Chapter 1 Shapes and Transformations Congruence: 24-26%				
Lesson	**Instructional Focus**	**TN Standard**	**Learning Objective**	**Additional Resources**
1.1.1 How can I design it? (Optional)	Creating a Quilt Using Symmetry		Study teams will be formed, and students will get to know the other team members. Students will work together to build symmetrical designs using the same basic shapes. They will have a brief opportunity at the end of the period to present to the class.	Parent Guide 1.1.1 to 1.1.5
1.1.2 Can you predict the results? (Optional)	Making Predictions and Investigating Results		Students will generate questions to investigate, make predictions, and test their predictions as they work with Möbius strips and related construction.	
1.1.3 How can I predict the area? (Optional)	Perimeter and Area of Enlarging Tile Patterns		Students will build an understanding of area and perimeter. Students will investigate how the perimeter and area of a shape change as the shape is enlarged proportionally.	
1.1.4 Are you convinced? (Optional)	Logical Arguments		Students will be introduced on how to develop a convincing argument.	
1.1.5 What shapes can you find? (Optional)	Building a Kaleidoscope		Students will build understanding of what an angle is and how it is measured. Students will be introduced to complicated shapes composed of triangles and will begin to use attributes of sides and angles to compare and describe those shapes.	
1.2.1 How do you see it?	Spatial Visualization and Reflections	**G.CO.A.2** Represent transformations in the plane in multiple ways, including technology. Describe transformations as functions that take	Students will use their spatial visualization skills to investigate reflection	

1.2.2 What if it is reflected more than once?	Rigid Transformations: Rotations and Translations	points in the plane (pre-image) as inputs and give other points (image) as outputs. Compare transformations that preserve distance and angle measure to those that do not (e.g., translation versus horizontal stretch). **G.CO.A.4** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **G.CO.A.5** Given a geometric figure and a rigid motion, draw the image of the figure in multiple ways, including technology. Specify a sequence of rigid motions that will carry a given figure onto another. **G.CO.B.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent.	Students will understand the three rigid transformations (translations, reflections, and rotations) and will learn some connections between them. Students are also introduced to notation for corresponding parts.

1.2.3 What is the relationship?	Slopes of Parallel and Perpendicular Lines	**G.CO.A.2** Represent transformations in the plane in multiple ways, including technology. Describe transformations as functions that take points in the plane (pre-image) as inputs and give other points (image) as outputs. Compare transformations that preserve distance and angle measure to those that do not (e.g., translation versus horizontal stretch). **G.CO.A.4** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **G.CO.A.5** Given a geometric figure and a rigid motion, draw the image of the figure in multiple ways, including technology. Specify a sequence of rigid motions that will carry a given figure onto another. **G.CO.B.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent. **G.GPE.B.5** Know and use coordinates to compute perimeters of polygons and areas of triangles and rectangles.	Students will discover that objects and their images are equidistant from the line of reflection, and that the line segment connecting a point with its reflected image is perpendicular to the line of reflection. In the process, students will recognize that the slopes of perpendicular lines are opposite reciprocals.	Parent Guide 1.2.1 to 1.2.5

1.2.4 How can I move it?	Defining Transformations	**G.CO.A.2** Represent transformations in the plane in multiple ways, including technology. Describe transformations as functions that take points in the plane (pre-image) as inputs and give other points (image) as outputs. Compare transformations that preserve distance and angle measure to those that do not (e.g., translation versus horizontal stretch). **G.CO.A.3** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry the shape onto itself. **G.CO.A.4** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **G.CO.A.5** Given a geometric figure and a rigid motion, draw the image of the figure in multiple ways, including technology. Specify a sequence of rigid motions that will carry a given figure onto another. **G.CO.B.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent. **G.CO.C.10** Prove theorems about triangles.	As students investigate reflections, they will begin to develop an understanding of reflection symmetry, which will be explored in Lesson 1.2.6. Students also will learn how to translate a geometric figure on a coordinate grid. Finally, students learn that reflection and reflection symmetry can help them discover relationships within a shape, namely an isosceles triangle.	
1.2.5 What shapes can I create with triangles?	Using Transformation to Create Shapes	**G.CO.A.2** Represent transformations in the plane in multiple ways, including technology. Describe transformations as functions that take points in the plane (pre-image) as inputs and give other points (image) as outputs. Compare transformations that preserve distance and angle measure to those that do not (e.g., translation versus horizontal stretch). **G.CO.A.4** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **G.CO.A.5** Given a geometric figure and a rigid motion, draw the image of the figure in multiple ways, including technology. Specify a sequence of rigid motions that will carry a given figure onto another. **G.CO.B.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent.	Students use what they know about transformations to make other shapes including: rhombus, square, parallelogram, isosceles triangle, right triangle, kite, and dart.	

