

Topics: Algebraic Terminology, Vocabulary, & Expressions

Materials List

- ✓ Blank card deck or blank business cards (54)
- ✓ Permanent marker
- ✓ Scratch paper
- ✓ Pencil

This activity can be used to teach:

- Expressions (Common Core Math Standards: Expressions & Equations, Grade 6, 1, 2, 3, 4, 5, & 6; Grade 7, 4)

Algebra Rummy

Master Algebraic Terminology Playing Rummy Games



Knowledge of simple algebraic terminology allows players to form a “like terms flush” or “coefficient three of a kind” combinations and be first to dispose of all cards in hand.

Assembly

1. Use 54 blank playing cards or business cards to create a special deck suitable to play Algebra Rummy. Mark each card with 1 of following expressions (1 per card):
 - 6 groups of 9 like terms each:
 - 1, 2, 3, 4, 5, 6, 7, 8, and 9
 - $1x$, $2x$, $3x$, $4x$, $5x$, $6x$, $7x$, $8x$, and $9x$
 - $1y$, $2y$, $3y$, $4y$, $5y$, $6y$, $7y$, $8y$, and $9y$
 - $1x^2$, $2x^2$, $3x^2$, $4x^2$, $5x^2$, $6x^2$, $7x^2$, $8x^2$, and $9x^2$
 - $1y^2$, $2y^2$, $3y^2$, $4y^2$, $5y^2$, $6y^2$, $7y^2$, $8y^2$, and $9y^2$
 - $1xy$, $2xy$, $3xy$, $4xy$, $5xy$, $6xy$, $7xy$, $8xy$, and $9xy$

Playing the Game (for 2-4 players)

1. Dealer shuffles deck & deals 7 cards to each player and then turns one card face up to start a discard pile. Each player arranges the 7 cards and attempts to form a set of 3 cards minimum (more is permitted). If initially not possible to form a set of 3, keep cards together which have the potential of forming acceptable combinations:
 - Three or more cards with “Like Terms” (i.e., terms with same variable) may be combined to form a “like terms flush”: e.g., $3y$, $5y$, and $6y$.
 - Three or more cards with “Unlike Terms” (i.e., terms with different variables) but with same coefficient may be combined to form a “coefficient three of a kind”: e.g., $4x$, $4y$, $4xy$.
2. The player clockwise from the dealer goes first and determines if the card on the discard pile can be used to form an acceptable combo. Player 1 may pick it up only if that card completes a valid set in which instance the combination must be laid out on the table in front of the player with the terms facing up. Alternatively, the player may take a card from the draw pile in an attempt to form an acceptable set. If successful, the player has the option to either lay down the set face up on the table or to keep it in the hand, hidden from the other players. As each set of cards is placed on the table, the player describes how they are related to each other – using appropriate Algebraic Terminology (see page 2). Placing a least desired card face up on the discard pile completes the turn.
3. Subsequent players take turns clockwise as in step 2. They are also allowed to “follow suit” based on another player’s combination already laid out on the table! For example, “ $4x$ ” is allowed to be put on the table (in front of the player) as part of a set of “ $4x^2$, $4y$, and $4xy$ ” already displayed on the table in front of another.
4. After a player discards a card, he or she must wait their turn (i.e., after the preceding player discards a card) before they can “follow suit”.
5. When a discarded card allows the player on turn to make an acceptable combo, then that player has the option to pick up all the cards discarded up to and including the card of interest. Then the player must put down that combination using that specific discarded card on the table. Note: just picking 1 card from the discard pile is not allowed, unless it is the last card discarded!

6. The round is complete when any player is successful in laying down all the cards in their hand. All players would add 1 point for every card laid out on the table, while subtracting the number of cards still left in hand.
7. Extra bonus points are possible for any player who can rearrange their own cards on the table as a straight flush: add 1 point for every like term cards with sequential coefficients.
8. Tabulate the points for each player and play another round (see steps 1-7). Continue play for 15 minutes or other agreed upon time period.

The Math Behind the Activity

Learning algebra is like learning a new language. It is a language used to create mathematical models of real-world situations and to handle problems that cannot be solved using only arithmetic. Rather than using words, algebra uses symbols to make statements about things, while letters often represent numbers. Games are a great means to encourage students to learn concepts in a fun way. This game reinforces and challenges students' knowledge of algebraic terminology by making connections to definitions and visual examples!

Taking it Further

For extra points, combine completed sets of algebraic terms with algebraic operations to create an equation with a real solution. For example, the complete sets with terms $(6x, 8x, 10x)$, $(5xy, 2xy, 1xy)$, and $(4y^2, 4y, 4x)$ can be combined as follows:

$$\begin{aligned} (5xy-2xy-1xy) / (6x-8x+10x-4x) &= 4y^2 + 4y \\ (2xy) / (4x) &= 4y^2 + 4y \\ \frac{1}{2}y &= (4y + 4)y \\ \frac{1}{2} &= 4y + 4 \quad \rightarrow \quad \text{final solution: } y = -\frac{7}{8} \end{aligned}$$

Web Resources (Visit www.raft.net/raft-idea?isid=604 for more resources!)

- Math terminology: index of words, definitions & examples www.mathwords.com/index_algebra.htm
- Terminology Used in Algebra: www.school-for-champions.com/algebra/terminology.htm
- Khan Academy resources on variables and expressions – <https://www.khanacademy.org/math/algebra/solving-linear-equations-and-inequalities>
- Teacher designed math courses from the New Jersey Center for Teaching & Learning – <https://njctl.org/courses/math>

Algebraic Terminology:

Terminology	Definition	Comments / Examples
Constant	A constant is a fixed quantity that does not change.	5 , 10 , or 1/3
Variable	A variable is a symbol that represents an unknown number.	In an expression for the perimeter of a square, 4s , the letter s is a variable.
Coefficient	The coefficient of a variable is the number that is placed in front of the variable	The number 4 is the coefficient in the expression 4s
Term	A term is either a number or a product of a number and one or more variables: 1) a constant 2) the product of a coefficient and a variable 3) the product of a coefficient and 2 or more variables	Multiplication is the only thing connecting coefficients with variables 1) 5, 10 1/3 2) 4s, 2x 3) xy, 7x ² y
Expression	An expression is any mathematical calculation or formula combining constants and/or variables using sums, differences, products, quotients, exponents, parentheses, or other mathematical operations (no equal sign)	2y + 5 x - 2y ² +3
Like Terms	An expression with Like Terms has the same variable(s) and corresponding power(s). They can be combined using addition and subtraction	3a + 21a 4a ² - 3a ² + 2a ² 5x ² y + 8x ² y
Unlike Terms	An expression with Unlike Terms has factors with different variables and/or corresponding powers.	5a - 7b, 3a ² + 21a, or 2y + 5
Equation	An equation is a statement where two expressions are equal.	7 = 2 + 5 or a ² + 2a + 4 = 3