

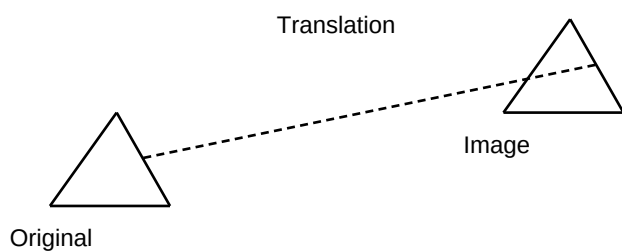
GRADE 8

TRANSFORMATIONS & SYMMETRY

Complete Worksheet Pack

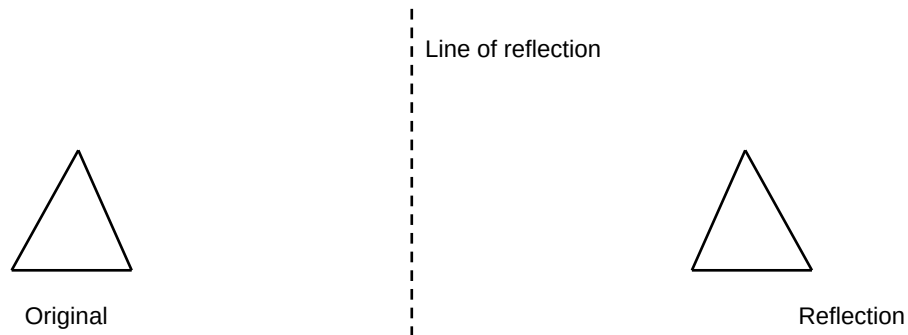
6 Practice Worksheets • 6 Answer Keys

Worksheet 1 — Translations & Transformation Rules



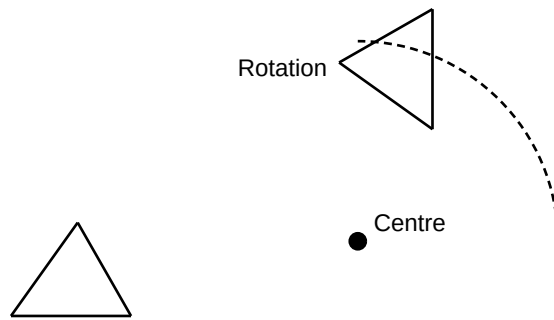
1. Translate point $A(2, 3)$ by the vector 4 units right and 2 units down. Give A' .
2. Translate $B(-3, 5)$ by 6 units right and 4 units down.
3. Apply the rule $(x, y) \rightarrow (x + 5, y - 3)$ to $P(-2, 4)$, $Q(1, 0)$ and $R(3, 6)$.
4. Describe the translation that maps $(-1, 4)$ to $(3, 1)$.
5. A shape is translated. Does its size, angle measures or orientation change? Explain.
6. Write a coordinate rule for a translation 7 units left and 2 units up.
7. Challenge: Point A is mapped to $A'(9, -2)$ after a translation of 5 right and 3 down. Find the original coordinates.

Worksheet 2 — Reflections



1. Reflect $A(4, 3)$ in the x -axis.
2. Reflect $B(-2, 5)$ in the y -axis.
3. Apply reflection in the x -axis to $P(-4, -1)$, $Q(2, -3)$ and $R(5, 4)$.
4. Describe the coordinate rule for reflection in the y -axis.
5. A point lies on the x -axis. What happens to it when reflected in the x -axis?
6. Reflect the triangle with vertices $(1, 1)$, $(4, 1)$, $(2, 4)$ in the y -axis.
7. Challenge: A point and its reflection in the y -axis are 14 units apart. What could the x -coordinate of the original point be?

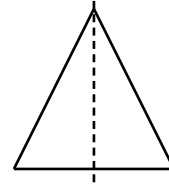
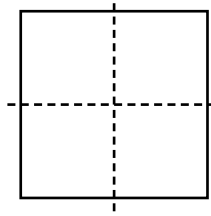
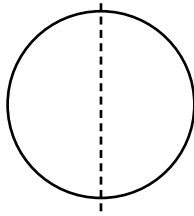
Worksheet 3 — Rotations



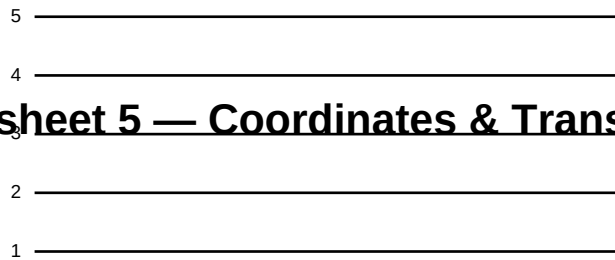
1. Rotate $A(3, 2)$ 180° about the origin.
2. Rotate $B(-4, 1)$ 180° about the origin.
3. State the coordinate rule for a 180° rotation about the origin.
4. A point is rotated 90° anticlockwise about the origin. Explain why its distance from the origin stays unchanged.
5. Rotate the triangle with vertices $(1, 2)$, $(4, 2)$, $(1, 5)$ through 180° about the origin.
6. Describe how a 90° rotation differs from a reflection.
7. Challenge: A point (a, b) becomes $(-b, a)$ after a rotation about the origin. Identify the rotation.

