TEKS Cluster: Geometry and Measurement – Two-Dimensional

8.3 **Proportionality.** The student applies mathematical process standards to use proportional relationships to describe dilations.

8.10 **Two-dimensional shapes.** The student applies mathematical process standards to develop transformational geometry concepts.

Connected Knowledge and Skills 8.8

Triangles and Transversals

Supporting Standards

8.8(D) use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles

Dilations

Readiness Standards

8.3(C) use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation

Supporting Standards

8.3(A) generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation

8.3(B) compare and contrast the attributes of a shape and its dilation(s) on a coordinate plane

8.10(D) model the effect on linear and area measurements of dilated two-dimensional shapes

Transformations

Readiness Standards

8.10(C) explain the effect of translations, reflections over the *x*- or *y*-axis, and rotations limited to 90°, 180°, 270°, and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation

Supporting Standards

8.10(A) generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane

8.10(B) differentiate between transformations that preserve congruence and those that do not

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8.8(D) Supporting

Subcluster: Triangles and Transversals

8.8(D)

8.8 Expressions, equations, and relationships. The student applies mathematical process standards to use one-variable equations or inequalities in problem situations. The student is expected to:

(D) use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles

Stimulus

Word Problem	Verbal Description*	Chart/Table	Graph
Equation/ Expression*	Ordered Pairs	Diagram/Image*	Number Line
Base Ten Blocks	Measurement Tool	Formula	Geometric Figures*

Item Types

Multiselect (2 pts)	Match Table Grid (2 pts)	Drag and Drop* (1-2 pts)	Fraction Model (1-2 pts)
Hot Spot (1-2 pts)	Inline Choice (1-2 pts)	Number Line (1-2 pts)	Graphing (1-2 pts)
Text Entry (1-2 pts)	Equation Editor (1-2 pts)	Multiple Choice* (1 pt)	

Academic Vocabulary

adjacent angle
complementary*/supplementary* angles
congruent*
exterior angle
interior angle
parallel*
transversal
vertical angle

Interesting Items

8.8(D) 2024 #14
8.8(D) 2021 #27
8.8(D) 2016 #24

Role in Concept Development

Supports

- G.5(A) investigate patterns to make conjectures about geometric relationships, including angles formed by parallel lines cut by a transversal, criteria required for triangle congruence, special segments of triangles, diagonals of quadrilaterals, interior and exterior angles of polygons, and special segments and angles of circles choosing from a variety of tools
- G.7(B) apply the Angle-Angle criterion to verify similar triangles and apply the proportionality of the corresponding sides to solve problems

Connection/ Relevance

Being able to use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles reinforces an understanding of the process for making conjectures and investigating patterns for these geometric relationships.

When to Teach

Before/Prerequisite to G.5(A) and G.7(B)

Instructional Implications

Students should use informal arguments to establish facts about the angle sum and exterior angle of triangles, angles created when parallel lines are cut by a transversal, and angle-angle criterion of similar triangles. Informal arguments are not formal geometric proofs and do not use proof notation. Instruction should integrate informal arguments for the angle-angle criterion into instruction with similar figures and dilations.

Students should be able to use the following angle recognitions to informally argue the established facts:

- vertical angles
- alternate interior angles
- alternate exterior angles
- same side exterior angles
- same side interior angles
- corresponding angles

Students may be expected to write an equation to demonstrate the relationship between the exterior angle of a triangle and the sum of the measures of the two nonadjacent angles.

Learning from Mistakes

Students may make the following mistakes:

- Incorrectly identifying angle pairs created by a parallel line cut by a transversal*
- Not connecting properties for similar figures to determine the missing angle measure in a triangle
- Not relating supplementary angles to the sum of the angles in a triangle*

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TEKS Scaffold

TEKS	Student Expectation
G.3(B)	determine the image and pre-image of a give two-dimensional figure under a composition of rigid transformation, a composition of non-rigid transformations, and composition of both, including dilations where the center can be any point in the plane (R)
8.10(D)	model the effect on linear and area measurements of dilated two-dimensional shapes
8.3(C)	**8.3 Proportionality.** The student applies mathematical process standards to use proportional relationships to describe dilations. The student is expected to: **(C) use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation**
8.3(A)	generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation (S)
8.3(B)	compare and contrast the attributes of a shape and its dilation(s) on a coordinate plane (S)
7.5(C)	solve mathematical and real-world problems involving similar shape and scale drawings
7.5(A)	generalize the critical attributes of similarity, including ratios within and between similar shapes (S)

