



KENTUCKY CENTER
FOR MATHEMATICS

Focus on Fractions:

Fraction Equivalence
with Dee Crescitelli

Welcome!



Your host

Dee Crescitelli

Director

Kentucky Center for Mathematics
cresciteld1@nku.edu

Are Fractions Numbers?

Artie said: "Choose a number between 1 and 10." Kay said: " $\frac{3}{2}$." Artie: "That's not a number! It's a fraction." Kay: "But fractions are numbers!"

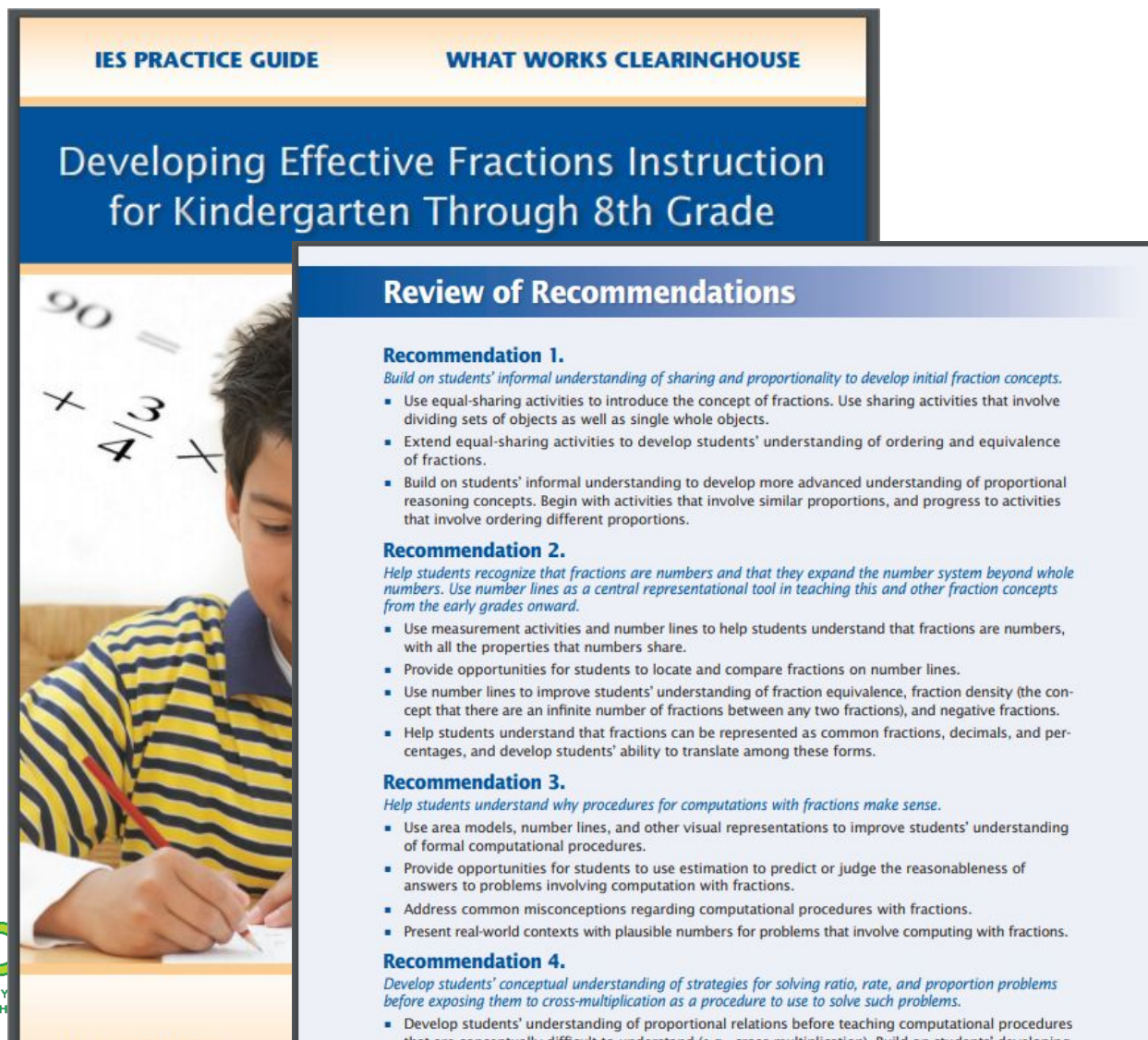
☞ Are fractions numbers? Take this quiz and decide.

Give an example (if possible)

1. Is it possible to add two fractions? Yes No Don't Know
2. Is it possible to add a fraction and a whole number? Yes No Don't Know
3. Is it possible to place a fraction on the number line? Yes No Don't Know
4. Is it possible for a fraction to equal a whole number? Yes No Don't Know
5. Is it possible to add two fractions and have the sum equal a whole number? Yes No Don't Know

☞ Based on your answers, do you agree with Artie or with Kay? Write 1-2 sentences to explain why.

Research



Link:

https://ies.ed.gov/ncee/wwc/Docs/PracticeGuide/fractions_pg_093010.pdf

IES Practice Guide Recommendation 2

Recommendation 2.

