End-of-Unit Assessment (B)

Teacher Instructions

Students need access to a straight edge and tracing paper for this assessment.

1

Standards

Addressing **8.G.A.2**

Narrative

This problem calls upon students to use their understanding of the meaning of congruence and apply it in an abstract situation in which they must think carefully about the taxonomy of quadrilaterals. Students who select choice A or choice E may be thinking that all rhombuses (or all parallelograms) have the same shape. They may be envisioning one of the pattern blocks, for instance, and forget that different rhombuses can have different angles. Students who do not select choice B or choice D may be forgetting that all squares and rectangles must have four right angles.

Student Task Statement

Select **all** the true statements.

A. Two rhombuses with the same side lengths are always congruent.

B. Two squares with the same side lengths are always congruent.

C. Two quadrilaterals with the same side lengths are always congruent.

D. Two rectangles with the same side lengths are always congruent.

E. Two parallelograms with the same side lengths are always congruent.

Solution

B, D

2

Standards

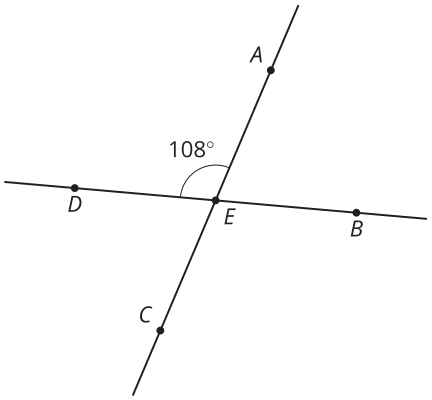
Addressing **8.G.A.1**

Narrative

Students identify vertical angles in a picture.

Student Task Statement

Lines AC and BD intersect at E.



What is the measure of angle BEC?

Solution

108°

3

Standards

Addressing **8.G.A.1.a**

Narrative

The key idea in this problem is that distances between all pairs of corresponding points of congruent figures are the same. It is not enough that the individual parts of complex shapes be congruent, as those parts also need to be in the same position relative to one another.

Student Task Statement

Clare created Figure A. Then she created Figure B by translating Triangle C and then translating Triangle D.

Figure A

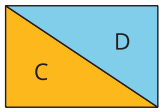
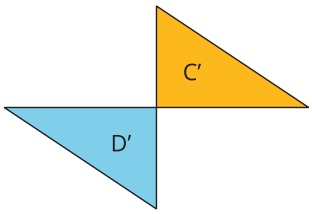


Figure B



Select **all** the true statements.

A. Figure A is congruent to Figure B

B. Figure B is a translation of Figure A.

C. Triangle C is congruent to Triangle C'.

D. Triangle D' is congruent to Triangle D.

E. Each triangle in Figure A has a congruent triangle within Figure B.

Solution

C, D, E

4

Standards

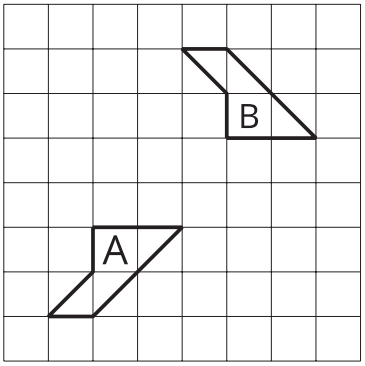
Addressing **8.G.A.2**

Narrative

Students show multistep congruence on a grid.

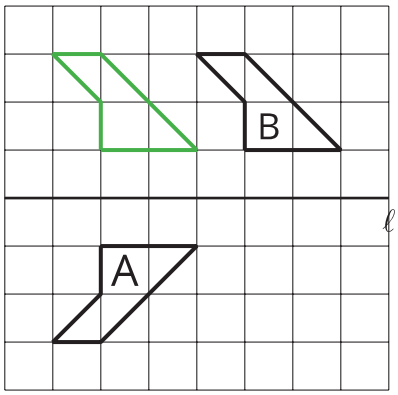
Student Task Statement

Describe a sequence of transformations that shows that Polygon A is congruent to Polygon B.



Solution

Answers vary. Sample response: If Polygon A reflected across line ℓ, a horizontal line 1 unit above the top of Polygon A, and then translated 3 units to the right, it matches up perfectly with Polygon B.



Minimal Tier 1 response:

- Work is complete and correct.
- Sample: Reflect across horizontal line ℓ, 1 unit above Polygon A, and then translate 3 units right.