1.2.6 What shapes have symmetry?	Symmetry	**G.CO.A.2** Represent transformations in the plane in multiple ways, including technology. Describe transformations as functions that take points in the plane (pre-image) as inputs and give other points (image) as outputs. Compare transformations that preserve distance and angle measure to those that do not (e.g., translation versus horizontal stretch). **G.CO.A.3** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry the shape onto itself. **G.CO.A.4** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **G.CO.A.5** Given a geometric figure and a rigid motion, draw the image of the figure in multiple ways, including technology. Specify a sequence of rigid motions that will carry a given figure onto another. **G.CO.B.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent.	Students will learn about reflection, rotation, and translation symmetry and will identify which common shapes have each type of symmetry.	
1.3.1 How can I classify this shape? (Optional)	Attributes and Characteristics of Shapes		Students will learn how to classify shapes by their attributes using Venn diagrams. They will also review geometric vocabulary and concepts, such as number of sides, number of angles, same-length sides, right angle(s), equilateral, perimeter, edge, and parallel.	Parent Guide 1.3.1 and 1.3.2
1.3.2 How can I describe it? (Optional)	More Characteristics of Shapes		Students will continue to study the attributes of shapes as they begin to formalize their vocabulary: both names of shapes (such as quadrilateral and trapezoid) and attributes of shapes (such as parallel sides and right angle). Students will also become familiar with how to mark diagrams to help communicate attributes such as equal length and right angle.	
Total: 13 days plus optional time for Chapter Closure and Assessment				

Chapter 2
Angles and Measurement

Congruence: 24-26%
Triangles and Circles: 36-42%

Lesson	Instructional Focus	TN Standard	Learning Objective	Additional Resources

2.1.1 What is the relationship?	Complementary, Supplementary, and Vertical Angles	**G.CO.C.9** Prove theorems about lines and angles.	Students will be introduced to a problem about mirror reflections that will motivate much of their work in Section 2.1. Students will learn how to name angles, and will learn the three main relationships for angle measures, namely, supplementary, complementary, and same (have the same measure). Students will also discover that vertical angles have the same measure.	Parent Guide 2.1.1 to 2.1.5
2.1.2 What is the relationship?	Angles Formed by Transversal		Students will use their understanding of translation to determine that when a transversal intersects parallel lines, corresponding angles have equal measure. They will also continue to practice using angle relationships to solve for unknown angles.	
2.1.3 What is the relationship?	More Angles Formed by Transversals		Students will continue to apply their knowledge of corresponding angles, and will develop theorems about alternate interior and same-side interior angles. Students will also learn that when a light beam reflects off a mirror, the angle of the light hitting the mirror equals the angle of the light leaving the mirror.	
2.1.4 How can I use it?	Angles in Triangles	**G.CO.C.9** Prove theorems about lines and angles.	Students will discover that the angles in a triangle add up to 180°. They will also practice finding angles in complex diagrams that use multiple relationships.	
2.1.5 What is the relationship?	Applying Angle Relationships	**G.CO.C.10** Prove theorems about triangles.	Students will learn the converses of some of their angle theorems, and see arguments for them. Students will also apply their knowledge of angle relationships to analyze the hinged mirror trick they saw in Lesson 2.1.1.	
2.2.1 How can I measure an object? (Optional)	Units of Measure		The students will gain a geometric sense of length and area by investigating various unit measures of each concept. Students will also learn that the measurement of an object depends on the units being used.	Parent Guide 2.2.1 to 2.2.4
2.2.2 How can I find the area? (Optional)	Areas of Triangles and Composite Shapes.		Students will learn how to find the area of a triangle and will develop multiple methods to find the area of composite shapes formed by rectangles and triangles.	
2.2.3 What is the area? (Optional)	Areas of Parallelograms and Trapezoids.		Students will use rectangles and triangles to develop algorithms to find the area of new shapes, including parallelograms and trapezoids.	
2.2.4 How can I find the height? (Optional)	Heights and Areas		Students will explore how to find the height of a triangle given that one side has been specified as the base. Additionally, students will find the areas of composite shapes using what they have learned about the areas of triangles, parallelograms, and trapezoids.	
2.3.1 Is the answer reasonable? (Optional)	Triangle Inequality		Students will develop a strategy to find the length of the hypotenuse of a right triangle when the lengths of the legs are known in preparation for the Pythagorean Theorem in Lesson 2.3.2. The students will also learn how to determine whether or not three given lengths can make a triangle. They will also understand how to find the maximum and minimum lengths of a third side given the lengths of the two other sides.	

2.3.2 Is there a shortcut?	The Pythagorean theorem	**G.SRT.C.8** Solve triangles. **a.** Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	Students will develop and prove the Pythagorean Theorem.	Parent Guide 2.3.1 and 2.3.2
11 days plus optional time for Chapter Closure and Assessment				

Chapter 3 **Justification and Similarity** **Congruence: 24-26%** **Triangles and Circles: 36-42%**				
Lesson	**Instructional Focus**	**TN Standard**	**Learning Objective**	**Additional Resources**
3.1.1 What do these shapes have in common?	Dilations	**G.CO.A.2** Represent transformations in the plane in multiple ways, including technology. Describe transformations as functions that take points in the plane (pre-image) as inputs and give other points (image) as outputs. Compare transformations that preserve distance and angle measure to those that do not (e.g., translation versus horizontal stretch). **G.CO.D.12** Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). **G.SRT.A.1** Verify informally the properties of dilations given by a center and a scale factor.	Students will learn about the concept of dilation and will investigate the characteristics that figures share if they have the same shape. Students will determine that dilations have equal angles and proportional corresponding side lengths.	

