

GRADE 6 MATHEMATICS

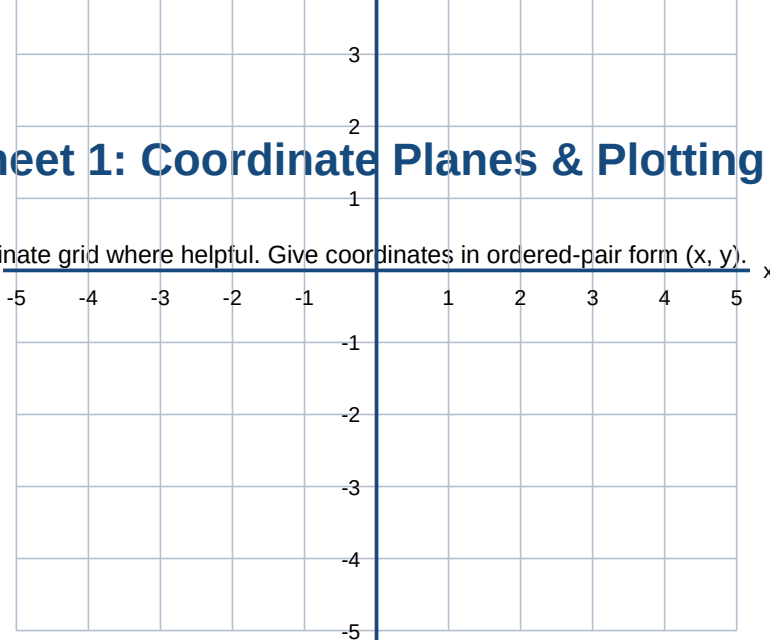
COORDINATES & TRANSFORMATIONS

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Coordinate planes • plotting • quadrants • translations • reflections • rotations • transformation reasoning

Worksheet 1: Coordinate Planes & Plotting

Use the coordinate grid where helpful. Give coordinates in ordered-pair form (x, y) .



1. Write the coordinates of each point: $A(3,4)$, $B(-2,5)$, $C(-4,-3)$, $D(5,-2)$. State the quadrant of each.
2. Plot and join $A(1,1)$, $B(5,1)$, $C(5,4)$, $D(1,4)$. What shape is formed?
3. Which point lies on the x-axis: $(4,0)$, $(0,4)$, $(-3,2)$?
4. Which point lies on the y-axis: $(0,-5)$, $(-5,0)$, $(3,4)$?
5. Point P is $(-2,-6)$. Move 4 units right and 3 units up. Give the new coordinates.
6. Point Q is $(5,-1)$. Move 7 units left and 5 units up. Give the new coordinates.
7. Reflect the point $(3,-4)$ in the x-axis. Give the image coordinates.
8. Challenge: A point $(-4,3)$ is reflected in the y-axis and then moved 2 units down. Give the final coordinates.

Answer Key — Worksheet 1: Coordinate Planes & Plotting

1. A(3,4) QI; B(-2,5) QII; C(-4,-3) QIII; D(5,-2) QIV.

2. Rectangle.

3. (4,0).

4. (0,-5).

5. (2,-3).

6. (-2,4).

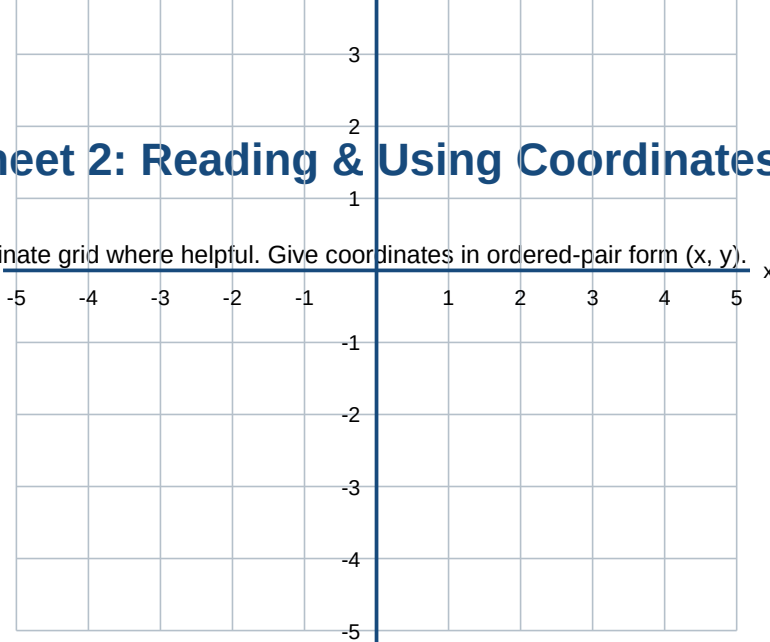
7. (3,4).

