Directions: Answer the following question(s).

1 Which of the following is the **most precise** definition of a line segment based on the notions of "point" and "line"?

A. A line segment is a figure composed of two points and a line.
B. A line segment is a portion of a line that lies between two points.
C. A line segment is a portion of a line that connects two distinct points on the line without extending beyond them.
D. A line segment is composed of all the points on a line that are greater than a distance *d* from a given point not on the line.

2 The basic concepts of "line" and "point" can be used to define a ray.

A ray is a portion of a line that starts at a point and extends in a particular direction.

How can this definition of a ray be used to formulate a definition of an angle?

A. An angle is the intersection of two rays at a common point.
B. An angle is the figure formed by two rays that lie on the same line.
C. An angle is a special kind of ray that points in two particular directions.
D. An angle is a figure formed by two rays extending from a common point.

3 **A line contains two distinct points, *X* and *Y*. Select *each* correct statement.**

A. Points *X* and *Y* determine one unique line.
B. There are infinitely many points between points *X* and *Y*.
C. The distance from *X* to *Y* is equal to the distance from *Y* to *X*.
D. Any line segment that contains point *X* must also contain point *Y*.

4 Cece rotated square $EFGH$ 90° counterclockwise about the point $(1, 3)$ on a coordinate plane and produced image $E'F'G'H'$. Which of the following describes this transformation?

A. $(x, y) \rightarrow (-y, x)$
B. $(x, y) \rightarrow (6 - y, x)$
C. $(x, y) \rightarrow (4 - y, x + 2)$
D. $(x, y) \rightarrow (3 - y, x - 1)$

Directions: Answer the following question(s).

5 The transformation functions *R*, *S*, *T*, *U*, and *V* are shown below.

Function	Transformation
R	$(x, y) \rightarrow (38x, 7y)$
S	$(x, y) \rightarrow (x + 9, -y)$
T	$(x, y) \rightarrow (-x, -y - 71)$
U	$(x, y) \rightarrow (-y, x + 124)$
V	$(x, y) \rightarrow (-x - 8831, y)$

Select *all* true statements regarding these functions.

A. The function *R* could represent a vertical stretch by a factor of 38 followed by a horizontal stretch by a factor of 7.

B. The function *S* could represent a translation of 9 units to the right followed by a reflection over the *y*–axis.

C. The function *T* could represent a translation of 71 units up followed by a rotation of 180° about the origin.

D. The function *U* could represent a 90° counterclockwise about the origin followed by a translation of 124 units to the right.

E. The function *V* could represent a reflection over the *y*–axis followed by a translation of 8831 units to the left.

6 Karl is investigating two transformations.

Karl claims that a reflection over the line $y = 1$ transforms a point (x, y) to the point $(2 - x, y)$. For example, (1, 1) is reflected to (1, 1).

Karl makes a second claim that a reflection over the line $y = x$ transforms a point (x, y) to the point (y, x). For example, (2, 2) is reflected to (2, 2).

Which statement correctly classifies Karl's claims?

A. Karl is correct regarding the first claim, but a reflection over $y = x$ carries (x, y) to (x, y).

B. Karl is correct in both of his claims because each provided example supports the associated claim.

C. Karl is incorrect in both of his claims because neither example is enough to prove the associated claim.

D. Karl is incorrect as a reflection over line $y = 1$ carries (x, y) to $(x, 2 - y)$ but is correct in his second claim.

7 A dilation, centered at the origin, is applied to a figure on a coordinate plane. The scale factor of the dilation is $\frac{5}{3}$. If the original figure passes through the point (x, y), through which point must the dilated figure pass?