3.1.2 How can I maintain the shape?	Similarity	**G.CO.A.2** Represent transformations in the plane in multiple ways, including technology. Describe transformations as functions that take points in the plane (pre-image) as inputs and give other points (image) as outputs. Compare transformations that preserve distance and angle measure to those that do not (e.g., translation versus horizontal stretch). **G.SRT.A.1** Verify informally the properties of dilations given by a center and a scale factor.	Students will learn that figures that can be related through a sequence of transformations that include a dilation are similar and will determine that multiplying (and dividing) lengths of figures by a common number (zoom factor) produces a similar figure. Students will use the equivalent ratios to find missing lengths in similar figures and will learn that congruent figures are similar and have a side ratio of 1.	
3.1.3How are the figures related?	Using Ratios of Similarity	**G.CO.A.2** Represent transformations in the plane in multiple ways, including technology. Describe transformations as functions that take points in the plane (pre-image) as inputs and give other points (image) as outputs. Compare transformations that preserve distance and angle measure to those that do not (e.g., translation versus horizontal stretch). **G.SRT.A.1** Verify informally the properties of dilations given by a center and a scale factor. **G.SRT.A.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.	As students continue to become familiar with similarity, they will examine the ratio of the perimeters of similar figures and will practice setting up and solving equations to solve proportional problems.	Parent Guide 3.1.1 to 3.1.4
3.1.4 How can I use equivalent ratios?	Application and Notation	**G.SRT.A.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. **G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.	Students will apply proportional reasoning and will learn how to write similarity statements.	

3.2.1 What information do I need?	Conditions for Triangle Similarity	**G.SRT.A.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. **G.SRT.A.3** Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. **G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures. **G.C.A.1** Recognize that all circles are similar.	Students will learn the SAS ~ and AA ~ conditions for determining triangle similarity.	
3.2.2 How can I organize my information?	Creating a Flow Chart	**G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.	Students will learn how to use flowcharts to organize their arguments for triangle similarity and will continue to practice applying the AA ~ and SAS ~ conditions.	
3.2.3 How can I use equivalent rations?	Triangle Similarity and Congruence		Students practice making and using flowcharts in more challenging reasoning contexts. Students also further investigate the fact that if two triangles are similar and the common ratio between the lengths of their corresponding sides is 1, then the triangles must be congruent.	Parent Guide 3.2.1 to 3.2.6
3.2.4 What information do I need?	More Conditions for Triangle Similarity	**G.SRT.A.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. **G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.	Students will complete their list of triangle similarity conditions involving sides and angles, learning about the SSS~ condition in the process.	
3.2.5 Are the triangles similar?	Determining Similarity	**G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.	Students will practice using the three triangle similarity conditions (AA ~, SAS ~, and SSS ~) and organizing their reasoning in a flowchart. Students will also use a flowchart to diagram a multi-step argument.	
3.2.6 What can I do with similar triangles?	Applying Similarity	**G.CO.A.3** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry the shape onto itself.	Students will apply their knowledge of similar triangles to multiple contexts.	
10 days plus optional time for Chapter Closure and Assessment				

Chapter 4 Justification and Similarity Triangles and Circles: 36-42%				
Lesson	**Instructional Focus**	**TN Standard**	**Learning Outcome**	**Additional Resources**
4.1.1 What patterns can I use?	Constant Rations in Right Triangles	G.SRT.C.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.	Students will recognize that all the slope triangles on a given line are similar to each other and will begin to connect a specific slope to a specific angle measurement and ratio.	Parent Guide 4.1.1 to 4.1.5
4.1.2 How important is the angle?	Connecting Slope Ratios to Specific Angles		Students will connect specific slope ratios to their related angles and use this information to find missing sides or angles of right triangles with 11°, 22°, 18°, or 45°angles (and their complements).	
4.1.3 What if the angle changes?	Expanding the Trig Table		Students will use technology to generate slope ratios for new angles in order to solve for missing side lengths on triangles.	
4.1.4 What about other right triangles?	The Tangent Ratio	G.SRT.C.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. G.SRT.C.8 Solve triangles. a. Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. b. Know and use the Law of Sines and Law of Cosines to solve problems in real life situations. Recognize when it is appropriate to use each.	Students will practice using slope ratios to find the length of a leg of a right triangle and will learn that this ratio is called tangent. Students will also practice re-orienting a triangle and will learn new ways to identify which leg is Δx and which is Δy. Additionally, students will learn how to find the slope ratio using a scientific calculator.	

4.1.5 What if I can't measure it?	Applying the Tangent Ratio	G.SRT.C.8 Solve triangles. a. Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. b. Know and use the Law of Sines and Law of Cosines to solve problems in real life situations. Recognize when it is appropriate to use each.	Students will apply their knowledge of tangent ratios to find measurements about the classroom or school site.	
4.2.1 How can I represent it? (Exclude)	Using an Area Model	These sections of Chapter 4 are not covered by the TN Geometry standards.		
4.2.2 How can I represent it? (Exclude)	Using a Tree Diagram			
4.2.3 What model should I use? (Exclude)	Probability Models			
4.2.4 What if both events happen? (Exclude)	Unions, Intersections, and Complements			

Chapter 5
Completing the Triangle Toolkit

Congruence: 24-26%
Triangles and Circles: 36-42%

Lesson	Instructional Focus	TN Standard	Learning Objective	Additional Resources
5.1.1 What if I know the hypotenuse?	Sine and Cosine Ratios	**G.SRT.C.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. **G.SRT.C.8** Solve triangles. a. Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. b. Know and use the Law of Sines and Law of Cosines to solve problems in real life situations. Recognize when it is appropriate to use each.	Students will learn about the sine and cosine ratios and will start a Triangle Toolkit.	

