**Math Stacks Cards**

(Different gameplay options to incorporate 3rd & 4th grade standards)

**Standards.**

**3.NF.A.1** Understand a unit fraction, 1/b, as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a non-unit fraction, n/b, as the quantity formed by n parts of size 1/b. For example, 3/4 represents a quantity formed by 3 parts of size 1/4.

**3.NF.A.2** Understand a fraction as a number on the number line. Represent fractions on a number line.

a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint locates the number 1/b on the number line. For example, on a number line from 0 to 1, students can partition it into 4 equal parts and recognize that each part represents a length of 1/4 and the first part has an endpoint at 1/4 on the number line.

b. Represent a fraction n/b on a number line diagram by marking off n lengths 1/b from 0. Recognize that the resulting interval has size n/b and that its endpoint locates the number n/b on the number line. For example, 5/3 is the distance from 0 when there are 5

iterations of 1/3.

**3.NF.A.3** Explain equivalence of fractions and compare fractions by reasoning about their size.

a. Understand two fractions as equivalent (equal) if they are the same size or the same point on a number line.

b. Recognize and generate simple equivalent fractions (e.g., 1/2 = 2/4, 4/6 = 2/3) and explain why the fractions are equivalent using a visual fraction model.

c. Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers. For example, express 3 in the form 3 = 3/1; recognize that 6/1= 6; locate 4/4 and 1 at the same point on a number line diagram.

d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Use the symbols >, =, or < to show the relationship and justify the conclusions.

**4.NF.A.2** Compare two fractions with different numerators and different denominators by creating common denominators or common numerators or by comparing to a benchmark such as 0 or 1/2 or 1. Recognize that comparisons are valid only when the two fractions refer to the same whole. Use the symbols >, =, or < to show the relationship and justify the conclusions.

**MP2** Reason abstractly and quantitatively.

**Literary Skills for Mathematical Proficiency**

Understand and use correct mathematical vocabulary.

Discuss and articulate mathematical ideas.

**Materials.**

Math Stacks Cards (including supplemental cards)

Tape or magnets, if using the large version of the cards

**Hook.**

Show a picture of smiling kids playing cards: <https://www.eaieducation.com/images/products/530150_L2.jpg>



**Description.**

**Game 1: Fraction Equivalence Math Stacks.**

Divide students into groups of 2-4 students. Each group will play the game separately. To play, begin by creating a faceup grid of the starter cards, which are the cards with a single numerical fraction (like 1/4 or 3/8). The rest of the cards, called the match cards, are placed in a facedown draw pile. Students take turns drawing a match card and placing it in the stack of cards that is equivalent to the match card (see image). Once the stack reaches 4 cards, the stack can be picked up by the player who placed the fourth card. The game ends when all of the match cards have been placed on the grid. The person with the most stacks at the end of play wins.

If using the supplemental cards, there are more match cards equivalent to a given starter card; instead of picking up an entire stack, the student who places the fourth card of the stack will only pick up the three match cards, leaving the original starter card in place. Then the game proceeds as usual.



**Game 2: Memory Matching.**

Divide students into groups of 2-4. Each group will play the game separately. To play, cards are selected to have equivalent pairs (having multiple pairs equivalent to each other is fine, but the total number of cards equivalent to each other must be even in each case). Then shuffle the cards and place them in a facedown grid. Students take turns choosing two cards and turning them faceup. If the pair is equivalent, the student picks up the pair and takes another turn. If the pair is not equivalent, the cards are turned facedown again and it is the next student’s turn. The game ends when the last pair has been picked up. The student with the most pairs wins.

*Whole class variation: Use large versions of the cards adhered to the board/classroom walls/desks facedown with magnets or tape. The students are separated into small groups, and these groups act as the “players.” The rules then follow the same as described above.*

**Game 3: Greater Than Wins. (incorporates 3.NF.A.3.d)**

Divide students into pairs. Each pair will play the game separately. Each pair will be presented with one numerical fraction card that will be their fixed card for the game (e.g. 3/4), one “is greater than” card, and a stack of comparison cards. The comparison cards are selected ahead of time so that each comparison card represents a fraction that has either the same numerator or denominator as the fixed card, or is equivalent to the fixed card. While the fixed card is a numerical fraction, the comparison cards can be numerical or visual fraction models.

The stack of comparison cards is shuffled and placed facedown on the left, the “is greater than card” is placed in the middle, and the fixed card is placed on the right. The students take turns flipping up the top card on the comparison stack. If the comparison card on the left is greater than the fixed card on the right, the player whose turn it is reads the cards from left to right (“3/2 is greater than 3/4”), and then collects the comparison card. If the comparison card is less than the fixed card, then the comparison card is discarded (no one gets the card). If the cards are equivalent, the first player to say “equivalent!” and grab the comparison card gets to keep it. (If there is a disagreement between players about the relationship between the cards, players must discuss their reasons for <, =, or > until an agreement is reached.)

The game ends when all comparison cards have been used. The player with the most comparison cards wins.

*Whole class variation: Use large versions of the cards. Write the fixed card fraction on the board (or adhere the fixed card to the board or wall with magnets or tape). The students are separated into two groups, and these groups act as the “players.” As the groups take turns, different group members come to the front of the class to draw a comparison card and hold it up for the class to see. If the comparison card is greater, the rest of that group announces it* (“5/4 is greater than 3/4”)*, and the player returns to the group with the card. If the comparison card is less than the fixed fraction, the card is discarded. If the comparison card is equivalent to the fixed fraction, the first seated player to say “equivalent!” wins the card for their group. (The standing player who draws the card is a silent participator who is not allowed to say “equivalent!”. In the event that both groups say “equivalent!” at the same time, neither team gets the card.) When all comparison cards have been used, the team with the most cards wins.*

**Game 4: Lesser VS Greater. (incorporates 4.NF.A.2)**

Divide students into pairs. Each pair will play the game separately. Each pair will have a stack of comparison cards with fractions (represented numerically, with visual fraction models, as sums or differences, etc.), and a stack (equal in number) of benchmark cards. The benchmark cards are each either 0, 1/2, or 1. The comparison cards have values between 0 and 1, and the number of cards with values greater than 1/2 should be roughly equal to the number of cards with values less than 1/2.

There are two more cards: an “is greater than” card and an “is less than” card. Each player gets one of these cards.

The stack of comparison cards is shuffled and placed facedown on the left, and the stack of benchmark cards is shuffled and placed facedown on the right, with a gap in between the stacks. Each player controls one of the stacks; at the same time, the students flip up the top card on their stack. If the left card is greater than the right card, the keeper of the “is greater than” card places it in between the stacks, reads aloud the mathematical inequality given by the cards (“5/8 is greater than 1/2”), then picks up the three cards (keeping the pair of comparison and benchmark cards). If the left card is less than the right card, then the keeper of the “is less than” card takes the analogous actions instead. If the cards are equivalent, then they are discarded in separate discard piles. (If there is a disagreement between players about the relationship between the cards, players must discuss their reasons for <, =, or > until an agreement is reached.)

When the cards in the comparison stack and the benchmark stack have all been used, the respective discard piles can be shuffled and reset, and a new round begins. The game ends when either (1) all cards have been taken by the players, or (2) the game goes a full round with all cards being discarded for equivalence. The player with the most pairs of cards wins.

*For this game, the difficulty level can be increased by adding more fractions to the benchmark deck (like 1/3 and 2/3).*

*For all four games, it is possible to differentiate the level of play by selecting only certain cards to be used. (E.g., by only including fractions of certain denominators, or by excluding the sum/difference cards, etc.)*