

Algebra II - Quadratic Transformation Exploration

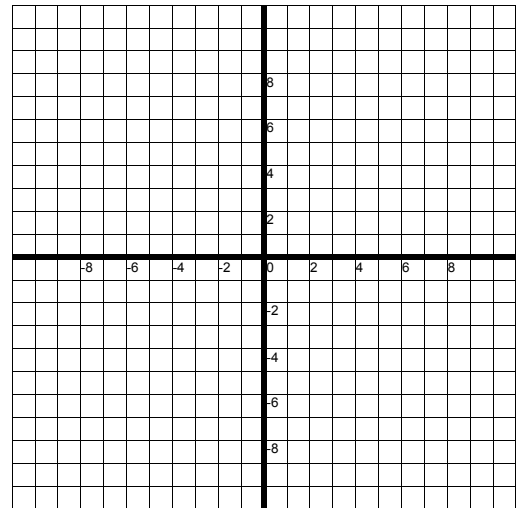
Name _____ Date _____

PARENT GRAPH

- 1) On Grid A, plot the graph of $y = x^2$ using the following x-values: -3, -2, -1, 0, 1, 2, and 3.
- 2) Connect the points using a smooth curve.
- 3) What are graphs with this shape called?

Grid A ↓

| X | Y |
|----|---|
| -3 | |
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |

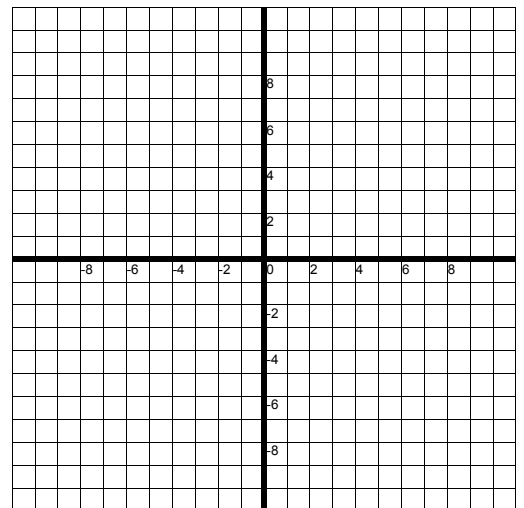


TRANSLATIONS

- 4) On Grid B, redraw the graph of $y = x^2$ with a light colored pencil.
- 5) Also on Grid B, use a different color to plot the graph of $y = x^2 + 2$ using the same x-values -3, -2, -1, 0, 1, 2, and 3. Again, use a smooth u-shaped curve. Be sure to label both of your graphs.
- 6) How does the graph of $y = x^2 + 2$ compare with the graph of $y = x^2$? Write your answer below:

Grid B ↓

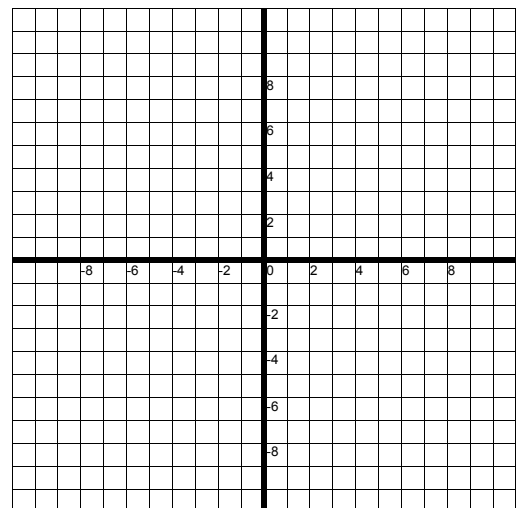
| X | Y |
|----|---|
| -3 | |
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |



- 7) On Grid C, redraw the graph of $y = x^2$ with a light colored pencil.
- 8) Also on Grid C, use a different color to plot the graph of $y = x^2 - 6$ using the same x-values -3, -2, -1, 0, 1, 2, and 3. Again, use a smooth u-shaped curve. Be sure to label both of your graphs.
- 9) How does the graph of $y = x^2 - 6$ compare with the graph of $y = x^2$? Write your answer below:

Grid C ↓

| X | Y |
|----|---|
| -3 | |
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |



Algebra II - Transformation Exploration - Pg 2

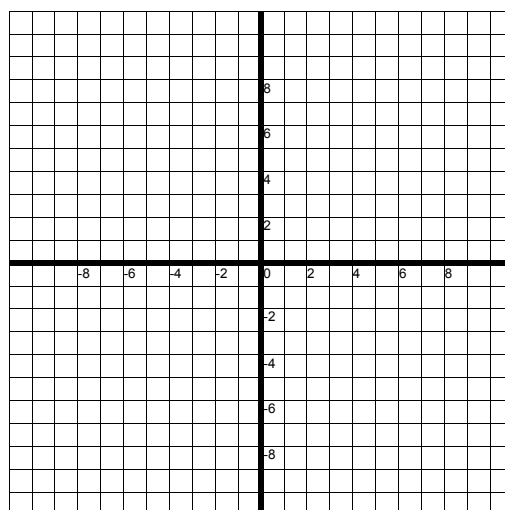
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TRANSLATIONS - CONT'D.