5.1.2 Which tool should I use?	Selecting a Trig Tool	**G.SRT.C.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. **G.SRT.C.7** Explain and use the relationship between the sine and cosine of complementary angles. **G.SRT.C.8** Solve triangles. **a.** Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. **b.** Know and use the Law of Sines and Law of Cosines to solve problems in real life situations. Recognize when it is appropriate to use each.	The students will develop strategies to recognize which trigonometric ratio to use based on the relative position of the reference angle and the given sides involved.	Parent Guide 5.1.1 to 5.1.3
5.1.3 How can I find the angle?	Inverse Trigonometry	**G.SRT.C.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. **G.SRT.C.8** Solve triangles. **a.** Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. **b.** Know and use the Law of Sines and Law of Cosines to solve problems in real life situations. Recognize when it is appropriate to use each.	The students will understand how to use trigonometric ratios to find the unknown angle measures of a right triangle and will be introduced to the concept of “inverse.”	
5.1.4 How can I use trig ratios?	Trigonmetric Applications	**G.SRT.C.8** Solve triangles. **a.** Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. **b.** Know and use the Law of Sines and Law of Cosines to solve problems in real life situations. Recognize when it is appropriate to use each.	The students will use sine, cosine, and tangent ratios to solve application problems.	

5.2.1 Is there a shortcut?	Special Right Triangles	**G.CO.C.10** Prove theorems about triangles. **G.SRT.B.4** Prove theorems about similar triangles. **G.SRT.C.8** Solve triangles. **a.** Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. **b.** Know and use the Law of Sines and Law of Cosines to solve problems in real life situations. Recognize when it is appropriate to use each.	Students will recognize the similarity ratios in 30°- 60°- 90° and 45°- 45°- 90° triangles and begin to apply those ratios as a shortcut to finding missing side lengths.	Parent Guide 5.2.1 and 5.2.2
5.2.2 How can I use similar triangles?	Pythagorean Triples	**G.SRT.C.8** Solve triangles. **a.** Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. **b.** Know and use the Law of Sines and Law of Cosines to solve problems in real life situations. Recognize when it is appropriate to use each.	Students will learn to recognize 3:4:5 and 5:12:13 triangles and find other examples of Pythagorean Triples. In addition, students will practice recognizing and applying all three of their new triangle shortcuts.	
5.3.1 What triangle tools do I still need?	Finding Missing Parts of Triangles		Students will review their tools for finding missing sides and angles of triangles (Pythagorean Theorem and right-triangle trigonometry) and will develop a method to solve for missing sides and angles for a non-right triangle in preparation for learning the Law of Sines in Lesson 5.3.2.	Parent Guide 5.3.1 to 5.3.3
5.3.2 Is there a faster way?	Law of Sines	**G.CO.C.9** Prove theorems about lines and angles. **G.CO.C.10** Prove theorems about triangles.	Students will recognize the relationship between a side and the angle opposite that side in a triangle. Students will also develop the Law of Sines and use it to find missing side lengths and angles of non-right triangles.	
5.3.3 How can I complete my triangle toolkit?	Law of Cosines	**G.CO.C.10** Prove theorems about triangles.	Students will complete their Triangle Toolkits by developing the Law of Cosines.	
5.3.4 Is there more than one possible triangle? (Exclude)	Ambiguous Case (This topic is not included in the TN Ready Geometry Assessment)		Students will learn that multiple triangles are sometimes possible when two side lengths and an angle not between them are given (SSA).	

5.3.5 Which tool should I use?	Choosing a Tool	**G.SRT.C.8** Solve triangles. **a.** Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. **b.** Know and use the Law of Sines and Law of Cosines to solve problems in real life situations. Recognize when it is appropriate to use each. **G.CO.C.11** Prove theorems about parallelograms.	Students will apply their current triangle tools (Pythagorean Theorem, trigonometric ratios, the Law of Sines, and the Law of Cosines) to solve multiple problems and applications.	Parent Guide 5.3.4 and 5.3.5
11 days plus optional time for Chapter Closure and Assessment				

Chapter 6 **Congruent Triangles** **Congruence: 24-26%** **Triangles and Circles: 36-42%** **Geometric Proofs and Solving Design Problems: 11-15%**				
Lesson	**Instructional Focus**	**TN Standard**	**Learning Objective**	**Additional Resources**

6.1.1 Are the triangles congruent?	Congruent Triangles	**G.CO.B.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent. **G.CO.B.7** Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. **G.CO.B.8** Explain how the criteria for triangle congruence (ASA, SAS, AAS, and SSS) follow from the definition of congruence in terms of rigid motions. **G.SRT.A.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. **G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.	Students will practice identifying congruent triangles by first determining that the triangles are similar and that the ratio of corresponding sides is 1. Students will develop triangle shortcuts (such as AAS ≅) in Lesson 6.1.2.	Parent Guide 6.1.1 to 6.1.4
6.1.2 What information do I need?	Conditions for Triangle Congruence	**G.CO.B.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent. **G.CO.B.7** Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. **G.CO.B.8** Explain how the criteria for triangle congruence (ASA, SAS, AAS, and SSS) follow from the definition of congruence in terms of rigid motions. **G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.	Students will use their understanding of similarity and congruence to develop conditions that guarantee that triangles are congruent (SSS ≅, ASA ≅ , AAS ≅ , HL ≅, and SAS ≅).	
6.1.3 How can I prove it?	Congruence of Triangles Through Rigid Motions		Students will show that the triangle congruence conditions that they developed in Lesson 6.1.2 are true using rigid transformations.	

