

Teacher Guide to Clarification

3.NF.2

Develop understanding of fractions as numbers

3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram.

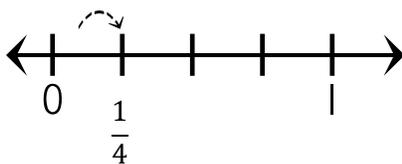
- Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole **portioning** partitioning it into b equal parts. Recognize that each part has a size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line.
- Represent a fraction a/b on a number line diagram by marking off a lengths $1/b$ from 0. Recognize that the resulting interval has a size a/b and that its endpoint locates the number a/b on the number line.

Represent Fractions on a Number Line Diagram

“Students transfer their understanding of parts of a whole to partition on a number line into equal parts. There are two new concepts addressed in this standard which students should have time to develop.”

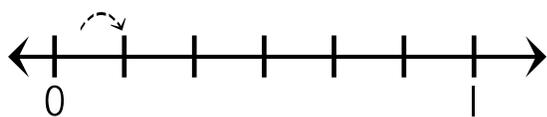
Kansas Association of Teachers of Mathematics (KATM) Flipbooks. Questions or to send feedback: melisa@ksu.edu. Retrieved from: <http://katm.org/wp/wp-content/uploads/flipbooks/3FlipBookedited.pdf>

3.NF.2a



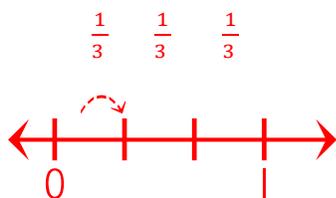
Students will need to recognize that the number line is partitioned into 4 equal sections and that each section can be represents with a unit fraction that is the same length $\frac{1}{4}$

1.



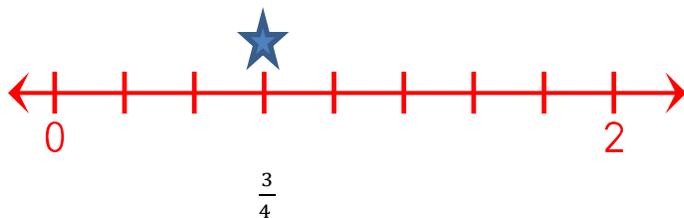
Label $\frac{6}{6}$, $\frac{0}{6}$ and $\frac{2}{6}$

2. Have students draw a number line, from 0 to 1, that represents $\frac{1}{3}$ intervals.



3.NF.2b

1. Given the fraction $\frac{3}{4}$ draw a number line from 0 to 1 and plot this fraction



Coherence and Connections: Need to Know

Below Grade Level	At Grade Level	Above Grade Level
2.MD.6	3.NF.2 3.NF.1 3.NF.3 3.MD.4	4.NF.3a-c 5.G.1 5.G.3

PARCC Evidence Tables

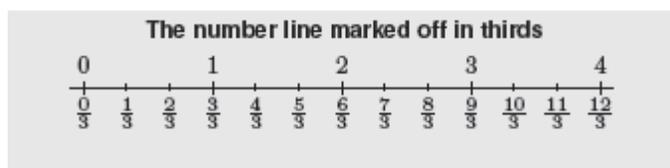
Evidence Statement Key	Evidence Statement Text	Clarifications	MP
3.NF.2 PBA/MYA	Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line. b. Represent a fraction a/b on a number line diagram by marking off a lengths $1/b$ from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.	i). Fractions may include values greater than 1. ii) Fractions equal whole numbers in 20% of these tasks. iii) Tasks have “thin context” or no context. . iv) Tasks are limited to fractions with denominators 2, 3, 4, 6, and 8. (See footnote CCSSM, p 24)	5
3.C.6-1 PBA/MYA	Base explanations/reasoning on a number line diagram (whether provided in the prompt or constructed by the student in her response). Content scope: Knowledge and skills articulated in 3.NF.2	None	5, 3, 6
3.NF.2 EOY	Understand a fraction as a number on the number line; represent fractions on a number line diagram. a) Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and portioning it into b equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line. b) Represent a fraction a/b on a number line diagram by marking off lengths $1/b$ from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.	i) Fractions may be greater than 1. ii) Fractions equal whole numbers in 20% of these tasks. iii) Tasks have “thin context” or no context. iv) Tasks are limited to fractions with denominators 2, 3, 4, 6, and 8. (See footnote CCSS p 24)	5
3.NF.A.Int.1 EOY	In a contextual situation involving a whole number and two fractions not equal to a whole number, represent all three numbers on a number line diagram then choose the fraction closest in value to the whole number.	i) Whole numbers are limited to 0, 1, 2, 3, 4, 5. Maybe you should have a number line going to 3 or 4 in the HOT question Fraction denominators are limited to 2, 3, 4.	2, 4, 5

PARCC Mathematics Evidence Tables. (2013, April). Retrieved from:
<http://www.parcconline.org/assessment-blueprints-test-specs>

“**3.NF.2** Developing an understanding of fractions as numbers is essential for future work with the number system. It is critical that students at this grade are able to place fractions on a number line diagram and understand them as a related component of their ever-expanding number system.”

