



KENTUCKY CENTER
FOR MATHEMATICS

Let's Do Math with KCM- Middle Grades

Connecting Fractions, Decimals and Percents

Welcome!

Your host

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Kentucky Center for Mathematics

- KCM seeks to advance the knowledge and practice of effective mathematics teaching and learning, encompassing early childhood through adult education.
- KCM provides and develops statewide leadership, facilitate professional learning experiences, and cultivate innovation with the aim of improving mathematics education, practice and policy.

KCM Yearly Numbers

29 math courses taught

73 cohorts of teachers

Over 1000 KY teachers
attending

Over 182 days of
math professional learning

Over \$150,000 of math
materials directly in the hands
of teachers

109 school districts

300 KY schools

100 principals trained

>5000 students impacted

KCM Annual Math Conference
national prominence

Closing the achievement gap
for our KY math students.

Math Achievement Fund
intervention students (3000)
had an average of 10 percentile
points gained as a direct result
of KCM trained math
interventionists.

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www.kentuckymathematics.org



HOME

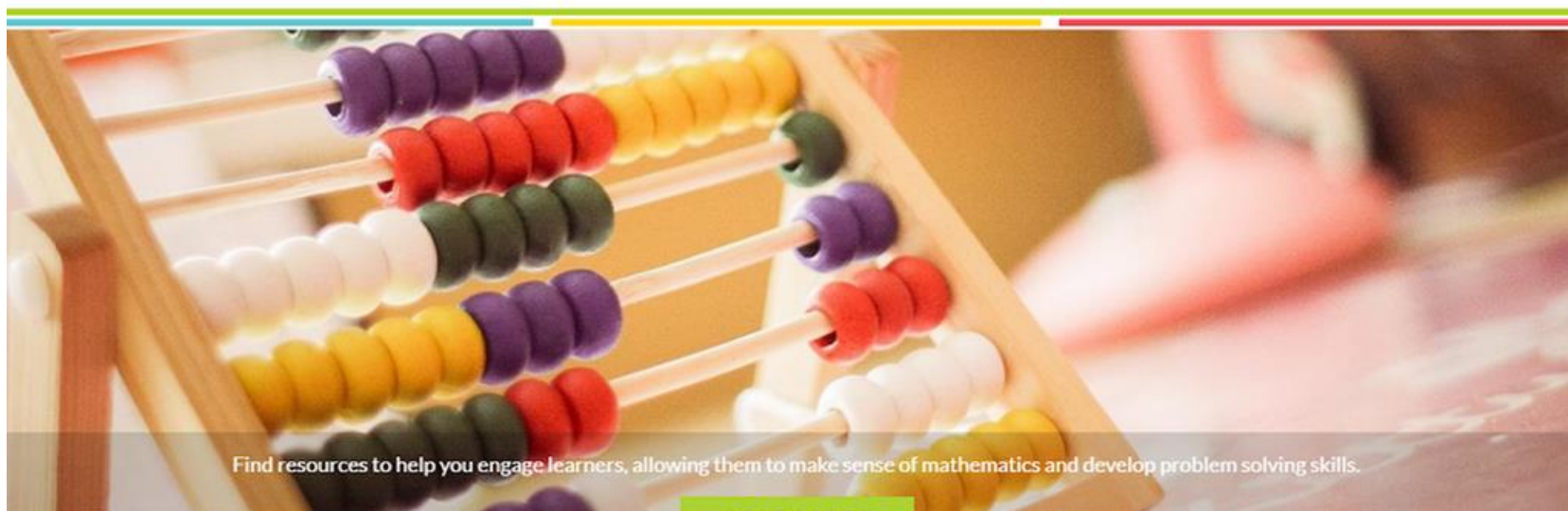
MAF

PROFESSIONAL
LEARNING▼

RESOURCES▼

ANNUAL
CONFERENCE▼

ABOUT US▼



Find resources to help you engage learners, allowing them to make sense of mathematics and develop problem solving skills.

Today's Goals

- Do some math, review promising problems and unpack key ideas important for developing meaningful learning.
- Review various strategies to help students use and connect mathematical representations.

Today's Agenda

- Research
- Doing Math/Review of some activities allowing students connect fractions, decimals and percent
 - Some more mathematical thinking and unpacking key ideas
- Games using multiple representations
- Ending with KCM

Research

“Violet is a fourth-grade student and asked to name and compare 0.38 to 0.4, responded in a way that is familiar to many fourth-grade teachers:

Violet: Zero point four.

Interviewer: OK, and how about this one?

Violet: Zero point thirty-eight.

Interviewer: And, which one is larger, or are they equal?

Violet: Thirty-eight.

Interviewer: Thirty-eight is larger, and why is that?

Violet: Because thirty-eight is bigger than four.”