A. $(3x, 5y)$

B. $(\frac{5}{3}x, y)$

C. $(5x, 3y)$

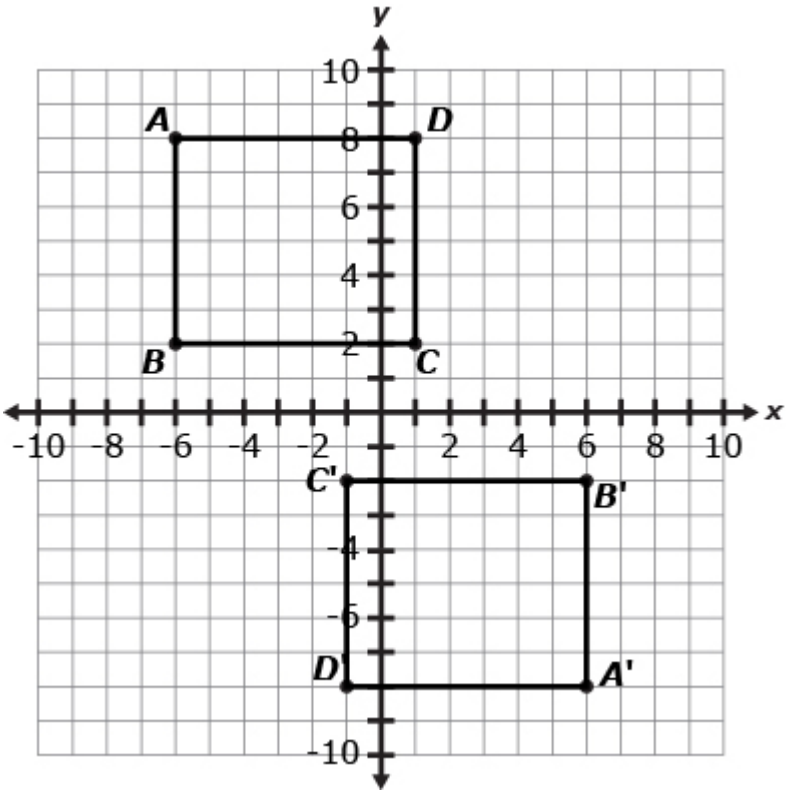
D. $(\frac{5}{3}x, \frac{5}{3}y)$

Directions: Answer the following question(s).

8 A regular dodecagon has 12 sides. What is the smallest angle of rotation about its center that carries a dodecagon onto itself?

_____°

9 Rectangle *ABCD* is shown on the chart below.



Rectangle *ABCD* went through a transformation and is now rectangle *A'B'C'D'*. Explain two different ways how rectangle *ABCD* becomes rectangle *A'B'C'D'*.

10

Directions: Answer the following question(s).

11 Square *ABCD* is shown below.

Square *ABCD* is reflected about side $\overline{BC}$. Which of the following statements are true? Select *three* that apply.

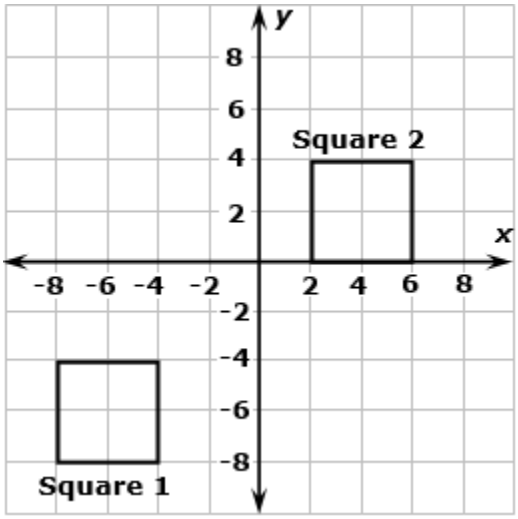
A. Vertex *B* is the midpoint of $\overline{AA'}$.
B. Side $\overline{BC}$ is parallel to $\overline{AA'}$.
C. The length of $\overline{CD}$ is equal to the length of $\overline{C'D'}$.
D. Vertex *C* and vertex *C*' are located at the same point.

12 The vertices of Δ*ABC* are *A*(–4, 2), *B*(6, 6), *C*(2, 7). A translation maps point *A* to the point *A'*(6, –3). If *B* and *C* are mapped by the same translation, what are the coordinates of *B'* and *C'*?

A. *B'*(–4, 11), *C'*(–8, –12)
B. *B'*(8, 5), *C'*(4, 6)
C. *B'*(12, 3), *C'*(8, 4)
D. *B'*(16, 1), *C'*(12, 2)

Directions: Answer the following question(s).

