Similarity, Congruence, and Proof

Unit Assessment

Circle the letter of the best answer.

1. If $\triangle DEF$ has vertices with the coordinates D (9, –3), E (–6, 3), and F (3, 6), what are the vertices of $\triangle D'E'F'$ under a dilation with a scale factor of $\frac{2}{3}$ and the center at the origin, (0, 0)?

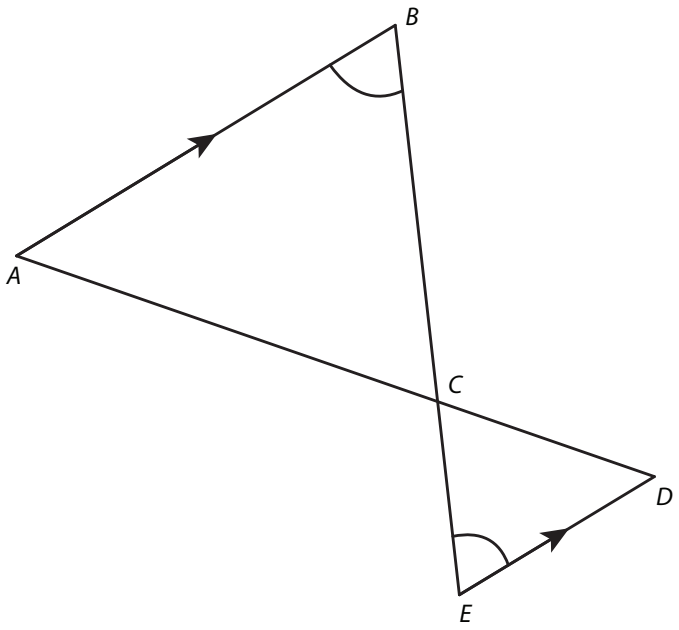
   a. D' (13.5, –4.5), E' (–9, 4.5), F' (4.5, 9)

   b. D' (6, –2), E' (–4, 2), F' (2, 4)

   c. D' (–2, 6), E' (2, –4), F' (4, 2)

   d. D' (–4.5, 13.5), E' (4.5, –9), F' (9, 4.5)

2. Are the two triangles similar? Why or why not?



   a. Yes, they are similar because of the AA Similarity Statement.

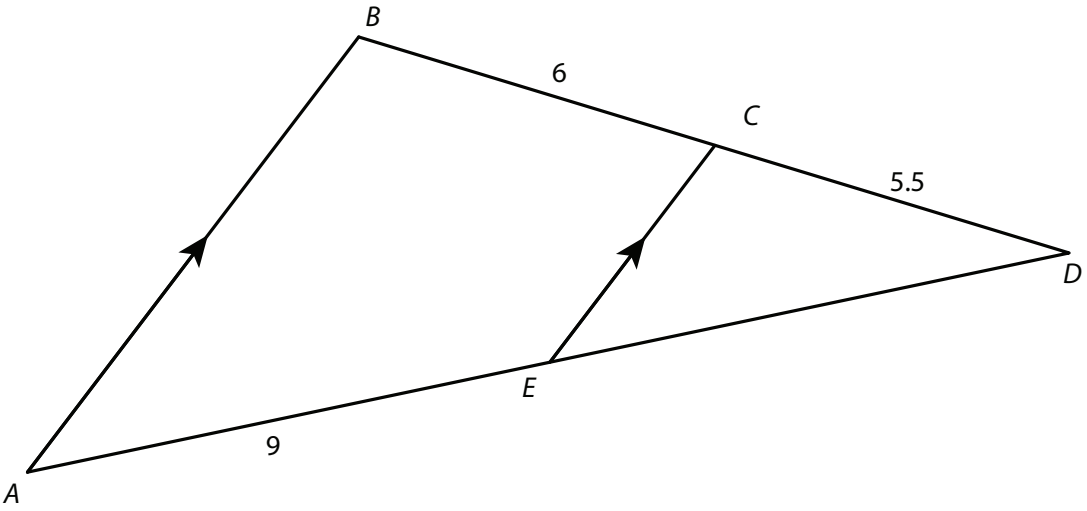
   b. Yes, they are similar because of the ASA Congruence Statement.

   c. No, they are not similar because congruence is not preserved.

   d. It cannot be determined if the triangles are similar.

continued

3. $\triangle ABD \sim \triangle ECD$. What is the length of $\overline{DE}$?