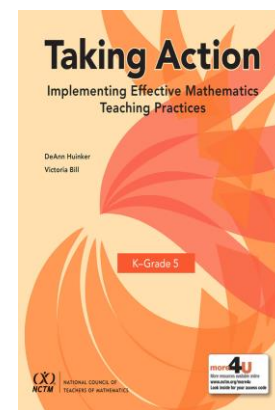
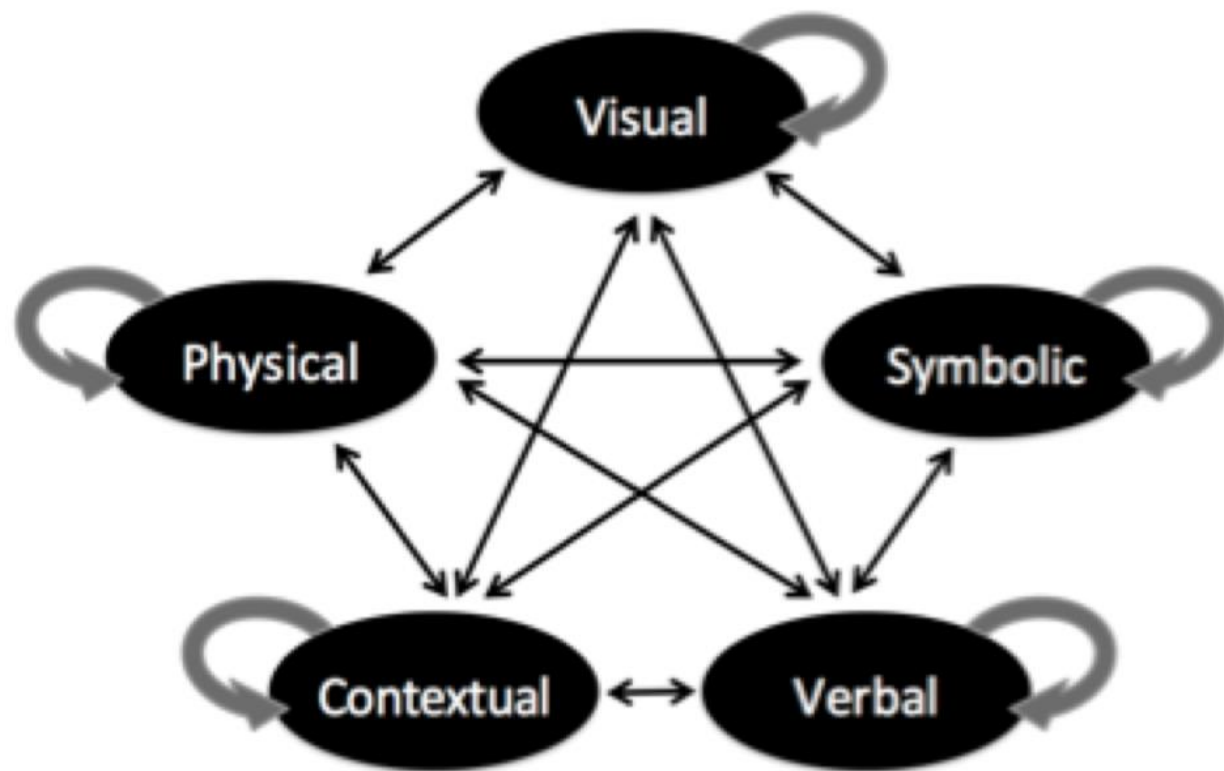
Research

Indicators of Understanding

1. Using **precise mathematical language** when working with decimals
2. Accurately **using models** to represent decimals
3. **Decomposing and composing decimals** based on **mental images of the models and/or place-value understandings** to order decimals
4. Using an understanding of **the relative size of decimals** to guide their estimation for operations with decimals
5. Using a model and their ability to compose and decompose decimals to interpret addition and subtraction operations and **build meaning for work with symbols.**



Research



DeAnn Huinker, 2015, p. 6

Standards

KY.5.NBT.7 Operations with decimals to hundredths.

a. Add, subtract, multiply and divide decimals to hundredths using...

- concrete models or drawings
- strategies based on place value
- properties of operations
- the relationship between addition and subtraction

b. Relate the strategy to a written method and explain the reasoning use.

KY.7.RP.3 Use percents to solve mathematical and real-world problems.

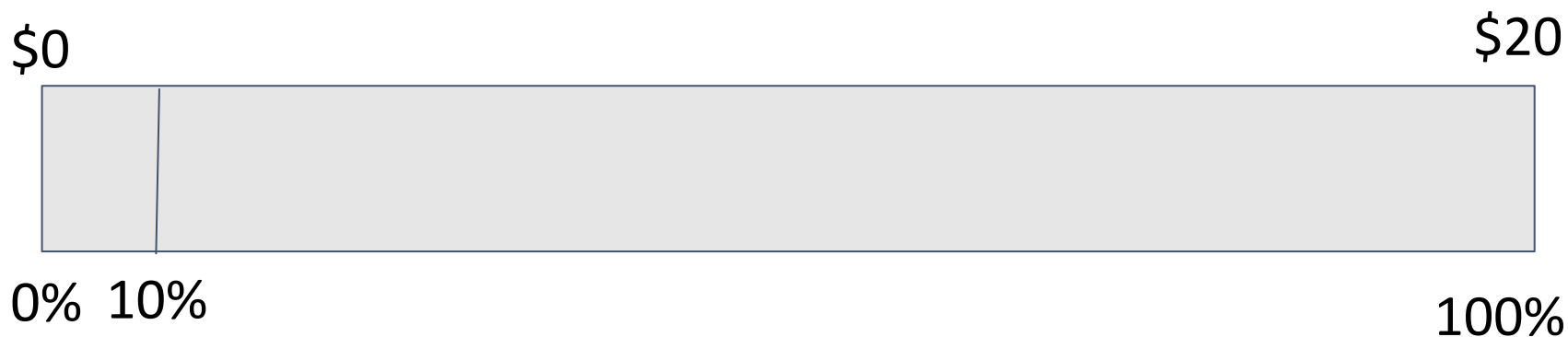
a. Find a percent of a quantity as a rate per 100; solve problems involving finding the whole, a part and a percent, given two of these.

