**Race to One**

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| In this lesson students explore equivalent fractions by playing the game Race to One. |

**NC Mathematics Standards:**

**Number and Operations - Fractions**

**NC.4.NF.1** Explain why a fraction is equivalent to another fraction by using area and length fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size.

**Additional/Supporting Standards:**

**NC.4.NF.3** Understand and justify decompositions of fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 100.

• Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

• Decompose a fraction into a sum of unit fractions and a sum of fractions with the same denominator in more than one way using area models, length models, and equations.

• Add and subtract fractions, including mixed numbers with like denominators, by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.

• Solve word problems involving addition and subtraction of fractions, including mixed numbers by writing equations from a visual representation of the problem.

**Standards for Mathematical Practice:**

3. Construct viable arguments and critique the reasoning of others.

5. Use appropriate tools strategically.

7. Look for and make use of structure.

**Student Outcomes:**

* I can find equivalent fractions and justify them with a model.
* I can use equivalent fractions to play the game Race to One.

**Math Language:**

* equivalence
* equivalent fractions
* numerator/denominator

**Materials:**

* Fraction Cards (attached)
* Race to One Game Board (attached)
* Race to One Rules (attached)
* A set of chips, counters, or cubes

**Advance Preparation:**

* Gather materials, cut out fraction cards, copy the Race to Once game board

**Launch:**

1. Introducing Race to One (8-10 minutes)

Student pairs are given a gameboard. They must label the fractions on each fraction bar before playing. (Halves, Thirds, Fourths, Fifths, Sixths, Eights, and Tenths). Introduce the game Race to One by playing a practice game with the class. Play a few rounds and make sure students are clear about how to play

Race to One Game Directions:

* Using just the fraction cards that are equal to or less than one, shuffle the cards and place them face down. Start by placing one chip on each fraction bar at a location that is less than 3/4. (Students will start at the beginning of the fraction bar during their game.)
* Select a card from the pile and discuss the possible moves available to the students. The player can move one chip or more than one chip during each play, but they must move the full amount on the chosen card.
* If a player is not able to move the full amount, they lose their turn.

**Explore:**

1. Playing Race to One (20-25 minutes)

Observe students as they play and pose questions to support their thinking about fractions, equivalent fractions, and composing fractions.

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| **Observation** | **Questions to consider asking:** |
| Students are unable to decide where to move. | * “What does the fraction say?” * “Based on the fraction what are some of the denominators that I could use?” |
| Students are unable to create correct equivalent fractions. | * “Can you draw a model of your fraction? * How can you use the model to find an equivalent fraction?” |
| Students are randomly moving without thinking strategically about fractions. | * “What influenced your decision to move that piece?” * “Do you have any pieces that you want to think about moving now or on your next move?” * “Which move will move a piece closest to one?” |

**Discuss:**

1. Discussion of Race to One (10-12 minutes)

Play a round as a class and have students advise you on where you should move. The focus of the discussion should be on equivalent fractions.

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| **Questions to Ask** | **Possible Responses** |
| Based on this card, what are all of the ways that I could move? | * “You could move the amount on the card.” * “You could double both the numerator and denominator and move that amount since doubling the numbers get you a number.” |
| Which move gets a piece to 1 or closest to 1? | * Responses will vary, but you should question students to think about equivalent fractions and justify how they know fractions are equivalent based on how they decide to move. |
| Suppose I draw the card ½. What are all of the ways I could move an equivalent amount? How do you know? | * “½ is equal to 2/4 because I double both the 1 and the 2.” * “½ is equal to 2/4 because when I have ½ of a rectangle shaded and I divide it into 4 equal pieces 2 of the 4 pieces are then shaded.” |

**Evaluation of Student Understanding:**

**Informal Evaluation:**

* As students are working on their tasks, pose questions and make observations about which students need further support playing the game.

**Formal Evaluation/Exit Ticket:**

* If you desire to give an exit ticket, consider posing the following task: You draw the card ¼. What are some ways you could move on the game board? Draw pictures to justify your answers.

**Meeting the Needs of the Range of Learners:**

**Interventions:**

* The game could be played only with the lines halves, fourths, and eighths to make the game simpler. Provide students with graph paper that they will use to create equivalent fractions for each turn. Students could also use fraction tiles or fraction bars to help them find equivalent fractions.

**Extensions:**

* Challenge students to see how few moves it takes for them to get all of the pieces to one.

**Possible Misconceptions/Suggestions:**

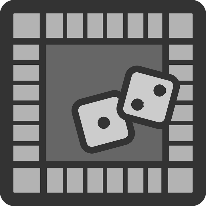
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| **Possible Misconceptions** | **Suggestions** |
| * Students are unable to decide where to move. * Students are unable to create correct equivalent fractions. * Students are randomly moving without thinking strategically about fractions. | * “What does the fraction say?” “Based on the fraction what are some of the denominators that I could use?” * “Can you draw a model of your fraction?” “How can you use the model to find an equivalent fraction?” * “What influenced your decision to move that piece?” “Do you have any pieces that you want to think about moving now or on your next move?” “Which move will move a piece closest to one?” |

**Possible Solutions:**

* Equivalent fractions will vary based on the card pulled. Encourage students to explain their reasoning with a model for each equivalent fraction.

**Race to One Rules**

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1. Shuffle the fraction cards that are equal to or less than 1. Place them

face down.

1. Place seven counters on the game board, one at the beginning of each fraction bar.
2. Player 1 draws the first card off the top of the deck of fraction cards. Move a chip (or chips) the total amount shown on the card. You can move one or more than one chip on every turn. You must move the full value of the fraction on the fraction card. Example: Player 1 chooses 3/5. They can move one chip 3/5 on the fifths line or 6/10 on the tenths line. They can also move more than one chip the following ways: 1/2 and 1/10, 1/5 and 4/10, or 1/3, 1/6, and 1/10.
3. Player 2 draws the next card off the top of the deck of fraction cards and moves their chip or chips the total found on their card. Players take turns flipping cards and moving chips.
4. When a chip lands exactly on one, the player has won the chip. Once a player has won a chip, another chip is placed at the beginning of the fraction bar so that there are always 7 chips being played at one time.
5. If you are unable to move the amount found on the fraction card, your turn is over.

**Race to One - Game Board**

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| 3  10 | 7  10 | 9  10 | 2  2 |
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| 4  4 | 5  4 | 6  4 | 5  5 |
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| 8  8 | 9  8 | 10  8 | 11  8 |
| 12  8 | 2  10 | 4  10 | 5  10 |
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| 12  10 | 13  10 | 14  10 | 15  10 |
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