Similarity

5.1 Use dilations to show figures similar

CCSS	4 – Mastery	3 – Proficient	2 - Basic	1 – Below Basic	0 – No Evidence
Dilations (5.NF.4, 5.NF.5, 6.NS.1, G.SRT.1)	Can extend thinking beyond the standard, including tasks that may involve one of the following: • Designing • Connecting • Synthesizing • Applying • Justifying • Critiquing • Analyzing • Creating • Proving	Given **the image and a rational scale factor, find the pre-image** Given a pre-image and image, **determine the scale factor to prove a dilation (centered at the origin) is a reduction or enlargement**	Given a rational scale factor, dilate a pre-image **from any point** Given a **scale factor and no images, explain what type of dilation occurred**	Given a rational scale factor, dilate a pre-image **from the origin** Given a pre-image and image, **determine if it is an enlargement or reduction**	Little evidence of reasoning or application to solve the problem Does not meet the criteria in a level 1
Properties of Dilations (G.SRT.1) **Explain similarity** (G.SRT.2)		**Verify** that when a side passes through the center of dilation, **the side and its image lie on the same line.** Verify that corresponding sides of the pre-image and images are **parallel and** proportional after dilation. Explain **using transformations** if two figures are similar by verifying ● corresponding angles are congruent ● corresponding sides are proportional	Given an image and the pre-image, **determine the center of dilation** Verify that corresponding sides of the pre-image and images are **proportional by finding the scale factor.** **Explain** if two figures are similar by verifying ● corresponding angles are congruent ● corresponding sides are proportional	**Perform dilation** with a given center and scale factor on a figure in the coordinate plane. **Show mathematically** if two figures are similar by verifying ● corresponding angles are congruent ● corresponding sides are proportional	

5.NF.5 Interpret multiplication as scaling (resizing), Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.

5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

G.SRT.1 Verify experimentally the properties of dilations given by a center and a scale factor:

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.

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.

Similarity

5.2 Explain and prove similarity theorems

CCSS	4 – Mastery	3 – Proficient	2 - Basic	1 – Below Basic	0 – No Evidence
Prove similar triangles (G.SRT.3)	Can extend thinking beyond the standard, including tasks that may involve one of the following: • Designing • Connecting • Synthesizing • Applying • Justifying • Critiquing • Analyzing • Creating • Proving	Prove, algebraically (multistep equations) for **all** using transformations of the following theorems: • Angle-Angle (AA) criterion for two triangles to be similar • SAS for two triangles to be similar • SSS for two triangles to be similar	Solve algebraically (one and two step) for **2** of the following theorem: • AA criterion for two triangles to be similar • SAS for two triangles to be similar • SSS for two triangles to be similar	**Identify** if triangles are similar by: • AA~ • SAS~ • SSS~	Little evidence of reasoning or application to solve the problem Does not meet the criteria in a level 1
Solve and prove relationships (G.SRT.5, G.MG.3, 8.EE.7, 7.RP.3)		Solve **and prove (by justifying proportionality and angle congruence)** geometric problems using congruence and similarity (include expressions with variables)	Solve **real world** geometric problems using angle congruence and proportionality **(include expressions with variables)**	Solve **mathematical** geometric problems using angle congruence **and** proportionality (numeric values only)	
Prove triangle theorems (G.SRT.4, G.CO.10, G.SRT.5, 8.EE.7)		**Prove (informal, explanation, etc.) all** of the following theorems: • A line parallel to one side of a triangle divides the other two proportionally • **If a line divides two sides of a triangle proportionally; then it is parallel to the third side.** • Pythagorean Theorem proved using triangle similarity	Solve geometric problems **(involving expressions)** using congruence and similarity for the following theorems: • A line parallel to one side of a triangle divides the other two proportionally • Pythagorean Theorem proved using triangle similarity	Solve geometric problems **(numerical)** using congruence and similarity for the following theorems: • A line parallel to one side of a triangle divides the other two proportionally • Pythagorean Theorem proved using triangle similarity	

G.SRT.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
G.SRT.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
G.SRT.4 Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.
G.CO.10 Prove theorems about triangles. Theorems include: ~~measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent~~; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length~~; the medians of a triangle meet at a point~~
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).★
7.RP.3 Use proportional relationships to solve multi-step ratio ~~and percent~~ problems.
8.EE.7 Solve linear equations in one variable. a - Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers). b - Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.