Transformations Interactive Notes

**Translations**

A transformation in which each point of a figure moves the same ______ in the same ______.

In a translation, the pre-image & image are ______.
The corresponding sides have the ______ measurement.
The corresponding angles have the ______ measurement.

Look at the graph below. Record the coordinate pairs for the pre-image. Using the pre-image points, create two new translated images.

Pre-Image A(______) B(______) C(______)
Image (x + 5, y + 2) A'(______) B'(______) C'(______)

In words, describe the translation.

Image (x + 5, y + 2) A'(______) B'(______) C'(______)
In words, describe the translation.

Using two different colored pencils, graph the new images. Make sure to label both figures.

What rule could be used to translate the figure so it would be located in quadrant 3?

**Dilations**

A transformation in which each point of a figure moves ______ with respect to a fixed point, called the ______. The corresponding angles have the ______ measurement. The corresponding sides have the ______ measurement.

In a dilation, the pre-image & image are ______.
The corresponding angles have the ______ measurement.
The corresponding sides have the ______ measurement.

Look at the graph below. Record the coordinate pairs for the pre-image. Using the pre-image points, create two new translated images.

Pre-Image A(______) B(______) C(______)
Image (2x, 2y) A'(______) B'(______) C'(______)

In words, describe the dilation.

Image (2x, 2y) A'(______) B'(______) C'(______)
In words, describe the dilation.

Using two different colored pencils, graph the new images. Make sure to label both figures.

What would the coordinates be if the pre-image was rotated 270° clockwise?

**Rotations**

A transformation in which a figure is ______ through a given angle, called the ______ and in a given direction about a fixed point, called the ______.

In a rotation, the pre-image & image are ______.
The corresponding angles have the ______ measurement.
The corresponding sides have the ______ measurement.

90° Clockwise 90° Counter Clockwise 180° Rotation
(x, y) --> (y, -x) (x, y) --> (-y, x) (x, y) --> (-x, -y)

Look at the graph below. Record the coordinate pairs for the pre-image. Using the pre-image points, create three new rotated images.

Pre-Image Coordinates A(______) B(______) C(______)
90° Clockwise A'(______) B'(______) C'(______)
90° Counter Clockwise A'(______) B'(______) C'(______)
180° Rotation A'(______) B'(______) C'(______)

In words, describe the dilation.

Using three different colored pencils, graph the new images. Make sure to label all of the figures.

What would the coordinates be if the pre-image was rotated 90° clockwise?

**Reflections**

A transformation in which a figure is ______ in a line, called the ______.

In a reflection, the pre-image & image are ______.
The corresponding angles have the ______ measurement.
The corresponding sides have the ______ measurement.

Reflection in the x-axis Reflection in the y-axis
(x, y) --> (x, -y) (x, y) --> (-x, y)

Look at the graph below. Record the coordinate pairs for the pre-image. Using the pre-image points, create three new rotated images.

Pre-Image Coordinates A(______) B(______) C(______)
Reflection in the x-axis A'(______) B'(______) C'(______)
Reflection in the y-axis A'(______) B'(______) C'(______)

In words, describe the dilation.

Using two different colored pencils, graph the new images. Make sure to label all of the figures.

A Figure has line symmetry if a line, called the ______, divides the figure into two parts that are ______ of each other.
This product involves four pages of interactive notes on translations, dilations, rotations and reflections. Each note page provides an opportunity for students to complete the definition, examine and compare the angles and sides of the images, list the pre-image and image coordinates and to describe in words the transformation completed. A graph is provided with the pre-image. Students can use colored pencils to graph the additional images.

An answer key is provided.
**Translations**

A transformation in which each point of a figure moves the same _________ in the same _________.

In a translation, the pre-image & image are _________.

The corresponding angles have the _____ measurement.
The corresponding sides have the _____ measurement.

Look at the graph below. Record the coordinate pairs for the pre-image. Using the pre-image points, create two new translated images.

<table>
<thead>
<tr>
<th>Pre-Image</th>
<th>A (___)</th>
<th>B (___)</th>
<th>C (___)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image (x + 5, y + 2)</td>
<td>A' (___)</td>
<td>B' (___)</td>
<td>C' (___)</td>
</tr>
</tbody>
</table>

In words, describe the translation.

<table>
<thead>
<tr>
<th>Image (x + 8, y - 8)</th>
<th>A'' (___)</th>
<th>B'' (___)</th>
<th>C'' (___)</th>
</tr>
</thead>
</table>

In words, describe the translation.