Let's Do Math

Many people use benchmarks for determining tips. Jill explains her strategy “I always figure out 10% of the bill, and then use this information to calculate a 15 % or 20% bill.”

1. Find 10% and 5% of \$20.00. How are the two percents related?
2. Find 10% and 20% of \$24.50. How are the two percents related?
3. Find 10% of \$15.00. Use this to find 15% and 20% of \$15. Explain your reasoning in each case.

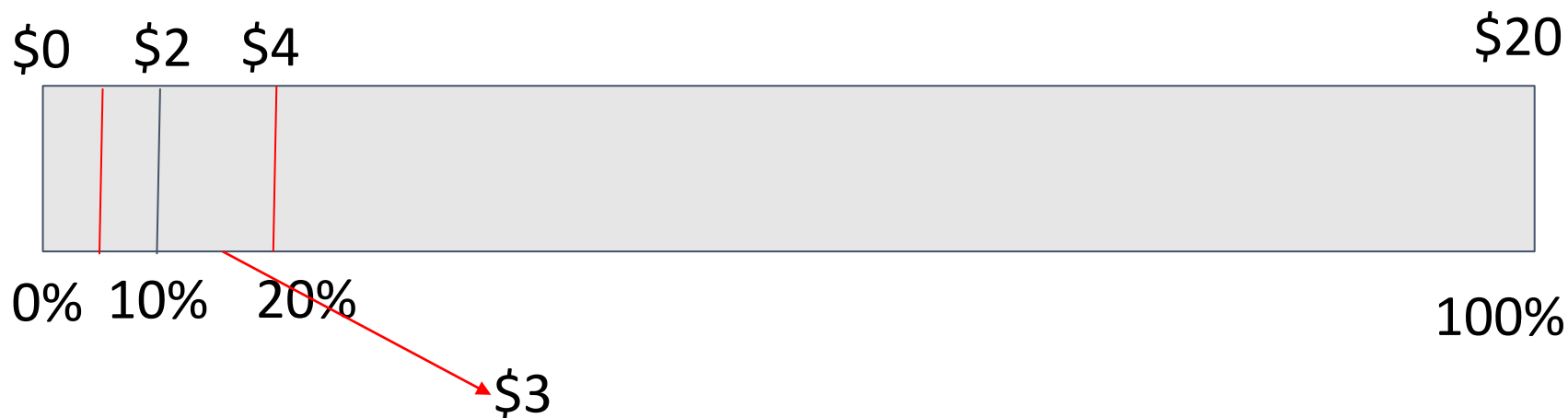
Let's Do Math



Tape Bar Diagrams

Connected Mathematics Program 2, Decimal Ops Unit

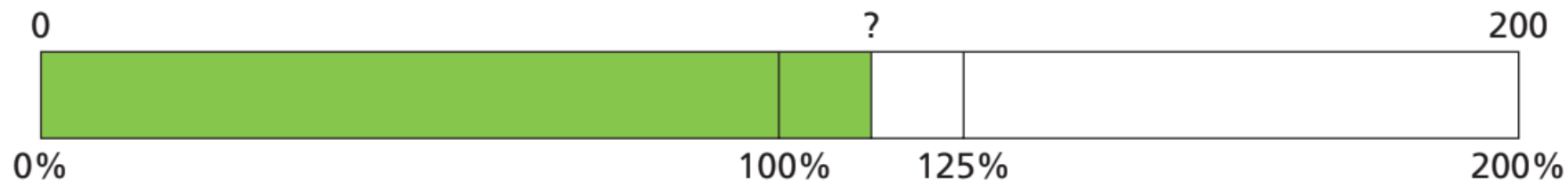
Let's Do Math



Tape Bar Diagrams

Connected Mathematics Program 2, Decimal Ops Unit

Let's Do Math

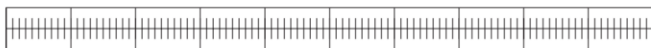
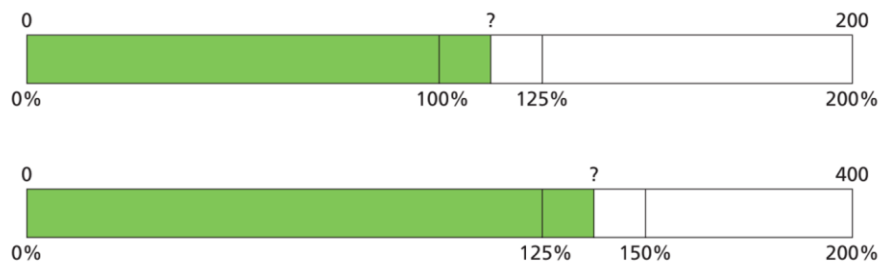


