WAKE COUNTY PUBLIC SCHOOL SYSTEM

High School Programs

Math 2 UNIT 4 OVERVIEW: Congruence & Similarity Parent Guide

Unit Outcomes At the end of this unit, your student should be able to:	**Key Vocabulary** Terms to deepen students' understanding
Congruent Figures ✓ Use the definition of congruence in terms of rigid motions to decide if two figures are congruent. ✓ 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. ✓ Explain how the criteria to show that two triangles are congruent, Angle-Side-Angle (ASA), Side-Angle-Side (SAS), and Side-Side-Side (SSS), follow from the definition of congruence in terms of rigid motions. ✓ Show that the Angle-Angle-Angle (AAA) and Side-Side-Angle (SSA) criteria are not sufficient to prove that two triangles are congruent. ***Similar Figures*** ✓ Use the definition of similarity in terms of transformations to decide if two figures are similar. ✓ Explain how the criteria to show that two triangles are similar, Side-Angle-Side (SAS), and Side-Side-Side (SSS), follow from the definition of similarity in terms of transformations. ✓ Show that the Angle-Angle-Angle (AA) is sufficient to prove two triangles are similar ✓ Find the scale factor of two similar figures ***Triangles*** ✓ Prove the validity of the Triangle Angle Sum Theorem: The sum of the measures of the interior angles of a triangle is 180^{o}. ✓ Draw the midsegment of a triangle. ✓ Prove the validity Midsegment Theorem: The segment connecting the midpoints of two sides of a triangle is parallel to and half the length of the third side. ✓ Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle using a	✓ *Rigid motion* ✓ *Non-rigid motion* ✓ *Prime notation* ✓ *Congruent* ✓ *Pre-Image* ✓ *Image* ✓ *Corresponding parts* ✓ *Line of Reflection* ✓ *Center of rotation* ✓ *Angle of rotation* ✓ *Scale Factor* ✓ *Congruent Figures* ✓ *Similar Figures* ✓ Side-Side-Side Similarity (SSS) ✓ Angle-Angle Similarity (AA) ✓ Side-Angle-Side Similarity (SAS) ✓ *Composition (of transformations)* ✓ *Angle-Side-Angle (ASA)* ✓ *Side-Angle-Side (SAS)* ✓ *Side-Side-Side (SSS)* ✓ *Angle-Angle-Side (AAS)* ✓ Hypotenuse-Leg (HL) ✓ *Triangle Angle Sum Theorem* ✓ *Midsegment of a triangle* ✓ *Midsegment Theorem*

Math 2 UNIT 4 OVERVIEW: Congruence & Similarity Parent Guide

compass and a straight edge. ✓ Find the point on a directed line segment that separates the segment in a given ratio.	✓ *Cross-section* ✓ *Density*

Key Standards Addressed Connections to Common Core/NC Essential Standards	**Where This Unit Fits** Connections to prior and future learning
NC.M2.G-CO.6 Determine whether two figures are congruent by specifying a rigid motion or sequence of rigid motions that will transform one figure onto the other. **NC.M2.G-CO.7** Use the properties 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. **NC.M2.G-CO.8** Use congruence in terms of rigid motion. Justify the ASA, SAS, and SSS criteria for triangle congruence. Use criteria for triangle congruence (ASA, SAS, SSS, HL) to determine whether two triangles are congruent. **NC.M2.G-CO.9** Prove theorems about lines and angles and use them to prove relationships in geometric figures including: ● Vertical angles are congruent. ● When a transversal crosses parallel lines, alternate interior angles are congruent. ● When a transversal crosses parallel lines, corresponding angles are congruent.	**Coming into this unit, students should have a strong foundation in:** ✓ Identifying whether a single transformation is a translation, reflection, rotation, or dilation. ✓ Determining the translation vector or, if graphed on the coordinate plane, give a verbal description of the horizontal and vertical change, given a pre-image and its translated image,. ✓ Determining the line of reflection given a pre-image and its reflected image ✓ Determining the center of rotation and angle of rotation given a pre-image and its rotated image ✓ Determining the scale factor given a pre-image and its dilated image ✓ Given a pre-image and its dilated image on the coordinate plane, determine an algebraic rule** to describe the dilation. ✓ Using geometric descriptions of rigid motions to transform figures. ✓ Draw on plain paper a translation given a translation vector; a reflection given a line of reflection; a rotation given a center and angle of rotation;, and a dilation given a scale factor and center of dilation. **This unit builds to the following future skills and concepts:**

