Algebra 2 Transformations Intro

Group Members: answers

In this exploration, you will revisit transformations introduced in Algebra 1 using the quadratic parent function. You will work through the questions using your graphing calculator.

The general equation for a quadratic is $y = a(b(x-h))^2 + k$

1. Before you begin, list any transformations you remember from Algebra 1 and Geometry. If you do not remember the formal names, list what you remember.

varies

Setting up your calculator

2. Turn your calculator ON and hit the Y= button then enter x^2 in the first equation spot ✓
3. Make sure your window is [-10,10] for x & y with a scale of 1

Parent Function Information (use your graph to answer the following)

4. The parent quadratic function is symmetric across the y-axis (x or y-axis).

5. The parent quadratic function has a domain of $(-\infty, \infty)$ and a range of $[0, \infty)$.

6. The parent quadratic function has a line of symmetry equation of $x = 0$.

7. The vertex of the parent quadratic function is the coordinate point $(0,0)$ and it is the min (maximum or minimum) of the function.

8. How do you line of symmetry and the vertex relate?

x-value of vertex

Exploration 1 (k-value)

9. Now add $x^2 - 5$ as the second equation; do not delete the first equation. Describe the transformation between the first and second graph.

down 5

10. Predict what the transformation would be for $y = x^2 + 3$. Check your answer with your calculator.

up 3

11. What could be the general rule for k? When $k > 0$? When $k < 0$?

up ↗ ↑ down

Exploration 2 (h-value)

12. Now make $(x+4)^2$ be the second equation keeping x^2 as the first equation. Describe the transformation between the first and second graph.

left 4

13. Predict what the transformation would be for $y = (x-3)^2$. Check your answer with your calculator.

right 3

14. What could be the general rule for h? When $h > 0$? When $h < 0$?

$(x-\#)^2$ right

$(x+\#)^2$ left

Exploration 3 (a-value)

15. Now make $3x^2$ be the second equation, keeping x^2 as the first equation. Describe the transformation between the first and second graph.

vertical dilation by 3

16. Try some different equations and describe what would happen to the graph when $a > 1$? What would happen when $0 < a < 1$?

taller

wider

17. Predict what would happen when a is negative. Check your answer with your calculator.

reflect over x-axis

Exploration 4 (b-value)

18. Now make $(2x)^2$ be the second equation, keeping x^2 as the first equation. Describe the transformation between the first and second graph.

horizontal dilation by 1/2

19. Try it out and describe what would happen to the graph when $b > 1$? What would happen when $0 < b < 1$?

taller

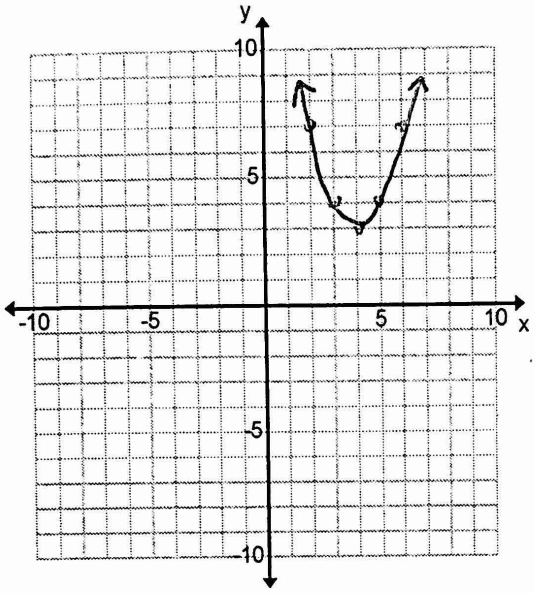
wider

Examples:

Using the following rules from above list the transformations & graph the following problems **by hand** and then check your answers on your calculator.

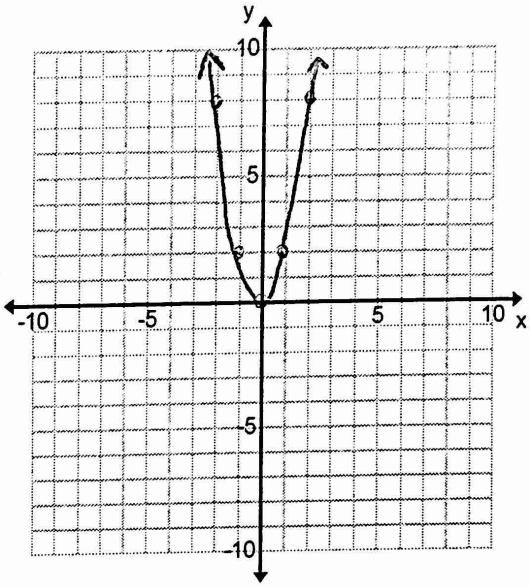
20. $f(x)=(x-4)^2+3$

R4, U3



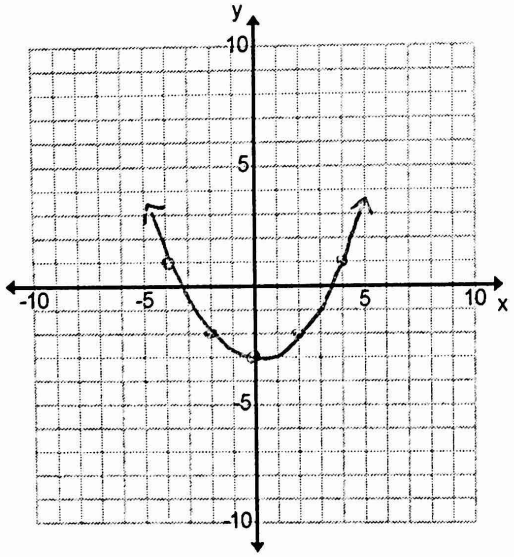
21. $y=2x^2$

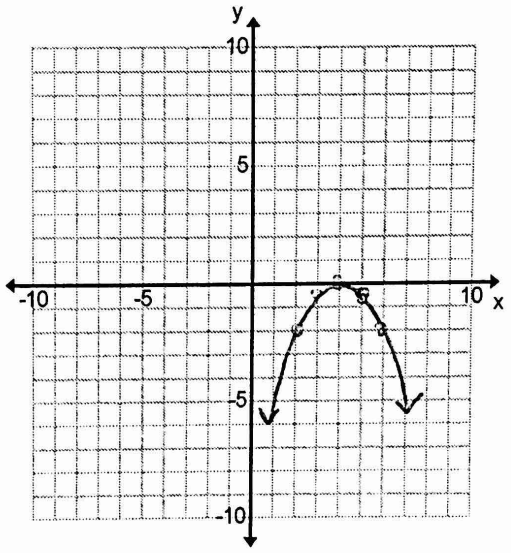
VD2



22. $m(x)=\left(\frac{x}{2}\right)^2-3$

HD2
D3



23. $y=-\frac{1}{2}(x-4)^2$

over x-axis
VD 1/2
R4