Help students recognize that fractions are numbers and that they expand the number system beyond whole numbers. Use number lines as a central representational tool in teaching this and other fraction concepts from the early grades onward.

- Use measurement activities and number lines to help students understand that fractions are numbers, with all the properties that numbers share.
- Provide opportunities for students to locate and compare fractions on number lines.
- Use number lines to improve students' understanding of fraction equivalence, fraction density (the concept that there are an infinite number of fractions between any two fractions), and negative fractions.
- Help students understand that fractions can be represented as common fractions, decimals, and percentages, and develop students' ability to translate among these forms.

Number Lines: Foundations in Whole Number

KY.2.MD.6 [Relate addition and subtraction to length.] Represent whole numbers as lengths from 0 on a number line with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line. **MP.3, MP.4**

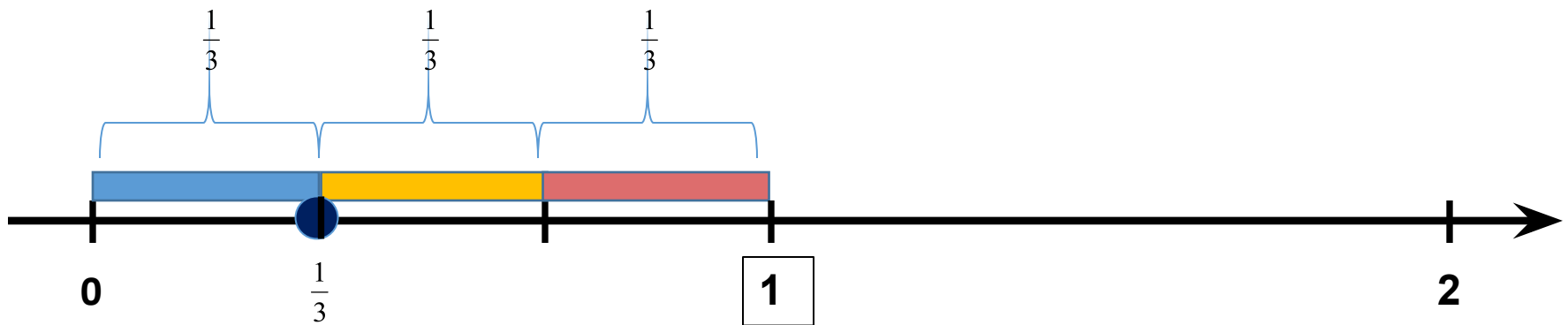
Through a Standards Lens

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

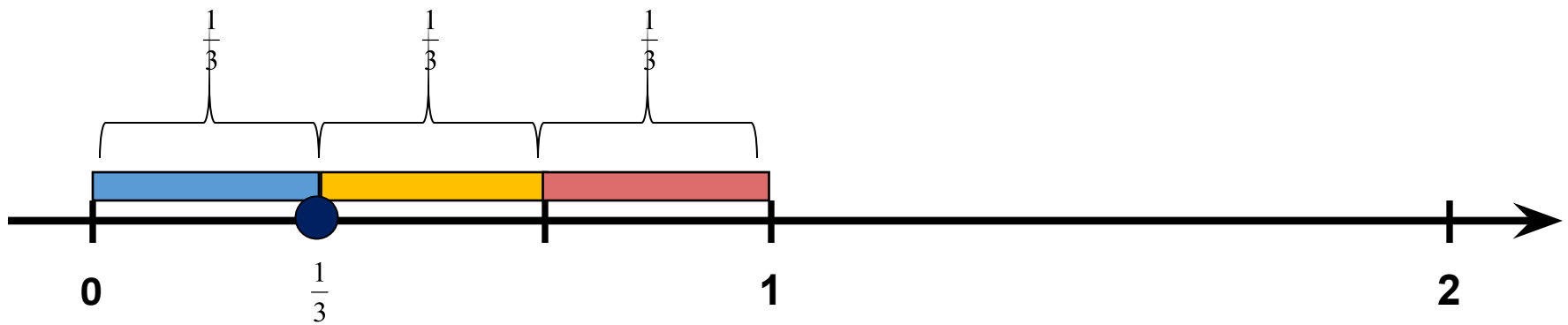
- a. Represent a fraction $\frac{1}{b}$ (unit fraction) on a number line by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts.
- Recognize each part has size $\frac{1}{b}$.
 - A unit fraction, $\frac{1}{b}$ is located $\frac{1}{b}$ of a whole unit from 0 on the number line.