Worksheet 4 — Symmetry & Invariance

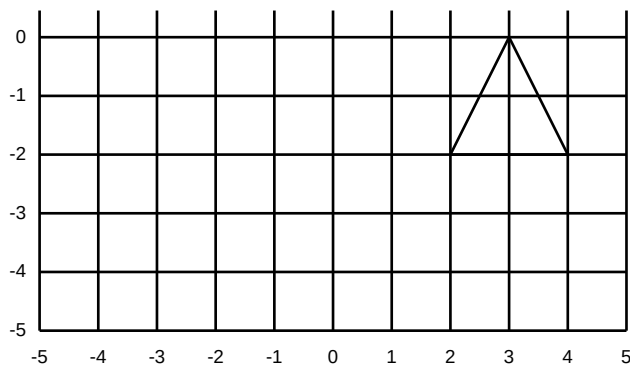
Line symmetry examples



1. How many lines of symmetry does a square have?
2. How many lines of symmetry does a rectangle that is not a square have?
3. How many lines of symmetry does an equilateral triangle have?
4. Explain the difference between line symmetry and rotational symmetry.
5. State the order of rotational symmetry of a square and an equilateral triangle.
6. Which transformations preserve lengths and angle measures? Explain what this tells you about congruence.
7. Challenge: Give an example of a shape with rotational symmetry but no line of symmetry.



Worksheet 5 — Coordinates & Transformations



Plot and transform points on the grid.

1. Plot A(1, 1), B(5, 1), C(5, 4), D(1, 4). Name the shape.
2. Reflect all four points in the x-axis and list the new coordinates.
3. Translate the original rectangle 3 units left and 2 units up. List the new coordinates.
4. Rotate point (2, 5) by 180° about the origin.
5. A point $(-3, 4)$ is translated to $(2, 1)$. State the translation.
6. Explain how you can check whether a transformation has preserved the size of a shape.
7. Challenge: Find the image of triangle A(-2,1), B(0,4), C(3,1) after reflection in the y-axis followed by a translation 2 units right.

Worksheet 6 — Transformation Detective Challenge

Transformation rule examples

Translation: $(x, y) \rightarrow (x + 3, y - 2)$

Reflection in x-axis: $(x, y) \rightarrow (x, -y)$

Reflection in y-axis: $(x, y) \rightarrow (-x, y)$

Rotation 180° : $(x, y) \rightarrow (-x, -y)$

1. A transformation maps $(2, -3)$ to $(-2, 3)$. What common transformation could this be?
2. The rule $(x, y) \rightarrow (x - 4, y + 6)$ is applied to a triangle. Describe the movement in words.
3. A shape is reflected and then translated. Explain why the final shape is still congruent to the original.
4. A square has side length 5 cm. It is enlarged by a scale factor of 2. Does this count as a rigid transformation? Explain.
5. A point $(6, -2)$ is reflected in the x-axis and then rotated 180° about the origin. Find the final coordinates.
6. A figure has rotational symmetry of order 4. Through what smallest positive angle can it map onto itself?
7. Challenge: Design a sequence of two transformations that maps $(1, 2)$ to $(-3, -2)$. Give the rules and verify the final coordinate.

Answer Key 1 — Translations & Rules

1. $A'(6, 1)$.
2. $B'(3, 1)$.
3. $P'(3,1)$, $Q'(6,-3)$, $R'(8,3)$.
4. 4 right and 3 down.
5. Lengths and angles stay the same; orientation also stays the same for a translation.
6. $(x,y) \rightarrow (x-7,y+2)$.
7. Original $A = (4,1)$.

Answer Key 2 — Reflections

1. $(4, -3)$.
2. $(2, 5)$.
3. $P'(-4, 1)$, $Q'(2, 3)$, $R'(5, -4)$.
4. $(x, y) \rightarrow (-x, y)$.
5. It stays in the same position because every point on the x-axis is on the mirror line.
6. $(-1, 1)$, $(-4, 1)$, $(-2, 4)$.
7. $x = 7$ or $x = -7$; the reflected point is 14 units away horizontally.

Answer Key 3 — Rotations

1. $(-3, -2)$.
2. $(4, -1)$.
3. $(x, y) \rightarrow (-x, -y)$.
4. A rotation changes direction but preserves distance from the centre.
5. $(-1, -2)$, $(-4, -2)$, $(-1, -5)$.
6. A rotation turns a figure about a centre; a reflection flips it across a line.
7. 90° anticlockwise.

Answer Key 4 — Symmetry & Invariance

1. 4.
2. 2.
3. 3.
4. Line symmetry uses a mirror line; rotational symmetry maps a figure onto itself after a turn.
5. Square: order 4; equilateral triangle: order 3.
6. Translations, reflections and rotations preserve lengths and angles, so they are rigid transformations.
7. Example: a general parallelogram has rotational symmetry of order 2 but no line symmetry.

Answer Key 5 — Coordinates & Transformations

1. Rectangle.
2. $(1,-1)$, $(5,-1)$, $(5,-4)$, $(1,-4)$.
3. $(-2,3)$, $(2,3)$, $(2,6)$, $(-2,6)$.
4. $(-2,-5)$.
5. 5 right and 3 down.
6. Compare corresponding side lengths and angle measures before and after.
7. Reflection gives $(2,1)$, $(0,4)$, $(-3,1)$; translating 2 right gives $(4,1)$, $(2,4)$, $(-1,1)$.

Answer Key 6 — Transformation Detective Challenge

1. A 180° rotation about the origin.
2. 4 units left and 6 units up.
3. Rigid transformations preserve all lengths and angles, so the image is congruent.
4. No. Enlargement changes side lengths, so it is not rigid.
5. Reflection: $(6,2)$; then 180° rotation: $(-6,-2)$.
6. 90° .
7. Example: translate 4 left to $(-3,2)$, then reflect in the x-axis to $(-3,-2)$.