<https://www.bitpaper.io/go/percents%20and%20Decimals/Sk0m9T1P8>

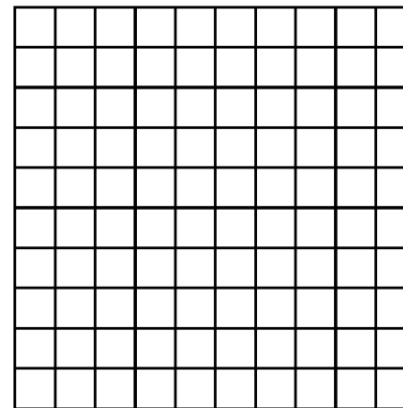
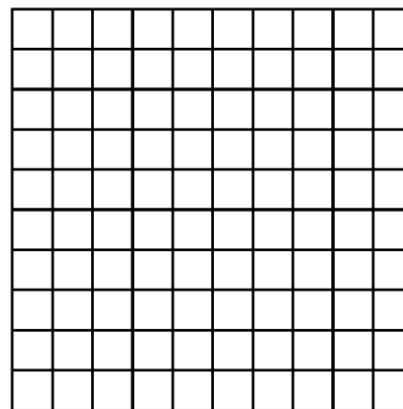
Connected Mathematics Program 2, Bits and Pieces Unit, p. 67

Let's Do Math

Tape Bar Diagram



Hundreds Strip



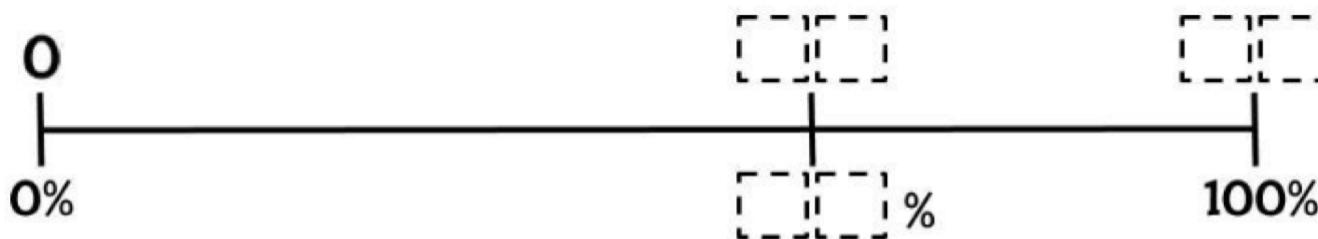
Hundreds Grid

Percents on a Number Line



PERCENTS ON A LINEAR MODEL 4

Directions: Using the digits 0 to 9 at most one time each, fill in the boxes to create an accurate number line. How many solutions can you find?



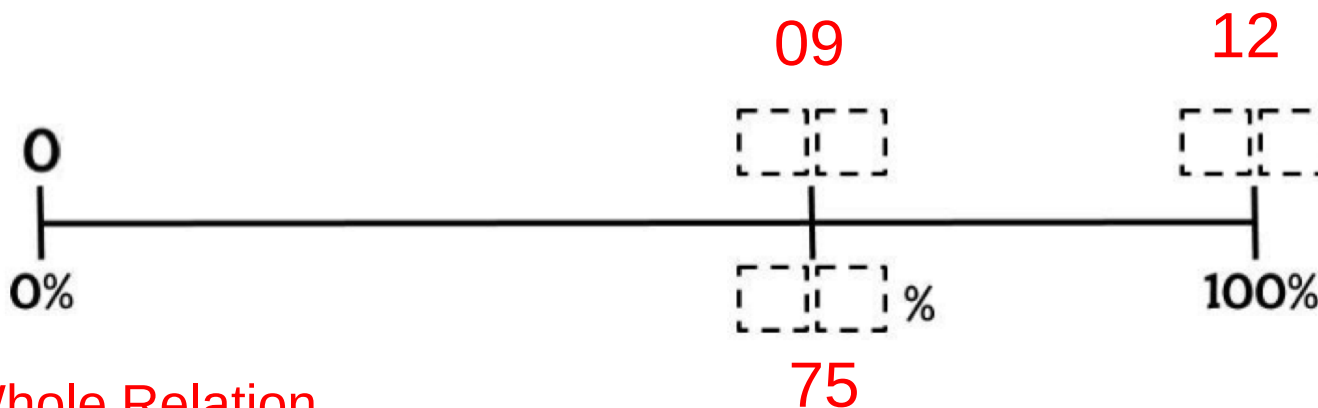
www.openmiddle.com

Percents on a Number Line



PERCENTS ON A LINEAR MODEL 4

Directions: Using the digits 0 to 9 at most one time each, fill in the boxes to create an accurate number line. How many solutions can you find?