Thirds

Partition the unit interval



Thirds



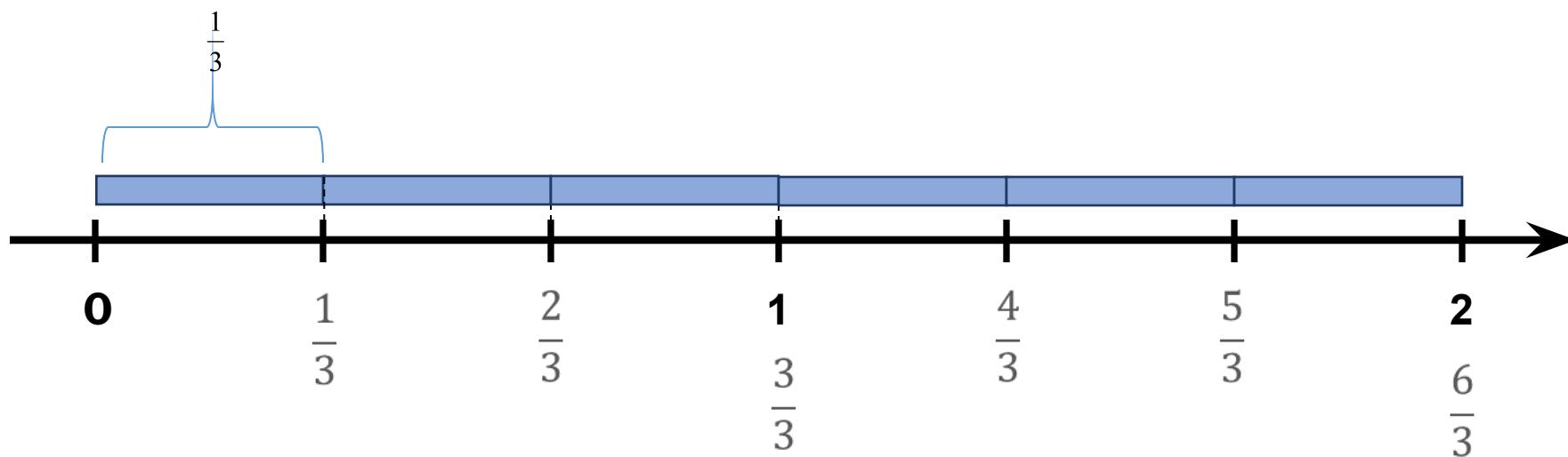
Through a Standards Lens

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

b. Represent a non-unit fraction $\frac{a}{b}$ on a number line by marking off a lengths of $\frac{1}{b}$ (unit fractions) from 0. Recognize that the resulting interval has size $\frac{a}{b}$ and that its endpoint locates the non-unit fraction $\frac{a}{b}$ on the number line.

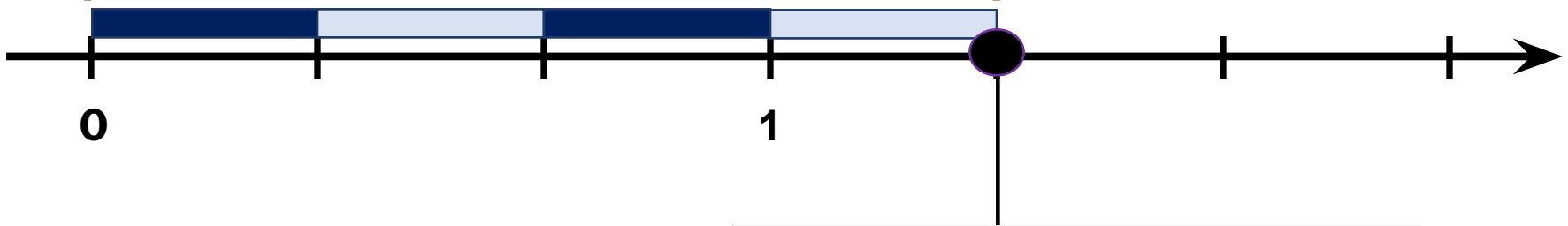
Thirds

Iterate the unit fraction



Interval of size $\frac{4}{3}$

4 lengths of $\frac{1}{3}$ starting from 0



The number $\frac{4}{3}$ on
the number line

LMR

Learning Mathematics through Representations

Complete resources with printable materials for

- Positive Integers
- Negative Integers
- Fractions (positive only)

□ Develop understanding of numbers on a number line using C-rods

LMR

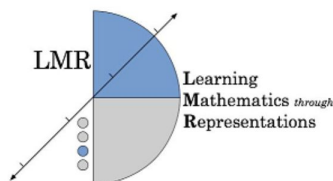
KCM website: Select Resources ☐ Learning Mathematics through Representations



HOME MAF PROFESSIONAL LEARNING▼ RESOURCES▼ ANNUAL CONFERENCE▼ ABOUT US▼

Learning Mathematics through Representations

A Curriculum Development and Research Project



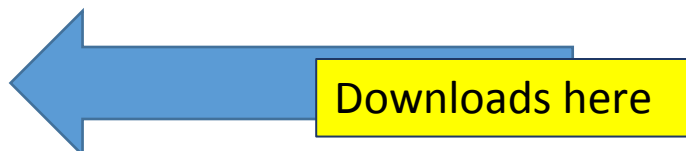
For more information: <http://www.culturecognition.com/lmr/>

Learning Mathematics through Representations (LMR) is a research-based curriculum unit for the teaching and learning of integers and fractions in the elementary grades, using the number line as the principal representational context. The curriculum builds on two core ideas: mathematical representations are fundamental to mathematical communication and learning, and curriculum units should be designed as well-orchestrated lesson sequences that support insight and understanding of representational forms.