Stimulus

Word Problem*	Verbal Description*	Chart/Table*	Graph*
Equation/ Expression*	Ordered Pairs*	Diagram/Image*	Number Line
Base Ten Blocks	Measurement Tool	Formula	Geometric Figures*

Academic Vocabulary

center of dilation*
dilation*/dilated*
origin*
prime notation/rule*
scale factor*

Interesting Items

8.3(C) 2023 #33
8.3(C) 2021 #20
8.3(C) 2019 #24
8.3(C) 2017 #5
8.3(C) 2016 #26

Content Builder (see Appendix for Tree Diagram)

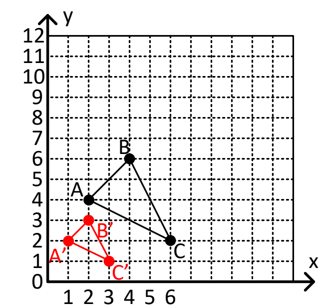
- Use an algebraic representation of a scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation

Instructional Implications

Students use an algebraic representation to explain the effect of a scale factor on a two-dimensional figure on a coordinate plane with the origin as the center of dilation.

- If the scale factor is between 0 and 1 the figure reduces
- If the scale factor > 1 the figure is enlarged
- If the scale factor = 1 the figure remains the same size

For example, triangle ABC with vertices A(2, 4), B(6, 2), C(4, 6) is dilated by a scale factor of $\frac{1}{2}$ with the origin as the center of dilation; the coordinates of the dilated image are A'(1, 2), B'(3, 1), C'(2, 3), and each corresponding vertex of the dilated image is half the distance from each axis as each vertex of the original triangle, as shown in the coordinate plane at right. The algebraic representation for the coordinates of the dilation with a scale factor of $\frac{1}{2}$ in the diagram would be (0.5*x*, 0.5*y*), where (*x*, *y*) are the coordinates of the original shape.



Instruction should include a variety of dilation problems involving shapes that are proportionally decreased or increased in size, in different quadrants on the coordinate plane, and the scale factor should be a positive rational number. Problems may also include shapes where one vertex is at the origin.

Students should be exposed to problems with verbal descriptions only (e.g., problems that do not include graphics).

Learning from Mistakes

Students may make the following mistakes:
- Using any vertex as the center of dilation rather than the origin*
- Not enlarging or reducing a shape proportionally
- Adding the scale factor to (*x*, *y*) to find new coordinate points instead of multiplying (*x*, *y*) by the scale factor (i.e. using additive relationship instead of multiplicative)*
- Using the value that is added/subtracted to the longest side lengths as the scale factor, *k* in the rule (*x*, *y*) -> (*kx*, *ky*)

Item Types

Multiselect (2 pts)	Match Table Grid (2 pts)	Drag and Drop* (1-2 pts)	Fraction Model (1-2 pts)
Hot Spot (1-2 pts)	Inline Choice (1-2 pts)	Number Line (1-2 pts)	Graphing (1-2 pts)
Text Entry (1-2 pts)	Equation Editor (1-2 pts)	Multiple Choice* (1 pt)	

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8.3(A) **8.3 Proportionality.** The student applies mathematical process standards to use proportional relationships to describe dilations. The student is expected to:

(A) generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation

Stimulus

Word Problem*	Verbal Description	Chart/Table	Graph
Equation/ Expression*	Ordered Pairs	Diagram/Image*	Number Line
Base Ten Blocks	Measurement Tool	Formula	Geometric Figures*

Item Types

Multiselect (2 pts)	Match Table Grid (2 pts)	Drag and Drop (1-2 pts)	Fraction Model (1-2 pts)
Hot Spot (1-2 pts)	Inline Choice (1-2 pts)	Number Line (1-2 pts)	Graphing (1-2 pts)
Text Entry (1-2 pts)	Equation Editor (1-2 pts)	Multiple Choice* (1 pt)	

Academic Vocabulary

corresponding side
dilation*/dilated*
proportion*
ratio
scale factor*

Interesting Items

8.3(A) 2024 #6

Role in Concept Development

Supports

8.3(C) use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation

Connection/ Relevance

Generalizing the ratio of corresponding sides of similar shapes is the foundation for students to be able to use an algebraic representation to explain the effects of a scale factor applied to two-dimensional figures on a coordinate plane.