13 Square 1 and Square 2 are shown in the coordinate plane below.



Audrey claims that Square 1 can be mapped to Square 2. Which of the following transformations or sequences of transformations can be used to support her claim? Select ALL that apply.

A. a rotation of $180°$ about the point (–1, –2)

B. a translation of 6 units right and 4 units up

C. a reflection over the line $y = -2$ followed by a translation of 10 units right

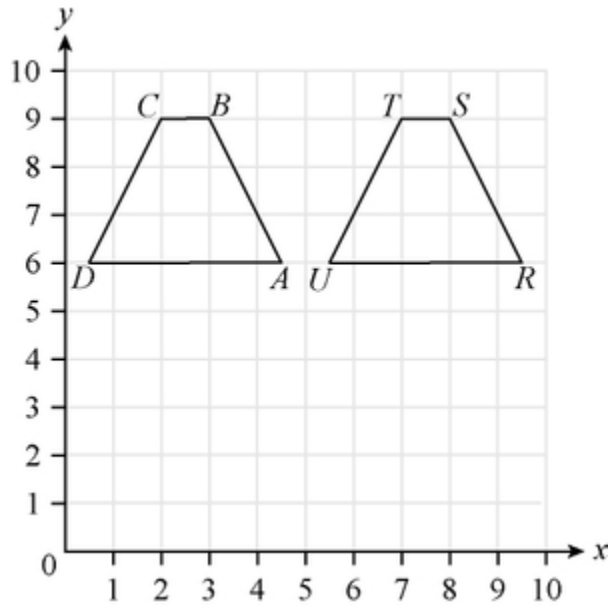
D. a reflection over the line $y = -1$ followed by a reflection over the line $x = -2$

E. a translation of 8 units up followed by a rotation of $180°$ about the point (–1, 0)

F. a rotation of $90°$ clockwise about the origin followed by a rotation of $180°$ about the point (–1, 4)

Directions: Answer the following question(s).

14 In the diagram below, quadrilateral *ABCD* is a translation of quadrilateral *RSTU*.

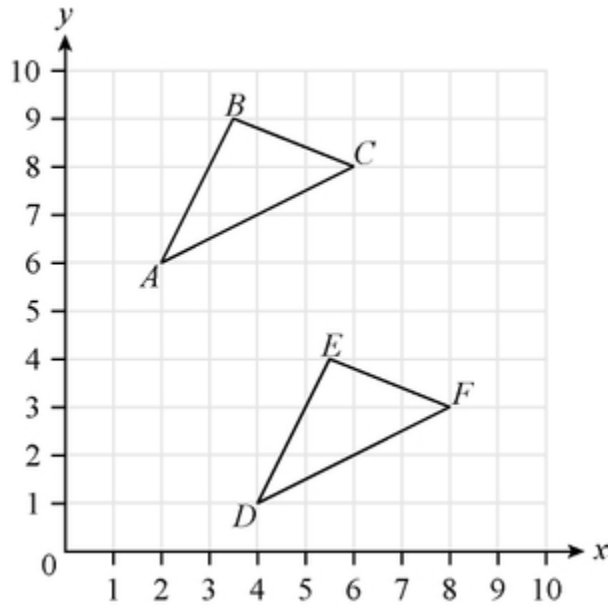


Which statement describes the translation of quadrilateral *RSTU* to quadrilateral *ABCD*?

A. 1 units left
B. 4 unit left
C. 5 units left
D. 9 units left

Directions: Answer the following question(s).

15 In the diagram below, triangle *DEF* is a translation of triangle *ABC*.



Which statement describes the translation of triangle *ABC* to triangle *DEF*?