6.1.4 How can I organize my reasoning?	Flowcharts for Congruence	**G.CO.C.10** Prove theorems about triangles. **G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.	Students will extend their use of flowcharts to document triangle congruence facts. They will practice identifying pairs of congruent triangles and will contrast congruence arguments with similarity arguments.	
6.1.5 What is the relationship? (Optional)	Converses	**G.CO.C.9** Prove theorems about lines and angles. **G.CO.C.10** Prove theorems about triangles. **G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.	Students will recognize the converse relationship between conditional statements, and will then investigate the relationship between the truth of a statement and the truth of its converse.	Parent Guide 6.1.5
6.2.1 How can I use it what is the connection? (Optional)	Angles on a Pool Table	**G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects. **G.MG.A.2** Apply geometric methods to solve real- world problems.	Students will review angle relationships, trigonometry, and similar triangles.	Parent Guide 6.2.1 to 6.2.5
6.2.2 How can I use it what is the connection? (Optional)	Investigating a Triangle	**G.GPE.B.5** Know and use coordinates to compute perimeters of polygons and areas of triangles and rectangles.	Students will review area and perimeter of a triangle, trigonometry, Pythagorean Theorem, and the Triangle Angle Sum Theorem.	
6.2.3 How can I use it what is the connection? (Optional)	Creating a Mathematical Model	**G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects. **G.MG.A.2** Apply geometric methods to solve real- world problems.	Students review building models, similarity, and inverse trigonometric ratios.	
6.2.4 How can I use it what is the connection?(Exclude)	Analyzing a Game	This section of Chapter 5 is not covered by the TN Geometry standards.		
6.2.5 How can I use it what is the connection? (Optional)	Using Transformations and Symmetry to Design Snowflakes	**G.CO.A.5** Given a geometric figure and a rigid motion, draw the image of the figure in multiple ways, including technology. Specify a sequence of rigid motions that will carry a given figure onto another. **G.CO.B.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent.	Students will review transformations and symmetry.	

9 days plus optional time for Chapter Closure and Assessment

Chapter 7
Proof and Quadrilaterals

Congruence: 24-26%
Triangles and Circles: 36-42%
Geometric Proofs and Solving Design Problems: 11-15%

Lesson	Instructional Focus	TN Standard	Learning Outcome	Additional Resources
7.1.1 Does it roll smoothly? (Optional)	Properties of a Circle	**G.CO.A.1** Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, plane, distance along a line, and distance around a circular arc.	Students will explore the special properties of a circle (specifically, its constant radius and constant diameter) and will explore Reuleaux (pronounced "roo-LOW") curves and square wheels.	Parent Guide 7.1.1 and 7.1.2
7.1.2 What can I build with a circle? (Optional)	Building a Tetrahedran		Students review shapes and their properties as they fold a circle to create a tetrahedron. Students also begin to understand how the area of a shape changes as it is enlarged proportionally.	
7.1.3 What is the shortest distance? (Optional)	Shortest Distance Problems	**G.MG.A.2** Apply geometric methods to solve real- world problems.	Students will analyze and solve several shortest distance problems and will reinforce their understanding of reflection and similarity. At the same time, students will lay the foundation for understanding the surface of a three-dimensional object, which will become important during the study of surface area in Chapters 9 and 11.	Parent Guide 7.1.3 and 7.1.4
7.1.4 How can I create it?	Using Symmetry to Study Polygons		Students will review how to create regular polygons with a hinged mirror and will use their understanding of reflection and congruence to learn more about the central angles of these shapes. At the same time, students will learn more about the diagonals of rhombi, which will become important during the study of constructions in Chapter 9.	
7.2.1 What can congruent triangles tell me?	Special Quadrilateral and Proof	**G.CO.C.11** Prove theorems about parallelograms.	Students will be introduced to proof and will learn more properties of parallelograms and kites.	Parent Guide 7.2.1 to 7.2.6
7.2.2 What is special about a rhombus?	Properties of a Rhombi		Students will use their understanding of congruent triangles to prove properties of rhombi and will practice using a flowchart structure to organize a proof.	
7.2.3 What else can be proved?	More Proofs with Congruent Triangles		Students will continue developing flowchart proofs as a way to communicate a logical argument and will prove that all rectangles are also parallelograms.	
7.2.4 What else can I prove?	More Properties of Quadrilaterals		Students will write flowchart proofs to demonstrate additional properties of quadrilaterals and isosceles triangles. The proofs created for problem 7-82 will be used in Lesson 7.2.5.	
7.2.5 How else can I write it?	Two-column Proofs		As students continue to learn how to build a convincing argument, they will be introduced to the format of a two-column proof.	
7.2.6 What can I prove?	Explore-Conjecture-Prove	**G.CO.C.10** Prove theorems about triangles. **G.CO.C.11** Prove theorems about parallelograms. **G.SRT.B.4** Prove theorems about similar triangles. **G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.	Students continue to develop their skills of writing proofs as they prove new properties of triangles and quadrilaterals. Students will be exposed to proofs based on similar triangles and those requiring auxiliary lines to be added to a diagram.	
7.3.1 What makes a quadrilateral special?	Studying Quadrilaterals on a Coordinate Grid	**G.GPE.B.2** Use coordinates to prove simple geometric theorems algebraically. **G.GPE.B.3** Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems. **G.GPE.B.5** Know and use coordinates to compute perimeters of polygons and areas of triangles and rectangles.	Students will investigate quadrilaterals for special properties, such as parallel sides or a right angle. Students will also review several algebraic tools and will apply these skills to analyze shapes on a coordinate grid.	Parent Guide 7.3.1 to 7.3.3
7.3.2 How can I find the midpoint?	Coordinate Geometry and Midpoint	**G.GPE.B.2** Use coordinates to prove simple geometric theorems algebraically. **G.GPE.B.5** Know and use coordinates to compute perimeters of polygons and areas of triangles and rectangles.	Students will develop methods for finding the midpoint of a segment on a coordinate grid as they continue their study of coordinate geometry.	
7.3.3 What kind of quadrilateral is it?	Identifying Quadrilaterals on a Coordinate Grid	**G.GPE.B.2** Use coordinates to prove simple geometric theorems algebraically. **G.GPE.B.4** Find the point on a directed line segment between two given points that partitions the segment in a given ratio. **G.GPE.B.5** Know and use coordinates to compute perimeters of polygons and areas of triangles and rectangles.	Students will analyze quadrilaterals on a coordinate grid and identify them by type.	
14 days plus optional time for Chapter Closure and Assessment				