Using two different colored pencils, graph the new images. Make sure to label both figures.

What rule could be used to translate the figure so it would be located in quadrant 3?

(___ , ___)
DILATIONS

A transformation in which each point of a figure-related or-unrelated with respect to a fixed point, called the origin.

In a translation, the pre-image & image are congruent. The corresponding angles have the same measurement. The corresponding sides are congruent.

Look at the graph below. Record the coordinate pairs for the pre-image. Using the pre-image points, create two new translated images.

Pre-Image | A (___) | B (___) | C (___)
--- | --- | --- | ---
Image (2x, 2y) | A’(___) | B’(___) | C’(___)

In words, describe the dilation.

Image (2x, 1y) | A”(___) | B” (___) | C” (___)

In words, describe the dilation.

Using two different colored pencils, graph the new images. Make sure to label both figures.

Compare the area of the pre-image to the image. Did the area double in size?
Complete the notes on transformations. Cut out the notes along the dotted lines and glue them in your notebook.

## ROTATIONS

A transformation in which a figure is _______ through a given angle, called the ____________, and in a given direction about a fixed point, called the ________.

In a rotation, the pre-image & image are ________. The corresponding angles have the _____ measurement. The corresponding sides have the _____ measurement:

<table>
<thead>
<tr>
<th>Angle</th>
<th>Clockwise</th>
<th>Counter Clockwise</th>
<th>180° Rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>90°</td>
<td>(x, y) → (y, -x)</td>
<td>(x, y) → (-y, x)</td>
<td>(x, y) → (-x, -y)</td>
</tr>
</tbody>
</table>

Look at the graph below. Record the coordinate pairs for the pre-image. Using the pre-image points, create three new rotated images.

<table>
<thead>
<tr>
<th>Pre-Image Coordinates</th>
<th>A (___)</th>
<th>B (___)</th>
<th>C (___)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90° Clockwise</td>
<td>A' (___)</td>
<td>B' (___)</td>
<td>C' (___)</td>
</tr>
<tr>
<td>90° Counter Clockwise</td>
<td>A'' (___)</td>
<td>B'' (___)</td>
<td>C'' (___)</td>
</tr>
<tr>
<td>180° Rotation</td>
<td>A''' (___)</td>
<td>B''' (___)</td>
<td>C''' (___)</td>
</tr>
</tbody>
</table>

Using three different colored pencils, graph the new images. Make sure to label all of the figures.

What would the coordinates be if the pre-image was rotated 270° clockwise?

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Complete the notes on transformations. Cut out the notes along the dotted lines and glue them in your notebook.

**REFLECTIONS**

A transformation in which a figure is ______________, in a line, called the ______________.

In a rotation, the pre-image & image are ______________.
The corresponding angles have the _____ measurement.
The corresponding sides have the _____ measurement.

Reflection in the x - axis

(x, y) → (x, -y)

Reflection in the y-axis

(x, y) → (-x, y)

Look at the graph below. Record the coordinate pairs for the pre-image. Using the pre-image points, create three new rotated images.

<table>
<thead>
<tr>
<th>Pre-Image Coordinates</th>
<th>A (___)</th>
<th>B (___)</th>
<th>C (___)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflection in the x - axis</td>
<td>A' (___)</td>
<td>B' (___)</td>
<td>C' (___)</td>
</tr>
<tr>
<td>Reflection in the y-axis</td>
<td>A'' (___)</td>
<td>B'' (___)</td>
<td>C'' (___)</td>
</tr>
</tbody>
</table>

Using two different colored pencils, graph the new images. Make sure to label all of the figures.

A figure has line symmetry if a line, called the ______________, divides the figure into two parts that are ______________ of each other in the line.
**TRANSLATIONS**

A transformation in which each point of a figure moves the same **distance** in the same **direction**.

In a translation, the pre-image & image are **congruent**.

The corresponding angles have the **same** measurement.

The corresponding sides have the **same** measurement.

Look at the graph below. Record the coordinate pairs for the pre-image. Using the pre-image points, create two new translated images.

<table>
<thead>
<tr>
<th>Pre-Image</th>
<th>A (-8, 8)</th>
<th>B (-8, 3)</th>
<th>C (-4, 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image (x + 5, y + 2)</td>
<td>A' (-3, 10)</td>
<td>B' (-3, 5)</td>
<td>C' (1, 5)</td>
</tr>
<tr>
<td>In words, describe the translation.</td>
<td>The image moved five units to the right and up two units.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Image (x + 8, y - 8) | A'' (0, 0) | B'' (0, -5) | C'' (4, -5) |
| In words, describe the translation. | The image moved eight units to the right and down eight units. |

Using two different colored pencils, graph the new images. Make sure to label both figures.

