

Rigid Transformations

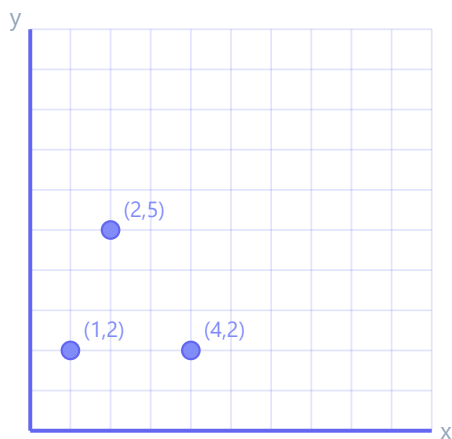
Geometry · Grade 8

Score: _____ / 12

◆ Medium · 12 Questions

Solve each problem. Show your work in the space provided. Write your answer on the line.

- Triangle ABC has vertices A(1,2), B(4,2), C(2,5). After a translation $(x+3, y-1)$, give the new vertices.



Answer: _____

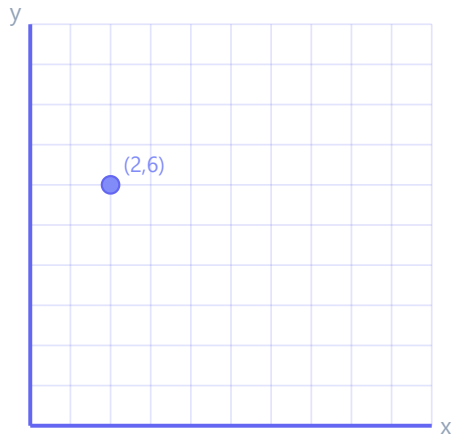
2. Reflect the point $(-4, 7)$ across the line $y = x$.

Answer: _____

3. Reflect $(3, -5)$ across the line $y = -x$.

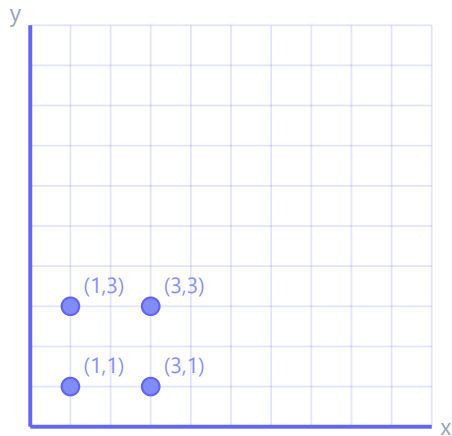
Answer: _____

4. Rotate point $(2, 6)$ 270° counterclockwise about the origin.



Answer: _____

5. Square PQRS has vertices $P(1,1)$, $Q(3,1)$, $R(3,3)$, $S(1,3)$. Describe how to map it onto a square $P'(-3,-1)$, $Q'(-1,-1)$, $R'(-1,1)$, $S'(-3,1)$.



Answer: _____

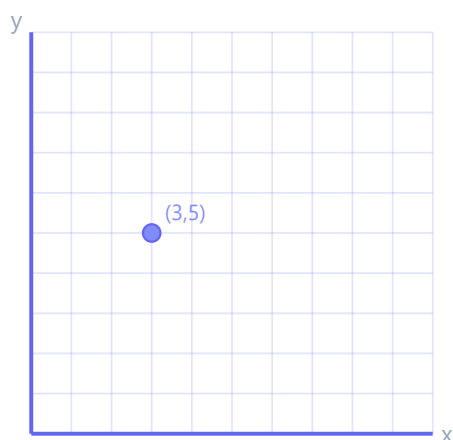
6. A figure undergoes two reflections: first across the x -axis, then across the y -axis. What single transformation is equivalent?