8. (4,1).

Teacher note: Accept equivalent correct methods and clearly shown reasoning.

Worksheet 2: Reading & Using Coordinates

Use the coordinate grid where helpful. Give coordinates in ordered-pair form (x, y) .



1. A rectangle has vertices $(-4, -2)$, $(3, -2)$, $(3, 3)$, $(-4, 3)$. Find its length, width and area.
2. Points $A(2, 5)$ and $B(2, -3)$ lie on a vertical line. What is the distance AB ?
3. Points $C(-6, 1)$ and $D(4, 1)$ lie on a horizontal line. What is the distance CD ?
4. A point has x-coordinate -5 and lies 4 units above the x-axis. Give its coordinates.
5. A point has y-coordinate 6 and lies 3 units left of the y-axis. Give its coordinates.
6. Which point is closest to the origin: $A(2, 2)$, $B(5, 1)$, $C(-1, -2)$, $D(3, -4)$?
7. A triangle has vertices $(1, 1)$, $(6, 1)$, $(1, 5)$. Find the lengths of its horizontal and vertical sides.
8. Challenge: A rectangle has one vertex at $(-3, -4)$, another at $(5, -4)$, and the top side is 6 units above. Give all four vertices and find its area.

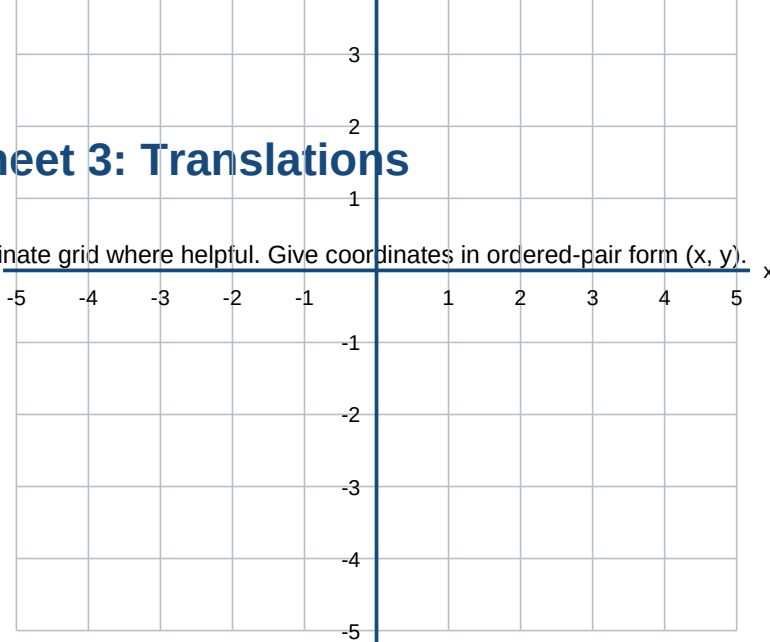
Answer Key — Worksheet 2: Reading & Using Coordinates

1. Length 7; width 5; area 35 square units.
2. 8 units.
3. 10 units.
4. $(-5, 4)$.
5. $(-3, 6)$.
6. $C(-1, -2)$, distance $\sqrt{5} \approx 2.24$ units.
7. Horizontal 5 units; vertical 4 units.
8. $(-3, -4)$, $(5, -4)$, $(5, 2)$, $(-3, 2)$; area 48 square units.

Teacher note: Accept equivalent correct methods and clearly shown reasoning.

Worksheet 3: Translations

Use the coordinate grid where helpful. Give coordinates in ordered-pair form (x, y) .



1. Translate $(2, 3)$ 5 units right and 2 units down. Give the image coordinates.
2. Translate $(-4, 5)$ 3 units left and 6 units down.
3. A point $(7, -2)$ is translated by the vector $(-5, +4)$. Give the image coordinates.
4. Triangle $A(1, 1)$, $B(4, 1)$, $C(2, 5)$ is translated 3 units left. Give all three image coordinates.
5. A point $(-3, -5)$ becomes $(4, -1)$. Describe the translation.
6. A rectangle has vertices $(-2, 1)$, $(3, 1)$, $(3, 4)$, $(-2, 4)$. Translate it 4 units down. Give the new vertices.
7. Does a translation change the size or shape of a figure? Explain.
8. Challenge: Point P is translated by $(+6, -8)$ to $P'(1, -3)$. Find the original coordinates of P .

