Fraction Approximation:
closer to zero, one-half or one whole?

CCSS: 3.NF.3, 4.NF.2
VA SOLS: 3.3, 4.2, 5.2
Fraction Approximation:
Closer to zero, one-half, or one whole?

Have students decide whether their fraction is closer to 0, ½ or 1 on the number line.

First, they should use their own set of cards to sort and brainstorm their own ideas.

Then, as a class, use the larger cards to create a class number line. Promote math talk by asking questions about how they know the placement and how they can defend their answer. If numbers are really close and students are struggling, suggest that they use a hands-on method such as fraction towers, or fraction circles for a more concrete understanding of the size.
What Fraction Approximation looks like in my resource classroom:

I started out the lesson drawing a random line on the board (I really didn't measure it until we started the conversation). As we chatted we talked about how much "space" the line took up and the kiddos decided that I needed to call that "distance". We went on to talk about how we could decide where to mark our fractions on a number line. The students told me that to find where half should be placed, we either needed to "find the middle" or divide the line in half. At this point, I pulled out a tape measure and measured the line 39 inches (inside I was ecstatic that it was only going to be divisible by 3!)
You may notice that a lot of what I am typing is written on the board below. I’ve learned with my resource kiddos, that if I write down the words they say out loud, it helps keep them more focused. As soon as I said that the line was 39 inches long, one kiddo said "UGH!? Why not 40!!". Another kiddo said "that’s not a ‘nice’ number". While neither of the kiddos said anything about divisibility, or really used any type of mathematical vocabulary, it was apparent that they had a understanding that 39 was not going to give them very ‘nice’ answers when they started working with breaking the number line apart.

We started working on our division and found that half of 39 was 19.5 inches. We used the measuring tape to measure out 19.5 inches and mark it on the number line, then the magic occurred. I asked if using that 19.5 inch length of measuring tape would ‘fit’ in the other half of the number line.

As their spatial reasoning is not great (still working on that!) most said ‘no’ because it was either too long or too short. They were super surprised when I put the left end of the measuring tape on the 1/2 mark and the right end landed on the 1 at the end.
Then a kiddo asked if that would always work (and I started to get giddy!). So we tried to figure out what to do with 3rds. We decided we needed to split the number line into three identical areas, so we divided by 3. 39 divided by 3 is 13 so we measured out 13 inches. We placed the measuring tape on the 0 and measured 13 inches and marked 1/3. Then we moved the tape to the right and measured 13 more inches. After some debate (and pulling out the fraction towers) we decided that second mark should be called 2/3 and we marked it on the line. Then we moved the measuring tape one more time and it landed on 1 again! The kiddos were super excited about this. Then one kiddo said, "Mrs. Riggs, of course that happened! 3/3 = 1" and then showed me that if she took 3 orange 1/3 pieces and stacked them she would get 1 whole piece.

YES... they were getting it! So we worked through 4ths and 5ths... and then someone said could we please not use decimals....

So I asked them how we could create a number line that would work for halves, thirds, fourths, fifths, sixths, eighths, tenths, and twelfths without including decimals when we divided. At this point, kiddos started thinking of numbers. (see pic on next page.)
One kiddo said “try 24!” but someone quickly responded that “5 didn’t divide into that number”, then someone suggested 35 but someone else said that 2 and 3 didn’t divide evenly into that number....

Then a kiddo said “it’s always either ‘good’ or ‘1 off’”. I asked them to elaborate and they showed me that 40 was divisible by 2, not by 3 (1 off as 3×13=39), divisible by 4, divisible by 4, not divisible by 6 (at this point the ‘1 off’ theory didn’t work)....

While the theory didn’t work, the conjecture was wonderful!

Then we chatted about how guessing wasn’t really working for us and a kiddo suggested we try multiples..... YES!!
So we each took a number 2,3,4,5,6,8,10,12 and found all the multiples up to 200 (I told them to stop there for time sake, but really that would have been fun to decide how far we needed to go as well). And then we listed the multiples on the smart board in an Excel file. You can see below the color coding we used.