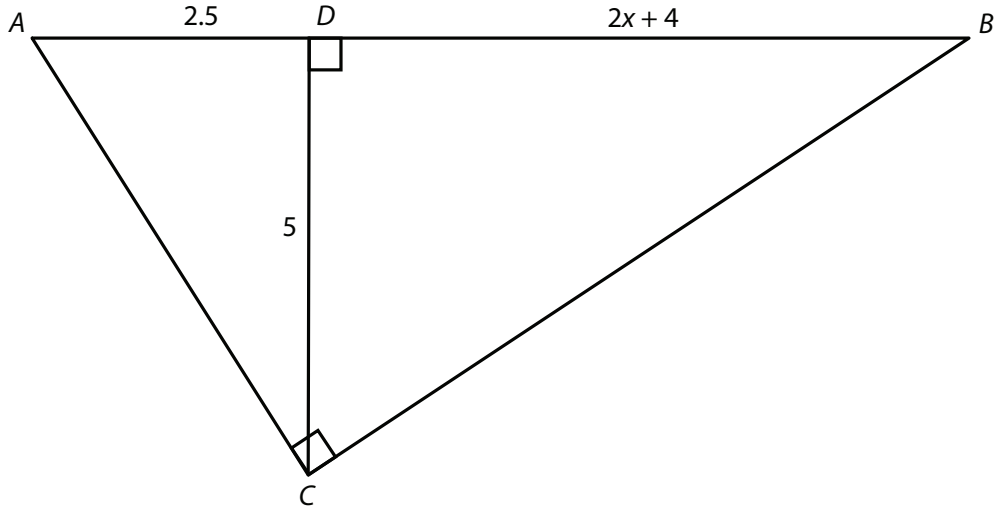
a. 8.25 units

b. 8.5 units

c. 9.8 units

d. There is not enough information to determine the length of $\overline{DE}$.

4. $\triangle ABC$ is a right triangle. Find the length of $\overline{BD}$.



a. 3 units

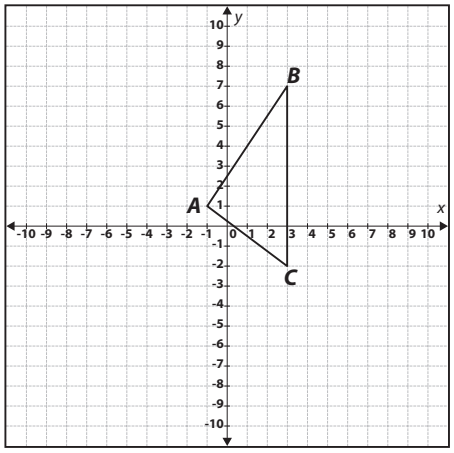
b. 7.5 units

c. 10 units

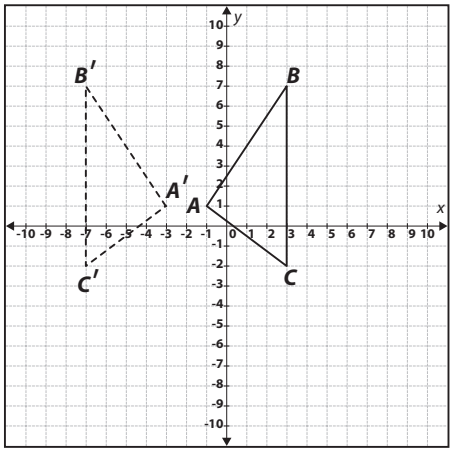
d. There is not enough information to determine the length of $\overline{BD}$.

