Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



Maria has 9/12 of a can of red paint for her art project, but she doesn’t think that will be enough. Maria’s mom found 1/2 of a can of red paint in the garage and gave it to Maria. How much red paint does Maria have now?

Justify your solution with numbers, pictures, and/or words.

Using what you learned from our discussion about the Paint for Maria problem, solve these number sentences.

Justify your solution with pictures, numbers, and/or words.

|  |  |  |
| --- | --- | --- |
| 3/4 + 1/12 = | 1/2 + 7/16 = | 21/24 + 3/8 = |

* What standards does this lesson address?
  + 5.NF.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*
  + For an excellent description about how other teachers have addressed this standard (including classroom discussions and additional problems) see Chapter 8 in your book Extending Children’s Mathematics: Fractions and Decimals by Empson and Levi.
* Why were these number sets chosen for this problem?
  + The number set for the Paint for Maria problem is 9/12 plus 1/2. This number set was chosen because, one denominator is a multiple of the other, but more challenging that just twice as much. (See page 185 in Extending Children’s Mathematics for further explanation of the sequence of these number choices).
  + Each of the follow up number sentences deals with denominators in which one is a multiple of the other. Notice, it is only necessary to find an equivalent fraction for one denominator because in each of the number sentences, the denominator of one fraction is a multiple of the other.
* What are some expected student strategies and misconceptions? How can I address these strategies and misconceptions in our class discussion?

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| --- | --- | --- |
| Number Set | Possible Student Strategies and Misconceptions | Possible Ways to Address Strategies and Misconceptions in Class Discussion |
| Paint for Maria Problem  Strategy 1 | C:\Documents and Settings\rsmith\Local Settings\Temporary Internet Files\Content.Word\photo[1].jpgC:\Documents and Settings\rsmith\Local Settings\Temporary Internet Files\Content.Word\photo[1].jpgC:\Documents and Settings\rsmith\Local Settings\Temporary Internet Files\Content.Word\photo[1].jpgC:\Documents and Settings\rsmith\Local Settings\Temporary Internet Files\Content.Word\photo[1].jpg | This student understands that in order to combine the amount of paint Maria had (9/12 of a can) with the amount of paint her mom found in the garage (1/2 of a can) that he must first partition the paint cans into the same size pieces. Students must understand how to solve addition problems this way before they can make sense of the algorithm of finding a common denominator. This strategy shows the need for the common denominator – we need the same size pieces.  This student sees that if he splits up the can from the garage the way Maria’s looks (into twelfths) both cans will have the same size partitions. This is the beginning of understanding why multiplying by 6/6 will work.  15/12 is an ok answer! If someone else answers 1 and 3/12 reason about whether or not those are the same. Do not worry about teaching converting mixed to improper – instead draw a model of each answer and look for how they are alike. 15/12 will show 12/12 of one whole and 3/12 of the next. This will be easy for students to see that 1 and 3/12 is the same amount as 15/12.  Simplest form is not necessary, but if it comes up, address it the same way you address the equivalence of the mixed number and improper fraction. Students will be able to reason about whether 3/12 of a can is the same as 1/4 of a can if they are discussing it in the context of this problem and can use models to explain their thinking. |
| Paint for Maria Problem  Strategy 2 | C:\Documents and Settings\rsmith\Local Settings\Temporary Internet Files\Content.Word\photo[1].jpg | While this student has found the correct answer, there may be little or no understanding about fractions behind this work.  If you see this strategy, ask the student questions to see if she understands WHY that works. Challenge that student to prove her strategy using a picture.  Make a connection between this strategy and strategy 1. It looks very different, but they both got the same answer. Where do we see the multiplication of 6/6 in strategy 1? (when the student says “ I split up the can from the garage the way Maria’s looks-into twelfths”). |
| Paint for Maria Follow Up Number Sentences  3/4 + 1/12 | C:\Documents and Settings\rsmith\Local Settings\Temporary Internet Files\Content.Word\photo[1].jpgC:\Documents and Settings\rsmith\Local Settings\Temporary Internet Files\Content.Word\photo[1].jpg | This student is showing a strong understanding of equivalent fractions.  10/12 is an ok answer! If someone else answers 5/6, reason about whether or not those are the same. Draw a model of each answer and look for how they are alike. Students will be able to reason about whether 10/12 is the same as 5/6 if they can use models to explain their thinking. Dividing by the greatest common factor will get you to simplest form, but it does not show whether or not a student has a deep understanding about fractions and equivalence.  \*If a student multiplies 3/4 by 3/3 to find a common denominator, ask the student questions to see if she understands WHY that works. Challenge that student to prove her strategy using a picture.  \*If a student says 3/4 + 1/12 = 4/16, pose the coin problem in Extending Children’s Mathematics book page 180. |
| Paint for Maria Follow Up Number Sentences  1/2 + 7/16  And  21/24 + 3/8 | The strategies for these number sentences will be similar to those for 3/4 + 1/12. | The focus of the discussion should be about equivalence and why it is important to replace one fraction with another equivalent fraction.  (The goal is not to just hear “because we need a common denominator” – The goal is for the students to understand that to add fractions, every piece needs to be the same size). If this is difficult for students to understand, pose the coin problem in Extending Children’s Mathematics book page 180. |