NVACS: Fractions

Overview for 5th Graders

5.NF

**Use equivalent fractions as a strategy to add and subtract fractions.**

Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them.

**Apply and extend previous understandings of multiplication and division to multiply and divide fractions.**

Students also use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.)

Fractions represent a considerable challenge and when they are not learned well they can result in short comings. A high percentage of U.S. and the NVACS has increased the prominence of fractions in grades 3 through 5. Teaching fractions through context by using real life objects and situations will help students develop a deeper understanding of fraction concepts.

**Equivalent Fractions**

When two fractions are equivalent that means there are two ways of describing the same amount by using different fractional parts.

Students should apply their understanding of equivalent fractions and their ability to rewrite fractions in an equivalent form to find common denominators. They should know that multiplying the denominators will always give a common denominator but may not result in the smallest denominator.

$2/5 + 7/8 = 16/40 + 35/40 = 51/40$

Fifth grader students will need to express both fractions in terms of a new denominator with adding unlike denominators. For example, in calculating 2/3 + 5/4 they reason that if each third in 2/3 is subdivided into fourths and each fourth in 5/4 is subdivided into thirds, then each fraction will be a sum of unit fractions with denominators 3 x 4 = 4 x 3 +12:

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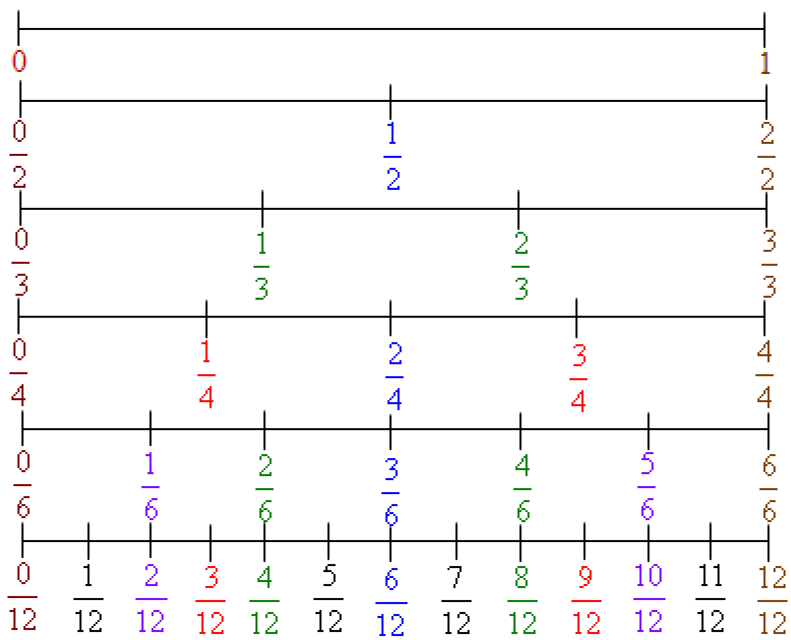
2/3 + 5/4 = 2 x 4/3 x 4 = 8/12 + 15/12 = 23/12

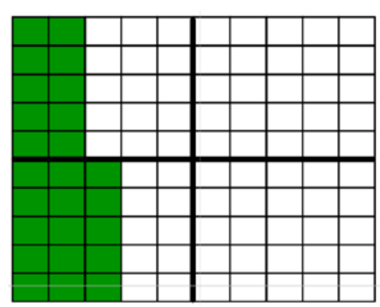
**Models for Fractions**

You can partition region or shapes, a number line paper strips, or sets of objects such as coins or counters.  The number of equal-sized parts that can be partition within the unit determines the fractional amounts. Understanding that parts of a whole must be partitioned into equal-sized shares across different models is an important step in conceptualizing fractions.




**Area Models**

An area is 2-dimensional surface in space. Students can represent fraction parts and computation with an area model by partitioning equal -sized pieces.  It is important to remember that the fractional parts must be the



same size, though not necessarily the same shape.[1]

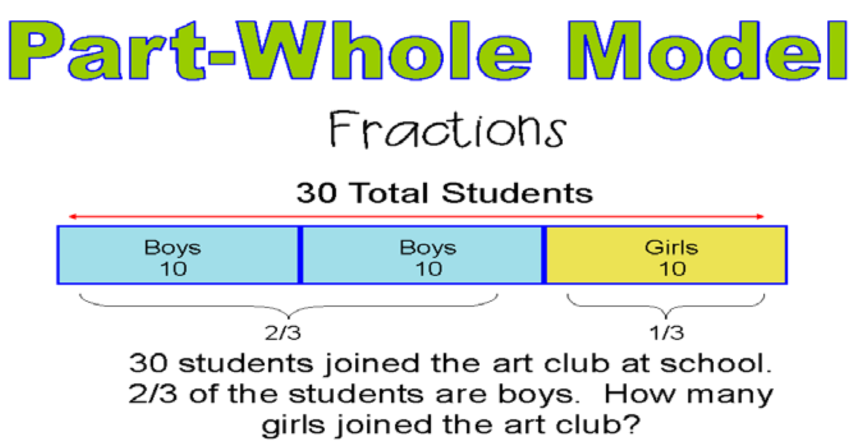
**Length or Measurement Models**

Students can develop their own understanding of length models by folding strips of paper. Students will have to decide where to fold to represent accurately partitioned length models. When labeling the number line, bar model or ruler the students should focus on these two ideas:

- The numerator counts.
- The denominator tells what fractional part is being counted.