continued

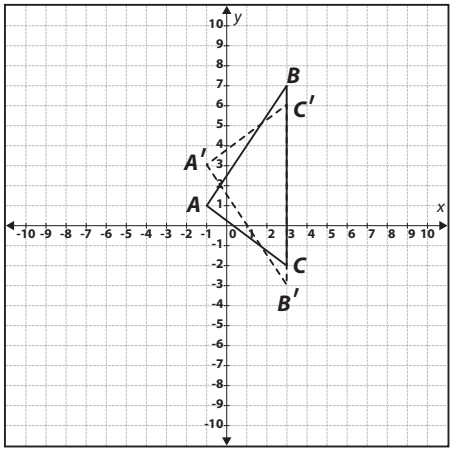
5. Which illustration shows the effect(s) of reflecting the given triangle over the line $x = -2$?



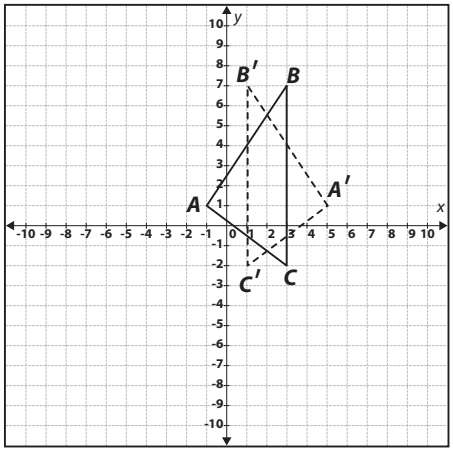
a.



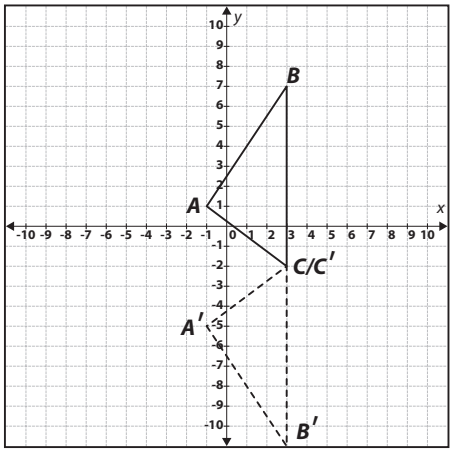
c.



b.



d.



continued

6. For $\triangle EFG$ and $\triangle MNP$, it is known that $\overline{EF} \cong \overline{MN}$, $\angle G \cong \angle P$, and $\overline{FG} \cong \overline{NP}$. Determine if the triangles are congruent, and if so, by which type of congruency.

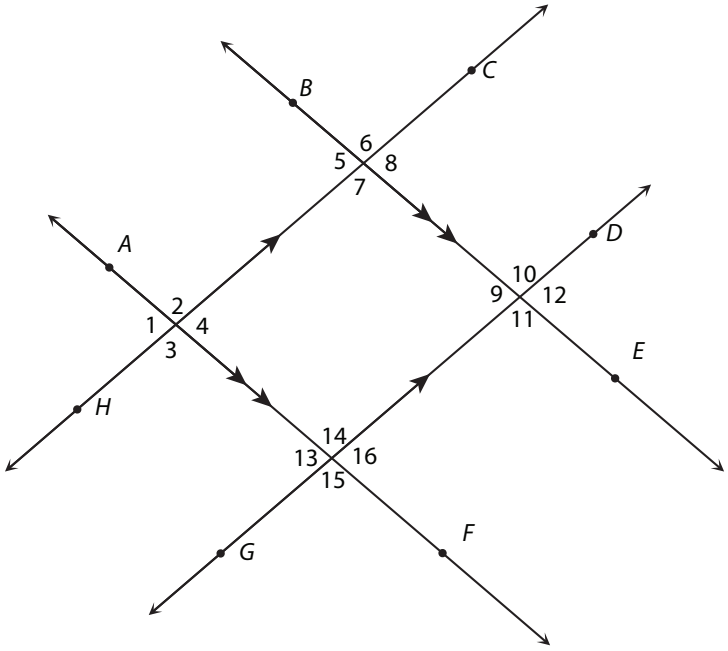
   a. SSS

   b. SAS

   c. ASA

   d. It cannot be determined if the triangles are congruent.