A. 2 units left, 5 units up
B. 5 units left, 2 units up
C. 2 units right, 5 units down
D. 5 units right, 2 units down

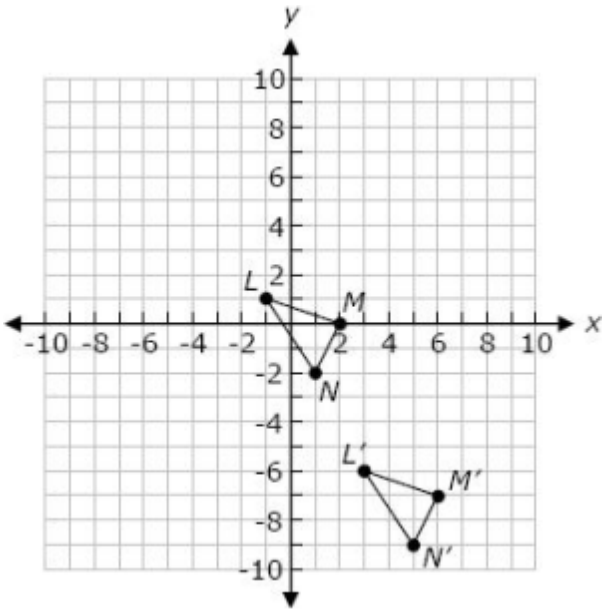
16 The image of point (−2, 3) under translation *T* is (3, −1). What is the image of point (4, 2) under the same translation?

A. (9, −2)
B. (−1, 6)
C. (5, 4)
D. (0, 7)

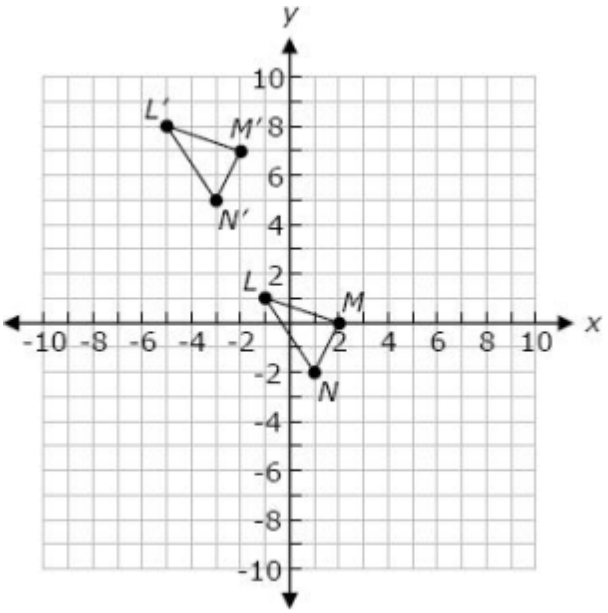
Directions: Answer the following question(s).

17 **William needs to translate ΔLMN by the rule $(x, y) \rightarrow (x - 4, y + 7)$. Which of the following graphs represents that translation?**

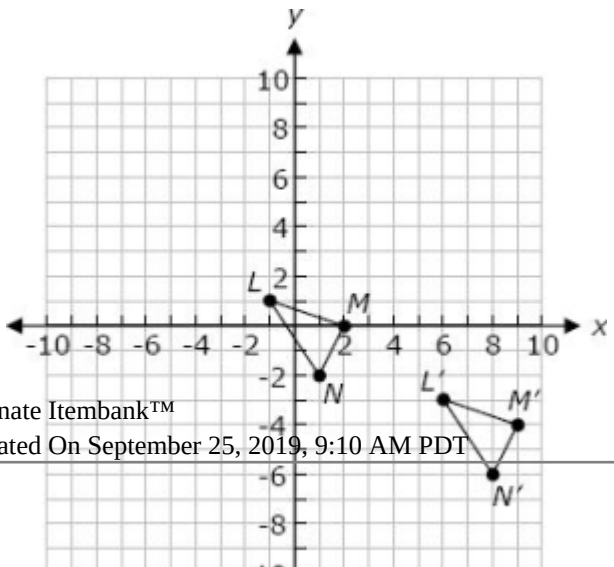
A.



B.