The members of the LMR staff bring expertise in developmental and educational research, curriculum development, pre-service education and professional development, and elementary classroom teaching. The LMR team is led by Geoffrey B. Saxe and includes additional faculty and graduate students in the Graduate School of Education, University of California, Berkeley.

There are 3 units.

- Positive Integers - 8 lessons
- Fractions - 14 lessons
- Negative Integers - 4 lessons



Resources for each unit include a Lesson Guide, Transparencies (can also be used with a document, designed to support full group discussions), Worksheets* (for in-class use), Homework, Classroom Poster**, Student Poster (with blanks to be filled in by the student), and a Completed

Worksheet Example

Fractions Lesson 1 Worksheet 3

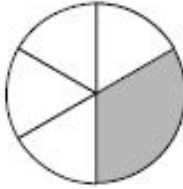
Fractions Lesson 1: Subunit Intervals

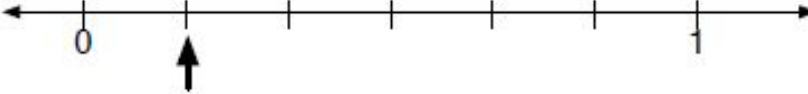
RODS

Name _____

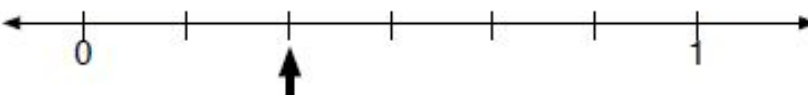
Worksheet 3

Some fraction of this circle is shaded. Which number line shows the same amount?



A. 

B. 

C. 

Explain why your answer is correct and why the other two answer choices are incorrect.

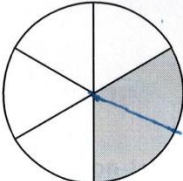
Example of Student work

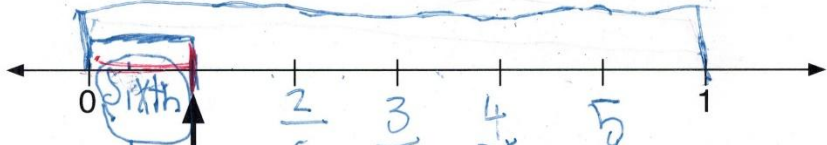
Fractions Lesson 1: Subunit Intervals RODS

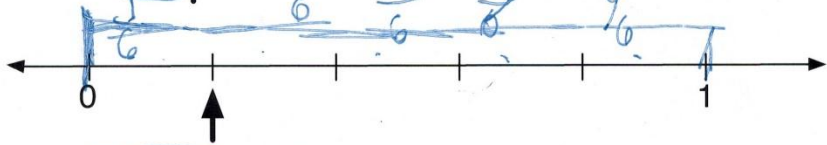
Name

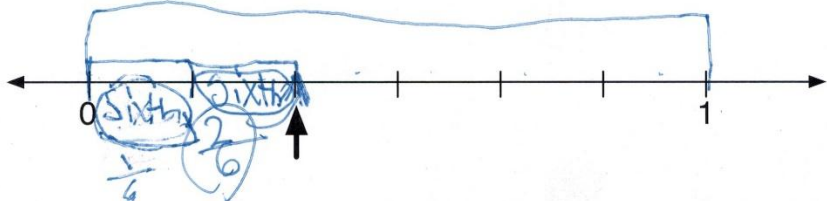
Worksheet 3

Some fraction of this circle is shaded. Which number line shows the same amount?



A. 

B. 

C. 

Explain why your answer is correct and why the other two answer choices are incorrect.

Through a Standards Lens

KY.3.NF.3 Explain equivalence of fractions in special cases and compare fractions by reasoning about their size.

- a. Understand two fractions as equivalent (equal) if they are the same size, or same point on a number line.
- b. Recognize and generate simple equivalent fractions. Explain why the fractions are equivalent through writing or drawing.
- c. Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers.

Through a Standards Lens

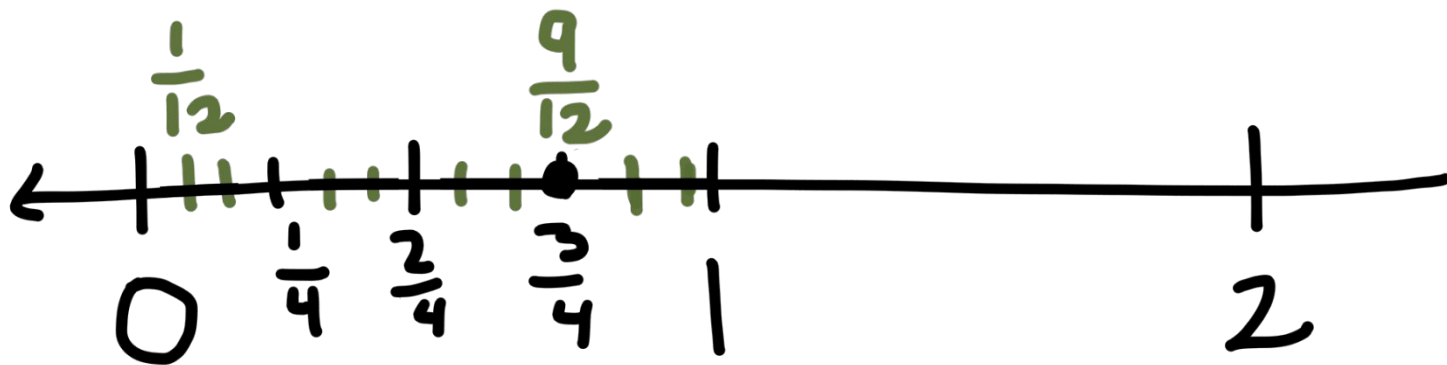
KY.4.NF.1 [Extend understanding of fraction equivalence and ordering.] Understand and generate equivalent fractions.

