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EDUC 5873
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Division of Fractions

SCO: Students will be expected to divide fractions concretely, pictorially, and symbolically.

Intended Grade Level: Grade 8

Student's Entry Point: Students will have familiarity with using fractions in mathematics, and understand how to add, subtract, and multiply fractions.

Materials Needed:
Numbered Fraction Tiles
Overhead Projector
Transparency Sheets (3 to 4 sheets)
Transparency Fraction Tiles
Markers

Core Discovery Activity

I) Ensure that each student (or in groups of two) has a set of numbered fraction tiles. As these will be used to help the students derive an algorithm, it is essential that students have the tiles at their disposal.

NOTE: after each question, let the students work at their tables briefly with others around them, as you walk around checking work. This is to be done after every question is placed on the overhead.

II) The first question, which will be written on a transparency sheet, will be placed on the overhead:

Divide 1 into groups of 1/5. How many groups are there? *(Answer = 5 groups)*

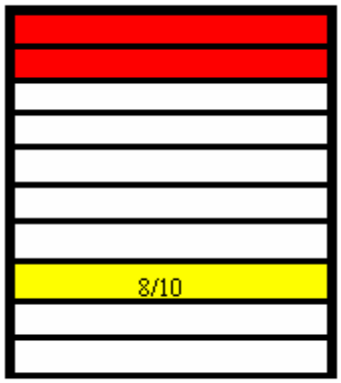
Have the students use their fraction tiles to determine how many 1/5s are in 1. Ask the students for the answer, and ask for an explanation of how they reached it. Briefly go over how the solution was reached using overhead fraction tiles. It should not take longer than 2 to 3 minutes for this activity.

III) Place a second question on the overhead:

Divide 8/10 into groups of 2/10. How many groups are there? (*Answer = 4 groups*)

Once again the students will use the fraction tiles to determine the answer. However, as this question is more difficult than the last, it may be necessary to do a walkthrough on the overhead. Most likely, the students should be able to determine the answer. As before, go over the answer using the overhead tiles. This should take about 2 to 3 minutes.

APPENDIX I: At the end of the lesson, you can revisit this question and attempt to have the students determine the solution pictorially. Have them draw a rectangle divided into tenths, and then shade in the areas representing 2/10 until they reach 8/10. However, the pictorial should only be attempted after all of the number tile questions are completed.



2/10 repeats four times when using the box illustration. Therefore, there are four groups.

IV) Place this question on the overhead:

Divide 4/10 into groups of 1/5? How many groups are there? (*Answer = 2 groups*)

The procedure for this question is the same as the previous question. However, you most likely will need to do a walkthrough with the overhead tiles, even though it divides evenly. Time taken should be about 2 to 3 minutes.

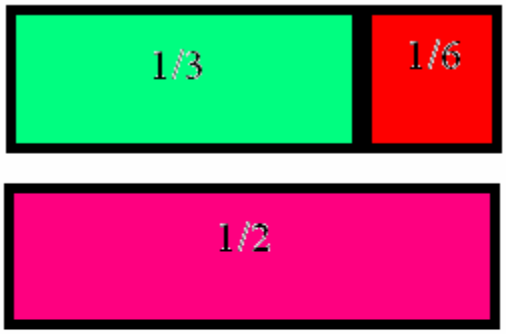
V) Next question:

Divide ½ into groups of 1/3. How many groups are there? (*Answer = 1 ½ groups*)

The class will require a few more minutes then usual to work on this question, as it does not divide evenly. If a student derives the answer, ask them to

explain how they arrived there. Then, or if no student finds the answer, use the overhead tiles.

The best method for accomplishing this is placing the 1/3 tile directly above the ½ fraction tile on the overhead, and following the instructions below



Dividing 1/2 into groups of 1/3 will give you one group. However, there will still be a remainder left. The students will determine how much the remainder is by finding the appropiate tile to fit the space

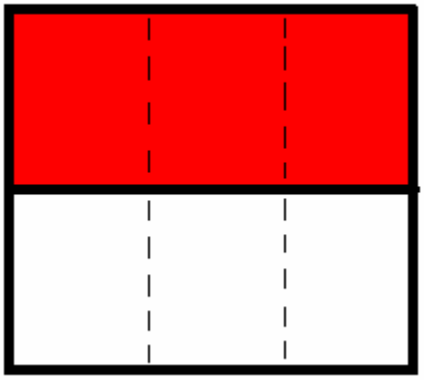
In this case, it is the 1/6 tile. To determine how much this is worth in 1/3 groupings, the students will then figure the number of 1/6 tiles it takes to create 1/3. Because it takes two 1/6 tiles to create one 1/3 tiles, students should be able to determine that one 1/6 tile is worth 1/2 of a group.

