Here you will learn how to reflect an image on a coordinate grid. Triangle A has coordinates $E(-5, -5)$, $F(2, -6)$ and $G(-2, 0)$. Draw the triangle on the Cartesian plane. Reflect the image across the y-axis. State the coordinates of the resulting image.

**Watch This**

First watch this video to learn about graphs of reflections.

![Multimedia](https://www.ck12.org/edcollabs/CK-12-Graphs-of-Reflections-A)

Then watch this video to see some examples.

![Multimedia](https://www.ck12.org/edcollabs/CK-12-Graphs-of-Reflections-B)

**Guidance**

In geometry, a transformation is an operation that moves, flips, or changes a shape to create a new shape. A reflection is an example of a transformation that takes a shape (called the preimage) and flips it across a line (called the line of reflection) to create a new shape (called the image).

To graph a reflection, you can visualize what would happen if you flipped the shape across the line.
1.5. Graphs of Reflections

Each point on the preimage will be the same distance from the line of reflection as it’s corresponding point in the image. For example, for the pair of triangles below, both $A$ and $A'$ are 3 units away from the line of reflection.

For common reflections, you can also remember what happens to their coordinates:

- reflections across the $x$-axis: $y$ values are multiplied by -1.
- reflections across the $y$-axis: $x$ values are multiplied by -1.
- reflections across the line $y = x$: $x$ and $y$ values switch places.
- reflections across the line $y = -x$: $x$ and $y$ values switch places and are multiplied by -1.

Knowing the rules above will allow you to recognize reflections even when a graph is not available.

**Example A**

Line $\overline{AB}$ drawn from (-4, 2) to (3, 2) has been reflected across the $x$-axis. Draw the preimage and image and properly label each.

**Solution:**
Example B

The diamond $ABCD$ is reflected across the line $y = x$ to form the image $A'B'C'D'$. Find the coordinates of the reflected image. On the diagram, draw and label the reflected image.

Solution:
Example C

Triangle $ABC$ is reflected across the line $y = -x$ to form the image $A'B'C'$. Draw and label the reflected image.

Solution:
Concept Problem Revisited

The coordinates of the new image \((B)\) are \(E'(5, -5)\), \(F'(2, -6)\) and \(G'(2, 0)\).

Vocabulary

Image
In a transformation, the final figure is called the image.

Preimage
In a transformation, the original figure is called the preimage.

Transformation
A transformation is an operation that is performed on a shape that moves or changes it in some way. There are four types of transformations: translations, reflections, dilations and rotations.
Reflection

A reflection is an example of a transformation that flips each point of a shape over the same line.

Line of Reflection

The line of reflection is the line that a shape reflects (flips) across when undergoing a reflection.

Guided Practice

1. Line $\overline{ST}$ drawn from (-3, 4) to (-3, 8) has been reflected across the line $y = -x$. Draw the preimage and image and properly label each.

2. The polygon below has been reflected across the y-axis. Draw the reflected image and properly label each.

3. The purple pentagon is reflected across the $y$ -axis to make the new image. Find the coordinates of the purple pentagon. On the diagram, draw and label the reflected pentagon.

Answers:

1.
1. Reflect the above figure across the x-axis.
2. Reflect the above figure across the y-axis.
3. Reflect the above figure across the line $y = x$. 
4. Reflect the above figure across the x-axis.
5. Reflect the above figure across the y-axis.
6. Reflect the above figure across the line $y = x$.

7. Reflect the above figure across the x-axis.
8. Reflect the above figure across the y-axis.
9. Reflect the above figure across the line $y = x$. 
10. Reflect the above figure across the x-axis.
11. Reflect the above figure across the y-axis.
12. Reflect the above figure across the line $y = x$.

13. Reflect the above figure across the x-axis.
14. Reflect the above figure across the y-axis.
15. Reflect the above figure across the line $y = x$. 
16. Reflect the above figure across the x-axis.
17. Reflect the above figure across the y-axis.
18. Reflect the above figure across the line $y = x$.

19. Reflect the above figure across the x-axis.
20. Reflect the above figure across the y-axis.
21. Reflect the above figure across the line $y = x$. 
22. Reflect the above figure across the x-axis.
23. Reflect the above figure across the y-axis.
24. Reflect the above figure across the line $y = x$. 
Here you will learn the notation for describing a dilation.

The figure below shows a dilation of two trapezoids. Write the mapping rule for the dilation of Image A to Image B.

Watch This

First watch this video to learn about writing rules for dilations.

Then watch this video to see some examples.