PARCC Model Content Frameworks: Mathematics Grades 3-11 (version 3). (2012, November 1). Retrieved June 3, 2014, from
http://parcconline.org/sites/parcc/files/PARCCMCFMathematicsNovember2012V3_FINAL_0.pdf

To construct a unit fraction on a number line diagram, e.g. $\frac{1}{3}$, students partition the unit interval into 3 intervals of equal length and recognize that each has length $\frac{1}{3}$. They locate the number $\frac{1}{3}$ on the number line by marking off this length from 0, and locate other fractions with denominator 3 by marking off the number of lengths indicated by the numerator. **3.NF.2**



Students sometimes have difficulty perceiving the unit on a number line diagram. When locating a fraction on a number line diagram, they might use as the unit the entire portion of the number line that is shown on the diagram, for example indicating the number 3 when asked to show $\frac{3}{4}$ on a number line diagram marked from 0 to 4. Although number line diagrams are important representations for students as they develop an understanding of a fraction as a number, in the early stages of the NF Progression they use other representations such as area models, tape diagrams, and strips of paper. These, like number line diagrams, can be subdivided, representing an important aspect of fractions.

The number line reinforces the analogy between fractions and whole numbers. Just as 5 is the point on the number line reached by marking off 5 times the length of the unit interval from 0, so $\frac{5}{3}$ is the point obtained in the same way using a different interval as the basic unit of length, namely the interval from 0 to $\frac{1}{3}$.

Common Core Standards Writing Team. (2013, September 19). *Progressions for the Common Core State Standards in Mathematics(draft). 3-5 Number and Operations - Fractions.* Tucson, AZ: Institute for Mathematics and Educations, University of Arizona.

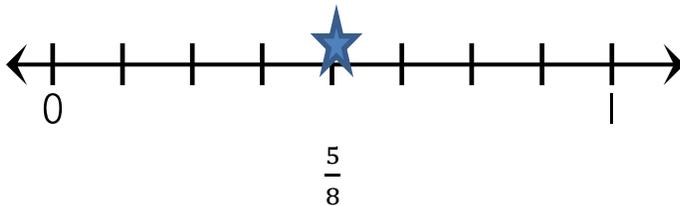
Classroom Resources

Power Point

HOT Questions

1. a. My friend and I have each have a bag of candy. If we combine our bags of candy together we have a total of $\frac{5}{8}$ pounds. Draw a number line and mark the total weight of the bag of candy.

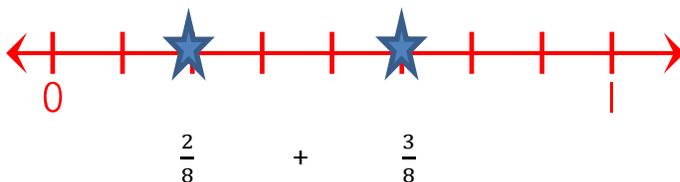
1. b. Jim said the star is located at $\frac{5}{8}$ What mistake did Jim make ?



He counted the lines not the lengths

1. c. Extension Activity

What are some possible amounts for the two bags of candy? Use a number line to prove your answer.



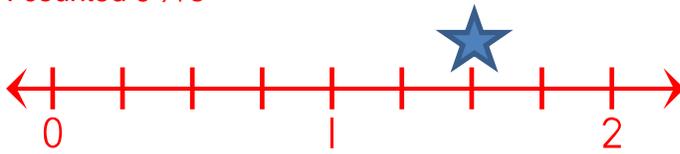
2. If I have a piece of ribbon that is split into three equal sections how long does each section measure?



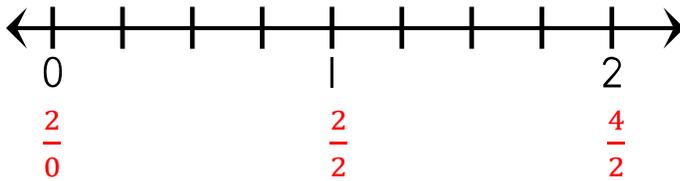
One-third

3. Represent $\frac{6}{4}$ on a number line. Explain how you know.

I counted 6 $\frac{1}{4}$'s



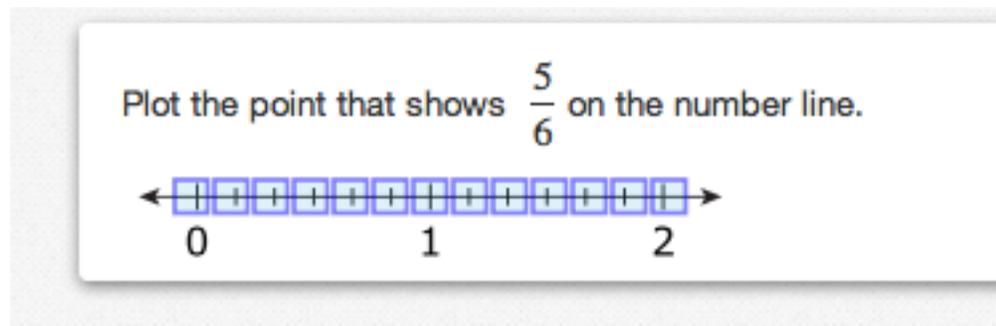
4. Name 0, 1, and 2 as fractions



Additional Resources

Grade 3 question # 8

<http://practice.parc.testnav.com/#>



PARCC example of 3.NF.2

http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20Sample%20Problems_GR3_Frac-Num-LineV2.pdf

K-5 teaching resources Number Line Roll

<http://www.k-5mathteachingresources.com/support-files/number-line-roll.pdf>

K-5 teaching resources Fraction Number Line – Great center idea!

<http://www.k-5mathteachingresources.com/support-files/fraction-number-lines.pdf>

Illustrative Math Grade 3 link scroll to 3.NF.2a & b

<https://www.illustrativemathematics.org/3>

NYC Aligned Tasks

http://schools.nyc.gov/NR/ronlyres/CD8EAF6-862F-433D-B293-8DA61757028E/141424/NYCDOE_G3_Math_PetersGarden_FINAL.pdf