Part-Whole Relation
Equivalency
Proportional Relation

www.openmiddle.com

Let's Do Math

Take turns to:

- 1.Fill in the missing decimals and percents.
- 2.Place the cards in order of size.
3. Check that you agree

0.2 ____ %	0.05 ____ %	—.— 80%
0.375 ____ %	—.— 12.5%	0.75 ____ %
1.25 ____ %	—.— 50%	—.— ____ %

0.2 ____%	0.05 ____%	____ 80%
0.375 ____%	____ 12.5%	0.75 ____%
1.25 ____%	____ 50%	____ ____%

0.2
20 %

0.05
5 %

0.80
80 %

0.375
37.5 %

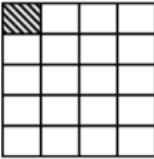
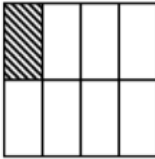
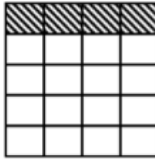
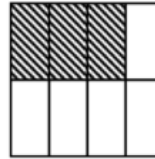
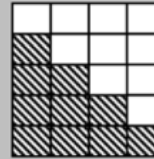
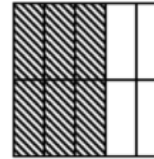
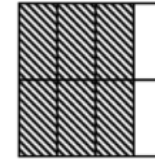
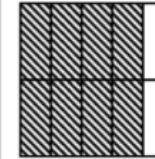
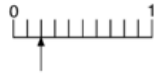
0.125
12.5 %

0.75
75 %

1.25
125 %

0.50
50 %

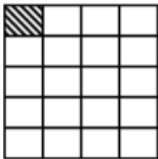
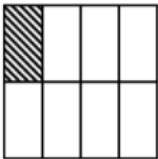
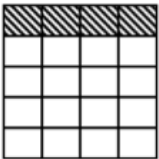
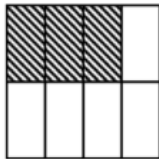
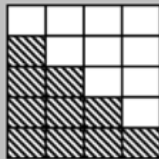
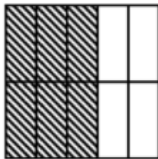
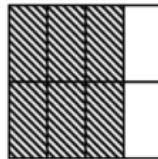
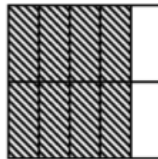
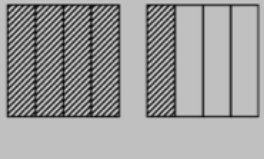
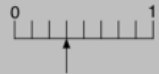
Let's Do Math

0.05 5%	0.125 12.5%	0.2 20%	0.375 37.5%	0.5 50%		0.75 75%	0.8 80%	1.25 125%
	$\frac{1}{8}$		$\frac{3}{8}$	$\frac{1}{2}$	$\frac{6}{10}$	$\frac{3}{4}$	$\frac{4}{5}$	$\frac{5}{4}$
								
								

The gray cards are the ones that students had to create for themselves.

<https://www.map.mathshell.org>

Let's Do Math

0.05 5%	0.125 12.5%	0.2 20%	0.375 37.5%	0.5 50%	0.6 60%	0.75 75%	0.8 80%	1.25 125%
$\frac{1}{20}$	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{6}{10}$	$\frac{3}{4}$	$\frac{4}{5}$	$\frac{5}{4}$
								
								

The gray cards are the ones that students had to create for themselves.

<https://www.map.mathshell.org>

Live Number Line 1

Materials: Clothesline, decimals/percent/fractions number cards
Students will put numbers in order on the clothesline.