Tier 2 response:

- Work shows general conceptual understanding and mastery, with some errors.
- Sample errors: Drawing showing the intermediate transformation (the green polygon in the sample response), but no verbal descriptions; incomplete verbal descriptions (such as reference to a reflection without specifying a line); sequence of transformations contains a small, easily identifiable error (such as identifying the wrong number of units in the translation); sequence of transformations is correct but does not use proper vocabulary ("turn" instead of rotate; "move" instead of translate).

Tier 3 response:

- Significant errors in work demonstrate lack of conceptual understanding or mastery.
- Sample errors: explanation without reference to rigid transformations, such as "the shapes have the same lengths and angles"; a sequence of transformations that does not take Polygon A to Polygon B (with no obvious small mistakes responsible for this error); descriptions of transformations are unclear and the intended meaning is not evident.

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Standards

Addressing **8.G.A.2**

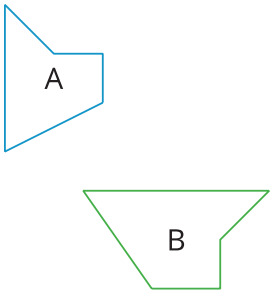
Narrative

Students determine if two shapes are congruent without the use of a grid. Tracing paper would be useful for this task. The description of the transformations when there is a congruence do not have the same precision as a description aided by a grid. That is, students may talk about translating to the left rather than specifying the exact distance on a grid. Similarly, they may talk about a vertical or horizontal reflection or a rotation without necessarily drawing the line of reflection or providing the measure of the angle of rotation.

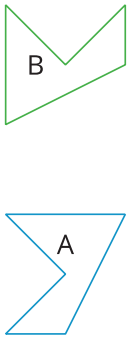
Student Task Statement

For each pair of shapes, decide whether or not Shape A is congruent to Shape B. Explain your reasoning.

1. First pair:



2. Second pair:



Solution

a. Not congruent. The shapes look congruent, but when Shape A is moved on top of Shape B with a translation and a 90-degree clockwise rotation, they do not match up.

b. Congruent. If Shape A is translated so the upper right vertex coincides with the lower left vertex of B, reflected along the horizontal side of the image of Shape A, and then rotated 90 degrees clockwise around the upper right vertex, it will be placed on top of Shape B.

Minimal Tier 1 response:

- Work is complete and correct.
- Acceptable errors: Omitting reference to lines of reflection, centers of rotation, angles of rotation, and distance of translation, provided the visual makes these things clear.
- Sample:

a. (with accompanying accurate drawing) Not congruent, because when I translate Shape A and then rotate it, it still doesn't match up with Shape B. Alternate response: I measured the angles, and they are not the same in the two shapes.

b. (with accompanying accurate drawing) Congruent, because I can translate Shape A, reflect it, and then translate it onto Shape B.

Tier 2 response:

- Work shows general conceptual understanding and mastery, with some errors.
- Sample errors: Transformations are shown, but with no written descriptions; in part b, transformations are done mostly correctly but enough accuracy was lost that the shapes appear to coincide.

Tier 3 response:

- Significant errors in work demonstrate lack of conceptual understanding or mastery.
- Sample errors: Work states that shapes are or are not congruent with no justification; descriptions of transformations are unclear and the intended meaning is not evident; vague explanations such as "the shapes look the same."

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Standards

Addressing **8.G.A.5**

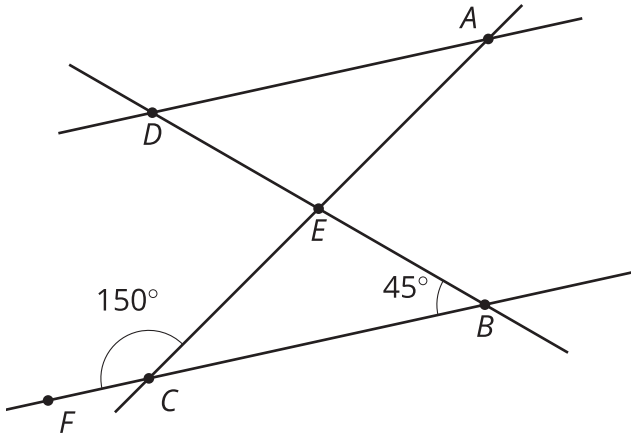
Narrative

Students can use the following to calculate angles:

- Supplementary angles add to 180°.
- Alternate interior angles made by parallel lines both cut by a third line are congruent.
- The three angles of a triangle add to 180°. Here they are asked to use this information to find the angles of a triangle.

