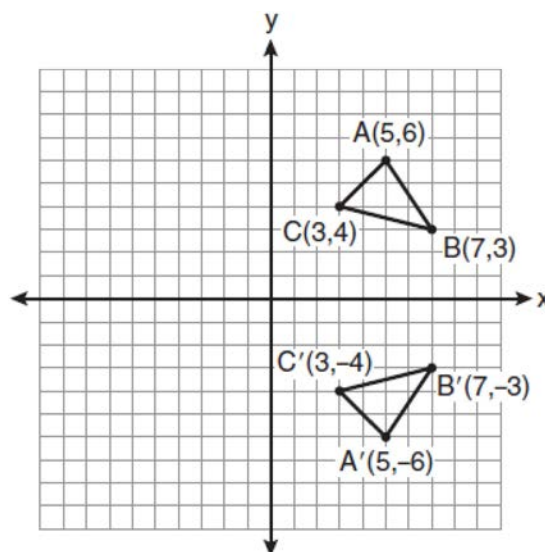


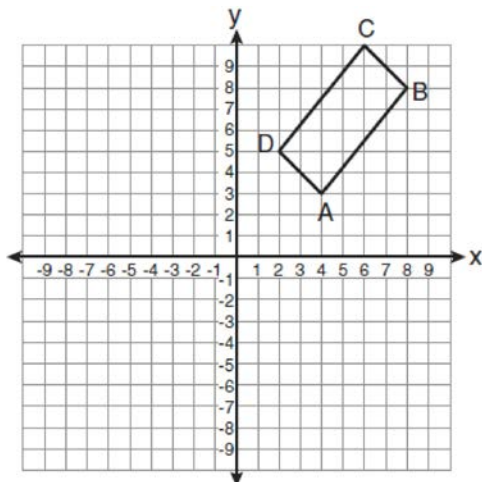
**G.G.55: Properties of Transformations 1: Investigate, justify, and apply the properties that remain invariant under translations, rotations, reflections, and glide reflections**

- 1 The image of rhombus  $VWXY$  preserves which properties under the transformation  $T_{2,-3}$ ?
  - 1) parallelism, only
  - 2) orientation, only
  - 3) both parallelism and orientation
  - 4) neither parallelism nor orientation
- 2 When a quadrilateral is reflected over the line  $y = x$ , which geometric relationship is *not* preserved?
  - 1) congruence
  - 2) orientation
  - 3) parallelism
  - 4) perpendicularity
- 3 The image of  $\triangle ABC$  after the transformation  $r_{y\text{-axis}}$  is  $\triangle A'B'C'$ . Which property is *not* preserved?
  - 1) distance
  - 2) orientation
  - 3) collinearity
  - 4) angle measure
- 4 The vertices of parallelogram  $ABCD$  are  $A(2,0)$ ,  $B(0,-3)$ ,  $C(3,-3)$ , and  $D(5,0)$ . If  $ABCD$  is reflected over the  $x$ -axis, how many vertices remain invariant?
  - 1) 1
  - 2) 2
  - 3) 3
  - 4) 0
- 5 Triangle  $ABC$  has the coordinates  $A(1,2)$ ,  $B(5,2)$ , and  $C(5,5)$ . Triangle  $ABC$  is rotated  $180^\circ$  about the origin to form triangle  $A'B'C'$ . Triangle  $A'B'C'$  is
  - 1) acute
  - 2) isosceles
  - 3) obtuse
  - 4) right
- 6 Which expression best describes the transformation shown in the diagram below?



- 1) same orientation; reflection
- 2) opposite orientation; reflection
- 3) same orientation; translation
- 4) opposite orientation; translation

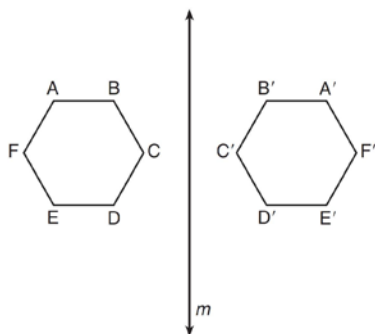
- 7 The rectangle  $ABCD$  shown in the diagram below will be reflected across the  $x$ -axis.



What will *not* be preserved?

