1. The midpoint of $\overline{AB}$ is M. If the coordinates of A are $(2, -6)$ and the coordinates of M are $(5, -1)$, find the coordinates of B.

2. The midpoint of $\overline{AB}$ is M, the coordinates of A are (a, b), and the coordinates of B are $(a + 4, 5b)$. What are the coordinates of M?

   A. $(2, 2b)$ B. $(a + 2, 3b)$

   C. $(2a + 4, 6b)$ D. $\left(\dfrac{a + 4}{2}, \dfrac{5b}{2}\right)$

3. On the set of axes below, $\triangle ABC$ is graphed with coordinates $A(-2, -1)$, $B(3, -1)$, and $C(-2, -4)$. Triangle QRS, the image of $\triangle ABC$, is graphed with coordinates $Q(-5, 2)$, $R(-5, 7)$, and $S(-8, 2)$.
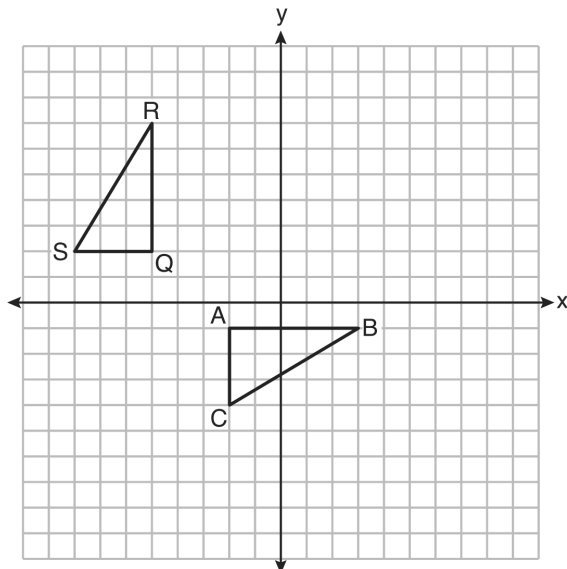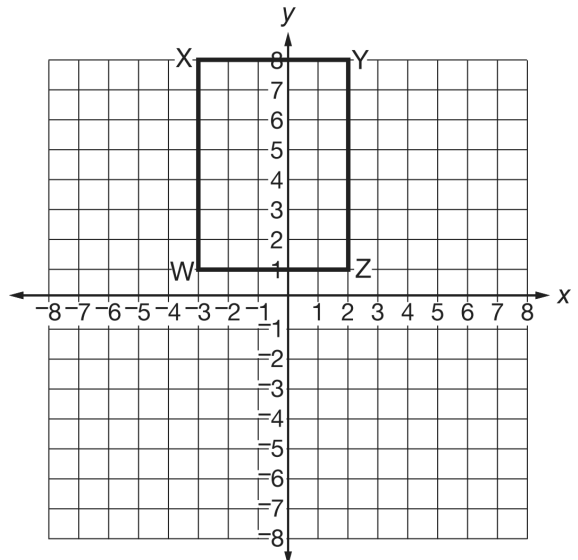

   Describe a sequence of transformations that would map $\triangle ABC$ onto $\triangle QRS$.

4. The accompanying diagram shows four congruent rectangles, each measuring 3 by 2. If the coordinates of A are $(3, 0)$ and the coordinates of B are $(0, 2)$, find the coordinates of C.
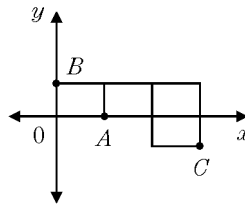
5. Use the graphic below to answer the question.

   Rectangle $WXYZ$ will be transformed so that W' is located at $(-3, -1)$ and Z' is located at $(2, -1)$. Which could be the coordinates of X' and Y' so that $W'X'Y'Z'$ is congruent to $WXYZ$?

   A. X' is located at $(-3, -6)$ and Y' is located at $(2, -6)$

   B. X' is located at $(3, 8)$ and Y' is located at $(-2, 8)$

   C. X' is located at $(-3, 6)$ and Y' is located at $(2, 6)$

   D. X' is located at $(2, -8)$ and Y' is located at $(-3, -8)$

6. Point P is on segment AB such that $AP:PB$ is $4:5$. If A has coordinates $(4, 2)$, and B has coordinates $(22, 2)$, determine and state the coordinates of P.