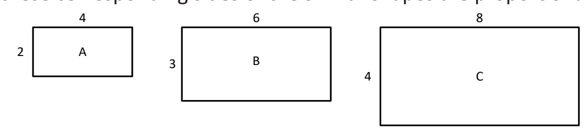
Role in Concept Development (continued)

When to Teach

Before/With 8.3(C)

Instructional Implications

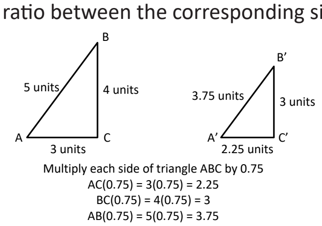
Students should generalize that the ratio of corresponding sides of similar shapes are proportional. For rectangles A, B, and C, the ratios of corresponding sides are equal; therefore, these corresponding sides of the similar shapes are proportional.



Within Ratio Rectangles A and B	Within Ratio Rectangles A and C	Within Ratio Rectangles B and C
$\frac{\text{width A}}{\text{length A}} = \frac{\text{width B}}{\text{length B}}$	$\frac{\text{width A}}{\text{length A}} = \frac{\text{width C}}{\text{length C}}$	$\frac{\text{width B}}{\text{length B}} = \frac{\text{width C}}{\text{length C}}$
$\frac{2}{4} = \frac{3}{6}$	$\frac{2}{4} = \frac{4}{8}$	$\frac{3}{6} = \frac{4}{8}$

Between Ratio Rectangles A and B	Between Ratio Rectangles A and C	Between Ratio Rectangles B and C
$\frac{\text{width A}}{\text{width B}} = \frac{\text{length A}}{\text{length B}}$	$\frac{\text{width A}}{\text{width C}} = \frac{\text{length A}}{\text{length C}}$	$\frac{\text{width B}}{\text{width C}} = \frac{\text{length B}}{\text{length C}}$
$\frac{2}{3} = \frac{4}{6}$	$\frac{2}{4} = \frac{4}{8}$	$\frac{3}{4} = \frac{6}{8}$

Instruction should also include a shape and its dilation (e.g., a similarity transformation in which a figure is enlarged, scale factor > 1, or reduced, 0 < scale factor < 1, or congruent, scale factor = 1) as shown in the diagram below where an original triangle was proportionally reduced using a scale factor = $\frac{3}{4}$ (e.g., the length of each side of triangle ABC was multiplied by a scale factor of $\frac{3}{4}$ to create a dilation such that the ratio between the corresponding sides of the two triangles are proportional).



Ratio Between Corresponding Sides		
$\frac{AC}{A'C'} = \frac{3}{2.25} = \frac{4}{3}$	$\frac{BC}{B'C'} = \frac{4}{3}$	$\frac{AB}{A'B'} = \frac{5}{3.75} = \frac{4}{3}$

Learning from Mistakes

Students may make the following mistakes:

- Thinking of proportions as an additive relationship instead of a multiplicative relationship
- Setting up proportions incorrectly*

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8.3(B) **8.3 Proportionality.** The student applies mathematical process standards to use proportional relationships to describe dilations. The student is expected to:

(B) compare and contrast the attributes of a shape and its dilation(s) on a coordinate plane

Stimulus

Word Problem	Verbal Description*	Chart/Table	Graph*
Equation/ Expression	Ordered Pairs	Diagram/Image	Number Line
Base Ten Blocks	Measurement Tool	Formula	Geometric Figures*

Item Types

Multiselect (2 pts)	Match Table Grid (2 pts)	Drag and Drop (1-2 pts)	Fraction Model (1-2 pts)
Hot Spot (1-2 pts)	Inline Choice (1-2 pts)	Number Line (1-2 pts)	Graphing (1-2 pts)
Text Entry (1-2 pts)	Equation Editor (1-2 pts)	Multiple Choice* (1 pt)	

Academic Vocabulary

dilation*/dilated*
scale factor*

Interesting Items

8.3(B) 2023 #11
8.3(B) 2022 #29

Role in Concept Development

Supports

8.3(C) use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation

Connection/ Relevance

The ability to compare and contrast the attributes of a shape and its dilation on a coordinate plane is the foundation for students to use an algebraic representation to explain the effects of a scale factor applied to two-dimensional figures on a coordinate plane.

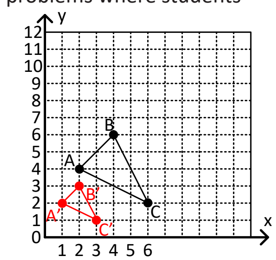
When to Teach

Before/With 8.3(C)

Instructional Implications

In conjunction with 8.3(A), instruction should include problems where students compare and contrast the attributes of a shape and its dilation on a coordinate plane.

Consider the diagram at right where triangle ABC with vertices A(2, 4), B(6, 2), C(4, 6) is dilated by a scale factor of $\frac{1}{2}$, and the coordinates of the dilated triangle A'B'C' are A'(1, 2), B'(3, 1), C'(2, 3).



Students may use a table to compare and contrast the attributes of the two triangles.

Compare	Contrast
Corresponding angles are congruent	Sides are different lengths
Same shape	Different sizes
Polygons with three vertices, three sides	Corresponding vertices of the dilated image are half the distance from each axis as the vertices of the original shape

Learning from Mistakes

Students may make the following mistakes:
- Confusing similarity and congruence*
- Having difficulty communicating the similarities/differences between the attributes of the given figure to its dilation*
- Assuming that the angle measures in dilated figures are also enlarged or reduced

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8.10(D)

8.10 Two-dimensional shapes. The student applies mathematical process standards to develop transformational geometry concepts. The student is expected to:

(D) model the effect on linear and area measurements of dilated two-dimensional shapes

Stimulus

Word Problem*	Verbal Description*	Chart/Table	Graph
Equation/ Expression	Ordered Pairs	Diagram/Image	Number Line
Base Ten Blocks	Measurement Tool	Formula	Geometric Figures

Item Types

Multiselect (2 pts)	Match Table Grid (2 pts)	Drag and Drop (1-2 pts)	Fraction Model (1-2 pts)
Hot Spot (1-2 pts)	Inline Choice (1-2 pts)	Number Line (1-2 pts)	Graphing (1-2 pts)
Text Entry (1-2 pts)	Equation Editor (1-2 pts)	Multiple Choice* (1 pt)	

Academic Vocabulary

area*
dilation/dilated
length
scale factor
similar*

Interesting Items

8.10(D) 2023 #35
8.10(D) 2016 #13

Role in Concept Development

Supports

8.3(C) use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation

Connection/ Relevance

Being able to model the effect on linear and area measurements of dilated two-dimensional shapes provides a foundation for students to use an algebraic representation to explain the effect of a given scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation.

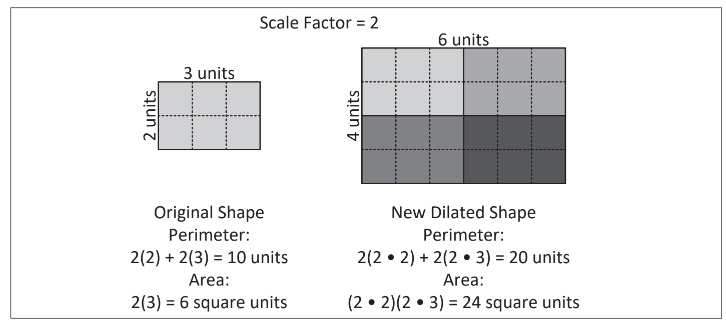
When to Teach

After 8.3(C)

Instructional Implications

Students should model the effect on linear and area measurements of dilated two-dimensional shapes.