7. Given two sets of parallel lines in the diagram below, what is the relationship between $\angle 4$ and $\angle 10$?



   a. No relationship exists.

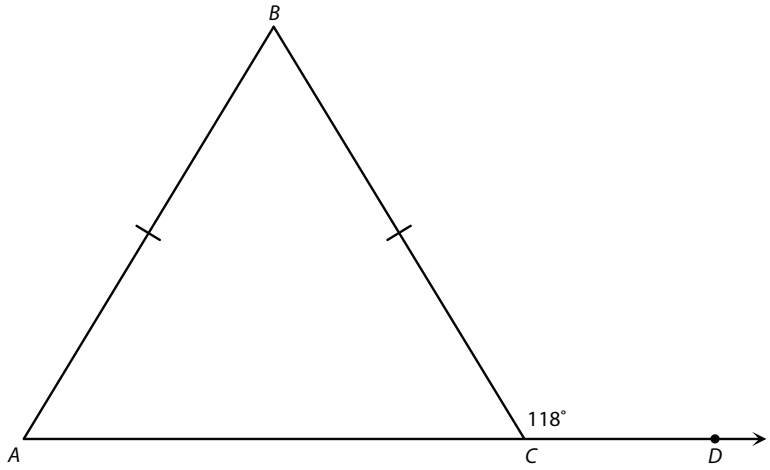
   b. $\angle 4 \cong \angle 10$ because $\angle 4 \cong \angle 13$ by the Alternate Interior Angles Theorem. Then $\angle 13 \cong \angle 10$ by the Alternate Exterior Angles Theorem. Therefore, by the Transitive Property, $\angle 4 \cong \angle 10$.

   c. $\angle 4$ and $\angle 10$ are congruent right angles because all right angles are congruent and two pairs of intersecting parallel lines are always perpendicular.

   d. $\angle 4$ is supplementary to $\angle 10$ because $\angle 4 \cong \angle 13$ by the Alternate Interior Angles Theorem. Then $\angle 13$ is supplementary to $\angle 10$ by the Alternate Exterior Angles Theorem. This means that $m\angle 13 + m\angle 10 = 180$ and, by substitution, $m\angle 4 + m\angle 10 = 180$. Therefore, by the definition of supplementary angles, $\angle 4$ is supplementary to $\angle 10$.

continued

8. What is the measure of $\angle A$?



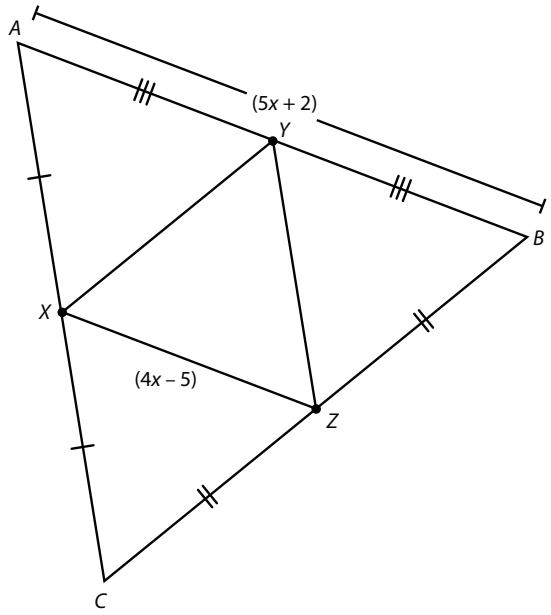
a. 31°

b. 62°

c. 56°

d. There is not enough information to determine the measure of $\angle A$.