0

1

0.2

0.5

0.25

0.125

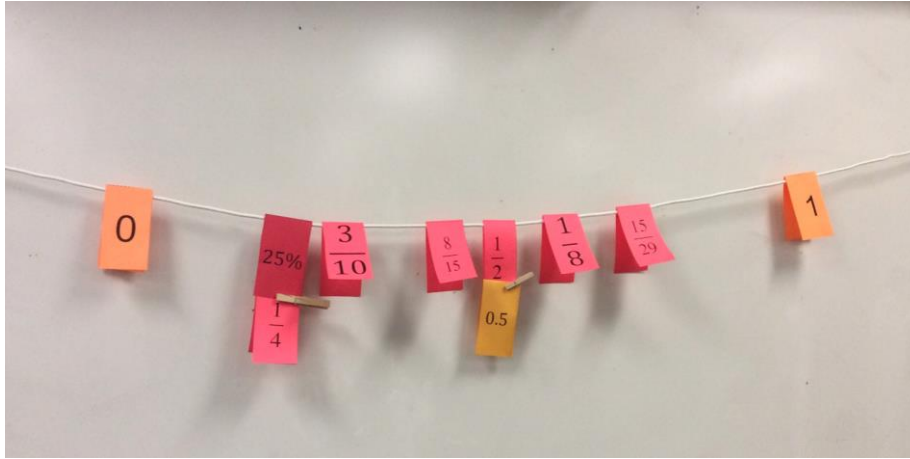
0.4

$\frac{1}{4}$

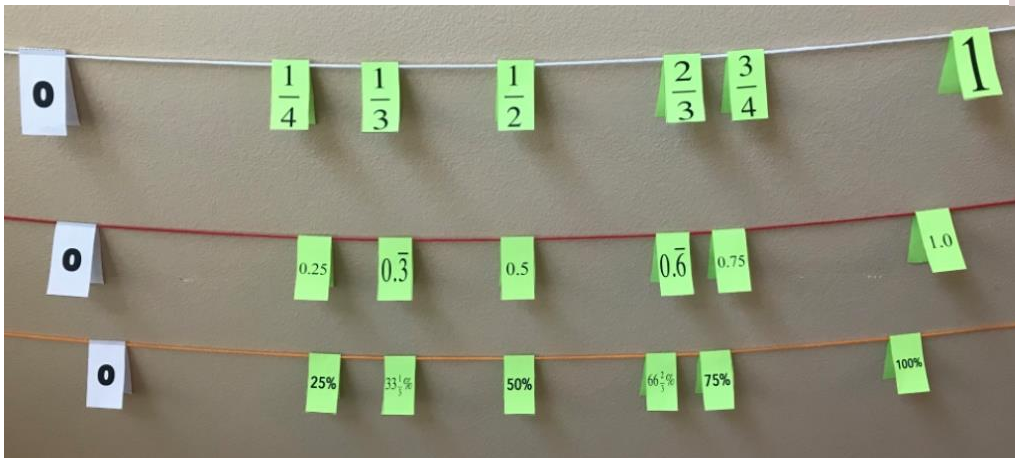
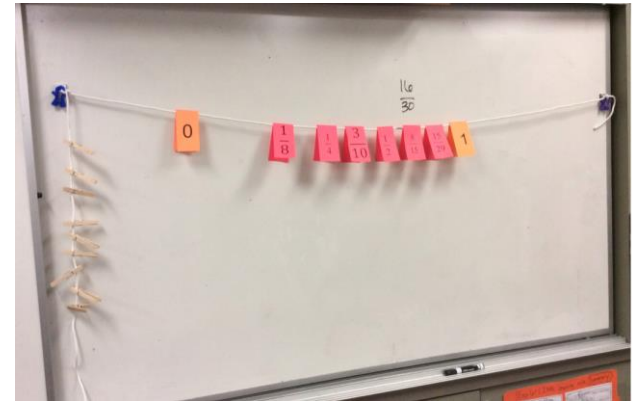
$\frac{8}{20}$

20 %

Live Number Line 1



This number line is still in progress, students worked on correcting their mistakes.



<https://andrewsmathspace.wordpress.com/2016/03/25/clothesline-math/>

Live Number Line 2

Materials: Decimal Number cards

Students are given random decimal number cards

They order themselves from smallest to biggest according to the value of their card. Once they are done, they determine which numbers are closest to 0, $\frac{1}{2}$ or 1.

0.07

1.150

0.391

0.0999

0.99

0.599

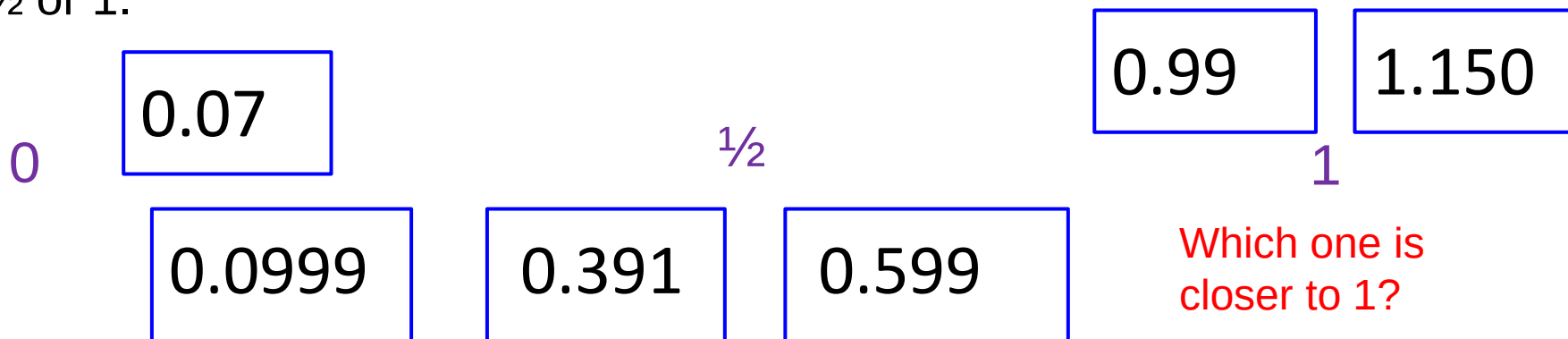
Live Number Line 2

Materials: Decimal Number cards

Students are given random decimal number cards

They get in order from smallest to biggest according to the value of the card they got.

Once they are done, they determine which numbers are closest to 0, $\frac{1}{2}$ or 1.



Which one is closer to half?

