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| **Synopsis of high-quality task:**  Students work with a partner to act out a scenario where one partner has made an error adding fractions and the other partner must explain the error and explain how to correct the error. Students will need to be able to use models to demonstrate addition of fractions.  **Anticipated student time spent on task:** 55 minutes  **Student task structure(s):** partner work, whole class discussion/ gallery walk |
| [**Math Content Standards and Practices:**](http://www.doe.mass.edu/frameworks/math/2017-06.pdf)  **5.NF.A.2** Solve real world problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result ⅖ + ½= 3/7, by observing that 3/7 < ½.*  **SMP.2** Reason abstractly and quantitatively.  **SMP.3** Construct viable arguments and critique the reasoning of others.  **SMP.4** Model with mathematics.  **SMP.5** Use appropriate tools strategically. |
| **Prior Knowledge:**  **4.NF.A** Extend understanding of fraction equivalence and ordering for fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.  **4.NF.A.1** Explain why a fraction a/b is equivalent to a fraction (nxa)/(nxb) by using visual fraction models, with attention to how the numbers and sizes of the parts differ even though the two fractions themselves are the same size.  **4.NF.B.** Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers for fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.  **4.NF.B.3.a** Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. |
| **Connections to the real-world:**  Students can connect to the experience of providing convincing arguments to peers.  Students can draft a relevant context for the addition expression in extension 1. |
| **Mastery Goals:**  Learning Objectives:  Students will determine if a fraction sum is reasonable by using their understanding of benchmark fractions.  Students will use visual models to find a correct fraction sum.  Language Objectives:  Students will be able to draft a convincing written argument describing an error and explaining meaning of a common denominator.  Students will be able to justify their conclusions and communicate them to others. |
| **Teacher instructions**  **Instructional Tips/Strategies/Suggestions:**  Distribute “Part A: Develop an Argument” (Appendix 1) to each pair of students. For part A, students will work in pairs. One student will take on the role of the student that made the error. The other will work to provide a convincing verbal argument incorporating estimation. (10 minutes)  Distribute “Sum of Two Fractions: Student Handout” (Appendix 2) to each student. Following the initial verbal discussion, pairs will work together to provide a written explanation for part A. (5 minutes)  For part B, students will select manipulatives and build a model that matches the expression. Manipulatives may include fraction bars, fraction circles, pattern blocks, erasable number lines, paper strips, etc. After building in two different ways, students should sketch the models on the student handout (15 minutes)  For part C, students discuss and record the error their classmate made on the student handout. (5 minutes)  For part D, display students’ solutions for part B (consider a gallery walk format) and, as a class, discuss connections that can be made among the representations. Discuss where “common denominators” can be seen in every visual model. Following the class discussion, pairs will work together to summarize the class discussion in a written explanation for part D on the student handout. (15 minutes)  To help students recognize that this equation can have a connection to a real-world context, ask students to independently complete part E. Select several student scenarios to share out whole class and discuss briefly (5 minutes)  **Extension**: Students record their written work as a screencast, imagining they are teaching the “confused” classmate a correct strategy for adding fractions. Their work should explain the process for adding fractions while creating and referring to a visual model. |
| **Instructional Materials/Resources/Tools:**   * *Part A: Develop an Argument* partner discussion prompt (Appendix 1) * *Sum of Two Fractions* student handout (Appendix 2) * Fraction bars * Fraction circles * Pattern blocks * Erasable number lines/ dry erase markers * Pencils/ colored pencils * Scoring rubric (Appendix 3) |
| **Accessibility and Supports:**  Potential sentence starters for each part:   1. (See Appendix 1 for student copy) The sum is (more/ less) than the benchmark \_\_\_\_. I know this because…   The sum should be (more than/ less than)\_\_\_\_\_\_.   1. (No writing necessary) 2. First, I think my classmate… Second, I think my classmate... 3. (See Appendix 2 for student copy) A common denominator is …. In my first model, the common denominator can be seen when…. In my second model, the common denominator can be seen when...   **Key academic vocabulary**: benchmark fraction, numerator, denominator, unit fraction, equivalent fraction, common denominators, sum, addends |

Partner Discussion Prompt (Appendix 1)