- 1) slope of  $\overline{AB}$
- 2) parallelism of  $\overline{AB}$  and  $\overline{CD}$
- 3) length of  $\overline{AB}$
- 4) measure of  $\angle A$

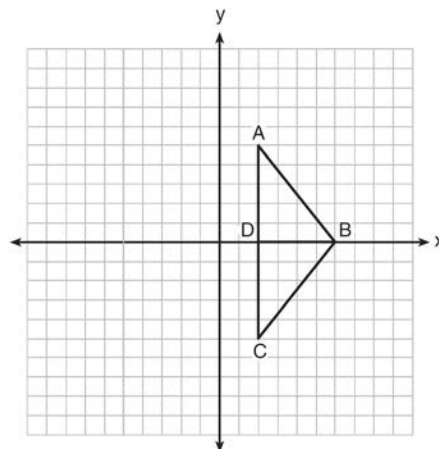
- 8 As shown in the diagram below, when hexagon  $ABCDEF$  is reflected over line  $m$ , the image is hexagon  $A'B'C'D'E'F'$ .



Under this transformation, which property is *not* preserved?

- 1) area
- 2) distance
- 3) orientation
- 4) angle measure

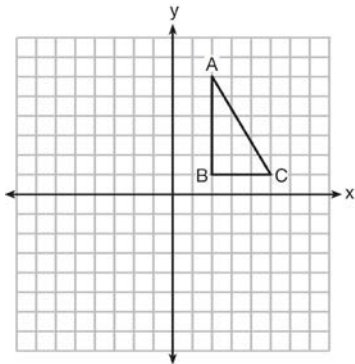
- 9 As shown in the diagram below, when right triangle  $DAB$  is reflected over the  $x$ -axis, its image is triangle  $DCB$ .



Which statement justifies why  $\overline{AB} \cong \overline{CB}$ ?

- 1) Distance is preserved under reflection.
- 2) Orientation is preserved under reflection.
- 3) Points on the line of reflection remain invariant.
- 4) Right angles remain congruent under reflection.

- 10 Right triangle  $ABC$  is shown in the graph below.



After a reflection over the  $y$ -axis, the image of  $\triangle ABC$  is  $\triangle A'B'C'$ . Which statement is *not* true?

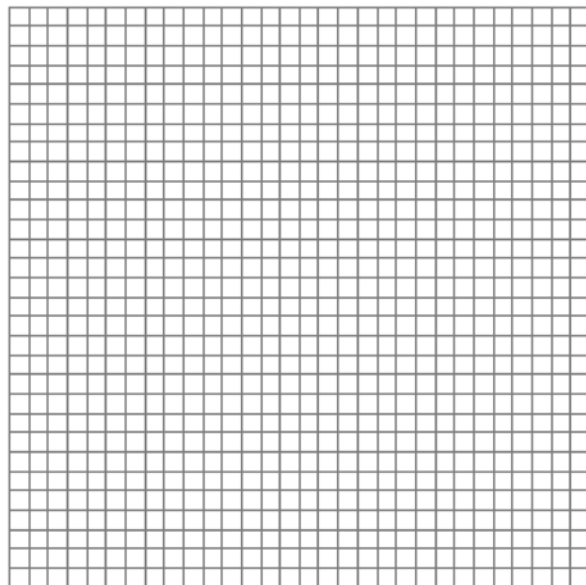
- 1)  $\overline{BC} \cong \overline{B'C'}$
  - 2)  $\overline{A'B'} \perp \overline{B'C'}$
  - 3)  $\overline{AB} = \overline{A'B'}$
  - 4)  $\overline{AC} \parallel \overline{A'C'}$
- 11 If  $\triangle W'X'Y'$  is the image of  $\triangle WXY$  after the transformation  $R_{90^\circ}$ , which statement is *false*?
- 1)  $\overline{XY} = \overline{X'Y'}$
  - 2)  $\overline{WX} \parallel \overline{W'X'}$
  - 3)  $\triangle WXY \cong \triangle W'X'Y'$
  - 4)  $m\angle XWY = m\angle X'W'Y'$
- 12 Quadrilateral  $MNOP$  is a trapezoid with  $\overline{MN} \parallel \overline{OP}$ . If  $M'N'O'P'$  is the image of  $MNOP$  after a reflection over the  $x$ -axis, which two sides of quadrilateral  $M'N'O'P'$  are parallel?
- 1)  $\overline{M'N'}$  and  $\overline{O'P'}$
  - 2)  $\overline{M'N'}$  and  $\overline{N'O'}$
  - 3)  $\overline{P'M'}$  and  $\overline{O'P'}$
  - 4)  $\overline{P'M'}$  and  $\overline{N'O'}$

- 13 Pentagon  $PQRST$  has  $\overline{PQ}$  parallel to  $\overline{TS}$ . After a translation of  $T_{2,-5}$ , which line segment is parallel to  $\overline{P'Q'}$ ?

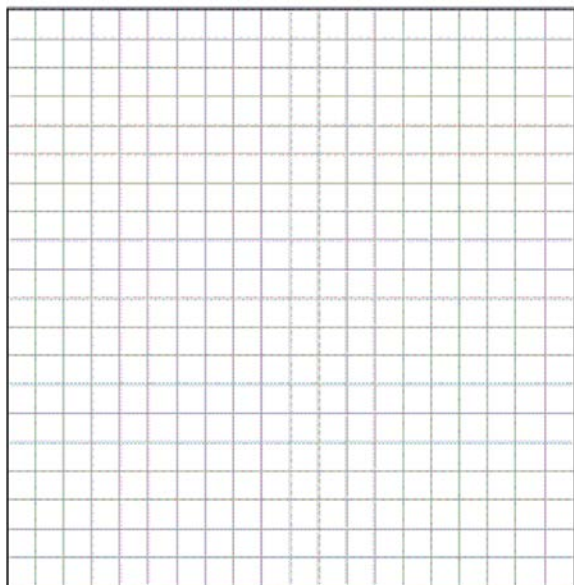
- 1)  $\overline{R'Q'}$
- 2)  $\overline{R'S'}$
- 3)  $\overline{T'S'}$
- 4)  $\overline{T'P'}$

- 14 After the transformation  $r_{y=x}$ , the image of  $\triangle ABC$  is  $\triangle A'B'C'$ . If  $AB = 2x + 13$  and  $A'B' = 9x - 8$ , find the value of  $x$ .

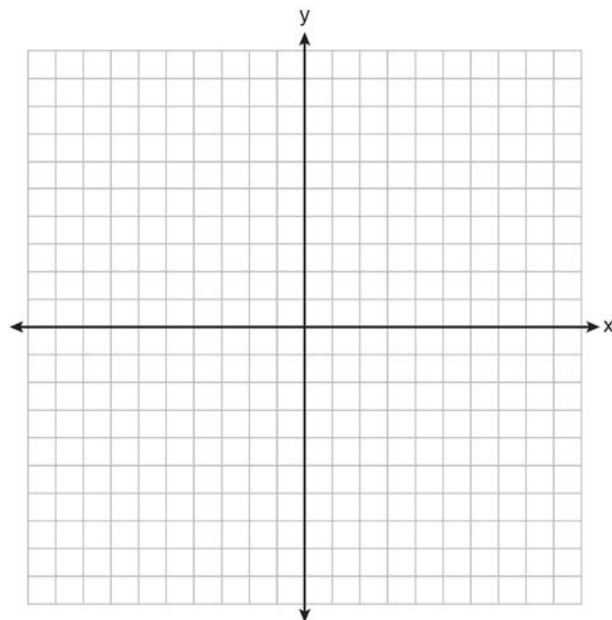
- 15 The vertices of  $\triangle ABC$  are  $A(3,2)$ ,  $B(6,1)$ , and  $C(4,6)$ . Identify and graph a transformation of  $\triangle ABC$  such that its image,  $\triangle A'B'C'$ , results in  $\overline{AB} \parallel \overline{A'B'}$ .



