



KENTUCKY CENTER  
FOR MATHEMATICS

# Let's Do Math with KCM- Middle Grades

## Contextualizing Proportional Reasoning

# Welcome!



Your host

## Kelly DeLong

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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.

# Visit Our Website

[www.kentuckymathematics.org](http://www.kentuckymathematics.org)



HOME

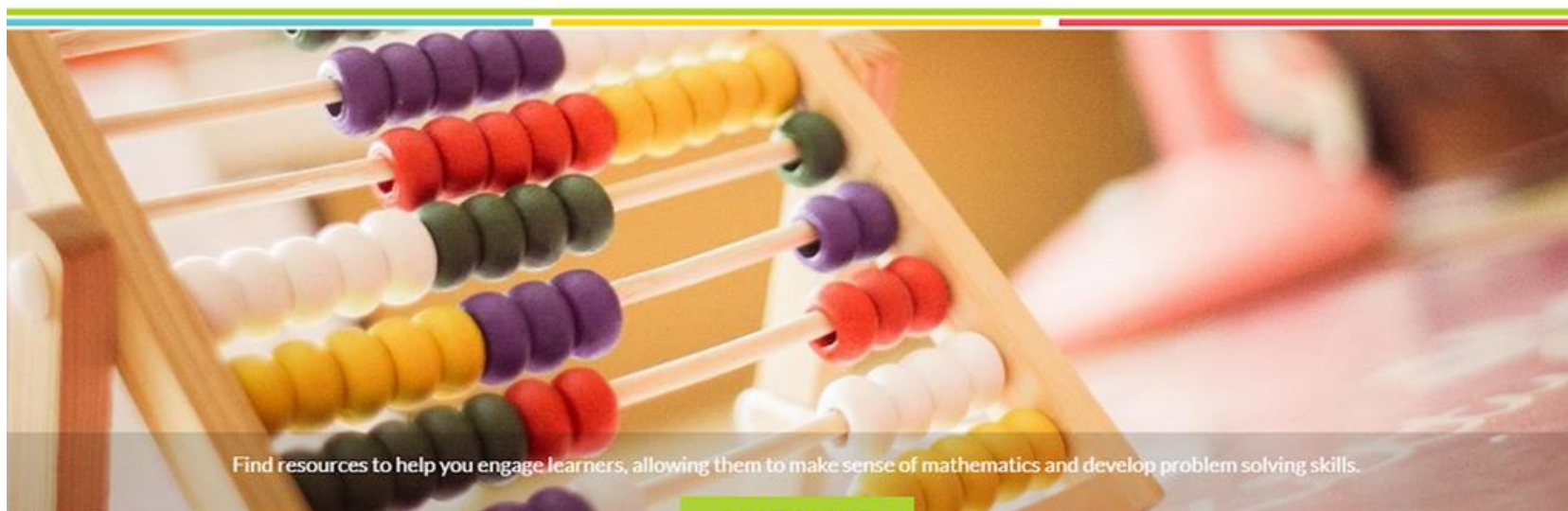
MAF

PROFESSIONAL  
LEARNING▼

RESOURCES▼

ANNUAL  
CONFERENCE▼

ABOUT US▼



# Today's Goals

- Contextualizing proportions
- Strategies for proportional reasoning
- Technology integration
  - The power of what if...
  - Technology as a tool
- Using our senses to understand proportions

# Today's Agenda

- Research
- Let's Do Math
  - Best Buy
  - Fizzy Orange Juice
  - Family Recipes
- PHET math simulations
- KCM here to support teachers
- #BetterTogether #TeamKCM



You are going to want pencil and paper for today's session. Maybe even a calculator.

# Research

**“Proportional reasoning is a pervasive activity that transcends topical barriers in adult life.** Proportional information is crucial in dealing with such diverse topics as economic values, relational spatial contrasts, temperatures, densities, concentrations, velocities, chemical compositions, demographic information, and recipe formulation”

([Karplus, Pulos, & Stage, 1983](#); [Moore, Dixon, & Haines, 1991](#); [Siegler & Vago, 1978](#); [Sophian & Wood, 1997](#); [Spinillo & Bryant, 1999](#)).