<https://www.bitpaper.io/go/percents%20and%20Decimals/Sk0m9T1P8>

Card Sorting

Students sort the given number cards.

Number cards can be created in many different ways.

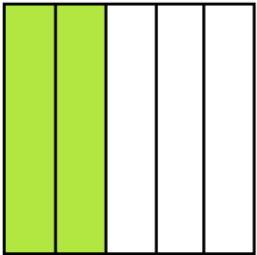
$$0.2$$

$$0.75$$

$$0.5$$

$$0.125$$

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

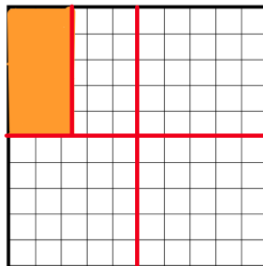


$$\frac{1}{4}$$

$$\frac{8}{20}$$

$$20\%$$

$$\frac{1}{2} + \frac{1}{4}$$



Getting Close Game

Two to four players can play Getting Close.

Materials

- Getting Close fraction or decimal game cards (one set per group)
- A set of four number squares (0, 1, 2, and 3) for each player



Directions

1. All players hold their 0, 1, 2, and 3 number squares in their hand. The game cards are placed facedown in a pile in the center of the table.
 2. One player turns over two game cards from the pile. Each player mentally estimates the sum of the numbers on the two game cards.
 3. Each player then selects a number square (0, 1, 2, or 3) closest to their estimate and places it facedown on the table.
 4. After each player has played a number square, the players turn their number squares over at the same time.
 5. Each player calculates the actual sum by hand or with a calculator. The player whose number square is closest to the actual sum gets the two game cards.
- Note:** If there is a tie, all players who tied get one game card. Players who have tied may take a game card from the deck if necessary.
6. Players take turns turning over the two game cards.
 7. When all game cards have been used, the player with the most game cards wins.

Connected Mathematics Program 2, Let's Be Rational Unit

https://connectedmath.msu.edu/sites/_connectedMath/assets/File/Conferences/carnival_instructions.pdf

Getting Close Fraction Game Cards

$\frac{1}{10}$	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{3}$
$\frac{1}{2}$	$\frac{3}{10}$	$\frac{7}{10}$	$\frac{9}{10}$	$\frac{2}{5}$
$\frac{3}{5}$	$\frac{4}{9}$	1	$\frac{3}{4}$	$1\frac{4}{10}$
$1\frac{1}{5}$	$1\frac{3}{4}$	$1\frac{2}{3}$	$1\frac{1}{3}$	$\frac{2}{3}$
$\frac{6}{8}$	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{5}{9}$



Getting Close Decimal Game Cards

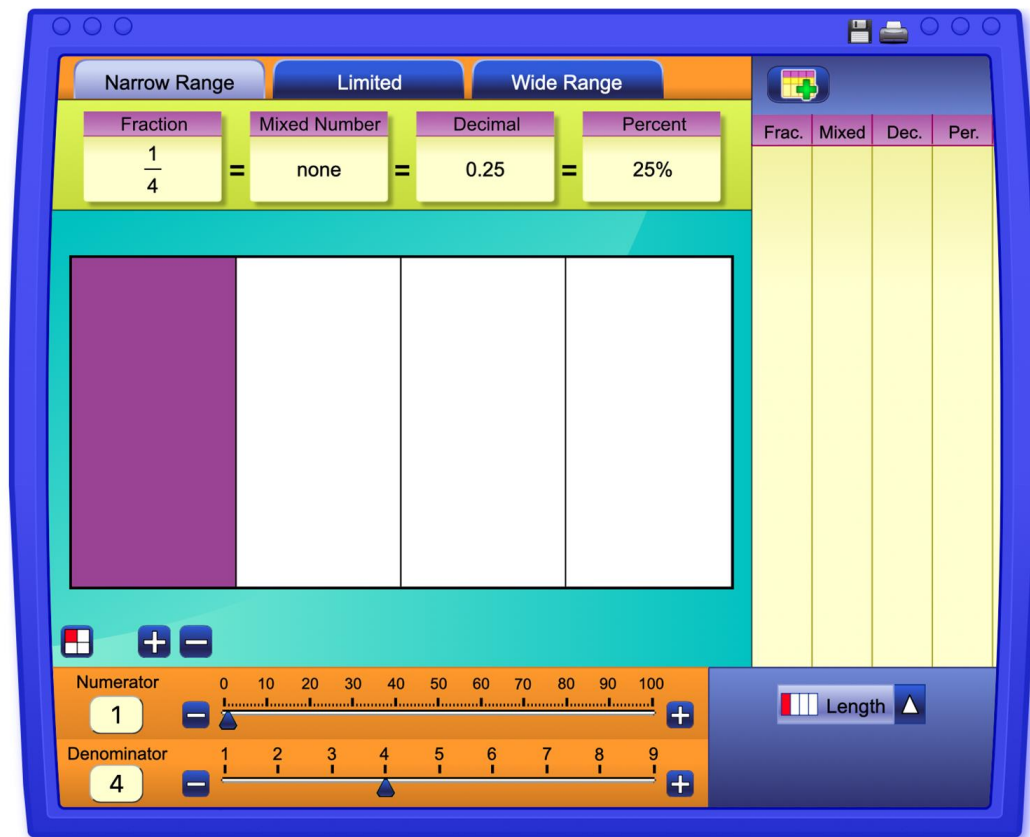
1.375	0.5	0.75	0.6	0.9
0.125	0.375	0.875	1.5	1.75
1.125	0.2	0.8	1.33	1.67
0.33	0.67	1.875	0.1	1.9
1.1	2	1.45	1.25	1.6

Connected Mathematics Program 2, Let's Be Rational Unit

https://connectedmath.msu.edu/sites/_connectedMath/assets/File/Conferences/carnival_instructions.pdf

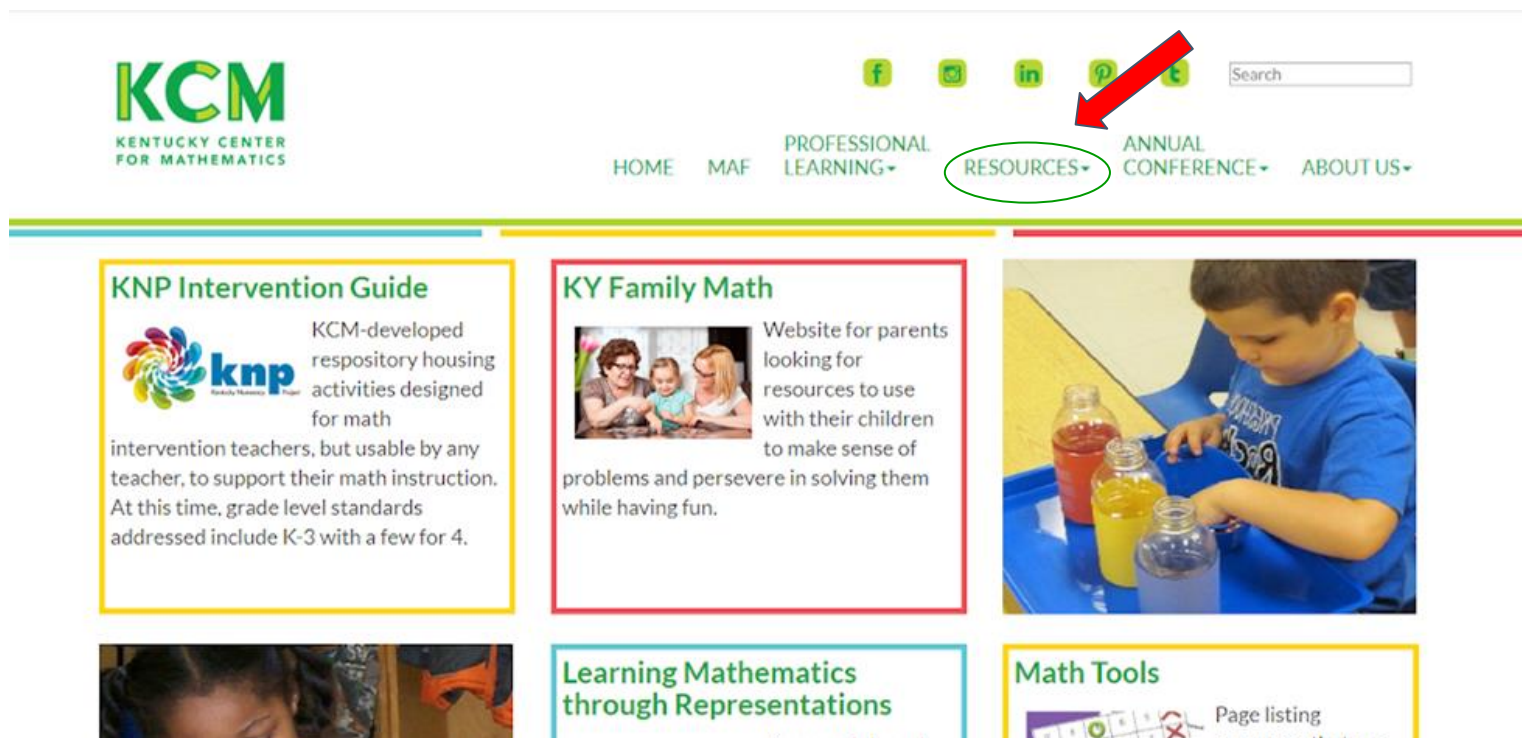
Online Interactive Resources

<https://www.nctm.org/Classroom-Resources/Illuminations/Interactives/Fraction-Models/>



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Upcoming Virtual Professional Learning

MARCH 30 - APRIL 3
2:00-2:30 PM EST



Let's Do Math!

w/ KY Math Leaders

Monday, March 30 - +- Fractions and Decimals

Tuesday, March 31 - Connecting Fractions,
Decimals, Percents

Wednesday, April 1 - Visualizing Proportions

Thursday, April 2 - Contextualizing
Proportional Reasoning

Friday, April 3 - More Proportional Reasoning

KCM loves to support teachers!

Contact me;

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