a. Use visual fraction models to recognize and generate equivalent fractions that have different numerators/denominators even though they are the same size.

b. Explain why a fraction $\frac{a}{b}$ is equivalent to a fraction $\frac{(n \times a)}{(n \times b)}$.

MP.4, MP.7, MP.8

Equivalent Fractions on a Number Line



Lesson 10 – Worksheet 1

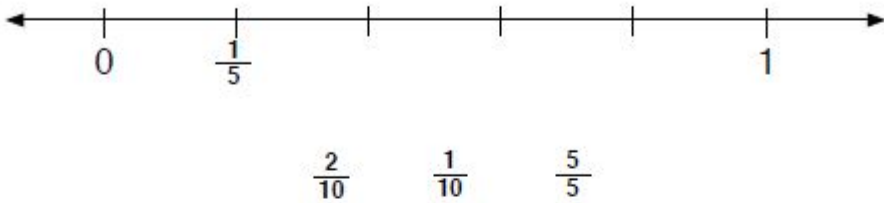
Fractions Lesson 10: Equivalent Fractions - More Strategies

RODS

Name _____

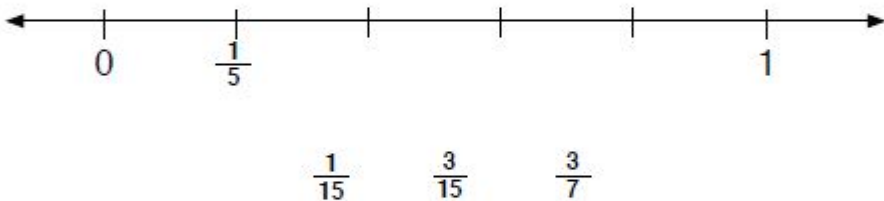
Worksheet 1

1. Circle the answer that shows another name for $\frac{1}{5}$.
You can add tickmarks and numbers to help you.



$\frac{2}{10}$ $\frac{1}{10}$ $\frac{5}{5}$

2. Circle the answer that shows another name for $\frac{1}{5}$.
You can add tickmarks and numbers to help you.

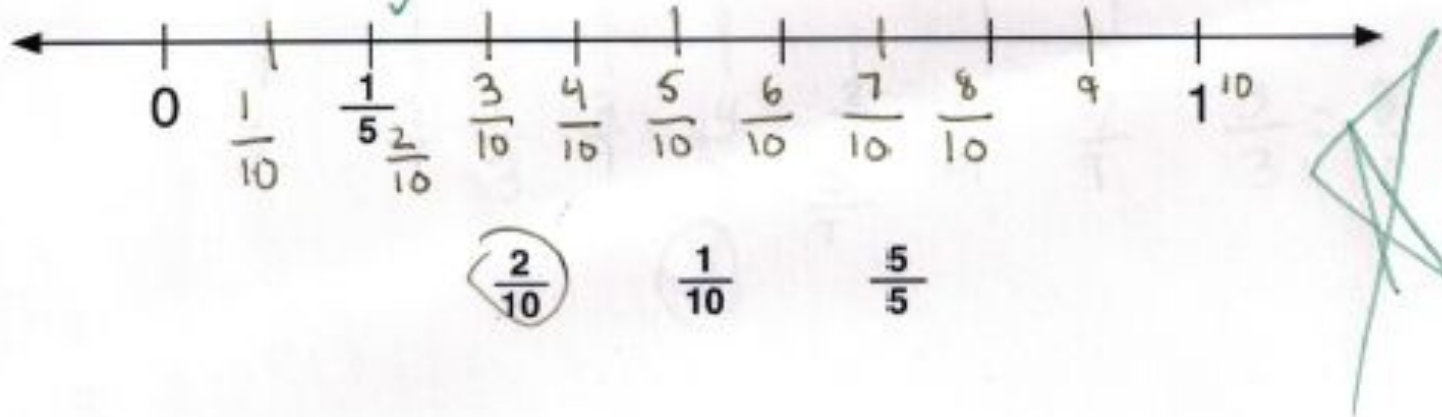


$\frac{1}{15}$ $\frac{3}{15}$ $\frac{3}{7}$

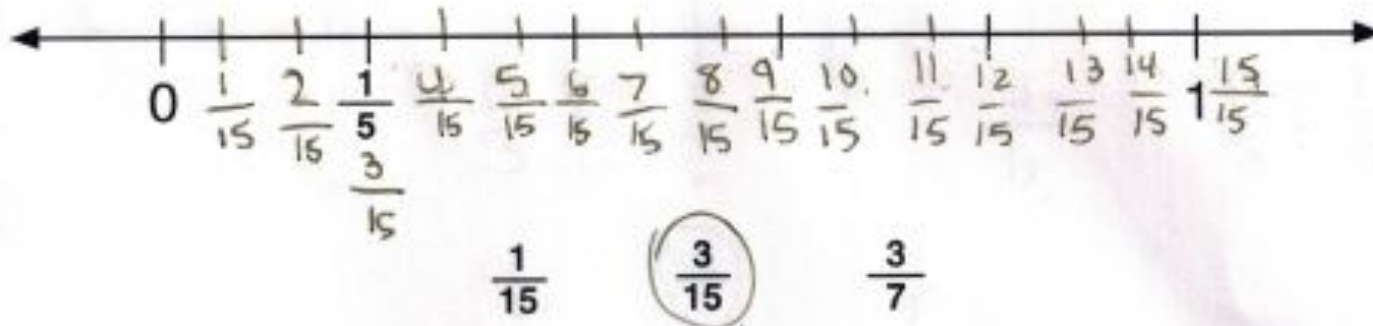