# Research

“It is beneficial for students to discover intuitive strategies, as opposed to the teacher presenting strategies to them. Certain proportional reasoning tasks are more likely to elicit intuitive strategies than other tasks. **The strategies that students are apt to use when approaching a task, *as well as the likelihood of a student’s success or failure* solving it, are influenced by that task’s context and numerical structure.**”

[de la Cruz, J. \(2016, May\). Saving Money Using Proportional Reasoning. \*Mathematics Teaching in the Middle School\*, 553–561.](#)

# Let's Do Math

4. Which is the better deal for paper towels?

Product	Quantity	Price
Bounty Regular or Select A Size	8 Rolls	\$8.99
Bounty Basic Select A Size	6 Big Rolls	7 <sup>99</sup>

**Solve it one way.**  
**Solve it another way.**

[de la Cruz, J. \(2016, May\). Saving Money Using Proportional Reasoning. \*Mathematics Teaching in the Middle School\*, 553–561.](#)

# Let's Do Math

Multiple entry points

- Build up, Reduction
- Factor Change
- Common Denominator
- Unit Rate

[de la Cruz, J. \(2016, May\). Saving Money Using Proportional Reasoning. \*Mathematics Teaching in the Middle School\*, 553–561.](#)

# Let's Do Math

4. Which is the better deal for paper towels?

	<p>Bounty <b>8 Rolls</b> Regular or Select A Size</p> <p><b>\$8.99</b></p>		<p>Bounty Basic <b>6 Big Rolls</b> Select A Size</p> <p><b>7<sup>99</sup></b></p>	<p><b>2/\$3</b> Bounty Regular or Select A Size</p>	
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# Let's Do Math

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# Let's Do Math

Fig. 5 The task and anticipated strategies for a problem involved comparing three ratios.

4. Which is the better deal for paper towels?



Unit Rate

$$\begin{array}{c} + 8 \\ \text{A: } \frac{\$8.99}{8 \text{ rolls}} = \frac{\$1.12}{1 \text{ roll}} \\ + 8 \end{array}$$

$$\begin{array}{c} + 6 \\ \text{B: } \frac{\$7.99}{6 \text{ rolls}} = \frac{\$1.33}{1 \text{ roll}} \\ + 6 \end{array}$$

$$\begin{array}{c} + 2 \\ \text{C: } \frac{\$3.00}{2 \text{ rolls}} = \frac{\$1.50}{1 \text{ roll}} \\ + 2 \end{array}$$

Reduction

$$\begin{array}{c} + 4 \\ \text{A: } \frac{\$8.99}{8 \text{ rolls}} = \frac{\$2.25}{2 \text{ rolls}} \\ + 4 \end{array}$$

$$\begin{array}{c} + 3 \\ \text{B: } \frac{\$7.99}{6 \text{ rolls}} = \frac{\$2.66}{2 \text{ rolls}} \\ + 3 \end{array}$$

$$\text{C: } \frac{\$3.00}{2 \text{ rolls}}$$

Common Denominator

$$\begin{array}{c} \times 3 \\ \text{A: } \frac{\$8.99}{8 \text{ rolls}} = \frac{\$26.97}{24 \text{ rolls}} \\ \times 3 \end{array}$$

$$\begin{array}{c} \times 4 \\ \text{B: } \frac{\$7.99}{6 \text{ rolls}} = \frac{\$31.96}{24 \text{ rolls}} \\ \times 4 \end{array}$$

$$\begin{array}{c} \times 12 \\ \text{C: } \frac{\$3.00}{2 \text{ rolls}} = \frac{\$36.00}{24 \text{ rolls}} \\ \times 12 \end{array}$$

# Let's Do Math

## Mixing Drinks

When Sam and his friends get together, Sam makes a fizzy orange drink by mixing orange juice with soda.

On Friday, Sam makes 7 liters of fizzy orange by mixing 3 liters of orange juice with 4 liters of soda.

On Saturday, Sam makes 9 liters of fizzy orange by mixing 4 liters of orange juice with 5 liters of soda.



1. Does the fizzy orange on Saturday taste the same as Friday's fizzy orange, or different?





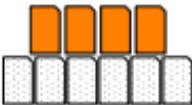
If you think it tastes the same, explain how you can tell.

If you think it tastes different, does it taste more or less orangey? Explain how you know.

