G.CO.B.6: Properties of Transformations 2
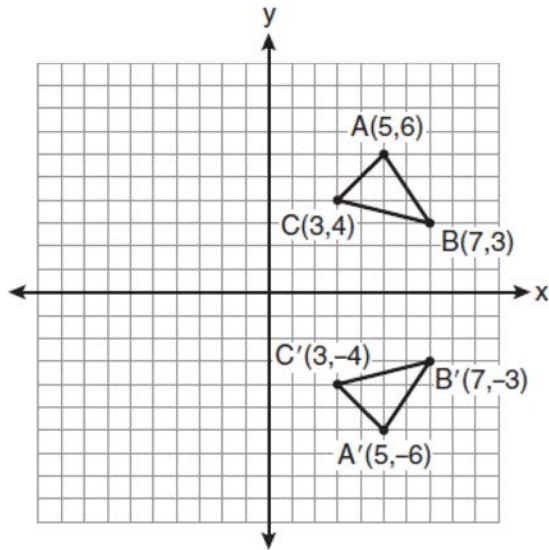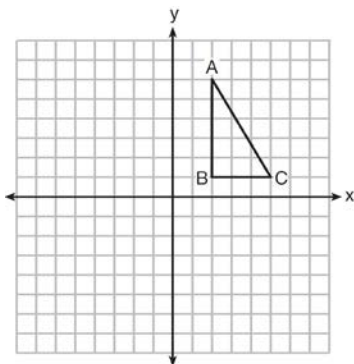
1   Which expression best describes the transformation shown in the diagram below?
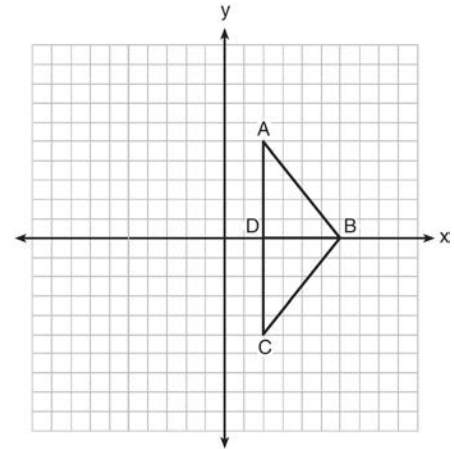

1) same orientation; reflection
2) opposite orientation; reflection
3) same orientation; translation
4) opposite orientation; translation

2   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) $AB = A'B'$
4) $\overline{AC} \parallel \overline{A'C'}$

3   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.

4 The rectangle $ABCD$ shown in the diagram below will be reflected across the x-axis.
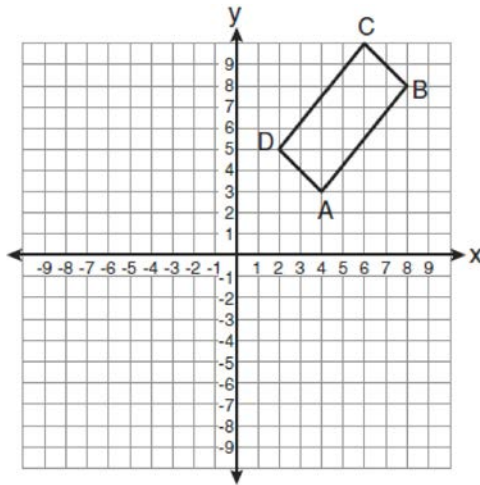
What will *not* be preserved?
1) slope of $\overline{AB}$
2) parallelism of $\overline{AB}$ and $\overline{CD}$
3) length of $\overline{AB}$
4) measure of $\angle A$

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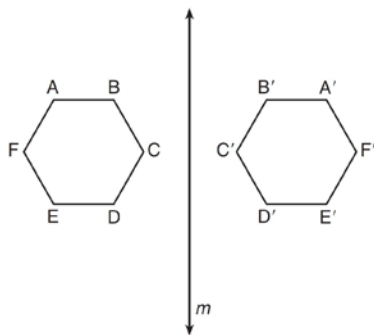

Under this transformation, which property is *not* preserved?
1) area
2) distance
3) orientation
4) angle measure

6 Which property is not preserved by a glide reflection?
1) betweenness
2) angle measure
3) orientation
4) collinearity

7 The image of $\triangle ABC$ after the transformation r_{y-axis} is $\triangle A'B'C'$. Which property is *not* preserved?
1) distance
2) orientation
3) collinearity
4) angle measure

8 A property not preserved under a line reflection is
1) angle measure
2) collinearity
3) distance
4) orientation

9 A line reflection preserves
1) distance and orientation
2) angle measurement and orientation
3) distance, but not angle measurement
4) distance and angle measurement

10 When a quadrilateral is reflected over the line $y = x$, which geometric relationship is *not* preserved?
1) congruence
2) orientation
3) parallelism
4) perpendicularity

11 If $\triangle W'X'Y'$ is the image of $\triangle WXY$ after the transformation $R_{90°}$, which statement is *false*?
1) $XY = X'Y'$
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 Triangle ABC has the coordinates $A(3,0)$, $B(3,8)$, and $C(6,6)$. If $\triangle ABC$ is reflected over the line $y = x$, which statement is true about the image of $\triangle ABC$?
1) One point remains fixed.
2) The size of the triangle changes.
3) The orientation does not change.
4) One side of $\triangle ABC$ is parallel to the line $y = x$.