Answer: _____

7. Point $P(4, -2)$ is reflected across $x = 1$. Find P' .

Answer: _____

8. Point $Q(3, 5)$ is reflected across $y = 2$. Find Q' .

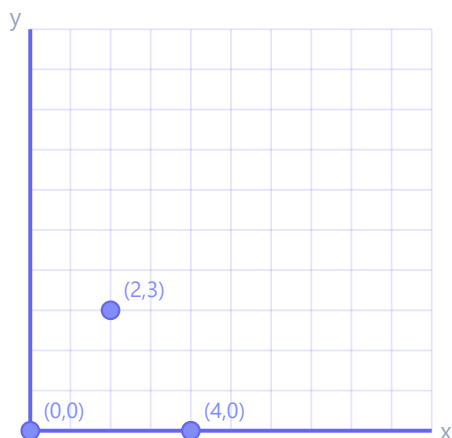


Answer: _____

9. Describe the symmetry of a regular hexagon.

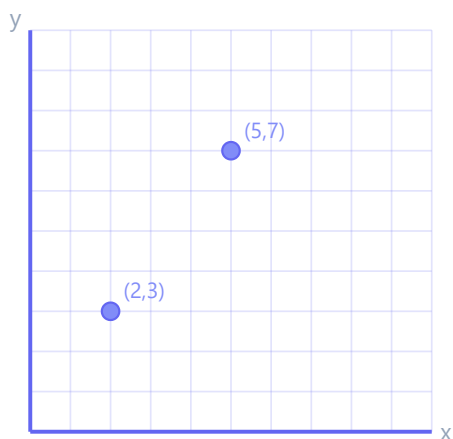
Answer: _____

10. Triangle DEF has vertices $D(0,0)$, $E(4,0)$, $F(2,3)$. After a 90° CCW rotation about the origin, give the new vertices.



Answer: _____

11. A translation maps $A(2,3)$ to $A'(5,7)$. What is the image of $B(-1,4)$ under the same translation?



Answer: _____

12. Are rotations commutative? Does rotating 90° then 180° give the same result as 180° then 90° ?

Answer: _____

Answer Key

Rigid Transformations — Medium

1. A'(4,1), B'(7,1), C'(5,4)

Add 3 to each x , subtract 1 from each y .

2. (7, -4)

Reflection across $y=x$: $(x,y) \rightarrow (y,x)$. Result: $(7,-4)$.

3. (5, -3)

Reflection across $y=-x$: $(x,y) \rightarrow (-y,-x)$. Result: $(5,-3)$.

4. (6, -2)

270° CCW = 90° CW: $(x,y) \rightarrow (y,-x)$. $(2,6) \rightarrow (6,-2)$.

5. Translation $(x-4, y-2)$

$P(1,1) \rightarrow P'(-3,-1)$: $x-4, y-2$. Check $Q(3,1) \rightarrow (-1,-1)$. ✓

6. A 180° rotation about the origin.

x -axis reflection: $(x,y) \rightarrow (x,-y)$. Then y -axis: $(x,-y) \rightarrow (-x,-y)$. This equals 180° rotation.

7. (-2, -2)

Distance from P to $x=1$: $4-1=3$ units right. Reflect: $1-3=-2$. $P'=(-2,-2)$.

8. (3, -1)

Distance from Q to $y=2$: $5-2=3$ above. Reflect: $2-3=-1$. $Q'=(3,-1)$.

9. 6 lines of reflection symmetry and 6-fold rotational symmetry (60° , 120° , 180° , 240° , 300° , 360°).

A regular hexagon has 6 sides. It has 6 lines of symmetry and rotational symmetry at multiples of 60° .

10. D'(0,0), E'(0,4), F'(-3,2)

90° CCW: $(x,y) \rightarrow (-y,x)$. $D(0,0) \rightarrow (0,0)$. $E(4,0) \rightarrow (0,4)$. $F(2,3) \rightarrow (-3,2)$.

11. B'(2, 8)

Translation: $x+3, y+4$. $B(-1,4) \rightarrow (-1+3, 4+4)=(2,8)$.

12. Yes, both give 270° total rotation (same outcome for a single point).

Rotations about the same centre add up. $90^\circ+180^\circ=270^\circ=180^\circ+90^\circ$. Order doesn't matter for same centre.