Student Task Statement

Lines AD and BC are parallel. Find the measures of the three angles in triangle ADE.



Solution

Angle ADE: 45°; Angle DAE: 30°; Angle DEA: 105°

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Standards

Addressing **8.G.A.5**

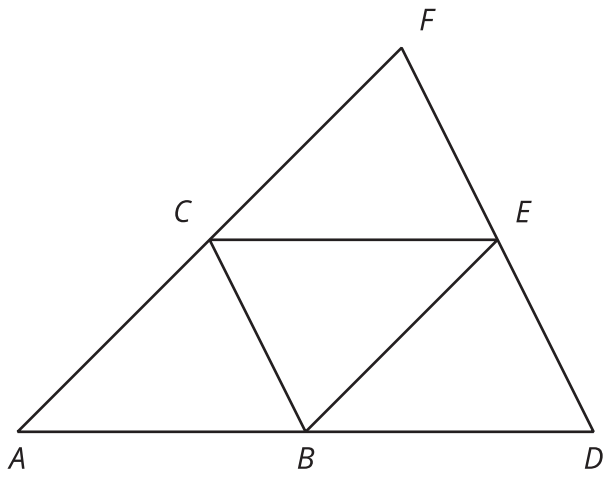
Narrative

Students understand that under a translation, the original figure and the image are congruent. The corresponding angles in congruent figures will also be congruent because rigid motions preserve angle measure. Students know angles that form a line sum to 180 degrees and that angles in a triangle sum to 180 degrees to determine angle

measures in this figure. To explain why the sides are parallel, students will need to recognize a pair of congruent alternate interior angles.

Student Task Statement

To create this diagram, triangle ABC was translated so that A goes to C. Then, triangle ABC was translated so that A goes to B. The measure of angle A is 45° and the measure of angle D is 63°.



a. Identify at least two pairs of congruent angles in the figure and explain how you know they are congruent.

b. What is the measure of angle CBE? Explain how you know.

c. Name a triangle congruent to triangle CBE. Explain how you know.

Solution

a. Answers vary. Any pair of corresponding angles will work. A sequence of rigid motions defines a congruence. Triangle ABC is congruent to triangle BDE and triangle CEF. Since corresponding angles in congruent figures have the same measure, I know that angle CAB is congruent to angle EBD. Similarly, I know that angle ABC is congruent to angle BDE.

b. 72°. Explanations vary. Possible response: Translations preserve angle measure so the measure of angle ABC is 63° and the measure of angle EBD is 45°. The measure of angle CBE is 72° because $180 - 63 - 45 = 72$.

c. Triangle BCA. The corresponding parts of these triangles are congruent so the two triangles are congruent. Because translations preserve side length, AC is congruent to EB and AB is congruent to EC. Side CB is part of both triangles. The measure of angle ACB is 72° because the angles in a triangle sum to 180°. In question 2, the measure of angle EBC is also 72°. Since angles on a line sum to 180°, the measure of angle ECB is 63° and the measure of angle BEC is 45°.

Minimal Tier 1 response:

- Work is complete and correct, with complete explanation or justification.

- Sample:

a. Translations preserve angle measure so angle CAB is congruent to angle FCE and angle CBA is congruent to angle EDB.

b. 72°. Because triangle ABC is congruent to triangle BDE, the measure of angle ABC is 63° and the measure of angle ECD is 45°. The angles at point C form a line and $180 - 63 - 45 = 72$.

c. Triangle BCA. A reflection across the line containing segment BC takes triangle CBE to triangle BCA.

Tier 2 response:

- Work shows good conceptual understanding and mastery, with either minor errors or correct work with insufficient explanation or justification.
- Sample errors: Explanations in parts a and b appeal to the diagram and are logically sequenced but do not appeal specifically to transformations; good complete explanations but a minor error in calculating angle measures or naming congruent figures; uses the fact that angles sum to 180° but does not connect to angles on a line or angles in a triangle.

Tier 3 response:

- Work shows a developing but incomplete conceptual understanding, with significant errors.
- Sample errors: Work does not appeal to transformations or congruent corresponding parts; incomplete explanations and minor errors; three or more error types under Tier 2 response.

Tier 4 response:

- Work includes major errors or omissions that demonstrate a lack of conceptual understanding and mastery.
- Sample errors: Little progress on any of the problem parts; justification with many errors or no justification for parts a and c.