- Linear measurements of dilated shape = original linear measurements • scale factor
- Area measurements of dilated shape = original area measurements • (scale factor)2



Learning from Mistakes

Students may make the following mistakes:

- Multiplying the area of the original figure by the scale factor to determine the area of the dilated image*
- Applying the scale factor to one of the sides of the figure instead of all the sides
- Adding the scale factor instead of multiplying (using additive relationship instead of multiplicative)*

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8.10(C) Readiness

Subcluster: Transformations

TEKS Scaffold

TEKS	Student Expectation
G.3(A)	describe and perform transformations of figures in a plane using coordinate notation (S)
	8.10 Two-dimensional shapes. The student applies mathematical process standards to develop transformational geometry concepts. The student is expected to:
8.10(C)	**(C) explain the effect of translations, reflections over the *x*- or *y*-axis, and rotations limited to 90°, 180°, 270°, and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation**
8.10(A)	generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane (S)

Stimulus

Word Problem*	Verbal Description*	Chart/Table	Graph*
Equation/ Expression*	Ordered Pairs*	Diagram/Image	Number Line
Base Ten Blocks	Measurement Tool	Formula	Geometric Figures*

Item Types

Multiselect (2 pts)	Match Table Grid (2 pts)	Drag and Drop* (1-2 pts)	Fraction Model (1-2 pts)
Hot Spot (1-2 pts)	Inline Choice (1-2 pts)	Number Line (1-2 pts)	Graphing (1-2 pts)
Text Entry (1-2 pts)	Equation Editor (1-2 pts)	Multiple Choice* (1 pt)	

Academic Vocabulary

center of rotation*
clockwise*/
counter-clockwise
origin*
reflection*
rotation (90°)* (180°)*
rotation (270°, 360°)
transformation*
translation*
x-axis*
y-axis*

Interesting Items

8.10(C) 2024 #35
8.10(C) 2023 #21
8.10(C) 2018 #31
8.10(C) 2017 #27

Content Builder (see Appendix for Tree Diagram)

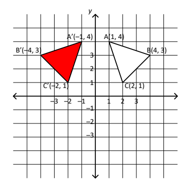
- Explain the effect of translations as applied to two-dimensional shapes on a coordinate plane using algebraic representation
- Explain the effect of reflections over the *x*- or *y*-axis as applied to two-dimensional shapes on a coordinate plane using algebraic representation
- Explain the effect of rotations limited to 90°, 180°, 270°, and 360° as applied to two-dimensional shapes on a coordinate plane using algebraic representation

Instructional Implications

Students should explain the effect of transformations (translations, reflections, and rotations) using algebraic representation:

- Translations: translation of (x, y) four units left and three units up is $\{x - 4, y + 3)$
- Reflections: reflection of (x, y) over the *x*-axis is $(x, -y)$ and reflection of (x, y) over the *y*-axis is $(-x, y)$
- Rotations about the origin: rotation of 90° counterclockwise or 270° clockwise for $(x, y) \rightarrow (-y, x)$; rotation of 180° counterclockwise or clockwise for $(x, y) \rightarrow (-x, -y)$; rotation of 270° counterclockwise or 90° clockwise for $(x, y) \rightarrow (y, -x)$; and rotation of 360° counterclockwise or clockwise for $(x, y) \rightarrow (x, y)$

Instruction should provide opportunities for students to graph a two-dimensional shape on a coordinate plane, perform one of the required transformations, and then explain the effect using algebraic representation, as shown in the example below for a reflection over the *y*-axis.



Reflection over the *y*-axis

Original Shape	Reflection	Algebraic Representation
A(1, 4)	A'(-1, 4)	$(x, y) \rightarrow (-x, y)$
B(4, 3)	B'(-4, 3)	$(x, y) \rightarrow (-x, y)$
C(2, 1)	A'(-2, 1)	$(x, y) \rightarrow (-x, y)$

Instruction should extend to include translations, reflections, and rotations (e.g., designate the point of rotation and the direction of the rotation). It is important to note that if no direction is given for the rotation, the rotation is assumed to be counter-clockwise.