3. Write different fraction names for $\frac{1}{5}$.
You can add tickmarks and numbers to help you.

Worksheet 1

1. Circle the answer that shows another name for $\frac{1}{5}$.
You can add tickmarks and numbers to help you.



2. Circle the answer that shows another name for $\frac{1}{5}$.
You can add tickmarks and numbers to help you.



Equivalence as Renaming

Students who have been composing and decomposing whole numbers and seeing different ways of renaming specific quantities have a sense of equivalence as renaming.

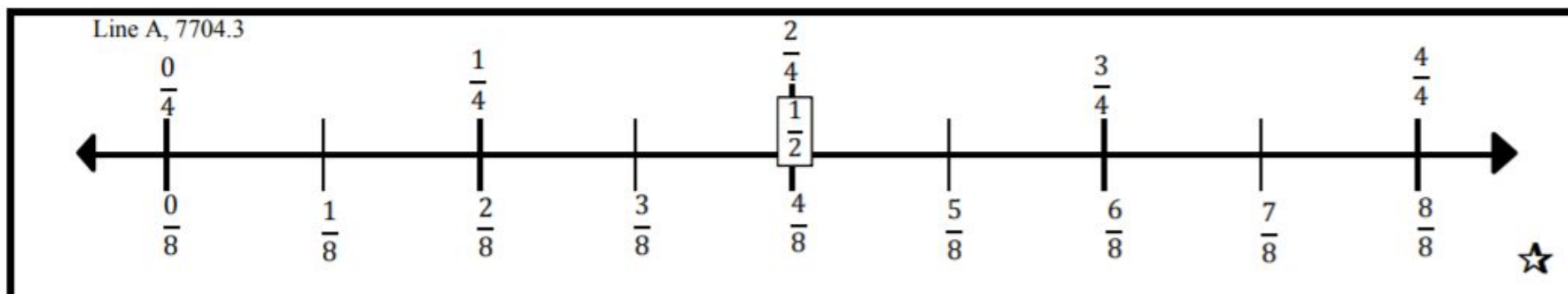
$$27 = 20 + 7$$

$$27 = 17 + 10$$

$$27 = 30 - 3$$

$$\frac{3}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$$

$$\frac{3}{4} = 3 \times \frac{1}{4}$$



Connections to Multiplication

Students learn to work with **multiunits**...

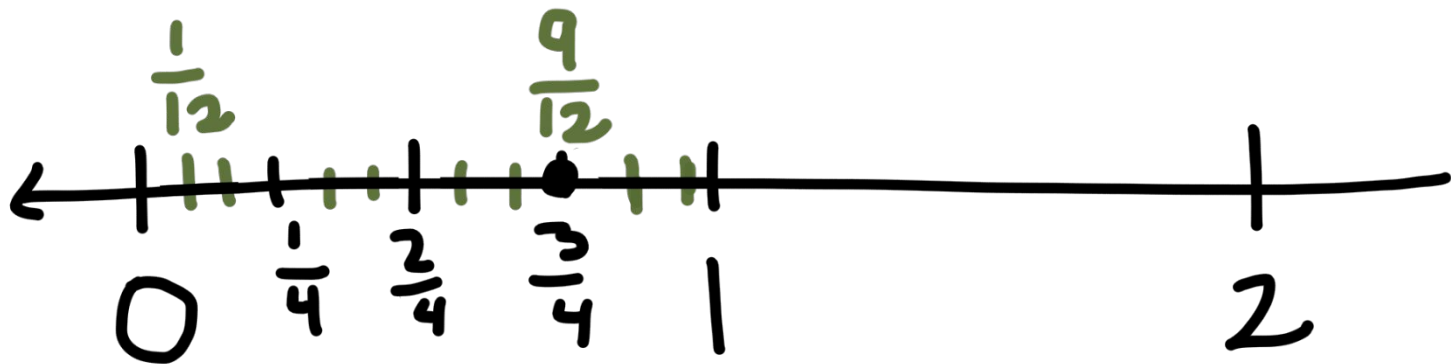
□ How do we ask kids to think about 7×6 ?