Chapter 8
Polygons and Circles

Chapter 8 Polygons and Circles Triangles and Circles: 36-42% Two and Three Dimensional Geometry: 16-19%				
8.1.1 How can I build it? (Optional)	Pinwheels and Polygons		Students will learn that regular polygons can be built using congruent isosceles triangles with certain angle measures. Students will also learn that the central angle of a regular *n*-gon or pinwheel with *n* sides is always 360° ÷ *n* and will learn how to determine if a shape is convex.	Parent Guide 8.1.1 to 8.1.5
8.1.2 What is it measure?	Interior Angles of Polygons	**G.GMD.A.1** Give an informal argument for the formulas for the circumference of a circle and the volume and surface area of a cylinder, cone, prism, and pyramid.	Students will learn how to find the sum of the interior angles of a polygon and will be able to apply this skill to solve problems.	
8.1.3 What if it is a regular polygon?	Angles of Regular Polygons		Students will learn how to determine the measure of an interior and exterior angle of a regular polygon	
8.1.4 Is there another way?	Regular Polygon Angle Connections		Students will develop multiple strategies to find the measures of interior and exterior angles of a regular polygon as well as the sum of the interior angles of polygons in general.	
8.1.5 What is the area?	Finding Areas of Regular Polygons		Students will develop an algorithm to find the area of any regular polygon.	
8.2.1 How does the area change?	Area Ratios of Similar Figures	**G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.	Students will learn that the ratio of the areas of similar figures is the square of the ratio of similarity (also called zoom factor).	Parent Guide 8.2.1 and 8.2.2
8.2.2 How does the area change?	Ratios of Similarity		Students will continue to develop their understanding for how the area and perimeter of a shape change as the shape is enlarged or reduced proportionally.	
8.3.1 What if it has infinitely many sides?	A Special Ratio	**G.GMD.A.1** Give an informal argument for the formulas for the circumference of a circle and the volume and surface area of a cylinder, cone, prism, and pyramid.	Students will discover the area and circumference formulas for a circle with radius 1.	Parent Guide 8.3.1 and 8.3.3
8.3.2 What is the relationship?	Area and Circumference of a Circle	**G.GMD.A.1** Give an informal argument for the formulas for the circumference of a circle and the volume and surface area of a cylinder, cone, prism, and pyramid. **G.C.B.4** Know the formula and find the area of a sector of a circle in a real-world context.	Students will use their understanding of the ratios of areas of similar figures to develop a method of finding the area and circumference of a circle with any sized radius. Students will also develop methods to find the area of sectors and the length of arcs.	
8.3.3 How can I use it?	Circles in Context	**G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects. **G.MG.A.2** Apply geometric methods to solve real- world problems.	Students will use problem-solving strategies to find areas of circular and polygonal regions in context.	
12 days plus optional time for Chapter Closure and Assessment				