<https://www.map.mathshell.org/lessons.php?unit=6230&collection=8&redir=1>

# Let's Do Math

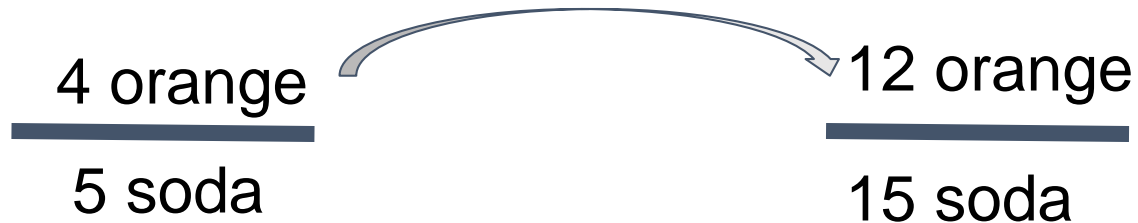
Card Set: Orange and Soda Mixtures

<p>A</p> 	<p>B</p> 
<p>C</p> 	<p>D</p> 
<p>E</p> 	<p>F</p> <p>Half of the mixture is orange</p>
<p>G</p> <p>For every orange there are 2 sodas</p>	<p>H</p> <p>Orange : Soda = 4 : 5</p>
<p>I</p> <p>One fourth of the mixture is orange</p>	<p>J</p> <p><math>\frac{2}{3}</math> of the mixture is soda</p>
<p>K</p> <p>For every orange there is <math>1\frac{1}{3}</math> soda</p>	<p>L</p> <p>For every soda there is <math>\frac{2}{3}</math> orange</p>

<https://www.map.mathshell.org/lessons.php?unit=6230&collection=8&redir=1>

# Let's Do Math

## Kelly's Thinking

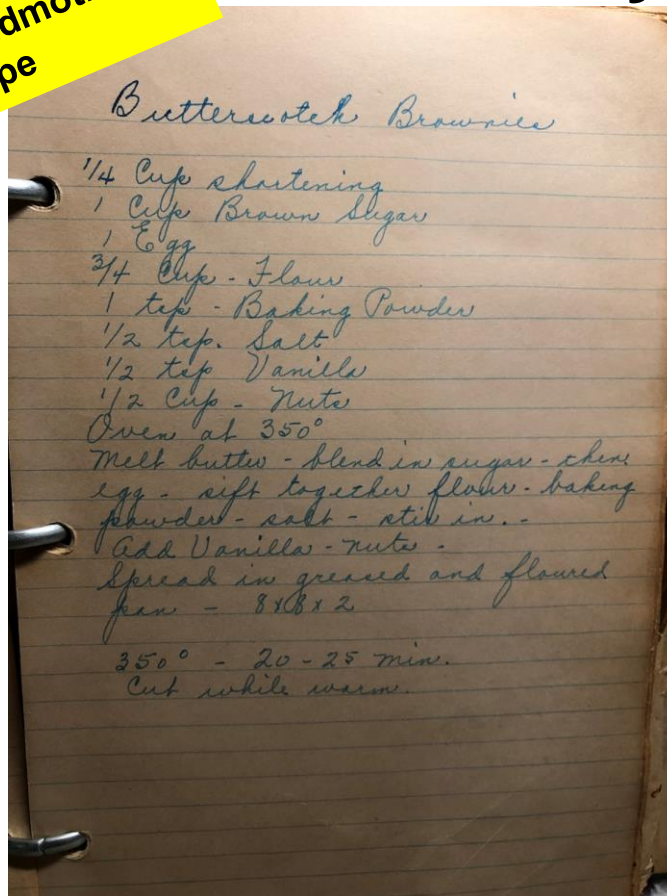


**Which one is the orangiest?  
Explain**

# Let's Do Math

## Family recipes

My great-grandmother's  
recipe



### Butterscotch Brownies

$\frac{1}{4}$  cup of shortening  
1 cup of brown sugar  
1 egg  
 $\frac{3}{4}$  cup flour  
1 tsp baking powder  
 $\frac{1}{2}$  tsp salt  
 $\frac{1}{2}$  tsp vanilla  
 $\frac{1}{2}$  nuts

Oven at 350

Melt butter-blend in sugar-then egg-sift  
together flour-baking powder-salt-stir in  
Add vanilla- nuts

Spread in greased and floured pan 8x8x2

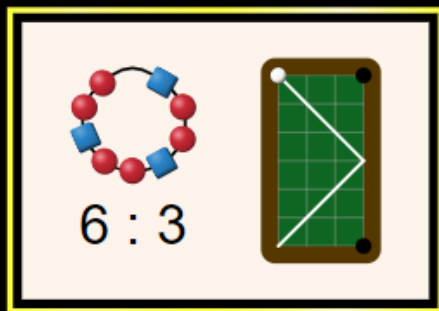
350 20-25 min

Cut while warm

What if I only have a pan with dimensions 9x13x2?  
How do I scale the ingredients? Explain.