- Skip counts by 6s
- Number line – 7 hops of 6
- Area & arrays – 7 “rows” of 6
- Think about 5 groups of 6 and 2 more groups of 6

□ These should be the SAME WAYS we ask kids to think about fractions

- Numbers built out of **subunits**

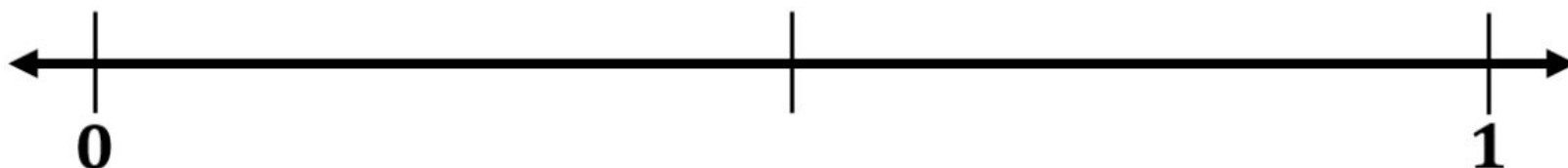
Equivalent Fractions on a Number Line



Placing Numbers on a Number Line

Place the arrows where they belong on the number line.

After you have placed all the numbers as best you can, reveal the number line below to check your answers.



Move this box down to check your work.

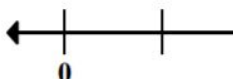
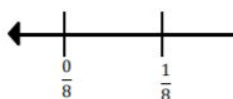
Activities in Handouts



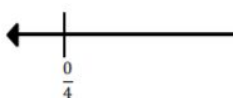
7704 Number Lines - Level 2

Preparing materials: This master will create two double number lines. Cut along the heavy black lines. Fold each along the light line so that both number lines face outward. Place paperclips on the folded edge.

Line B, 7704.2



Line A, 7704.2

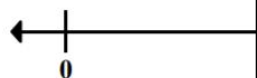
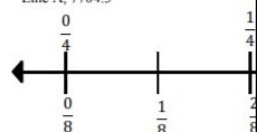


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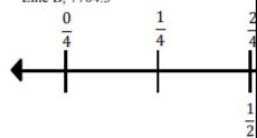
7704 Number Lines - level 3

Preparing materials: This master will create two double number lines. Cut along the heavy black lines. Fold each along the light line so that both number lines face outward. Place paperclips on the folded edge.

Line A, 7704.3



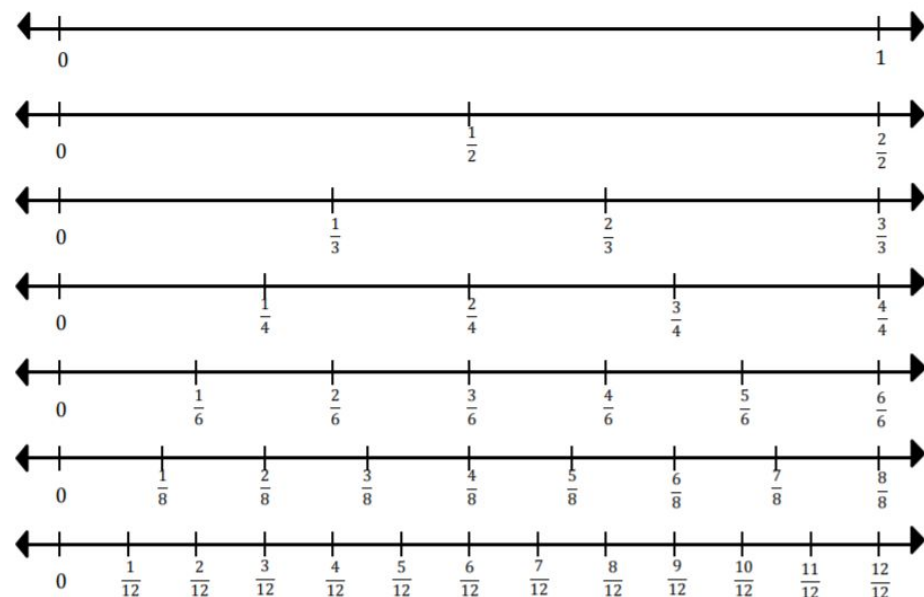
Line B, 7704.3



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Number Lines -Fraction Wall

7704.5



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KNP # F 7704.5
Last updated 8/8/2014