Chapter 9 Solids and Constructions Congruence: 24-26% Two and Three Dimensional Geometry: 16-19% Triangles and Circles: 36-42% Geometric Proofs and Solving Design Problems: 11-15%				
Lesson	**Instructional Focus**	TN Standard	**Learning Objective**	**Additional Resources**
9.1.1 How can I build it?	Three-Dimensional Solids	**G.GMD.A.1** Give an informal argument for the formulas for the circumference of a circle and the volume and surface area of a cylinder, cone, prism, and pyramid.	Students will learn how to represent three-dimensional solids using side views and a mat plan. Students will also be introduced to volume as a form of measurement.	Parent Guide 9.1.1 to 9.1.5
9.1.2 How can I measure it?	Volumes and Surface Areas of Prisms		Students will understand how to represent a solid with a net and will be introduced to prisms. Students will also learn how to find the surface area of a solid.	
9.1.3 What if the bases are not rectangles?	Prisms and Cylinders	**G.GMD.A.1** Give an informal argument for the formulas for the circumference of a circle and the volume and surface area of a cylinder, cone, prism, and pyramid. **G.GMD.A.2** Know and use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems. **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.	Students will practice finding the surface area and volume of non-rectangular prisms and cylinders. Students will understand that the volume of a cylinder or prism remains constant if the solid is slanted (as long as the height of the solid remains the same). Finally, students will learn how to sketch prisms and cylinders on their paper.	
9.1.4 How does the volume change?	Volumes of Similar Solids	**G.GMD.A.2** Know and use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems.	Students will understand that the ratio of the volumes of similar figures is the cube of the linear scale factor and they will use this relationship in applications.	
9.1.5 How does the volume change?	Ratios of Similarity	**G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.	Students will apply their understanding of the ratios of similarity.	

Chapter 9 Solids and Constructions Congruence: 24-26% Two and Three Dimensional Geometry: 16-19% Triangles and Circles: 36-42% Geometric Proofs and Solving Design Problems: 11-15%				
9.2.1 How can I construct it? (Optional)	Introduction to Constructions	**G.CO.C.9** Prove theorems about lines and angles. **G.CO.D.12** Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). **G.C.A.3** Construct the incenter and circumcenter of a triangle and use their properties to solve problems in context. **G.MG.A.2** Apply geometric methods to solve real- world problems.	Students will become acquainted with basic construction techniques such as copying an angle or a line segment using a compass and a straightedge. Students will also learn how to construct the incenter of a triangle, a circle inscribed within a triangle, a regular hexagon, and an equilateral triangle.	Parent Guide 9.2.1 to 9.2.4
9.2.2 How can I construct it? (Optional)	Constructing Bisectors	**G.CO.D.12** Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).	Students will understand how to construct a perpendicular bisector and an angle bisector and will understand how the properties of the diagonals of a rhombus help create each construction.	
9.2.3 How do I construct it? (Optional)	More Explorations with Constructions		Students will learn how to construct a line parallel to a given line through a given point not on the line and how to construct a square. Students will also learn how to copy triangles.	
9.2.4 What more can I construct? (Optional)	Other Constructions	**G.CO.C.10** Prove theorems about triangles. **G.CO.D.12** Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). **G.C.A.3** Construct the incenter and circumcenter of a triangle and use their	Students will further explore geometric constructions with a compass and a straightedge. Students will learn about the medians and centroid of a triangle and will understand how to construct them.	

Chapter 10 Circles and Conditional Probability Triangles and Circles: 36-42% Two and Three Dimensional Geometry: 16-19%				
Lesson	**Instructional Focus**	**TN Standard**	**Learning Objective**	**Additional Resources**
10.1.1 What is the length of the diameter?	Introduction to Chords	**G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects. **G.C.A.2** Identify and describe relationships among inscribed angles, radii, and chords.	Students will learn that the perpendicular bisector of a chord passes through the center of the circle and will learn new circle-related vocabulary, such as major and minor arcs.	Parent Guide 10.1.1 to 10.1.5
10.1.2 What is the relationship?	Angles and Arcs	**G.C.A.2** Identify and describe relationships among inscribed angles, radii, and chords. **G.C.B.4** Know the formula and find the area of a sector of a circle in a real-world context.	Students will learn about the relationships between inscribed angles and the arcs that they intercept. Students will also learn the difference between arc measure and arc length.	
10.1.3 What more can I learn about circles?	Chords and Angles	**G.C.A.2** Identify and describe relationships among inscribed angles, radii, and chords. **G.C.A.3** Construct the incenter and circumcenter of a triangle and use their properties to solve problems in context.	Students will learn that an angle inscribed in a semicircle measures 90°. Students will also prove that opposite angles in an inscribed quadrilateral are supplementary. Students will develop different methods to find the length of a chord and will use the idea of similar triangles to find the relationships between the lengths created by two intersecting chords.	
10.1.4 What is the relationship?	Tangents and Secants		Students will learn that a line tangent to a circle is perpendicular to the radius of the circle drawn to the point of tangency. Students will apply their knowledge of tangents, chords, angles, and arcs to solve problems involving circles.	
10.1.5 How can I solve it?	Problem Solving with Circles		Students will consolidate their understanding of the relationships that exist between angles, arcs, chords, and tangents of a circle as they solve application problems. Students will also learn how to find a circle that circumscribes a triangle.	
10.2.1 What does independence tell me? (Exclude)	Conditional Probability and Independence	These sections of Chapter 10 are not covered by the TN Geometry standards.		
10.2.2 Is there another way to organize the data? (Exclude)	Two-Way Tables			
10.2.3 How can I pull it all together? (Exclude)	Applications of Probability			
10.3.1 What if the sample space is very large? (Exclude)	The Fundamental Principle of Counting			
10.3.2 How can I count arrangements? (Exclude)	Permutations			

Chapter 10 Circles and Conditional Probability Triangles and Circles: 36-42% Two and Three Dimensional Geometry: 16-19%				
10.3.3 How many groups are possible? (Exclude)	Combinations			
10.3.4 What kind of counting problem is this? (Exclude)	Categorizing Counting Problems			
10.3.5 What are my chances of winning? (Exclude)	Some Challenging Probability Problems			
5 days plus optional time for Chapter Closure and Assessment				