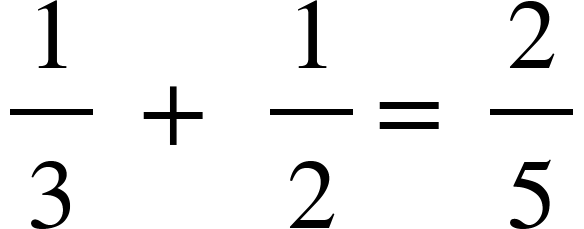
**Develop an Argument**

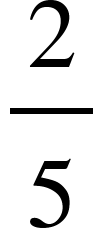
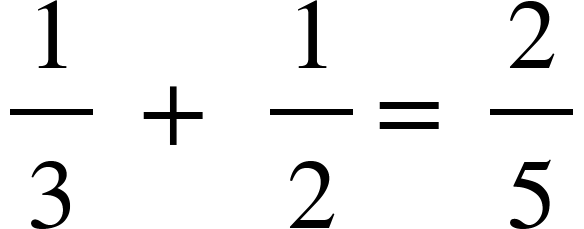
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| **Partner 1: Solver** | **Partner 2: Explainer/ Convincer** |
| Imagine that you found the sum of two fractions like this:        Your partner is going to convince you that your sum is not reasonable.    Don’t make it an easy explanation for them! Take on the role of someone who needs some convincing. Ask “why?” and ask for clarification when you do not understand their point. | Without finding an exact sum, convince your partner the sum is not reasonable and cannot be correct.    Use what you know about comparing fractions to benchmarks (like 0, ½ and 1) and estimation to explain.    Consider using these discussion starters:     * ⅖ is (more than/ less than) the benchmark \_\_\_\_\_\_\_. I know this because…      * The sum should be (more than/ less than) \_\_\_\_\_\_\_\_.      * ⅖ rounds to…. |

Student Worksheet (Appendix 2)

**Sum of Two Fractions**

Your classmate found the sum of two fractions. The work is below:



1. Without actually solving, convince your classmate that  is not a reasonable sum.
2. Show your classmate two different visual models that could be used to find the correct sum. Build the models before you sketch. There are fraction manipulatives, pattern blocks, and number lines available for you to use.
3. What error do you think your classmate made?
4. Explain what a “common denominator” is and describe where you see a common denominator in your visual models.
5. Write a scenario that can be solved using the expression.

Rubric (Appendix 3)

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| **Extended Response**  **Scoring Rubric** | **On Target**    Constructs and communicates a complete response | **Almost There**    Constructs and communicates a partial response | **Not Yet**    Does not construct  and communicate a relevant response |
| **Accuracy**  -Use math skills | The entire problem is solved accurately | Part of the problem is solved accurately | The problem is not solved accurately |
| **Modeling/Representing**  -Show your work/strategy (diagram, drawing, chart, table, graph, equation, etc.) | \*Shows appropriate work/strategy clearly and completely | \*Shows some appropriate work/strategy, but parts are missing or incorrect | \*Does not show appropriate work/strategy |
| **Reasoning**  -Explain / justify your strategy  -Tell WHY, not how  -Put solution in context (use sentence frame) | \*Explanation is complete and organized  → Uses math vocabulary correctly  → Puts answer in a sentence frame. | \*Explanation is missing parts or is not organized | \*Explanation is not included or is incorrect |

Sample Student Work Student work.
Part a: "one third rounds to one half, and one half is equal to one half. one half plus one half equals one. one is greater than two fifths." (teacher comment: "2/5 is less than 1/2!")
Part B: visual depicting where 1/3 and 1/2 fall on a number line relative to each other, with denominators of 3 and 6. "1/3 is equivalent to 2/6 because they are on the same point of the number line. Also, 1/2 is equal to 3/6 because they're also on the same point of the number line.... 1/2 is equal to 3/6, 1/3 is equal to 2/6 and 1/6 is equal to 1/6. to 2/6 + 3/6 = 5/6." 


Part c: "my classmate thought it made perfect sense because 1 + 1= 2 and 3+2=5 so it's correct in 1/3 + 1/2 = 2/5. But that doesn't seem reasonable. Also our classmate was adding the denominators which is incorrect."
Part D: "1. Find a common denominator: in our first model we showed 1/3 could be 2/6, 1/2 could be 3/6, and 1 could be 6/6. So, our common denominator would be 6.
2. Convert the fractions: the two numbers we use are 1/2 and 1/3. On the number line we show that 1/3 is equal to 2/6 and 1/2 is equal to 3/6. 
3. Add the fractions: while we add we have to keep in mind that we do not add the denominators and we can only add fractions if they have the same denominators. So, 2/6(1/3) + 3/6 (1/2) = 5/6."
Teacher comment: "Right! We don't add the denominators because that just identifies the unit fraction you used."