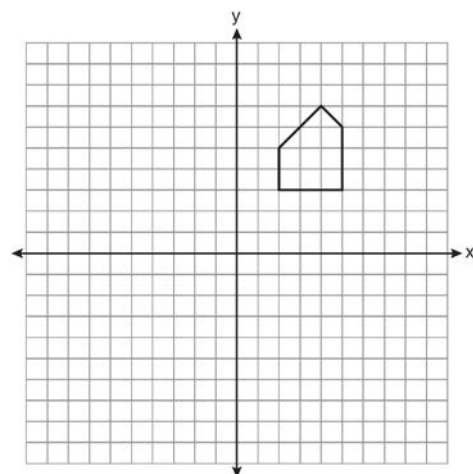
- 16 Triangle  $DEG$  has the coordinates  $D(1,1)$ ,  $E(5,1)$ , and  $G(5,4)$ . Triangle  $DEG$  is rotated  $90^\circ$  about the origin to form  $\triangle D'E'G'$ . On the grid below, graph and label  $\triangle DEG$  and  $\triangle D'E'G'$ . State the coordinates of the vertices  $D'$ ,  $E'$ , and  $G'$ . Justify that this transformation preserves distance.



- 17 Triangle  $ABC$  has coordinates  $A(2,-2)$ ,  $B(2,1)$ , and  $C(4,-2)$ . Triangle  $A'B'C'$  is the image of  $\triangle ABC$  under  $T_{5,-2}$ . On the set of axes below, graph and label  $\triangle ABC$  and its image,  $\triangle A'B'C'$ . Determine the relationship between the area of  $\triangle ABC$  and the area of  $\triangle A'B'C'$ . Justify your response.



- 18 A pentagon is drawn on the set of axes below. If the pentagon is reflected over the  $y$ -axis, determine if this transformation is an isometry. Justify your answer. [The use of the set of axes is optional.]



**G.G.55: Properties of Transformations 1: Investigate, justify, and apply the properties that remain invariant under translations, rotations, reflections, and glide reflections**

**Answer Section**

1 ANS: 3 REF: 061421ge

2 ANS: 2 REF: 011211ge

3 ANS: 2 REF: 081515ge

4 ANS: 2 REF: 081202ge

5 ANS: 4

Distance is preserved after a rotation.

REF: 081304ge

6 ANS: 2 REF: 011003ge

7 ANS: 1 REF: 061005ge

8 ANS: 3 REF: 011503ge

9 ANS: 1 REF: 061307ge

10 ANS: 4 REF: 081408ge

11 ANS: 2 REF: 061509ge

12 ANS: 1 REF: 011102ge

13 ANS: 3 REF: 081104ge

14 ANS:

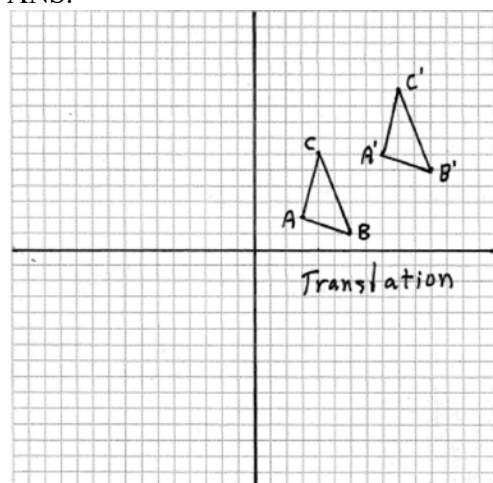
Distance is preserved after the reflection.  $2x + 13 = 9x - 8$

$$21 = 7x$$

$$3 = x$$

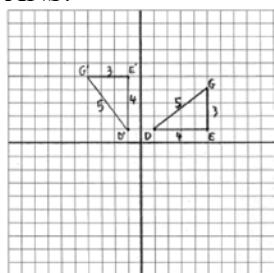
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15 ANS:



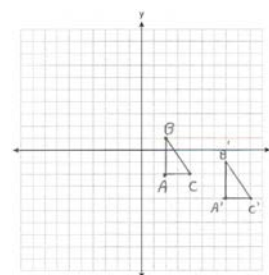
REF: fall0830ge

16 ANS:


 $D'(-1,1), E'(-1,5), F'(-4,5)$ 

REF: 080937ge

17 ANS:


 $A'(7,-4), B'(7,-1), C'(9,-4)$ . The areas are equal because translations preserve distance.

REF: 011235ge

18 ANS:

Yes. A reflection is an isometry.

REF: 061132ge