Chapter 11 Solids and Circles Two and Three Dimensional Geometry: 16-19% Triangles and Circles: 36-42% Geometric Proofs and Solving Design Problems: 11-15%				
Lesson	**Instructional Focus**	**TN Standard**	**Learning Objectives**	**Additional Resources**
11.1.1 How can I build it? (Optional)	Platonic Solids		Students will build the five Platonic Solids (tetrahedron, octahedron, icosahedron, cube, and dodecahedron) and will understand why these are the only solids with faces that are congruent, regular polygons. Students will also learn how to describe polyhedra using the number of faces (such as tetrahedron for any polyhedron with four faces) and will learn about dual polyhedra.	Parent Guide 11.1.1 to 11.1.5
11.1.2 How can I measure it?	Pyramids	**G.GMD.A.1** Give an informal argument for the formulas for the circumference of a circle and the volume and surface area of a cylinder, cone, prism, and pyramid. **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.	Students will learn how a pyramid is defined and how to name it according to the shape of its base. Students will learn about slant height and finding the total surface area of a pyramid.	
11.1.3 What is the volume?	Volume of a Pyramid	**G.GMD.A.1** Give an informal argument for the formulas for the circumference of a circle and the volume and surface area of a cylinder, cone, prism, and pyramid. **G.GMD.A.2** Know and use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems. **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.	Students will discover that the volume of a pyramid is one third of the volume of a prism with the same base and height.	
11.1.4 What if it is a cone?	Surface Area and Volume of a Cone		Students will practice calculating the volume of a pyramid and will learn how to find the volume and surface area of a cone. Students will solve two application problems involving cones.	
11.1.5 What is the relationship?	Surface Area and Volume of a Sphere		Students will learn how to find the surface area and volume of a sphere.	
11.2.1 Where is this location?	Coordinates on a Sphere	**G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects. **G.C.B.4** Know the formula and find the area of a sector of a circle in a real-world context.	Students will learn what a great circle is and will learn about a spherical coordinate system. They will also learn how to calculate the distance between two locations on the Earth using the measure of the arc between them	Parent Guide 11.2.1 and 11.2.2
11.2.2 What is the relationship?	Tangents and Arcs	**G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects. **G.C.A.2** Identify and describe relationships among inscribed angles, radii, and chords.	Students will study the relationships between the measures of the arcs and angles formed when two lines that are tangent to the same circle intersect.	
11.2.3 What is the measure?	Secant and Tangent Relationships	**G.C.A.2** Identify and describe relationships among inscribed angles, radii, and chords.	Students will complete their study of circles in this course by finding the relationships between the measures of the angles and arcs intercepted by two intersecting secants or a secant and a tangent that intersect.	Parent Guide 11.2.3
12 days plus optional time for Chapter Closure and Assessment				

Chapter 12 Conics and Closure Geometric Proofs and Solving Design Problems: 11-15%				
Lesson	**Instructional Focus**	**TN Standard**	**Learning Objective**	**Additional Resources**
12.1.1 What is the equation?	The Equation of a Circle	**G.GPE.A.1** Know and write the equation of a circle of given center and radius using the Pythagorean Theorem.	Students will learn how to find the equation of a circle graphed on coordinate axes.	Parent Guide 12.1.1 and 12.1.2
12.1.2 How can I graph a circle from its equation?	Completing the Square for Equations of Circles		Students will complete the square to rewrite the equation of a circle from general form to graphing form.	
12.1.3 What is the cross section? (Exclude)	Introductions to Conic Sections	These sections of Chapter 12 are not covered by the TN Geometry standards.		
12.1.4 How can I graph it? (Exclude)	Graphing a Parabola Using the Focus and Directrix			
12.2.1 What is the shape?	Using Coordinate Geometry and Constructions to Explore Shapes	**G.GPE.B.2** Use coordinates to prove simple geometric theorems algebraically.	Students will learn that the quadrilateral formed by joining consecutive midpoints of any quadrilateral is a parallelogram. As they work today, they will have opportunities to review how to: • Identify angle relationships • Prove a conjecture • Use similarity conjectures to show that two triangles are similar • Use the Pythagorean Theorem • Find the slope of a line • Write and solve a linear equation based on a geometric relationship • Construct a midpoint with a compass and straightedge • Find the length of a triangle's midsegment	

Chapter 12 Conics and Closure Geometric Proofs and Solving Design Problems: 11-15%				
12.2.2 What is the pattern? (Optional)	Euler's Formula for Polyhedra	**G.MG.A.2** Apply geometric methods to solve real- world problems.	Students will review their understanding of polyhedra as they conjecture about the relationship of the number of faces, vertices, and edges of a basic polyhedron.	
12.2.3 What is special about this ratio? (Optional)	The Golden Ratio		Students will be introduced to phi (ϕ), the golden ratio, and will study several different contexts where phi arises. During this investigation, students will review similarity, writing and solving quadratic equations, the angles of regular polygons, and the definitions of regular polyhedra. Students will also get a preview of infinite series, which will be a subject for a later math course.	
12.2.4 What is the probability? (Exclude)	Using Geometry to Find Probabilities.	These sections of Chapter 12 are not covered by the TN Geometry standards.		
5 days plus optional time for Chapter Closure and Assessment				