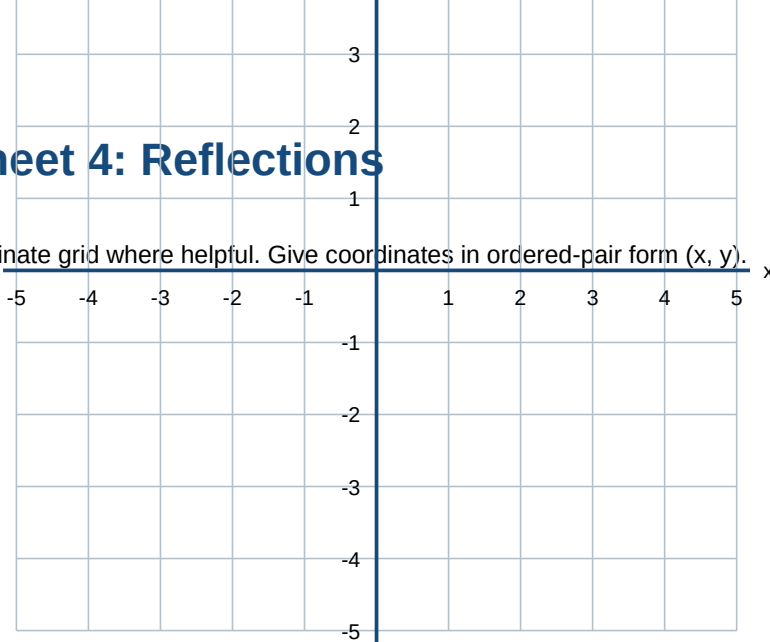
Answer Key — Worksheet 3: Translations

1. $(7,1)$.
2. $(-7,-1)$.
3. $(2,2)$.
4. $A'(-2,1)$, $B'(1,1)$, $C'(-1,5)$.
5. 7 units right and 4 units up.
6. $(-2,-3)$, $(3,-3)$, $(3,0)$, $(-2,0)$.
7. No; it preserves size and shape.
8. $P(-5,5)$.

Teacher note: Accept equivalent correct methods and clearly shown reasoning.

Worksheet 4: Reflections

Use the coordinate grid where helpful. Give coordinates in ordered-pair form (x, y) .



1. Reflect $(4,3)$ in the x-axis.
2. Reflect $(-5,2)$ in the y-axis.
3. Reflect $(-3,-6)$ in the x-axis and then in the y-axis.
4. Triangle $A(1,2)$, $B(5,2)$, $C(3,6)$ is reflected in the x-axis. Give the image coordinates.
5. A point $(7,-4)$ is reflected in the y-axis. Where is the image?
6. What happens to the x-coordinate when a point is reflected in the y-axis?
7. What happens to the y-coordinate when a point is reflected in the x-axis?
8. Challenge: A point $(-6,4)$ is reflected in the y-axis and then in the x-axis. Give the final coordinates and describe the overall effect.

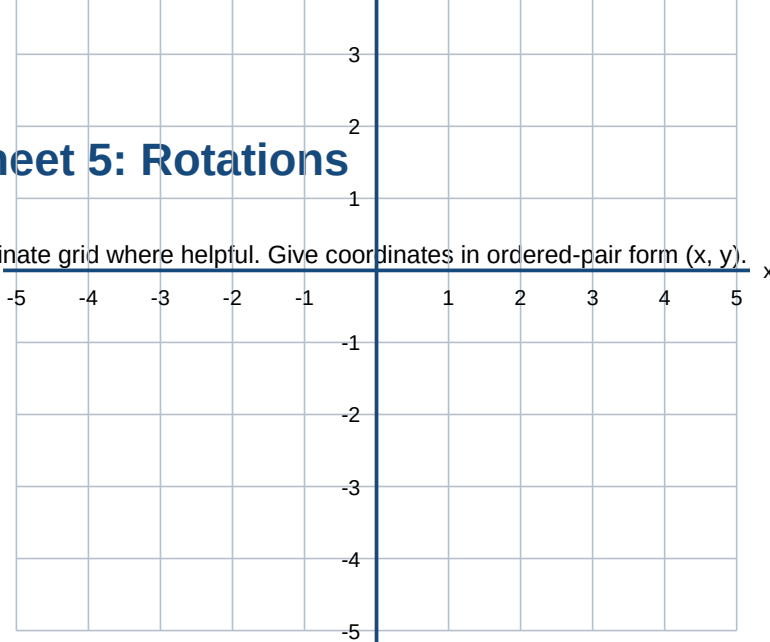
Answer Key — Worksheet 4: Reflections

1. $(4, -3)$.
2. $(5, 2)$.
3. $(3, 6)$.
4. $A'(1, -2)$, $B'(5, -2)$, $C'(3, -6)$.
5. $(-7, -4)$.
6. The x-coordinate changes sign.
7. The y-coordinate changes sign.
8. $(6, -4)$; equivalent to a 180° rotation about the origin.