What rule could be used to translate the figure so it would be located in quadrant 3?

Possible Answer: (x - 1, y - 10)

**DILATIONS**

A transformation in which each point of a figure **stretches** or **shrinks** with respect to a fixed point, called the **center** of dilation.

In a dilation, the pre-image & image are **similar**.

The corresponding angles have the **same** measurement.

The corresponding sides are **proportional**.

Look at the graph below. Record the coordinate pairs for the pre-image. Using the pre-image points, create two new translated images.

<table>
<thead>
<tr>
<th>Pre-Image</th>
<th>A (0, 5)</th>
<th>B (0, 0)</th>
<th>C (5, 0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image (2x, 2y)</td>
<td>A' (0, 10)</td>
<td>B' (0, 0)</td>
<td>C' (10, 0)</td>
</tr>
<tr>
<td>In words, describe the dilation.</td>
<td>The image doubled in size.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Image (1/2x, 1/2y) | A'' (0, 2.5) | B'' (0, 0) | C'' (2.5, 0) |
| In words, describe the dilation. | The image is half the size of the preimage. |

Using two different colored pencils, graph the new images. Make sure to label both figures.

Compare the area of the pre-image to the image. Did the area double in size?

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**ROTATIONS**

A transformation in which a figure is turned through a given angle, called the **angle of rotation**, and in a given direction about a fixed point, called the **center of rotation**.

In a rotation, the pre-image & image are **congruent**. The corresponding angles have the **same** measurement. The corresponding sides have the **same** measurement.

- **90° Clockwise**
  - $(x, y) \mapsto (y, -x)$

- **90° Counter Clockwise**
  - $(x, y) \mapsto (-y, x)$

- **180° Rotation**
  - $(x, y) \mapsto (-x, -y)$

Look at the graph below. Record the coordinate pairs for the pre-image. Using the pre-image points, create three new rotated images.

<table>
<thead>
<tr>
<th>Pre-Image Coordinates</th>
<th>A $(2, 6)$</th>
<th>B $(2, 1)$</th>
<th>C $(6, 1)$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>90° Clockwise</strong></td>
<td>A’ $(6, -2)$</td>
<td>B’ $(1, -2)$</td>
<td>C’ $(1, -6)$</td>
</tr>
<tr>
<td><strong>90° Counter Clockwise</strong></td>
<td>A” $(-6, 2)$</td>
<td>B” $(-1, 2)$</td>
<td>C” $(-1, 6)$</td>
</tr>
<tr>
<td><strong>180° Rotation</strong></td>
<td>A” $(2, -6)$</td>
<td>B” $(-2, -1)$</td>
<td>C” $(-6, -1)$</td>
</tr>
</tbody>
</table>

Using three different colored pencils, graph the new images. Make sure to label all of the figures.

What would the coordinates be if the pre-image was rotated $270°$? The coordinates would be the same as the $90°$ counter clockwise coordinates.

**REFLECTIONS**

A transformation in which a figure is **reflected or flipped** in a line, called the **line of reflection**.

In a reflection, the pre-image & image are **congruent**. The corresponding angles have the **same** measurement. The corresponding sides have the **same** measurement.

- **Reflection in the x-axis**
  - $(x, y) \mapsto (x, -y)$

- **Reflection in the y-axis**
  - $(x, y) \mapsto (-x, y)$

Look at the graph below. Record the coordinate pairs for the pre-image. Using the pre-image points, create three new rotated images.

<table>
<thead>
<tr>
<th>Pre-Image Coordinates</th>
<th>A $(3, 8)$</th>
<th>B $(3, 3)$</th>
<th>C $(7, 3)$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reflection in the x-axis</strong></td>
<td>A’ $(3, -8)$</td>
<td>B’ $(3, -3)$</td>
<td>C’ $(7, -3)$</td>
</tr>
<tr>
<td><strong>Reflection in the y-axis</strong></td>
<td>A” $(-3, 8)$</td>
<td>B” $(-3, 3)$</td>
<td>C” $(-7, 3)$</td>
</tr>
</tbody>
</table>

Using two different colored pencils, graph the new images. Make sure to label all of the figures.

A figure has line symmetry if a line, called the **line of symmetry**, divides the figure into two parts that are reflections of each other in the line.
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