**Fraction Relay Race**

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| In this lesson, students decompose 1 whole into smaller fractions in the context of a relay race.  |

**NC Mathematics Standards:**

**Number and Operations - Fractions**

**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:**

1. Make sense of problems and persevere in solving them.

7. Look for and make use of structure.

**Student Outcomes:**

* I can decompose a fraction into smaller fractional parts.
* I can compose a fraction from smaller fractional parts.

**Math Language:**

* compose
* decompose
* denominator
* equivalent
* greater than
* less than
* numerator
* partition

**Materials:**

* Relay Race student sheet

**Launch:**

1. Introducing the Relay Race (8-10 minutes)

Begin the lesson by showing a quick video on a relay race from the 2016 Olympics (<https://www.youtube.com/watch?v=suE25yO5mHc>). Say to the class: “Today we are going to get ready for a relay race. Before we run the race, we need to make a plan. Each team will have three people on it. Each person on a team has to run in the race, but they do not need to run the same distance. There are certain places during the race where you can hand off the baton to the next runner. You are going to get a chance to plan the distances of each runner on your team before the race begins.”

“Let’s work together to try to make a plan for a team. Today’s race will have different places that a team can hand off their baton to the next runner.”

Draw a line on the board with a start and finish line. Mark 5 locations, equal distance apart to create 6 equal sections. Tell students, “These are the sections where students can hand off the baton if they want. In a relay race, they are called the legs of the race.”

Say to the class, “How many sections, or legs, do we have? What is the fraction that represents each section?” Students may have a difficult time with the concept that there are 5 locations to hand off, but 6 sections to the race. This is a good time to discuss to use the distance between the marks and not the marks to determine the fractional length.

Have students talk with their teammates to determine some possibilities to setting up the race. Remember that each person doesn’t have to run the same distance.

Share a few of the students’ ideas and ask what fraction of the race each student will need to run.

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In this race the first runner runs 3/6 of the race, the second runner runs 2/6, and the final runner runs 1/6. The equation would be 3/6 + 2/6 + 1/6 = 6/6 or 1.

Tell students that today they are going to design their own relay race with different sections.

**Explore:**

1. Exploring How to Design Relay Races (18-20 minutes)

Students work on planning four different races. For each race the student teams need to find multiple ways to set up each race. They record the distance each runner will run, and then write an equation that will equal one whole. Use the student handout sheets. During this time, the teacher circulates to ask questions and to choose responses to share out during the discussion portion of the lesson.

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| **Observation** | **Possible Questions** |
| Students struggle to get started on the task. | * “If two runners ran the same amount what would that number line look like? How far would each runner go?”
* “Is there a different way for them to hand off the baton?”
 |
| Students are unable to equally partition a number line. | * Provide students with graph paper.
* “Is there a way that you can divide the number line into 4 equal parts?”
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**Discuss:**

1. Discussion of Relay Races (10-12 minutes)

Have students share their work in the pre-determined order, and discuss patterns students might see in the number of fractional parts and the ways they can be split.

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| **Question** | **Possible Responses** |
| How did you begin to partition the distance of the relay race? | * Responses will vary. Focus on strategically partitioning the number line and using reasoning to determine the fractional amount that each person will run.
* “I made a few marks on the number line and then estimated how far apart the marks were.”
* “I started by dividing it into half. Then I broke each half into half to make fourths.”
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| When you partitioned the distance, how did you determine how far each person was running? | * “I started at 0 and just counted the marks that I went past until the person stopped running.”
* “I looked at the distance between the marks and kept joining sections. If the race were divided in 6 equal parts and one person ran 3 sections, that would be 3/6 which is the same as ½.”
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Close the lesson by returning to the learning targets: I can decompose a fraction into smaller fractional parts. and I can compose a fraction from smaller fractional parts. Have students discuss the ways they composed and decomposed fractions in today’s lesson using specific examples.

**Evaluation of Student Understanding**

**Informal Evaluation:**

* As students are working on their tasks, pose questions and make observations about which students need further support or more of a challenge.

**Formal Evaluation/Exit Ticket:**

* Students’ work on the relay race can be used as a formal evaluation.

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

**Interventions:**

* Students who are having trouble with this activity may want to start with dividing a relay race into half, then fourths.

**Extensions:**

* If students are in need of an extension have them design a relay race that is 2 units long so they have to decompose the number 2. You could also have them design a race that is 2 ½ laps long.

**Possible Misconceptions/Suggestions:**

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| **Possible Misconceptions** | **Suggestions** |
| * Students struggle to get started on the task.
* Students are unable to equally partition a number line.
 | * “If two runners ran the same amount what would that number line look like? How far would each runner go?”
* Provide students with graph paper. “Is there a way that you can divide the number line into 4 equal parts?”
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**Possible Solutions:**

Solutions will vary.

Relay Race Student Sheet

* + - 1. This race has 5 legs. There are three runners. Find two different ways they could run. Draw a model and write an equation to match each solution.

Model:

Equation:

* + - 1. This race has 8 legs. There are three runners. Find two different ways they could run. Draw a model and write an equation to match each solution.

Model:

Equation:

* + - 1. This race has 12 legs. There are three runners. Find two different ways they could run. Draw a model and write an equation to match each solution.

Model:

Equation: