



KENTUCKY CENTER
FOR MATHEMATICS

Focus on Fractions -

*Addition and Subtraction
with Unlike Denominators
with Lisa Riggs*

Welcome!



Your host

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KCM Website

www.kentuckymathematics.org



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GOOD NEWS

KCM Launches Multi-Series Virtual PD

Find out more in this month's article!



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](#)

[Focus on Geometry - May 11 - May 15](#)

[More Multiplicative Thinking - May 18 - May 22](#)

Today's Agenda

- Research
- Standards
- Activities
- Resources

Always, Sometimes, Never

To add or subtract fractions with unlike denominators you must first find a common denominator.

Research

IES PRACTICE GUIDE

WHAT WORKS CLEARINGHOUSE

Developing Effective Fractions Instruction for Kindergarten Through 8th Grade



Review of Recommendations

Recommendation 1.

Build on students' informal understanding of sharing and proportionality to develop initial fraction concepts.

- Use equal-sharing activities to introduce the concept of fractions. Use sharing activities that involve dividing sets of objects as well as single whole objects.
- Extend equal-sharing activities to develop students' understanding of ordering and equivalence of fractions.
- Build on students' informal understanding to develop more advanced understanding of proportional reasoning concepts. Begin with activities that involve similar proportions, and progress to activities that involve ordering different proportions.

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.

Recommendation 3.

Help students understand why procedures for computations with fractions make sense.

- Use area models, number lines, and other visual representations to improve students' understanding of formal computational procedures.
- Provide opportunities for students to use estimation to predict or judge the reasonableness of answers to problems involving computation with fractions.
- Address common misconceptions regarding computational procedures with fractions.
- Present real-world contexts with plausible numbers for problems that involve computing with fractions.

Recommendation 4.

Develop students' conceptual understanding of strategies for solving ratio, rate, and proportion problems before exposing them to cross-multiplication as a procedure to use to solve such problems.

- Develop students' understanding of proportional relations before teaching computational procedures that are conceptually difficult to understand (e.g., cross-multiplication). Build on students' developing

Link:

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

IES Recommendations

Recommendation 3



Help students understand why procedures for computations with fractions make sense.

Students are most proficient at applying computational procedures when they understand why those procedures make sense. Although conceptual understanding is foundational for the correct use of procedures, students often are taught computational procedures with fractions without an adequate explanation of how or why the procedures work.

Teachers should take the time to provide such explanations and to emphasize how fraction computation procedures transform the fractions in meaningful ways. In other words, they should focus on both conceptual understanding and procedural fluency and should emphasize the connections between them. The panel recommends several practices for developing understanding of computational procedures, including use of visual representations and estimation to reinforce conceptual understanding. Addressing students' misconceptions and

Quote from Greg Tang

Concepts before
conventions
Reasons before rules
Make sense before
symbols
Learn before labels
Knowledge before
notation

Standards

Number and Operations - Fractions

Standards for Mathematical Practice

[MP.1.](#) Make sense of problems and persevere in solving them.
[MP.2.](#) Reason abstractly and quantitatively.
[MP.3.](#) Construct viable arguments and critique the reasoning of others.
[MP.4.](#) Model with mathematics.

[MP.5.](#) Use appropriate tools strategically.
[MP.6.](#) Attend to precision.
[MP.7.](#) Look for and make use of structure.
[MP.8.](#) Look for and express regularity in repeated reasoning.

Cluster: Use equivalent fractions as a strategy to add and subtract fractions.

Standards

KY.5.NF.1 Efficiently add and subtract fractions with unlike denominators (including mixed numbers) by...

- using reasoning strategies, such as counting up on a number line or creating visual fraction models
- finding common denominators

MP.2, MP.3

KY.5.NF.2 Solve word problems involving addition and subtraction of fractions.

- Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators.
- Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

MP.1, MP.4

Clarifications

Using common denominator $\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$
 In general, $\frac{a}{b} + \frac{c}{d} = \frac{(ad+bc)}{bd}$

[KY.4.NF.1](#)

Coherence [KY.4.NF.3](#) → [KY.5.NF.1](#) → [KY.6.EE.7](#)

- For example: Mary ate $\frac{1}{3}$ of the pizza. Tommy ate $\frac{2}{5}$ of the pizza. How much of the total pizza did they eat together?
 - making equivalent fractions to add/subtract fractions
 - using visual representations to add/subtract fractions
 - Area Model
 - Linear Model
- Recognize an incorrect result $\frac{2}{5} + \frac{1}{2} = \frac{3}{7}$, by observing that $\frac{3}{7} < \frac{1}{2}$.

Note: Estimation skills include identifying when estimation is appropriate, determining method of estimation and verifying solutions or determining the reasonableness of situations using various estimation strategies. The skill of estimating within context allows students to further develop their number sense.

Coherence [KY.4.NF.3](#) → [KY.5.NF.2](#)

Attending to the Standards for Mathematical Practice

As students add and subtract fractions, they make sense of situations in story problems, selecting and creating representations of the situation such as partitioned rectangles or number lines (**MP.1, 4**). Students notice if the fractions in the problem can be solved using a reasoning strategy, or if it is more efficient to find common denominators (**MP.2**). For example, for the problem $2\frac{3}{4} + 3\frac{1}{2}$, students may mentally or physically refer to a ruler and use a counting up strategy:

What do you notice?



What if . . .



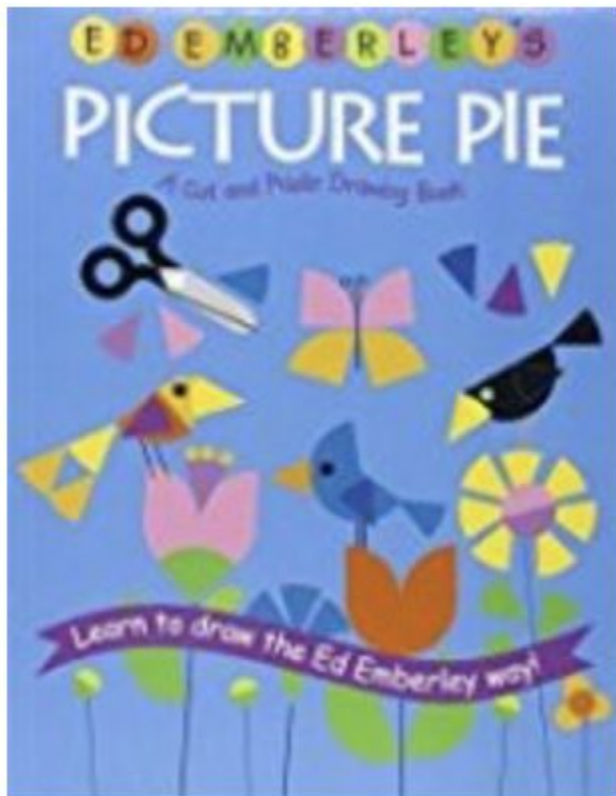
How many number sentences can you come up with?



Let's share!



Picture Pie



Picture Pie



Materials: copy of *Picture Pie* by Ed Emberley, fraction circles, scissors, glue

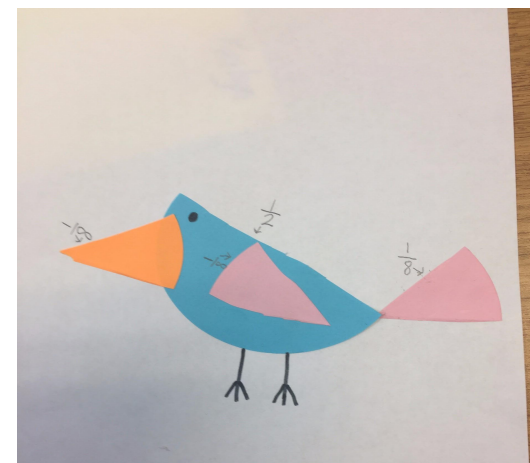
1. Look closely at the artwork in *Picture Pie*.
2. Fold paper circles into halves, fourths or eighths.



3. Cut, paste and color your circle pieces to create a picture.
4. Name the fractions used to create your picture.

Challenge: Put together pieces from a fraction kit to find the total value of your picture. Explain your thinking.

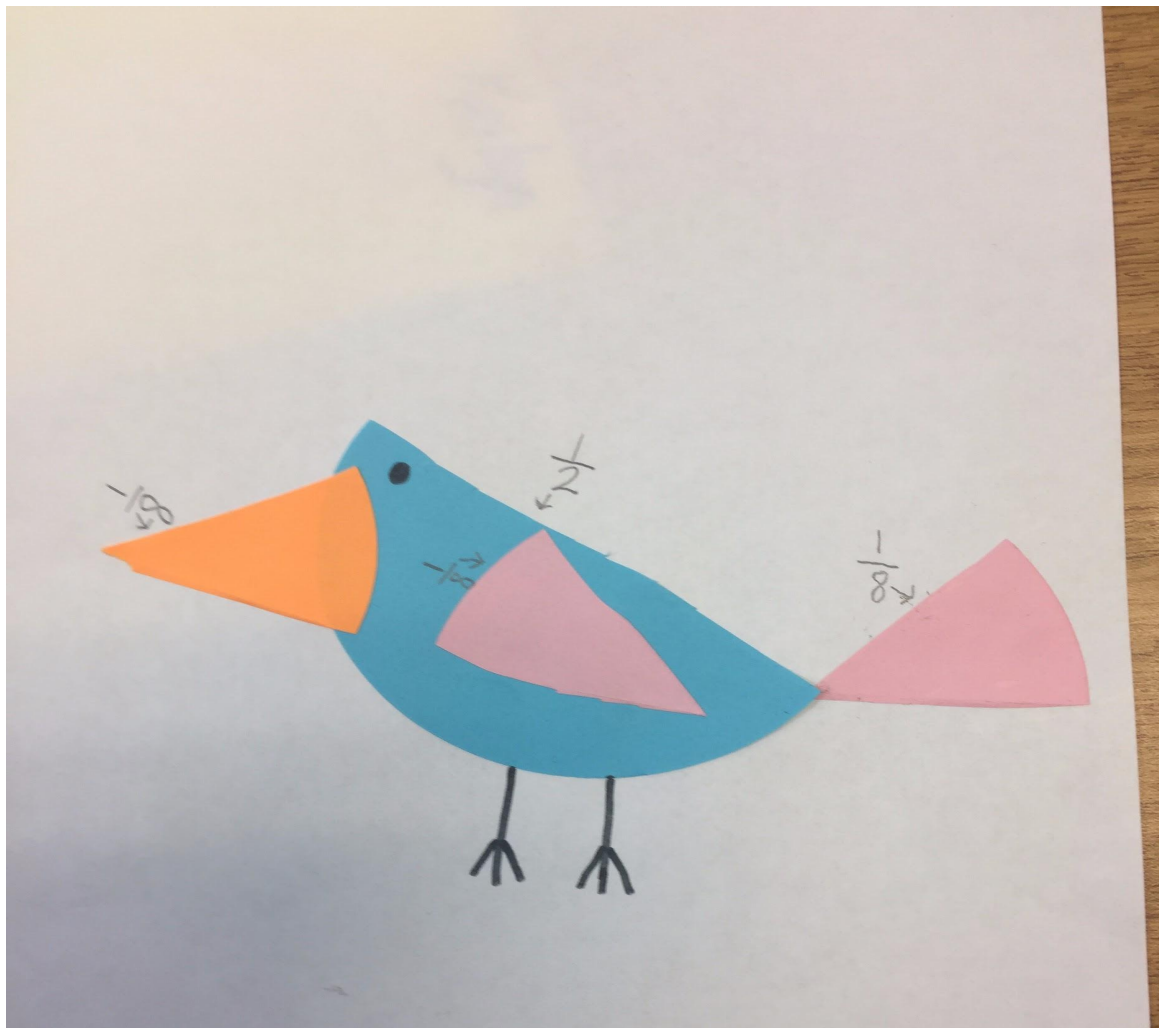
OK-MathTeachingResources.com



Picture Pie



Picture Pie

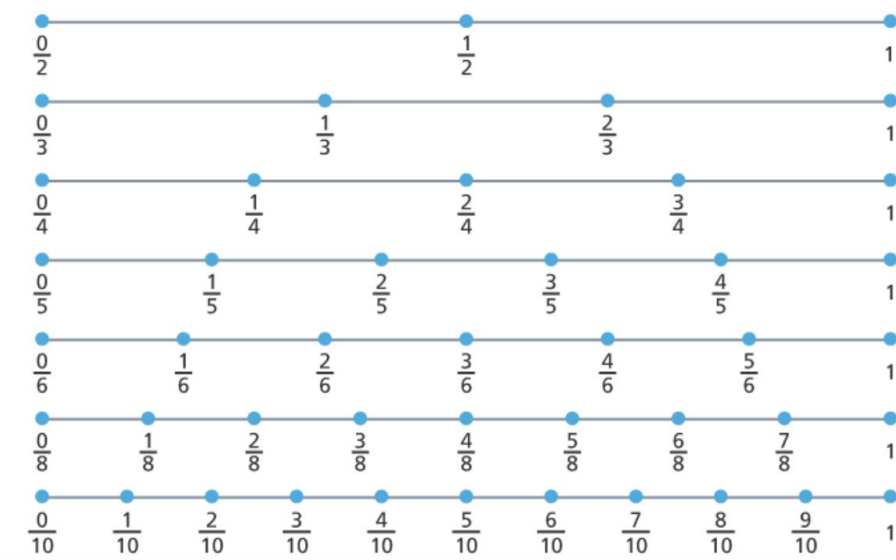


Fraction Track

Fraction Track

Drag chips to the tracks on the gameboard. Deal a fraction card. Move a chip, or chips, to total the amount shown.

Directions ▾



Player 1

Collection Box

Player 2

Collection Box

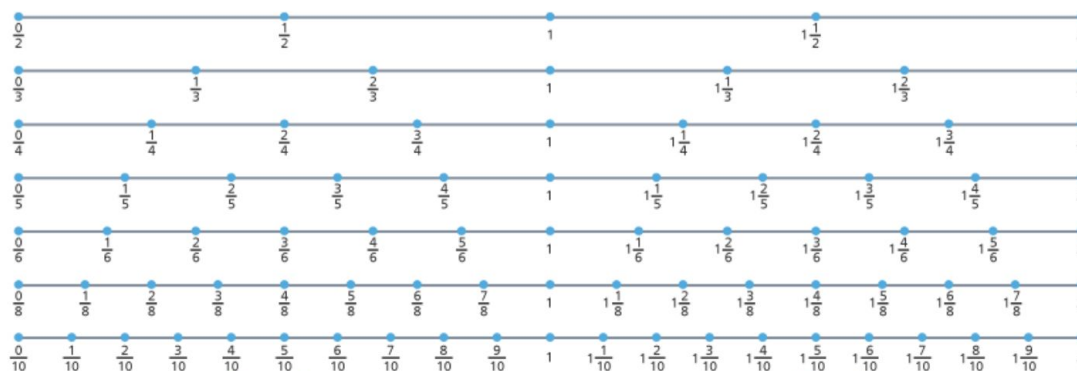


Fraction Track to 2

Fraction Track to 2

Drag chips to the tracks on the gameboard. Deal a fraction card. Move a chip, or chips, to total the amount shown.

Directions ▾



Player 1

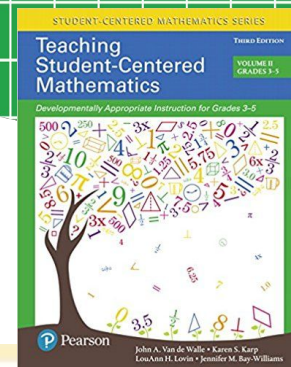
Player 2

Collection Box

Collection Box

Start Over

Moving from materials to symbols



$$\frac{5}{6} - \frac{1}{3}$$

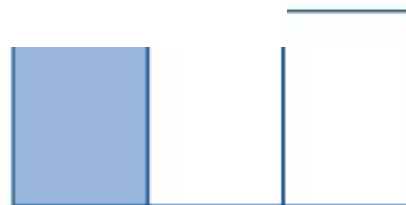
Teaching Tip

To reinforce equivalences, ask “What equivalent fractions might you use so that you have equal-sized parts?” rather than “What is the common denominator?”



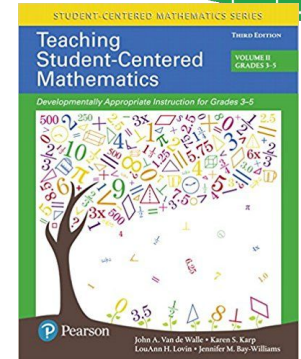
ngle

Place the $\frac{1}{3}$ piece
over the $\frac{5}{6}$ and
there are $\frac{3}{6}$ left.



$\frac{1}{3}$ of the same rectangle

Moving from materials to symbols



- Begin by using task where only 1 denominator has to be changed.

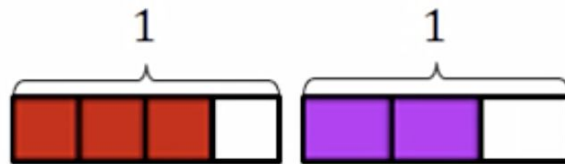
$$\frac{5}{8} + \frac{3}{4}$$

The key question is - “How can we change this problem into one in which the parts are the same sized units?”

- Then continue to examples in which both fractions need to be changed. $\frac{2}{3} - \frac{1}{4}$

Fraction Progression - Addition of Fractions

5th: Adding unlike denominators



$$\frac{3}{4} + \frac{2}{3}$$

Resources


[Investigation games](#)

[Howard County Public School System](#)

[Georgia Standards Framework](#)

Upcoming Sessions

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

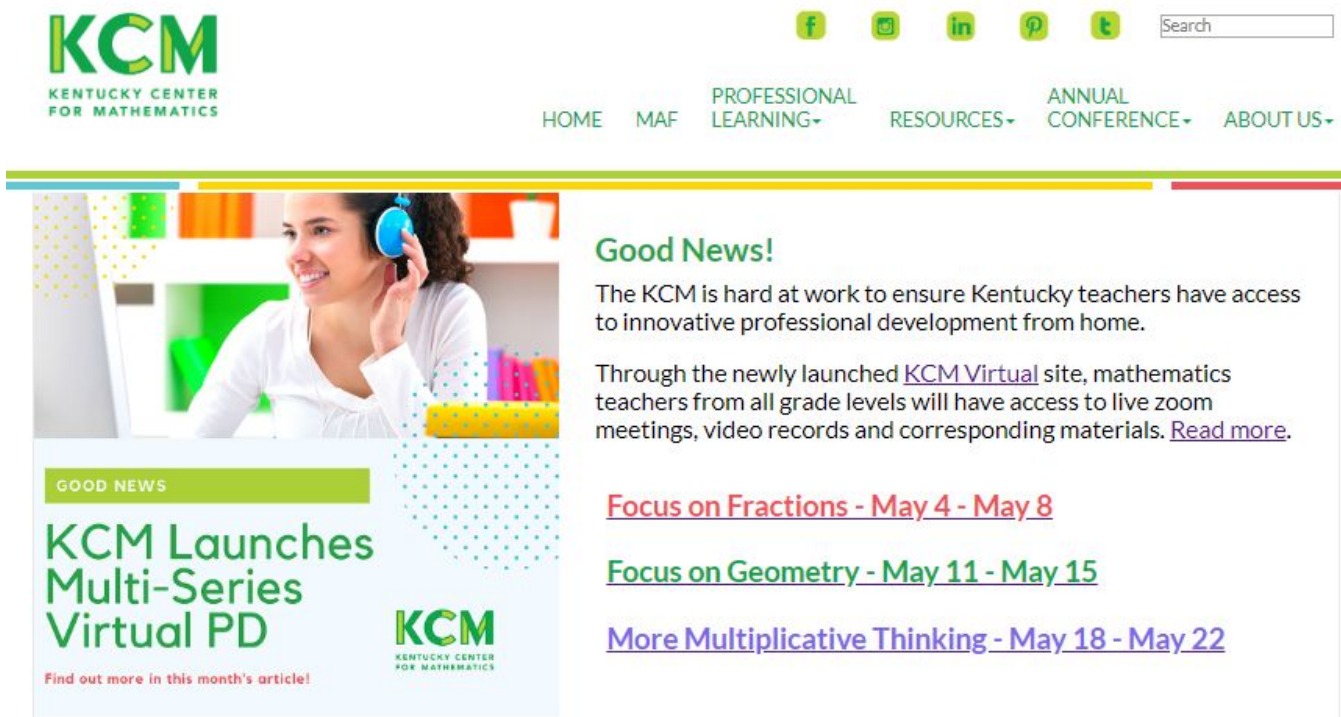
Wednesday, May 6 - Fraction Operations: + - with Common Denominators

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

Friday, May 8 - Fraction Operations- Multiplication and Division

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The screenshot shows the homepage of the Kentucky Center for Mathematics (KCM). At the top left is the KCM logo. To its right are social media icons for Facebook, Instagram, LinkedIn, Pinterest, and Twitter, followed by a search bar. Below these 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 on a video call. Below the image is a green banner with the text "GOOD NEWS". The main headline reads "KCM Launches Multi-Series Virtual PD". Below this is a sub-headline "Find out more in this month's article!". To the right of the image is a section titled "Good News!" with two paragraphs of text. The first paragraph states that KCM is working to ensure Kentucky teachers have access to innovative professional development from home. The second paragraph mentions the newly launched KCM Virtual site, which provides access to live zoom meetings, video records, and corresponding materials. Below the paragraphs are three links: "Focus on Fractions - May 4 - May 8", "Focus on Geometry - May 11 - May 15", and "More Multiplicative Thinking - May 18 - May 22".

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KCM is here to support you!



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