7. Translation T maps point $(2, 6)$ to point $(4, -1)$. What is the image of points $(-1, 3)$ under translation T?

8. On the set of axes below, Geoff drew rectangle $ABCD$. He will transform the rectangle by using the translation $(x, y) \rightarrow (x + 2, y + 1)$ and then will reflect the translated rectangle over the x-axis.
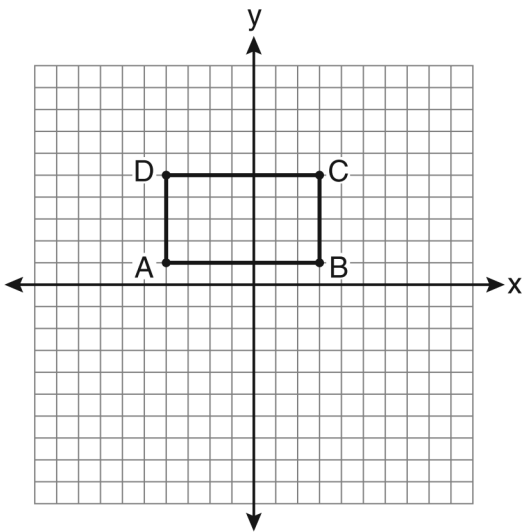
What will be the area of the rectangle after these transformations?

A. exactly 28 square units

B. less than 28 square units

C. greater than 28 square units

D. It cannot be determined from the information given.

9. Given $A(3, 2)$ and $B(6, 11)$.

Find the point that divides the line segment AB two-thirds of the way from A to B.

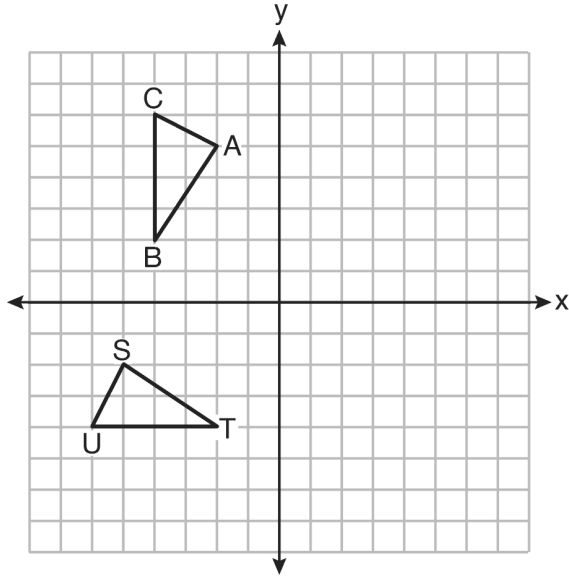Find the midpoint of line segment AB.

10. Triangle DAN is graphed on the set of axes below. The vertices of $\triangle DAN$ have coordinates $D(-6, -1)$, $A(6, 3)$, and $N(-3, 10)$.
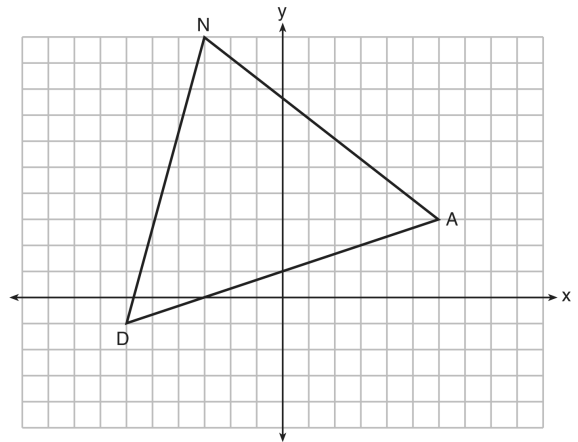
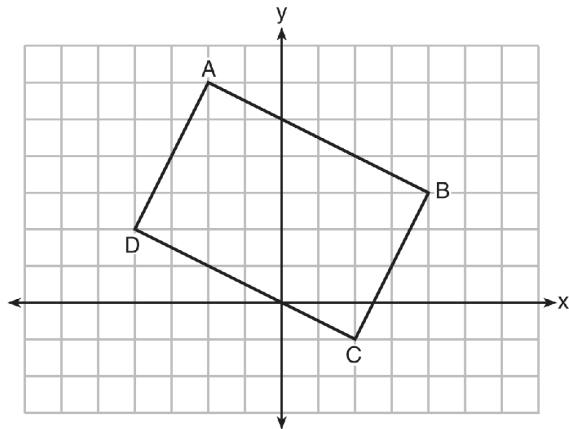

What is the area of $\triangle DAN$?

A. 60   B. 120

C. $20\sqrt{13}$ D. $40\sqrt{13}$

11. On the set of axes below, $\triangle ABC \cong \triangle STU$.

Describe a sequence of rigid motions that maps $\triangle ABC$ onto $\triangle STU$.

