

# The Game

## Linear Relationships

*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. The cards representing proportional relationships ( $y = x$ ,  $y = -x$ ,  $y = 2x$ ,  $y = -2x$ ,  $y = 0.5x$ , and  $y = 3x$ ) address standards 6.RP.3a, 6.EE.9, and 7.RP.2a-d. Activities using the entire deck also address standards 8.EE.5 and 8.F.2-5.*

**Objective:** Students will be able to translate between the verbal, algebraic, numerical, and graphical representations of linear functions. Students will have the opportunity to see the relationship between linear and proportional relationships (linear relationships that go through the origin).

**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 the cards that represent proportional relationships (24 cards), rather than the entire deck. Once students are able to successfully match the cards representing proportional relationships, 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 - Linear Relationships - Answer Key

The output is the cost of an international call that costs one dollar per minute.

The output is the amount of water in a pool that starts off empty and increases by two gallons every minute.

The output is the temperature that starts at zero degrees and drops one degree each week.

The output is the position of a diver that starts at the ocean's surface and dives at a rate of two feet per minute.

The output is the amount of chicken needed to adjust a recipe to feed three times as many people.

The output is the amount of pasta needed to adjust a recipe to feed half as many people.

The output is the cost to ship a box at a rate of one dollar per ounce plus a flat fee of two dollars.

The output is the amount of water in a pool that starts with three gallons and increases by two gallons every minute.

The output is the total profit for selling pens for two dollars each after paying a flat five-dollar booth fee.

The output is a taxi fare that costs three dollars per mile plus a three dollar boarding fee.

The output is the account balance when three dollars is deposited every day into an account that was overdrawn by three dollars.

The output is the value of a stock fund that starts at three dollars and loses two dollars every month.

$$y = x$$

$$y = 2x$$

$$y = -x$$

$$y = -2x$$

$$y = 3x$$

$$y = 0.5x$$

$$y = x + 2$$

$$y = 2x + 3$$

$$y = 2x - 5$$

$$y = 3x + 3$$

$$y = 3x - 3$$

$$y = -2x + 3$$

x	y
1	1
2	2
3	3
4	4
5	5
6	6

x	y
1	2
2	4
3	6
4	8
5	10
6	12

x	y
1	-1
2	-2
3	-3
4	-4
5	-5
6	-6

x	y
1	-2
2	-4
3	-6
4	-8
5	-10
6	-12

x	y
1	3
2	6
3	9
4	12
5	15
6	18

x	y
1	0.5
2	1
3	1.5
4	2
5	2.5
6	3

x	y
1	3
2	4
3	5
4	6
5	7
6	8

x	y
1	5
2	7
3	9
4	11
5	13
6	15

x	y
1	-3
2	-1
3	1
4	3
5	5
6	7

x	y
1	6
2	9
3	12
4	15
5	18
6	21

x	y
1	0
2	3
3	6
4	9
5	12
6	15

x	y
1	1
2	-1
3	-3
4	-5
5	-7
6	-9