Upcoming This Week

MAY 4 - 8
2:00-2:30 PM EST

 **Focus on Fractions!**
w/ KY Math Leaders

Monday, May 4 - Third Grade Fraction Concepts

Tuesday, May 5 - Fraction Equivalence

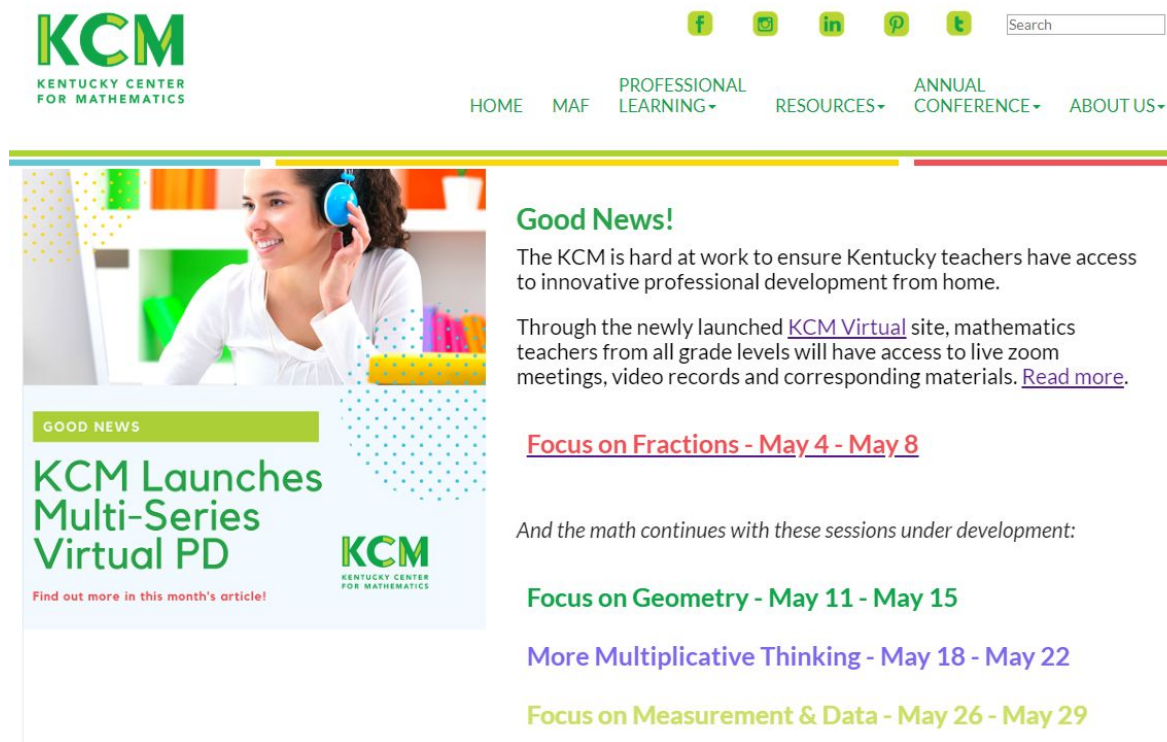
Wednesday, May 6 - Fraction Operations: + - with Common Denominators

Thursday, May 7 - Fraction Operations: +- with Unlike Denominators

Friday, May 8 - Fraction Operations- Multiplication and Division

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www.kentuckymathematics.org



The screenshot shows the KCM website homepage. At the top left is the KCM logo with the text "KENTUCKY CENTER FOR MATHEMATICS". To the right are social media icons for Facebook, Instagram, LinkedIn, Pinterest, and Twitter, followed by a search bar. Below this is a navigation menu with links: HOME, MAF, PROFESSIONAL LEARNING, RESOURCES, ANNUAL CONFERENCE, and ABOUT US. The main content area features a large image of a woman wearing a headset, smiling. Below the image is a green banner with the text "GOOD NEWS". To the right of the image is a section titled "Good News!" with text stating that KCM is hard at work to ensure Kentucky teachers have access to innovative professional development from home. It mentions the newly launched "KCM Virtual" site and lists benefits like live zoom meetings, video records, and corresponding materials, with a link to "Read more." Below this is a section titled "Focus on Fractions - May 4 - May 8". Further down, it says "And the math continues with these sessions under development:" followed by "Focus on Geometry - May 11 - May 15", "More Multiplicative Thinking - May 18 - May 22", and "Focus on Measurement & Data - May 26 - May 29".

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Good News!

The KCM is hard at work to ensure Kentucky teachers have access to innovative professional development from home.

Through the newly launched [KCM Virtual](#) site, mathematics teachers from all grade levels will have access to live zoom meetings, video records and corresponding materials. [Read more.](#)

Focus on Fractions - May 4 - May 8

And the math continues with these sessions under development:

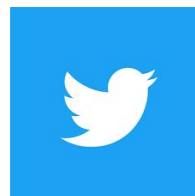
Focus on Geometry - May 11 - May 15

More Multiplicative Thinking - May 18 - May 22

Focus on Measurement & Data - May 26 - May 29



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KCM is here to support you!



Your host

Dee Crescitelli

Director
Kentucky Center for Mathematics
cresciteld1@nku.edu