12 is a LCM for the numbers 2,3,4,6, and 12.

24 is a LCM for the numbers 2,3,4,6,8,12.

We kept moving through multiples of 12 until we hit 120 which is an LCM for ALL the numbers.

The next day kiddos took a very long strip of adding tape and used a ruler to mark 120 inches along the length. They also labeled the tick marks from 0 to 120. This helped us quickly find our placement on the number line without having to count each tick mark out repeatedly.
Then, as a class, we decided what color our number line should be— they chose purple.

The kiddos made sure to place the 0, 1/2, and 1 markers on the number line to help visualize the benchmarks.

You can also see that we needed to move into the hallway to give ourselves some more room. Kiddos took turns being the ‘official gluer’. While one student decided where to place their given fraction, the official gluer made sure it was on the correct number of the 120 inches, then glued down the fraction card.
We placed all the halves, then all the thirds, and then we got to the fourths. We had to decide what to do with 2/4 because it was equal to 1/2. The kiddos decided that they wanted to see both numbers so they "stacked" the 2/4 on top of the 1/2 so you could visualize the equivalence.

At the end of day 3 our number line was taking shape!! (see left!)
Day four came along quickly and the numbers grew and grew! The number line quickly became very colorful and kiddos started looking for patterns as the line was complete.

Each kiddo was given post it notes to 'find patterns' in the number line. You can see below where the colorful post it notes are all stuck to the paper.

Some of their pattern discoveries were:
":Every denominator [in the 1/2's column] increases by 2"
"This [the 1/4's column] pattern is going up by 4's you can see it in the denominators"
"The numerator counts up as 1,2,3,4,5,6 [in the 1/2's column]"
"[on the far left] they all have zero in the numerator!!"
"[on the far right] they all have the same number in the numerator and denominator"
It isn't necessary, but having each "fraction family" on the same color piece of paper/cardstock helps with the visualization.

Materials needed:
- Fractions
- Scissors
- Glue
- Bulletin board paper
- Ruler
- Post it notes

www.missmathdork.com
<table>
<thead>
<tr>
<th>Closer to ZERO</th>
<th>Closer to ONE-HALF</th>
<th>Closer to ONE WHOLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
\[
\begin{array}{ccc}
\frac{0}{6} & \frac{1}{6} & \frac{2}{6} \\
\frac{3}{6} & \frac{4}{6} & \frac{5}{6} \\
\frac{6}{6} & & \\
\end{array}
\]
\[ \frac{9}{10} \text{ and } \frac{10}{10} \]
0/12
1/12
2/12
3/12
4/12
5/12
6/12
7/12
8/12
\[ \frac{9}{12} \quad \frac{10}{12} \quad \frac{11}{12} \]
Visu
ions
Copyright

© 2013 Jamie Riggs: MissMathDork All rights reserved.

Purchase of this unit entitles the purchaser the right to reproduce the pages in limited quantities for classroom use only. Duplication for an entire school, an entire school system or commercial purposes is strictly forbidden without written permission from the publisher.

Copying any part of this product and placing it on the internet in any form (even a personal/classroom website or network drive) is strictly forbidden and is a violation of the Digital Millennium Copyright Act (DMCA).

If you have any questions or comments about the usage of this product, please email me at missmathdork@gmail.com
Thank you so very much for your support!

I am so thankful that you have taken your time to purchase and download one of my products! It is such an honor to be able to share my activities with each of you.

I would greatly appreciate you taking a few more moments to leave me some constructive feedback on this product. I am constantly looking to improve each activity so that it can best serve you and your students!

If you have any questions or comments, feel free to email me at missmathdork@gmail.com or leave me a message on my store Q&A.

Stay connected with me!
http://www.TeachersPayTeachers.com/Store/MissMathDork

www.missmathdork.com
Miss Math Dork

Digi by Amy Alvis
pattern papers, frames, fonts and more

KG Fonts
Lifetime Licensed

The Enlightened Elephant

free fonts!
from kevinandamanda.com