assessment types that address this standard
  - Drill and practice
  - Multiple choice
  - Short answer (written)
  - Performance (verbal explanation)
  - Product / Project

### Vocabulary

- Geometric model, graph, equation, formula, table
# Unit 2: Similarity, Proof, and Trigonometry G.SRT.9

## Cluster: Apply trigonometry to general triangles.

<table>
<thead>
<tr>
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<th>Somewhat Aligned</th>
<th>Not Aligned</th>
</tr>
</thead>
</table>
| **G.SRT.9 (+)** Derive the formula \( A = \frac{1}{2} ab \sin(C) \) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. | • I can understand that two right triangles are created when an altitude is drawn from a vertex.  
• I can find the length of a triangle’s altitude by using the sine function.  
• I can use the traditional area formula of a triangle \( A = \frac{1}{2} \cdot base \cdot height \) and the sine function to generate an equivalent area formula \( A = \frac{1}{2} \cdot a \cdot b \cdot \sin(C) \), using any angle of the triangle. | | | |

### Standards of Mathematical Practice (SMP’s)

- #1 Make sense of problems and persevere in solving them.
- #2 Reason abstractly and quantitatively.
- #3 Construct viable arguments and critique the reasoning of others.
- #4 Model with mathematics.
- #5 Use appropriate tools strategically.
- #6 Attend to precision.
- #7 Look for and make use of structure.
- #8 Look for and express regularity in repeated reasoning.

### Essential Questions/ Enduring Understandings

- **How might the features of one figure be useful when solving problems about a similar figure?**
  Dilations, similarity, and the properties of similar triangles allow for the application of trigonometric ratios to real-world situations.

### Assessment

- Assessments align to suggested learning targets.

<table>
<thead>
<tr>
<th>Directly Aligned</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Check all assessment types that address this standard</td>
<td>Drill and practice</td>
<td>Multiple choice</td>
</tr>
<tr>
<td></td>
<td>Short answer (written)</td>
<td>Performance (verbal explanation)</td>
</tr>
<tr>
<td></td>
<td>Product / Project</td>
<td></td>
</tr>
</tbody>
</table>

### Vocabulary

**Vertex, perpendicular, sine ratio, altitude**
## Unit 2: Similarity, Proof, and Trigonometry G.SRT.10

**Cluster: Apply trigonometry to general triangles.**

### Instructional Notes

*With respect to the general case of the Laws of Sines and Cosines, the definitions of sine and cosine must be extended to obtuse angles.*

### G.SRT.10 (+) Prove the Laws of Sines and Cosines and use them to solve problems.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>G.SRT.10 (+)</td>
<td>- I can derive the Law of Sines by drawing an altitude in a triangle, using the sine function to find two expressions for the length of the altitude, and simplifying the equation that results from setting these expressions equal ( \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} ).</td>
<td>Content/Skills Included in Textbook (Include page numbers and comments)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- I can use the Law of Sines to solve real-world problems.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Standards of Mathematical Practice (SMP’s)

- #1 Make sense of problems and persevere in solving them.
- #2 Reason abstractly and quantitatively.
- #3 Construct viable arguments and critique the reasoning of others.
- #4 Model with mathematics.
- #5 Use appropriate tools strategically.
- #6 Attend to precision.
- #7 Look for and make use of structure.
- #8 Look for and express regularity in repeated reasoning.

### Essential Questions/ Enduring Understandings

- How might the features of one figure be useful when solving problems about a similar figure?

Dilations, similarity, and the properties of similar triangles allow for the application of trigonometric ratios to real-world situations.

### Assessment

Assessments align to suggested learning targets.