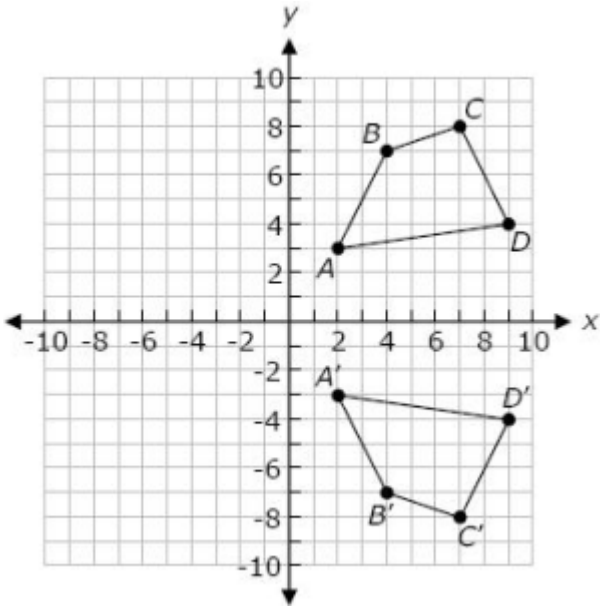
C.



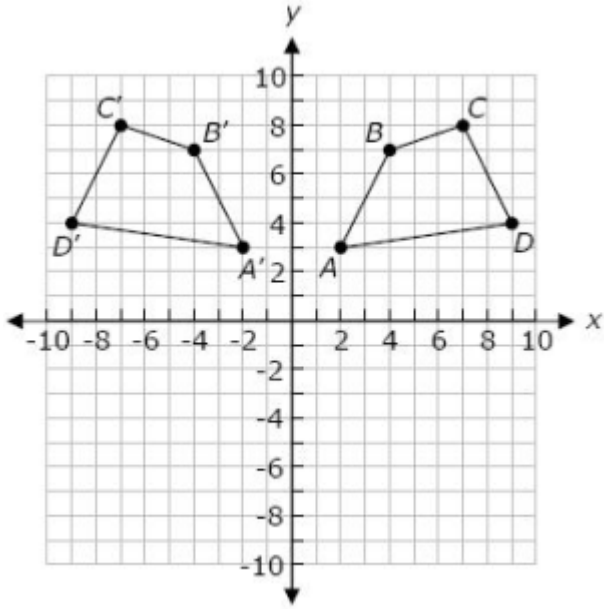
Directions: Answer the following question(s).

18 Determine which figure below has been rotated 270° clockwise about the origin.

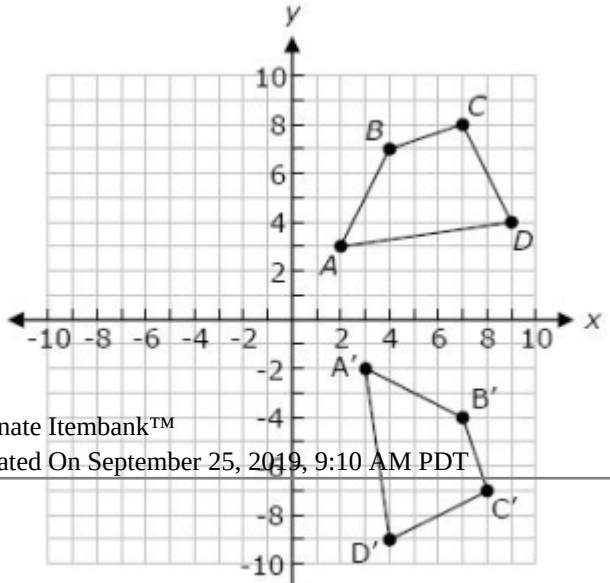
A.



B.



C.



Directions: Answer the following question(s).

19 The vertices of parallelogram *ABCD* are $A(2,1), B(3,4), C(5,3)$, and $D(4,0)$. *ABCD* is reflected over the *x*-axis to create parallelogram *QRST*. What are the coordinates of *QRST*?

A. $Q(-2,1), R(-3,4), S(-5,3), T(-4,0)$

B. $Q(-2,-1), R(-3,-4), S(-5,-3), T(-4,0)$

C. $Q(1,2), R(4,3), S(3,5), T(0,4)$

D. $Q(2,-1), R(3,-4), S(5,-3), T(4,0)$