9. If $AB = 5x + 2$ and $XZ = 4x - 5$, what is the actual length of AB?



a. 1.5 units

b. 4 units

c. 11 units

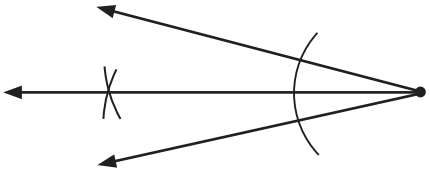
d. 22 units

continued

10. Classify a quadrilateral as precisely as possible given four vertices: C (–4, –3), D (5, 0), E (–6, 3), and F (3, 6).

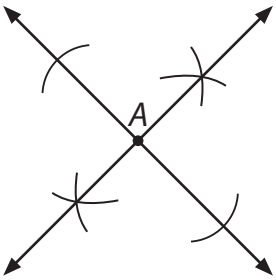
    a. rhombus
    b. square
    c. rectangle
    d. kite

11. Which geometric construction matches the diagram below?



    a. construction of a segment bisector
    b. construction of an angle bisector
    c. copying a segment
    d. copying an angle

12. Which geometric construction matches the diagram below?

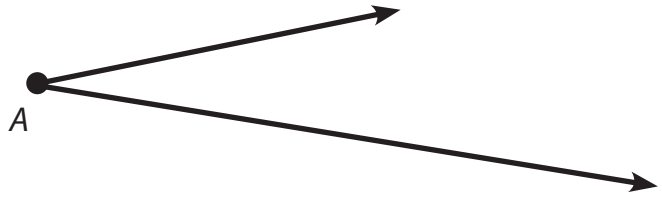


    a. construction of a median
    b. construction of a parallel line through point A
    c. construction of a segment bisector
    d. construction of a perpendicular line through point A

continued

Use what you have learned about congruence and proofs to complete problems 13–15.

13. Use the parts of a triangle given below to solve the problems that follow.

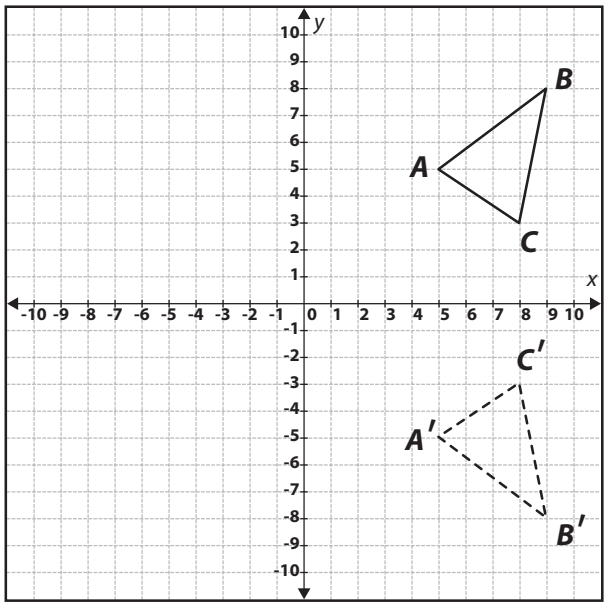


a. Use construction tools to construct $\triangle ABC$ using the given parts.

b. Is it possible to construct a second non-congruent triangle using the given parts? If it is not possible, explain why not. If it is possible, construct a second non-congruent triangle.

continued

14. $\triangle ABC$ is reflected over the line $y = 0$. Use the diagram to solve the problems that follow.



a. Reflect $\triangle A'B'C'$ over the line $x = 0$.

b. Is it possible to perform one rigid motion to the preimage $\triangle ABC$ rather than a series of reflections to create the same image that you created in question a? Explain your reasoning.

continued

15. Given: *ABCD* is a parallelogram.

Prove: $\frac{BH}{HA} = \frac{DH}{HE}$