

The Game

Quadratic Functions

This highly interactive card game increases engagement and deepens understanding by helping students make connections between verbal, algebraic, numerical, and graphical representations of important math concepts. This deck addresses standards F-IF.2, F-IF.4, F-IF.9, F-BF.3, and A-REI.4a.

Objective: Students will be able to translate between the verbal, algebraic, numerical, and graphical representations of quadratic functions. Students will have the opportunity to see the relationship between the parent graph of a quadratic function and graphs with vertical and horizontal shifts and stretches.

Directions: If students are being introduced to the cards for the first time, it is recommended that they begin with the matching cards activity. Students may do the matching activity in groups of 2 - 4 people. Depending on the readiness of the students, it may be helpful to begin with only a subset the cards, rather than the entire deck. Once students are able to successfully match the smaller set of cards, they can repeat the matching activity with the remaining cards, until all cards are successfully matched. Students already pretty familiar with this topic, may begin this activity with all 48 cards.

MATCHING CARDS ACTIVITY

1. Remove the 2 wild cards, and sort all cards into four stacks: Verbal (words), Algebraic (equation), Numerical (table), and Graphical (graph)
2. Beginning with a card from any stack, find the other cards that match to form a book.
3. Once a book is completed (four matching VANG cards) set it aside.
4. Select another card, and find the other cards that match that one also.
5. Continue this process until all 48 cards have been matched.
6. There should be a total of 12 books and 2 wild cards.

Once students have successfully completed the Matching Cards Activity, they are now ready to play the VANG card game. The card game may be played by 2 – 5 players with one deck of cards.

It is recommended that students play the game at least twice a week, until mastery is attained. Mastery means that beginning with any representation (Verbal, Algebraic, Numerical, and Graphical), students can quickly and efficiently translate to the other three representations.

VANG CARD GAME

1. Shuffle the cards and deal each person 5 cards.
2. Place the remaining cards in the middle to be the “kitty.”
3. Choose the tallest person to go first. That person must play an Algebraic Card (card with an equation on it). If that person does not have an Algebraic Card to play, he must end his turn by pulling a card from the kitty.
4. The person on the right plays next. He must play a Verbal, Numerical, or Graphical Card that matches the Algebraic Card(s) already played, or begin a new stack with an Algebraic card. If a player is unable to play a card, his turn ends by pulling a card from the kitty. Even if a player is able to play a card, he must still end his turn by pulling a card from the kitty. Only one card can be played each turn.
5. Play continues with the next person on the right.
6. The person who plays the 4th card on a stack wins that book.
7. Play continues until all cards have been played.
8. A Wild Card may be played as the 4th card on any stack.
9. The winner is the player with the most book.

The VANG Game - Quadratic Functions - Answer Key

Quadratic parent graph

Parent graph is reflected over the x-axis

Parent graph is vertically stretched

Parent graph is horizontally stretched

Parent graph is shifted up two units

Parent graph is shifted down two units

Parent graph is shifted left two units

Parent graph is shifted right two units

Parent graph is shifted left two units and down one unit

Parent graph is shifted right two units and up one unit

Parent graph is reflected over x-axis, vertically stretched, shifted left two units and up one unit

Parent graph is reflected over x-axis, horizontally stretched, shifted right two units and down one unit

$$f(x) = x^2$$

$$f(x) = -x^2$$

$$f(x) = 2x^2$$

$$f(x) = \frac{1}{2}x^2$$

$$f(x) = x^2 + 2$$

$$f(x) = x^2 - 2$$

$$f(x) = (x+2)^2$$

$$f(x) = x^2 - 4x + 4$$

$$f(x) = x^2 + 4x + 3$$

$$f(x) = (x-2)^2 + 1$$

$$f(x) = -2(x+2)^2 + 1$$

$$f(x) = -\frac{1}{2}(x-2)^2 - 1$$

x	f(x)
-3	9
-2	4
-1	1
1	1
2	4
3	9

x	f(x)
-3	-9
-2	-4
-1	-1
1	-1
2	-4
3	-9

x	f(x)
-3	18
-2	8
-1	2
1	2
2	8
3	18

x	f(x)
-3	4.5
-2	2
-1	0.5
1	0.5
2	2
3	4.5

x	f(x)
-3	11
-2	6
-1	3
1	3
2	6
3	11

x	f(x)
-3	7
-2	2
-1	-1
1	-1
2	2
3	7

x	f(x)
-3	1
-2	0
-1	1
1	9
2	16
3	25

x	f(x)
-3	25
-2	16
-1	9
1	1
2	0
3	1

x	f(x)
-3	0
-2	-1
-1	0
1	8
2	15
3	24

x	f(x)
-3	26
-2	17
-1	10
1	2
2	1
3	2

x	f(x)
-3	-1
-2	1
-1	-1
1	-17
2	-31
3	-49

x	f(x)
-3	-14
-2	-9
-1	-5.5
1	-1.5
2	-1
3	-1.5