**Set Model**

Students should understand that objects such as counters can be used to represent fractions. 12 counters can be partitioned into halves, thirds, fourths, sixths, twelfths.




**Example of application of models:**

[1] <http://1.bp.blogspot.com/-ADy57DYbHig/T7ZfLI0mNaI/AAAAAAAABbc/bcgqeY-Cg2I/s1600/Screen+Shot+2012-05-18+at+8.39.07+AM.png>

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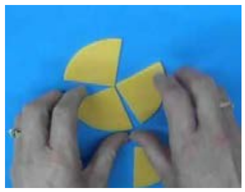
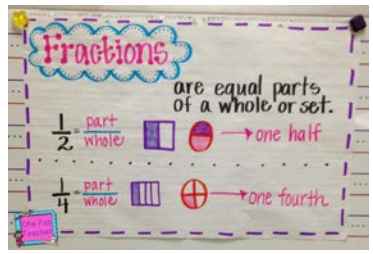
Give a fraction problem they are supposed to understand, 1/2 + 1/3, for example. Ask them to show you what the problem means with any concrete materials, or drawing or relating to a real life situation. Ask them questions to support their understanding. “How would it look if you used these materials?” “Would it help to draw a sketch?”






**Students make sense of fractional quantities when solving work problems, estimating answers mentally to see if they make sense**

**Addition of Fractions**

Students should apply their understanding of equivalent fractions they learned in fourth grade and their ability to rewrite fractions in an equivalent form to find common denominators.

**For** Example:

1/3 + 1/6 = 3/6 = 1/2

I drew a rectangle and shaded 1/3. I knew that if I cut every third in half then I would have sixths. Based on my pictures, 1/3 + 1/6 = ½. Try it!

**Subtraction of Fractions**

Students should apply their understanding of equivalent fractions they learned in fourth grade and their ability to rewrite fractions in an equivalent form to find common denominators.

**For** Example:

3/5 - 1/10 = 6/10 – 1/10 = 5/10

I drew a number line and segmented it into 5 equal parts and then 10 equal parts. I then used the number line to solve the equation by modeling that three-fifths is equal to six-tenths.

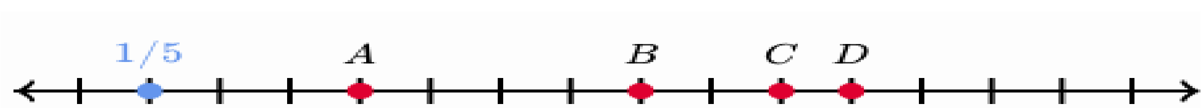
**Why Multiplying Fractions Make Sense**

**For Example:**

Products of fractions and whole numbers can be calculated mentally by thinking of the meaning of the numerator and denominator. For example, 3/5 is 3 one-fifths. So, if the problem is to find 3/5 of 350, first think about one-fifth of 350, or 70. If one-fifth is 70, then three-fifths is 3 X 70, or 210. Start with compatible numbers, determine the unit fractional part (like an identifying rate), and then multiplying by the number of parts you want.

The blue dot on the number line below represents $\frac{1}{5}$.

Which dot on the number line represents 8 x $\frac{1}{5}$?




Can you figure out where 1, 2, and 3 can be labeled on the number line?

The problem above proves the need for foundational understanding in 3rd and 4th grade of unit fraction. Example of **Unit Fractions**: $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{100}$ Any fraction that has a one in the denominator.

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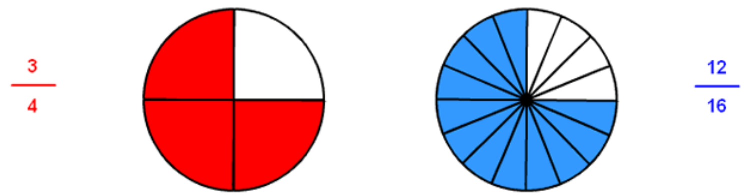


$$\frac{3}{4} \times \frac{4}{4} = \frac{12}{16}$$

The problem above shows the Multiplicative Identity Property applied to fraction computation. Any number multiplied by 1, you get the same number you started with.

**Example Problem:**

If it takes 1 ¼ yards of fabric to make a cape and each of the six people on the cheering squad needs a cape, how much fabric should you buy?

**Why Dividing Fractions Make Sense**

**For Example:** Use estimation to support understanding of division of fractions. Consider the problem 12 divided by 4. "This can mean how many fours in 12?" Similarly, 12 divided by ¼ means "How many fourths in 12?" There are 48 fourths in 12. With this basic idea in mind, students should be able to estimate problems like 4 1/3 divided by ½. Ask students to first use words to describe what these equations are asking (e.g., "How many halves in 4 1/3?") This can help them think about the meaning of division and then develop a reasonable estimate.

**Example Problem:**

I invited eight people to a party (including me), and I had 12 brownies. How much did each one get if they got a fair share? Brownies can be used to show a representation of the process and solution. Try this! Draw a picture. Use paper brownies or a model to figure it out. Read below when you are ready to read about other peoples solutions.

**Examples of Student Solutions:**

Student One: I took eight of the brownies and gave one to each person at the party including me. I had 4 left over. I too the 4 and cut them in half and gave each person including me a half. Each person received $1\frac{1}{2}$ brownies.

Student Two: I cut all the brownies in half and gave each person including me at the party $\frac{2}{2}$ (2 halves) a brownie. I had 8 halves left over so I gave each person another $\frac{1}{2}$ . Each person received $\frac{3}{2}$.