12. Quadrilateral $ABCD$ is graphed on the set of axes below.

When $ABCD$ is rotated $90°$ in a counterclockwise direction about the origin, its image is quadrilateral $A'B'C'D'$. Is distance preserved under this rotation, and which coordinates are correct for the given vertex?

A. no and $C'(1, 2)$ B. no and $D'(2, 4)$

C. yes and $A'(6, 2)$ D. yes and $B'(-3, 4)$

13. Select all transformations from the list below that could transform the original to the image in the coordinate grid below?
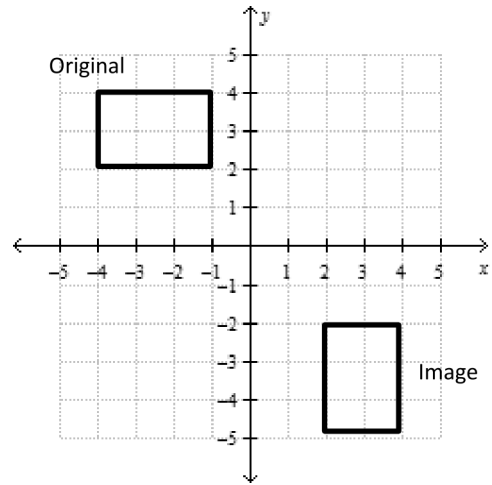
A. Rotate $180°$ about the origin.
B. Rotate $90°$ clockwise about the origin, translate down 6 units
C. Rotate $90°$ counterclockwise about the origin, translate down 6 units
D. Rotate $90°$ counterclockwise about the origin, translate down 1 unit and right 6 units
E. Rotate $90°$ counterclockwise about the origin, translate down 6 units and left 1 unit
F. Rotate $90°$ counterclockwise about the origin, translate down 1 unit, reflect over the y-axis
G. Rotate $90°$ clockwise about the origin, translate down 1 unit, reflect over the y-axis

14. Triangle *LMN* has vertices $L(-2, 6)$, $M(-6, -4)$, and $N(7, -6)$ as shown below.
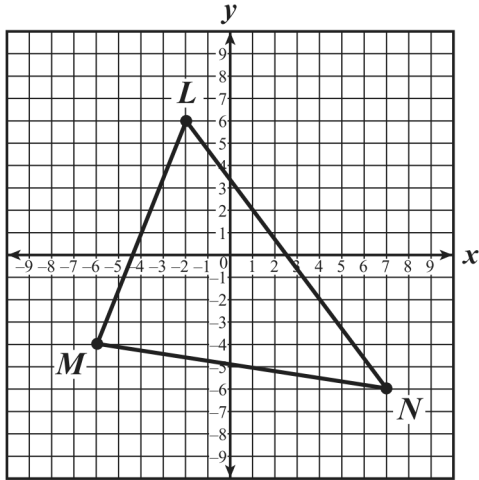
Which of the following is a true statement?

A. The slope of $\overline{MN}$ is $\dfrac{5}{2}$.

B. The slope of $\overline{LN}$ is $-\dfrac{3}{4}$.

C. The midpoint of $\overline{MN}$ is $\left(-\dfrac{1}{2}, 5\right)$.

D. The midpoint of $\overline{LN}$ is $\left(2\dfrac{1}{2}, 0\right)$.

15. Julia created the coordinate grid below to identify the locations of her house and her friend Carol's house. Julia's house is located at $(155, 102)$. Carol's house is located at $(493, 388)$.
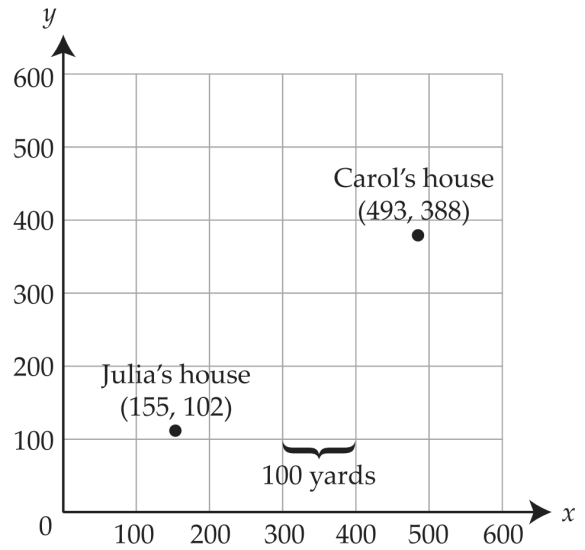
a) What are the coordinates of the midpoint between the girls' houses? Show all your work and explain how you know your answer is correct.

b) There is a straight path between the girls' houses. If Julia and Carol meet at the midpoint between their houses, what distance would each girl have to walk? Round the answer to the nearest yard. Show all your work and explain how you know your answer is correct.