Teacher note: Accept equivalent correct methods and clearly shown reasoning.

Worksheet 5: Rotations

Use the coordinate grid where helpful. Give coordinates in ordered-pair form (x, y) .



1. Rotate $(3, 2)$ 90° clockwise about the origin. Give the new coordinates.
2. Rotate $(-4, 1)$ 90° anticlockwise about the origin.
3. Rotate $(5, -2)$ 180° about the origin.
4. Rotate $(-3, -6)$ 90° clockwise about the origin.
5. A point $(2, 5)$ is rotated 180° . Give its image.
6. Describe what happens to a point (x, y) after a 180° rotation about the origin.
7. Triangle $A(1, 1)$, $B(4, 1)$, $C(2, 3)$ is rotated 180° about the origin. Give the image coordinates.
8. Challenge: Point $P(-2, 4)$ is rotated 90° anticlockwise. Give the image and state its quadrant.

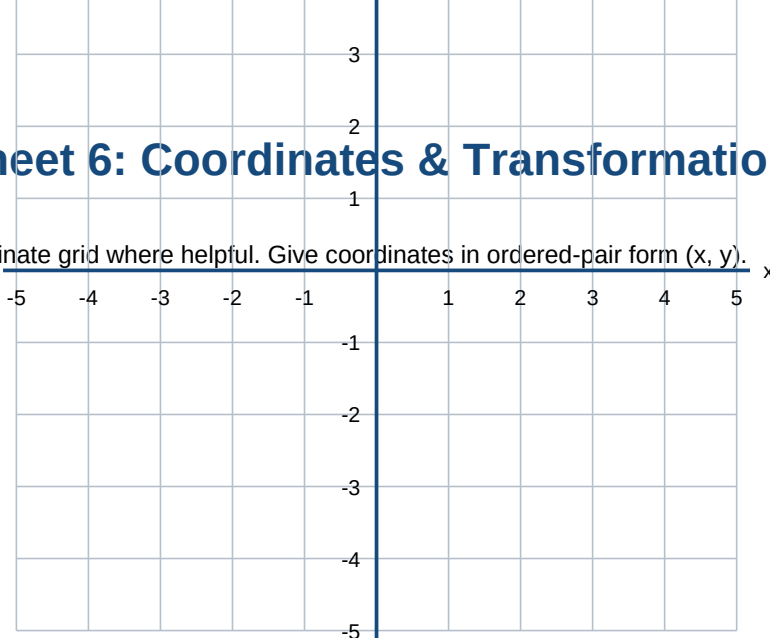
Answer Key — Worksheet 5: Rotations

1. $(2,-3)$.
2. $(1,4)$.
3. $(-5,2)$.
4. $(-6,3)$.
5. $(-2,-5)$.
6. $(x,y) \rightarrow (-x,-y)$.
7. $A'(-1,-1)$, $B'(-4,-1)$, $C'(-2,-3)$.
8. $(-4,-2)$; Quadrant III.

Teacher note: Accept equivalent correct methods and clearly shown reasoning.

Worksheet 6: Coordinates & Transformations Challenge

Use the coordinate grid where helpful. Give coordinates in ordered-pair form (x, y) .



1. A rectangle has vertices $(-5, -2)$, $(2, -2)$, $(2, 3)$, $(-5, 3)$. Translate it 4 units right and 5 units down. Give the new vertices.
2. Reflect point $(-3, 5)$ in the y-axis, then translate it 2 units down.
3. Rotate point $(4, -1)$ 180° about the origin, then move it 3 units right.
4. Triangle $A(-2, 1)$, $B(2, 1)$, $C(0, 5)$ is reflected in the x-axis. Give all image coordinates.
5. A point P is translated 7 units left and 4 units up from $(6, -3)$. Give P' .
6. A point $Q(-5, 2)$ is transformed to $Q'(5, -2)$. One possible single transformation is used. Name it.
7. Explain why translations, reflections and rotations are called transformations. What do they preserve?
8. Challenge: Point $(-2, 3)$ is reflected in the x-axis and then rotated 180° about the origin. Give the final coordinates and describe a single equivalent transformation.

Answer Key — Worksheet 6: Coordinates & Transformations Challenge

1. $(-1,-7)$, $(6,-7)$, $(6,-2)$, $(-1,-2)$.
2. $(3,-3)$.
3. $(-1,1)$.
4. $A'(-2,-1)$, $B'(2,-1)$, $C'(0,-5)$.
5. $(-1,1)$.
6. A 180° rotation about the origin.
7. They preserve distances and angles, so the size and shape of a figure are preserved.
8. $(2,3)$; equivalent to a reflection in the y-axis.

Teacher note: Accept equivalent correct methods and clearly shown reasoning.