13 Triangle ABC has the coordinates $A(1,2)$, $B(5,2)$, and $C(5,5)$. Triangle ABC is rotated 180° about the origin to form triangle $A'B'C'$. Triangle $A'B'C'$ is
1) acute
2) isosceles
3) obtuse
4) right

14 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 $\overline{N'O'}$

15 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

16 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

17 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) $\overline{T'P'}$

18 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 $\overline{AB} \parallel \overline{A'B'}$.
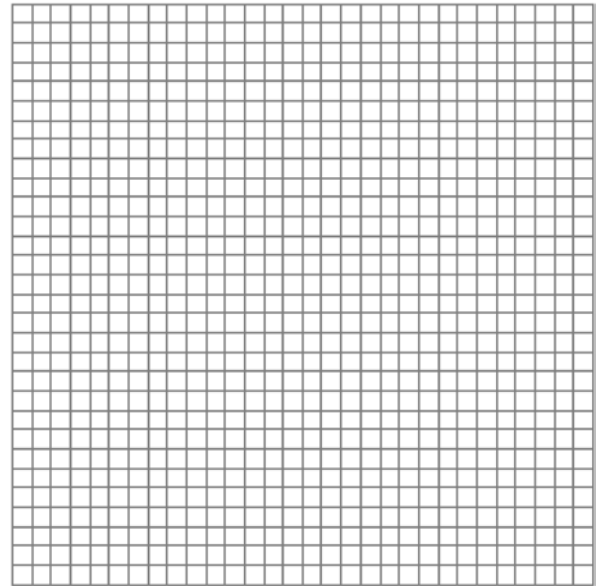
19 Triangle DEG has the coordinates $D(1,1)$, $E(5,1)$, and $G(5,4)$. Triangle DEG is rotated 90° about the origin to form $\triangle D'E'G'$. On the grid below, graph and label $\triangle DEG$ and $\triangle D'E'G'$. State the coordinates of the vertices D', E', and G'. Justify that this transformation preserves distance.
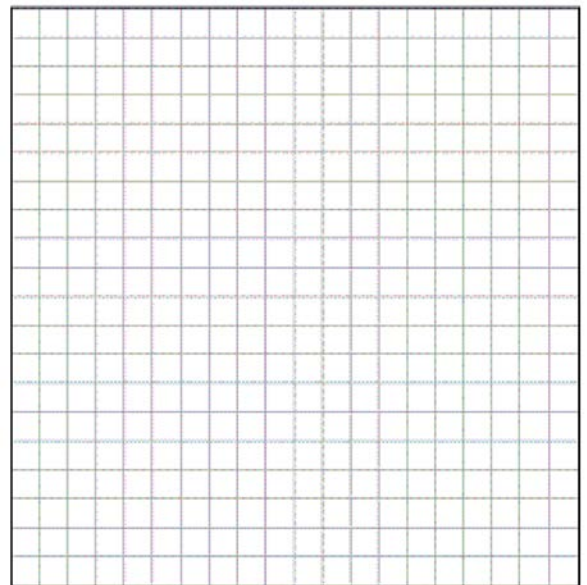
20 Triangle ABC has coordinates $A(2,-2)$, $B(2,1)$, and $C(4,-2)$. Triangle $A'B'C'$ is the image of $\triangle ABC$ under $T_{5,-2}$. On the set of axes below, graph and label $\triangle ABC$ and its image, $\triangle A'B'C'$. Determine the relationship between the area of $\triangle ABC$ and the area of $\triangle A'B'C'$. Justify your response.
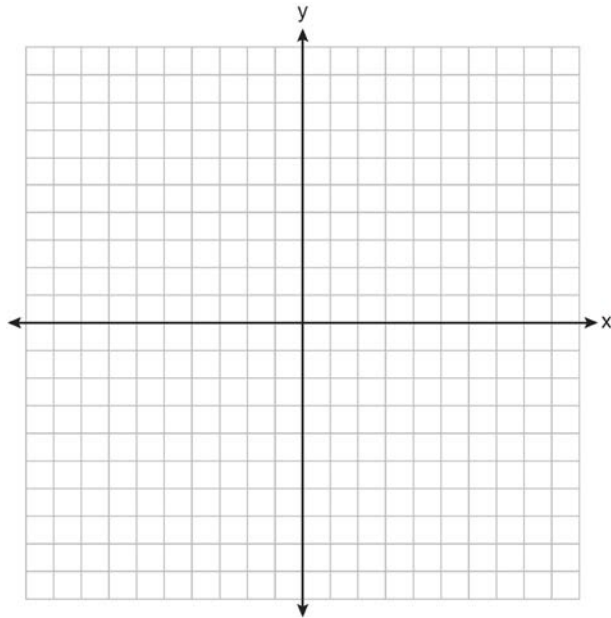
21 In the accompanying diagram of square $ABCD$, F is the midpoint of $\overline{AB}$, G is the midpoint of $\overline{BC}$, H is the midpoint of $\overline{CD}$, and E is the midpoint of $\overline{DA}$.
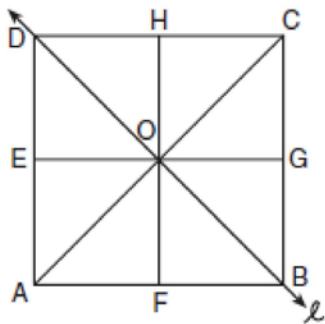
Find the image of $\triangle EOA$ after it is reflected in line ℓ. Is this isometry direct or opposite? Explain your answer.