Learning from Mistakes

Students may make the following mistakes:

- Reflecting the original shape across the wrong axis (e.g., reflecting a shape over the *x*-axis when asked to reflect over the *y*-axis)*
- Understanding that translations preserve congruence; dilations do not*
- Confusing what components of the coordinates and/or algebraic representation are impacted by the transformation or dilation of an object*
- Using a multiplicative relationship instead of additive when describing the algebraic rule of a translation*
- Struggling to understand the difference between the algebraic rules for rotations and reflections*

* Used on STAAR
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8.10(A) **8.10 Two-dimensional shapes.** The student applies mathematical process standards to develop transformational geometry concepts. The student is expected to:

(A) generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane

Stimulus

Word Problem	Verbal Description*	Chart/Table	Graph*
Equation/ Expression	Ordered Pairs	Diagram/Image	Number Line
Base Ten Blocks	Measurement Tool	Formula	Geometric Figures

Item Types

Multiselect (2 pts)	Match Table Grid (2 pts)	Drag and Drop (1-2 pts)	Fraction Model (1-2 pts)
Hot Spot (1-2 pts)	Inline Choice (1-2 pts)	Number Line (1-2 pts)	Graphing (1-2 pts)
Text Entry (1-2 pts)	Equation Editor (1-2 pts)	Multiple Choice* (1 pt)	

Academic Vocabulary

clockwise*/counter-clockwise
congruence*
corresponding side length*/angle*
reflection
rotation*
translation*

Interesting Items

8.10(A) 2021 #8

Role in Concept Development

Supports

8.10(C) explain the effect of translations, reflections over the *x*- or *y*-axis, and rotations limited to 90°, 180°, 270°, and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation

Connection/ Relevance

Being able to generalize the properties of orientation and congruence of rotations of two-dimensional shapes on a coordinate plane provides the foundational understanding to explain the effect of translations, reflections, or rotations as applied to two-dimensional shapes.

When to Teach

Before/With 8.10(C)

Instructional Implications

Students generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane.

Properties of orientation can be distinguished with two methods:
- the orientation of the vertices (clockwise or counterclockwise)
- the direction in which the figure is placed on the coordinate plane

Using the first method, orientation is preserved for all transformations except for a reflection. Using the second method, orientation is preserved for dilations and translations, but not for reflections or rotations. Properties of congruence are preserved for rotations, reflections, translations, and dilations with a scale factor of 1. Dilations with scale factors between 0 and 1 create a reduction whereas scale factors greater than 1 create an enlargement.

Learning from Mistakes

Students may make the following mistakes:
- Assuming that if an image is oriented differently on a coordinate plane, then it is no longer congruent to its figure or pre-image, the sum of the interior angles will change, and/or the area of the figure will change*

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8.10(B) **8.10 Two-dimensional shapes.** The student applies mathematical process standards to develop transformational geometry concepts. The student is expected to:

(B) differentiate between transformations that preserve congruence and those that do not

Stimulus

Word Problem	Verbal Description*	Chart/Table	Graph
Equation/ Expression*	Ordered Pairs	Diagram/Image	Number Line
Base Ten Blocks	Measurement Tool	Formula	Geometric Figures

Item Types

Multiselect (2 pts)	Match Table Grid* (2 pts)	Drag and Drop (1-2 pts)	Fraction Model (1-2 pts)
Hot Spot (1-2 pts)	Inline Choice (1-2 pts)	Number Line (1-2 pts)	Graphing (1-2 pts)
Text Entry (1-2 pts)	Equation Editor (1-2 pts)	Multiple Choice* (1 pt)	

Academic Vocabulary

congruence*
reflection*
rotation*
transformation*
translation*

Interesting Items

8.10(B) 2021 #12
8.10(B) 2016 #33

Role in Concept Development

Supports

8.10(C) explain the effect of translations, reflections over the *x*- or *y*-axis, and rotations limited to 90°, 180°, 270°, and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation

Connection/ Relevance

Being able to differentiate between transformations that preserve congruence and those that do not provides the foundational understanding to explain the effect of translations, reflections, or rotations as applied to two-dimensional shapes.

When to Teach

Before/With 8.10(C)

Instructional Implications

In conjunction with 8.10(A), students differentiate between transformations (rotations, reflections, translations, and dilations) that preserve congruence and those that do not. Instruction should include observations made as students perform transformations on a coordinate plane and represent the results concerning congruence in a table similar to the one shown below.

Rotation	Reflection	Translation	Dilation
congruence preserved	congruence preserved	congruence preserved	Congruence not preserved 0 < scale factor < 1: reduce Scale factor = 1: congruent 1 < scale factor: enlarged

Learning from Mistakes

Students may make the following mistakes:

- Assuming that if an image is oriented differently on a coordinate plane, then it is no longer congruent to its figure or pre-image

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