Therefore, the answer is 1 1/2 groups.

Some students may answer that there is 1 1/6 groups, so it may be helpful to turn the fraction tiles over when they are placed on the overhead as to obscure the number values. By doing so, it will force the students to think in terms of the tiles themselves, instead of the number value.

The total time taken for this activity should be about 5 to 7 minutes.

APPENDIX II: This question should also be attempted pictorially as well. Follow the same procedure as APPENDIX I. See next page for diagram



When 1/2 is divided by 1/3, it is not evenly spread out. Each two red squares accounts for one grouping, and because there are three, we are left with 1 and 1/2 groups as the solution.

VI) Next question on overhead:

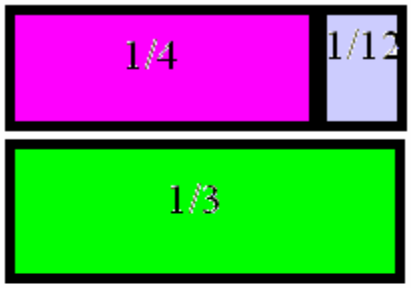
Divide ¼ into groups of 1/6. How many groups are there? (*Answer = 1 ½ groups*)

This question follows the same principles as the previous one, except you will be using a 1/12 tile instead of a 1/6 in the solution. After the first example of this type of question, the students should be able to determine the answer. Time taken should be about 2 to 3 minutes.

VII) Time for a harder question on the overhead:

Divide ¼ into groups of 1/3. How many groups are there? (*Answer = ¾ groups*)

The students will most likely have a more difficult time with this question, as the division problem will not even create one whole group. So you will likely give students a few minutes to try to work through the answer with fraction tiles, but you will have to do a walkthrough on the overhead as it is not likely that all will understand the answer.



Because 1/4 is less than 1/3, there will be less than one whole group. To determine how many groupings are created, fill in the remainder with a 1/12 tile.

Now that we know the size of the tile needed to fill in, have the students determine how many 1/12 tiles are needed to create both 1/3 and 1/4 tile (3 and 4, respectively).

Because 1/3 is one 1/12 tile shy of having four 1/12 (and thus being equal to 1/4) the answer is 3/4 groups.

The time taken should be around 7 or 8 minutes.

VIII) This is the conclusion of the lesson. By this point the students should be comfortable with the use of fraction tiles to determine simple equations.

However, I have included several examples of how to attempt these questions using a pictorial base (in particular the use of rectangles). This would be the next step after comprehension of the fraction tile system. Eventually, after several weeks of practice at this method, the algorithm would either:

A) Be introduced to the class
B) Students would derive it themselves as they begin to see patterns in their work. (ideal objective of activities)

IX) Acknowledgements to these various sources in helping to create this presentation

Hanselman, Cheryl A. “Stop Using Foul Language in the Mathematics Classroom”. *Mathematics Teaching in Middle School*. Oct 1997, 154–60.

Warrington, Mary Ann and Kamii, Constance. “Multiplication with Fractions: A Piagetian Constructivist Approach”. *Mathematics Teaching in Middle School*. Feb.1998, 339-343.

Warrington, Mary Ann. “How Children Think About Division with Fractions”. *Mathematics Teaching in Middle School*. May 1997, 390-394.

Divide 1 into groups of 1/5. How many groups are there?

Divide 8/10 into groups of 2/10. How many groups are there?

Divide 4/10 into groups of 1/5. How many groups are there?

Divide ½ in groups of 1/3. How many groups are there?

Divide ¼ into groups of 1/6. How many groups are there?

Divide ¼ into groups of 1/3. How many groups are there?