- Directly Aligned
- Somewhat Aligned
- Not Aligned

Check all assessment types that address this standard:

- Drill and practice
- Multiple choice
- Short answer (written)
- Performance (verbal explanation)
- Product / Project

### Vocabulary

Law of Sines, altitude, right triangle, side, Pythagorean Theorem, Law of Cosines
## Unit 2: Similarity, Proof, and Trigonometry G.SRT.11

### Cluster: Apply trigonometry to general triangles.

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Instructional Notes:</strong> With respect to the general case of the Laws of Sines and Cosines, the definitions of sine and cosine must be extended to obtuse angles.</td>
<td>• I can use the triangle inequality and side/angle relationships (e.g., largest angle is opposite the largest side) to estimate the measures of unknown sides and angles.</td>
<td>Content/Skills Included in Textbook <em>(Include page numbers and comments)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>G.SRT.11 (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).</strong></td>
<td>• I can distinguish between situations that require the Law of Sines (ASA, AAS, SSA) and situations that require the Law of Cosines (SAS, SSS).</td>
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<tr>
<td></td>
<td>• I can apply the Law of Sines to find unknown side lengths and unknown angle measures in right and non-right triangles.</td>
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</table>

### Standards of Mathematical Practice (SMP’s)

- #1 Make sense of problems and persevere in solving them.
- #2 Reason abstractly and quantitatively.
- #3 Construct viable arguments and critique the reasoning of others.
- #4 Model with mathematics.
- #5 Use appropriate tools strategically.
- #6 Attend to precision.
- #7 Look for and make use of structure.
- #8 Look for and express regularity in repeated reasoning.

### Essential Questions/ Enduring Understandings

- How might the features of one figure be useful when solving problems about a similar figure?

Dilations, similarity, and the properties of similar triangles allow for the application of trigonometric ratios to real-world situations.

### Assessment

Assessments align to suggested learning targets.

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Check all assessment types that address this standard

- Drill and practice
- Multiple choice
- Short answer (written)
- Performance (verbal explanation)
- Product / Project

### Vocabulary

- Law of Sines, Law of Cosines, ASA, AAS, SSA, SAS, SSS, right triangle, triangle inequality
## Unit 2: Similarity, Proof, and Trigonometry

### G.SRT.11 continued

#### Cluster: Apply trigonometry to general triangles.

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<tr>
<td>G.SRT.11 (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).</td>
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**Instructional Notes:** With respect to the general case of the Laws of Sines and Cosines, the definitions of sine and cosine must be extended to obtuse angles.

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<thead>
<tr>
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<tbody>
<tr>
<td>I can use the Law of Sines to determine if two given side lengths and a given non-adjacent angle measures (SSA) make two triangles, one triangle, or no triangle.</td>
</tr>
<tr>
<td>I can apply the Law of Cosines to find unknown side lengths and unknown angle measures in right and non-right triangles.</td>
</tr>
<tr>
<td>I can represent real-world problems with diagrams of right and non-right triangles and use them to solve for unknown side lengths and angle measures.</td>
</tr>
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</table>

### Standards of Mathematical Practice (SMP’s)

- Make sense of problems and persevere in solving them. ($\checkmark$)
- Reason abstractly and quantitatively. ($\checkmark$)
- Construct viable arguments and critique the reasoning of others. ($\checkmark$)
- Model with mathematics. ($\checkmark$)
- Use appropriate tools strategically. ($\checkmark$)
- Attend to precision. ($\checkmark$)
- Look for and make use of structure. ($\checkmark$)
- Look for and express regularity in repeated reasoning. ($\checkmark$)

### Essential Questions/Enduring Understandings

- How might the features of one figure be useful when solving problems about a similar figure? Dilations, similarity, and the properties of similar triangles allow for the application of trigonometric ratios to real-world situations.

### Assessment

- Assessments align to suggested learning targets.
  - Directly Aligned
  - Somewhat Aligned
  - Not Aligned

- Check all assessment types that address this standard
  - Drill and practice
  - Multiple choice
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### Vocabulary

- Law of Sines, Law of Cosines, ASA, AAS, SSA, SAS, SSS, right triangle, triangle inequality