Math 2 UNIT 4 OVERVIEW: Congruence & Similarity Parent Guide

• Points are on a perpendicular bisector of a line segment if and only if they are equidistant from the endpoints of the segment. • Use congruent triangles to justify why the bisector of an angle is equidistant from the sides of the angle. **NC.M2.G-CO.10** Prove theorems about triangles and use them to prove relationships in geometric figures including: • The sum of the measures of the interior angles of a triangle is 180 degrees. • An exterior angle of a triangle is equal to the sum of its remote interior angles. • The base angles of an isosceles triangle are congruent. • The segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length. **NC.M2.G-SRT.2** Understand similarity in terms of transformations. a. Determine whether two figures are similar by specifying a sequence of transformations that will transform one figure into the other. b. Use the properties of dilations to show that two triangles are similar when all corresponding pairs of sides are proportional and all corresponding pairs of angles are congruent. **NC.M2.G-SRT.3** Use transformations (rigid motions and dilations) to justify the AA criterion for triangle similarity. **NC.M2.G-SRT.4** Use similarity to solve problems and to prove theorems	✓ Continued experimentation with transformations in the coordinate plane. ✓ Making connections between geometric and algebraic transformations. ✓ Writing a logical argument with a “given” and a “prove” statement. ✓ Using deductive reasoning to construct formal geometric proofs. ✓ Constructing geometric shapes using various tools, including dynamic geometry software. ✓ Applying geometric concepts to solve more complex modeling and design problems.

Math 2 UNIT 4 OVERVIEW: Congruence & Similarity Parent Guide

about triangles. Use theorems about triangles to prove relationships in geometric figures. ● A line parallel to one side of a triangle divides the other two sides proportionally and its converse. ● The Pythagorean Theorem.	

Additional Resources Materials to support understanding and enrichment
✓ **Congruent Figures and Triangle Congruence** o Concepts of Congruence – (Reference Notes) Explanations of congruent figures in terms of rigid motions o Testing Congruence by Transformations – (Video) Explores transformations and tests for congruency of the figures o Testing Congruence by a Combination of Transformations – (Video) Explores combinations of transformations and tests for congruency o Criteria for Triangle Congruence – (Reference Notes) Explanations of the validity of triangle congruence of ASA, SAS, and SSS along with explanations of why AAA and SSA are not valid. o Congruent Triangles Tests– (Video) Explores triangle congruency postulates and theorems of SSS, SAS, and ASA along with AAA and SSA o Proving Triangles are Congruent – (Video) Explores pairs of given triangles and tests congruency. ✓ **Triangles** o Triangle Theorems – (Reference Notes) Explanations and proofs of the Triangle Sum Theorem, the Midsegment Theorem and other triangle relationships

WAKE COUNTY PUBLIC SCHOOL SYSTEM

High School Programs

Math 2 UNIT 4 OVERVIEW: Congruence & Similarity Parent Guide

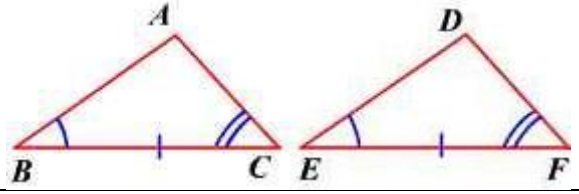
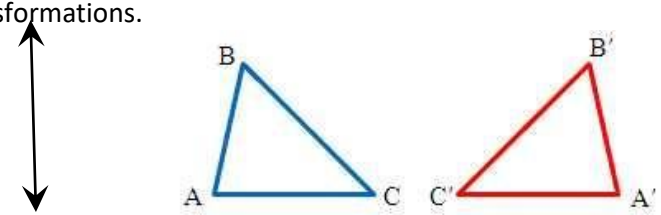
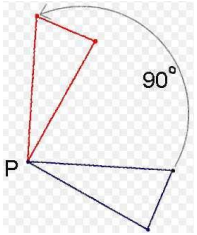
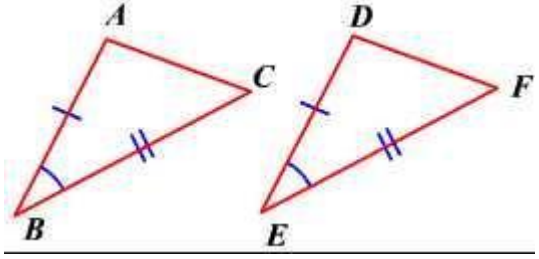
Glossary		
Angle-Side-Angle (ASA)	If two angles and the included side of one triangle are congruent to the corresponding two angles and included side of another triangle, then the triangles are congruent. 	Click to return to Key Vocabulary List
Composition (of transformations)	A series of transformations produced one after the other such that the image of the first transformation becomes the preimage of the second.	
Congruent	Having the same size and shape.	
Congruent figures	Figures having the same size and shape; for polygons the corresponding angles and sides are congruent.	
Corresponding parts	When figures are in the same orientation, the parts on one figure that map onto the parts of another figure.	
Cross-section	The two-dimensional figure formed when a plane passes through a solid.	