- 10) On Grid D, redraw the graph of $y = x^2$ with a light colored pencil.
- 11) Also on Grid D, use a different color to plot the graph of $y = (x + 4)^2$ using the x-values -7, -6, -5, -4, -3, -2, and -1. Again, use a smooth u-shaped curve. Be sure to label both of your graphs.
- 12) How does the graph of $y = (x + 4)^2$ compare with the graph of $y = x^2$? Write your answer below:

| X | Y |
|----|---|
| -7 | |
| -6 | |
| -5 | |
| -4 | |
| -3 | |
| -2 | |
| -1 | |

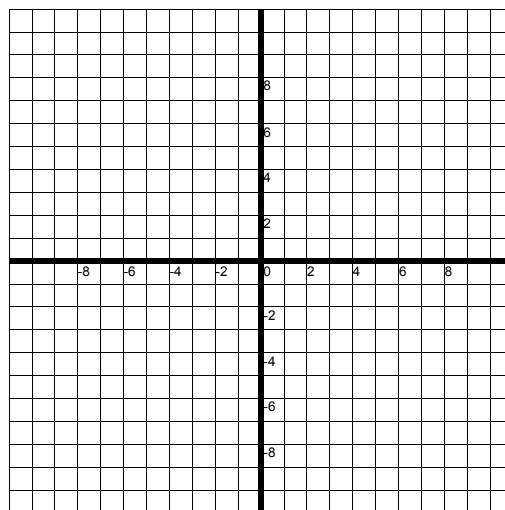
Grid D ↓



- 13) On Grid E, redraw the graph of $y = x^2$ with a light colored pencil.
- 14) Also on Grid E, use a different color to plot the graph of $y = (x - 5)^2$ using the x-values 2, 3, 4, 5, 6, 7, and 8. Again, use a smooth u-shaped curve. Be sure to label both of your graphs.
- 15) How does the graph of $y = (x - 5)^2$ compare with the graph of $y = x^2$? Write your answer below:

| X | Y |
|---|---|
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |

Grid E ↓

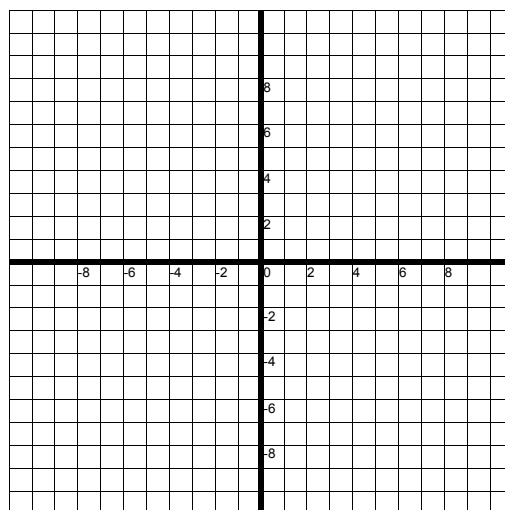


REFLECTIONS

- 16) On Grid F, redraw the graph of $y = x^2$ with a light colored pencil.
- 17) Also on Grid F, use a different color to plot the graph of $y = -(x^2)$ using the x-values -3, -2, -1, 0, 1, 2, and 3. Again, use a smooth u-shaped curve. Be sure to label both of your graphs.
- 18) How does the graph of $y = -(x^2)$ compare with the graph of $y = x^2$? Write your answer below:

| X | Y |
|----|---|
| -3 | |
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |

Grid F ↓

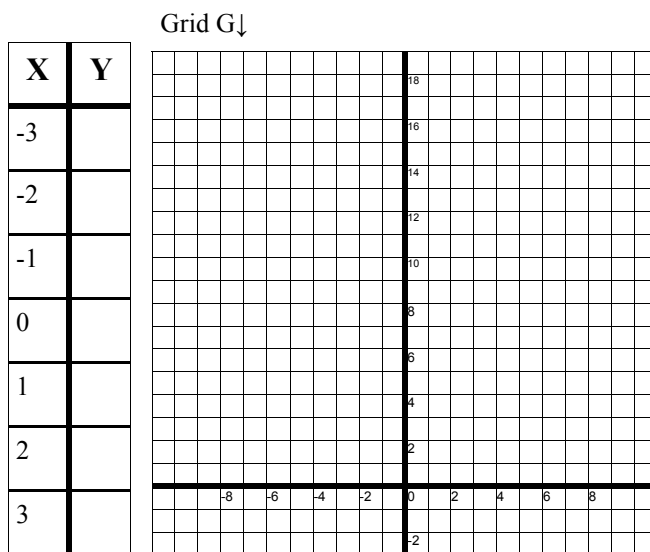


Algebra II - Transformation Exploration - Pg 3

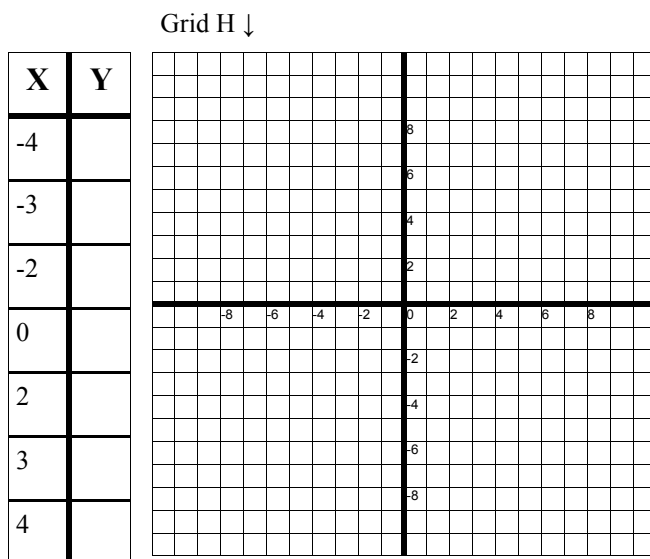
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VERTICAL STRETCH AND COMPRESS

- 19) On Grid G, draw the graph of $y = x^2$ with a light colored pencil.
- 20) Also on Grid G, use a different color to plot the graph of $y = 2x^2$ using the x-values -3, -2, -1, 0, 1, 2, and 3. Again, use a smooth curve. Be sure to label both of your graphs.
- 21) How does the graph of $y = 2x^2$ compare with the graph of $y = x^2$? Write your answer below:



- 22) On Grid H, draw the graph of $y = x^2$ with a light colored pencil.
- 23) Also on Grid H, use a different color to plot the graph of $y = \frac{1}{2}x^2$ using the x-values -4, -3, -2, 0, 2, 3, and 4. Again, use a smooth curve. Be sure to label both of your graphs.
- 24) How does the graph of $y = \frac{1}{2}x^2$ compare with the graph of $y = x^2$? Write your answer below:



MULTIPLE TRANSFORMATIONS

- 25) On Grid I, draw the graph of $y = x^2$ with a light colored pencil.
- 26) Based on the transformations listed on this sheet, can you predict what the graph of $y = -\frac{1}{2}(x+2)^2 + 4$ would look like?

Would there be:

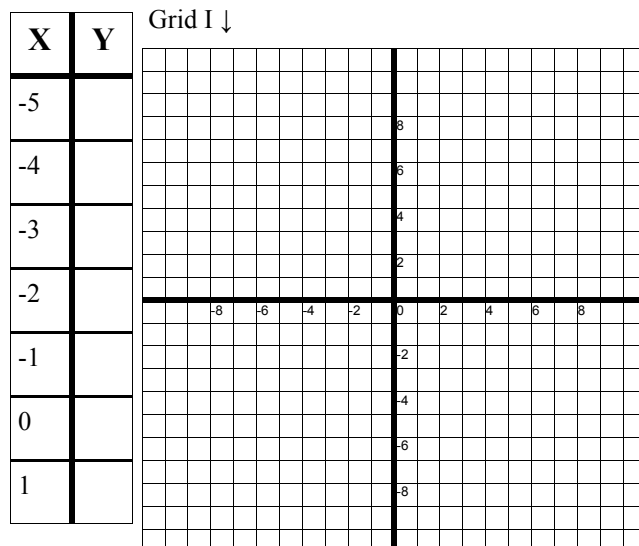
Vertical Shift? _____

Horizontal Shift? _____

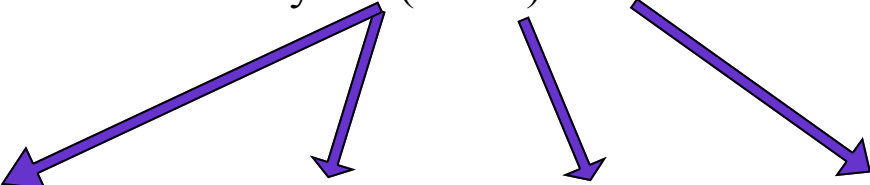
Reflection over x-axis? _____

Vertical Stretch or Compression? _____

- 27) Complete the table to the left, and graph $y = -\frac{1}{2}(x+2)^2 + 4$. Were your predictions correct?



Graphing Transformation Summary

$$y = a (x - h)^2 + k$$


What does the graph look like when the value of “a” is positive?

What happens to the graph if the value of “a” is negative?

What happens to the graph when the value of “a” is greater than one? (Describe the graph in words)

What happens to the graph when the value of “a” is a fraction between 0 and 1?

How does the value of “h” affect the graph?

If “h” is positive, how does the graph shift?

If “h” is negative, how does the graph shift?

In the equation above, there is a negative in front of the “h”. Why do you think that is?

What is critical to remember about the “h” value or horizontal shift of a graph?

How does the value of “k” affect the graph?

If “k” is positive, how does the graph shift?

If “k” is negative, how does the graph shift?