22 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.]
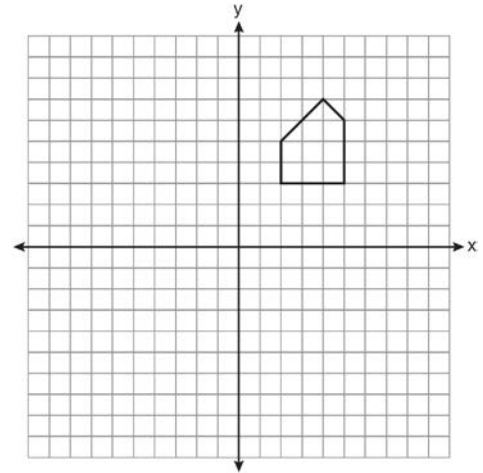
23 After the transformation $r_{y=x}$, the image of $\triangle ABC$ is $\triangle A'B'C'$. If $AB = 2x + 13$ and $A'B' = 9x - 8$, find the value of x.

G.CO.B.6: Properties of Transformations 2
## Answer Section

1 ANS: 2   REF: 011003ge
2 ANS: 4   REF: 081408ge
3 ANS: 1   REF: 061307ge
4 ANS: 1   REF: 061005ge
5 ANS: 3   REF: 011503ge
6 ANS: 3   REF: 088617siii
7 ANS: 2   REF: 081515ge
8 ANS: 4   REF: 068030siii
9 ANS: 4   REF: 088421siii
10 ANS: 2   REF: 011211ge
11 ANS: 2   REF: 061509ge
12 ANS: 1
   $C(6,6)$ remains fixed after the reflection.

   REF: 011622ge
13 ANS: 4
   Distance is preserved after a rotation.

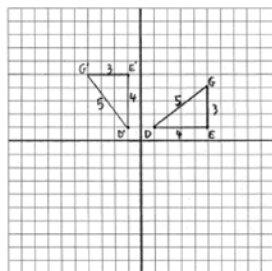   REF: 081304ge
14 ANS: 1   REF: 011102ge
15 ANS: 2   REF: 081202ge
16 ANS: 3   REF: 061421ge
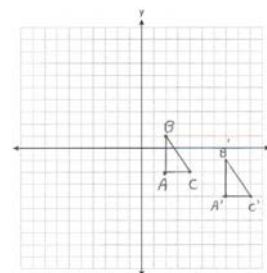17 ANS: 3   REF: 081104ge
18 ANS:
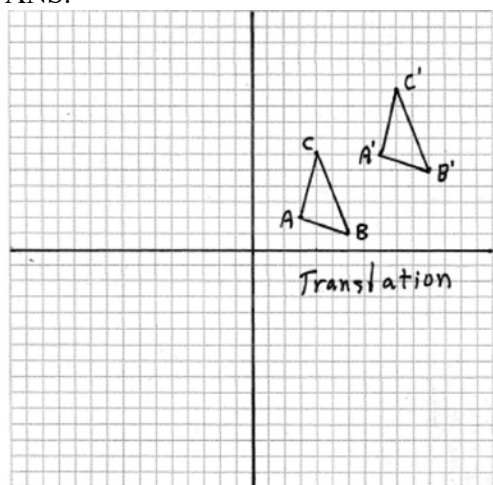
   REF: fall0830ge

19 ANS:

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

REF: 080937ge

20 ANS:

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

REF: 011235ge

21 ANS:
$\triangle HOC$. This reflection is an opposite isometry because the orientation of $\triangle EOA$ is different from $\triangle HOC$.

REF: 060424b

22 ANS:
Yes. A reflection is an isometry.

REF: 061132ge

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

$$21 = 7x$$

$$3 = x$$

REF: 011329ge