Image	The figure that is a result of a transformation of a previous geometric figure	Click to return to Key Vocabulary List
Line of Reflection	The location where a preimage flips over to create the image. The corresponding parts of the pre-image and image are equidistant to the line of reflection.	
Midsegment Theorem	A segment is a midsegment of a triangle if and only if the segment connecting two sides of the triangle is parallel and half the length of the third side of the triangle.	
Midsegment of a triangle	Segment whose endpoints are the midpoints of two sides of a triangle.	
Non-rigid motion	A motion in which the preimage and image are not congruent.	
Preimage	Original figure in a transformation	

WAKE COUNTY PUBLIC SCHOOL SYSTEM

High School Programs

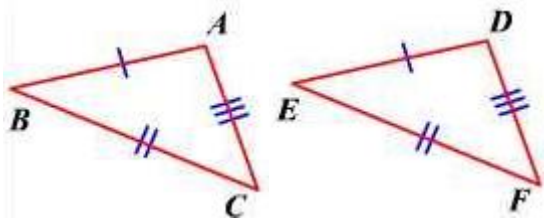
Math 2 UNIT 4 OVERVIEW: Congruence & Similarity Parent Guide

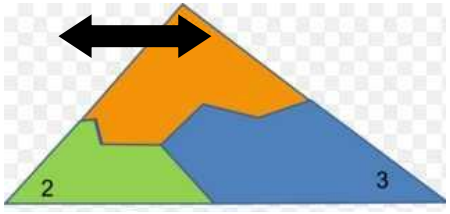
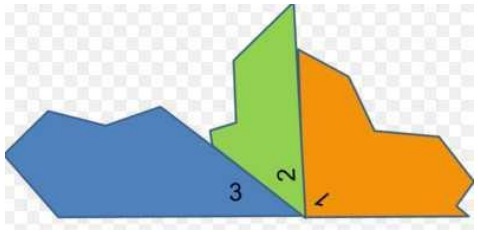
Prime notation	Symbolic representation given to images as a result of a transformation. If P is the original figure, then P' (read P prime) is the original figure after one transformation; P'' (read P double-prime) is the result of the original figure after two transformations. 	
Rigid motion	Transformation in which the preimage and image are congruent (the same size and shape).	
Rotation	It is a rigid motion that turns a figure in a given direction a given number of degrees (angle of rotation) about a fixed point (the center of rotation). The corresponding parts of the preimage and image are equidistant to the center of rotation and have all turned angle of rotation amount. 	[Click to return to Key Vocabulary List]
Scale factor	The ratio of a side of a preimage to the corresponding side of its image in two similar figures	
Side-Angle-Side (SAS)	If two sides and the included angle of one triangle are congruent to the corresponding two sides and included angle of another triangle, then the triangles are congruent. 	

WAKE COUNTY PUBLIC SCHOOL SYSTEM

High School Programs

Math 2 UNIT 4 OVERVIEW: Congruence & Similarity Parent Guide

Side-Side-Side (SSS)	If sides of one triangle are congruent to the corresponding three sides of another triangle, then the triangles are congruent. 	
Similar figures	Geometric figures whose corresponding angles are congruent and whose corresponding sides are proportional	
Transformation of a geometric figure	Motion which causes the change of a figures the position, shape, or size.	

Translation vector (honors only)	an arrow that indicates the distance and direction to translate a figure in a plane	[Click to return to Key Vocabulary List]
Triangle Angle Sum Theorem	The sum of the measures of the interior angles of a triangle is 180^{o}.  	

*** Please note**, the unit guides are a work in progress. If you have feedback or suggestions on improvement, please feel free to contact sdupree@wcpss.net.