# Let's Do Math- Technology

## Proportion Playground



Explore



Predict

<https://phet.colorado.edu/en/simulation/proportion-playground>

# Let's Do Math- Technology



SIMULATIONS

TEACHING

RESEARCH

ACCESSIBILITY

DONATE



## Proportion Playground



DOWNLOAD

EMBED

- Ratios
- Proportional Reasoning
- Unit Rate

DONATE

PhET is supported by

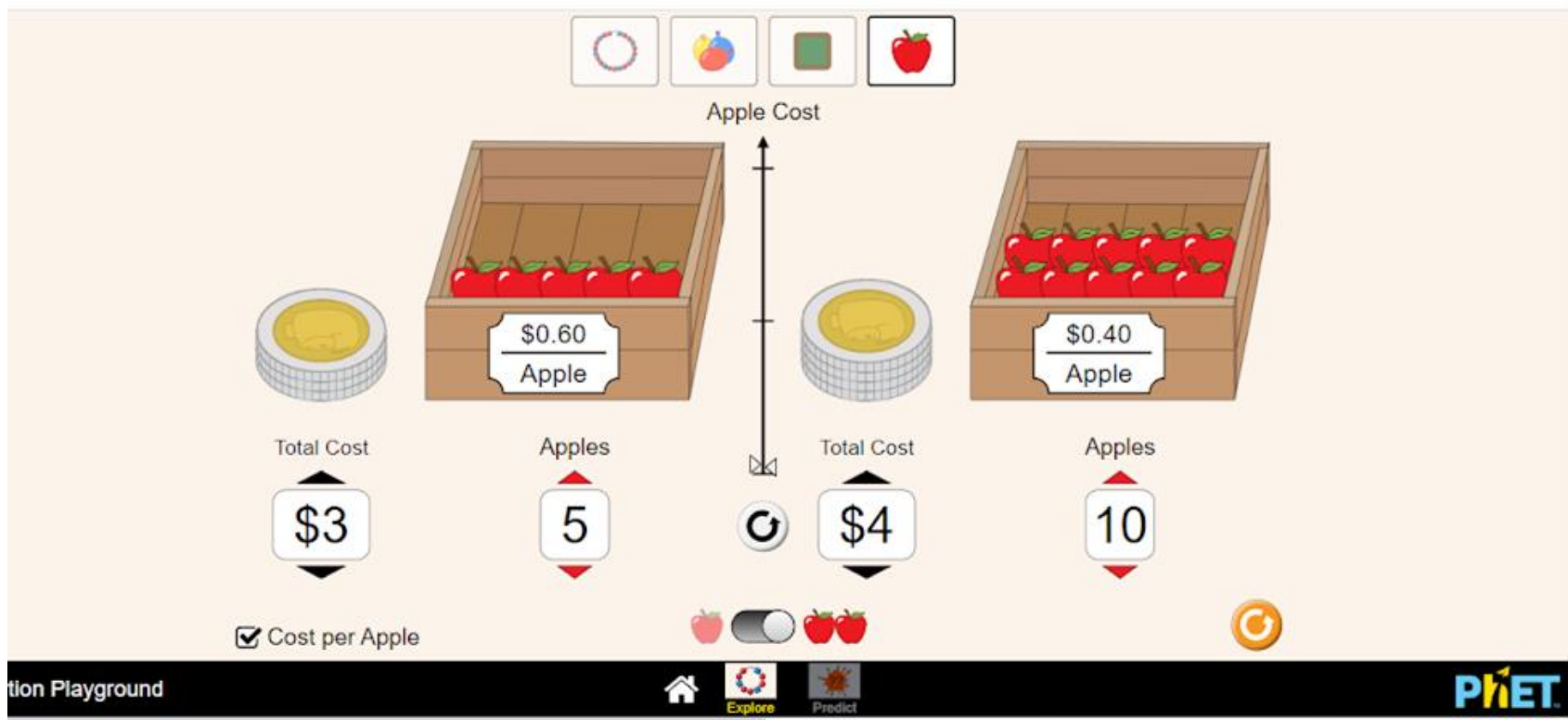
**BMG**  
BILIM MEDIA GROUP

and educators like you.



<https://phet.colorado.edu/en/simulation/proportion-playground>

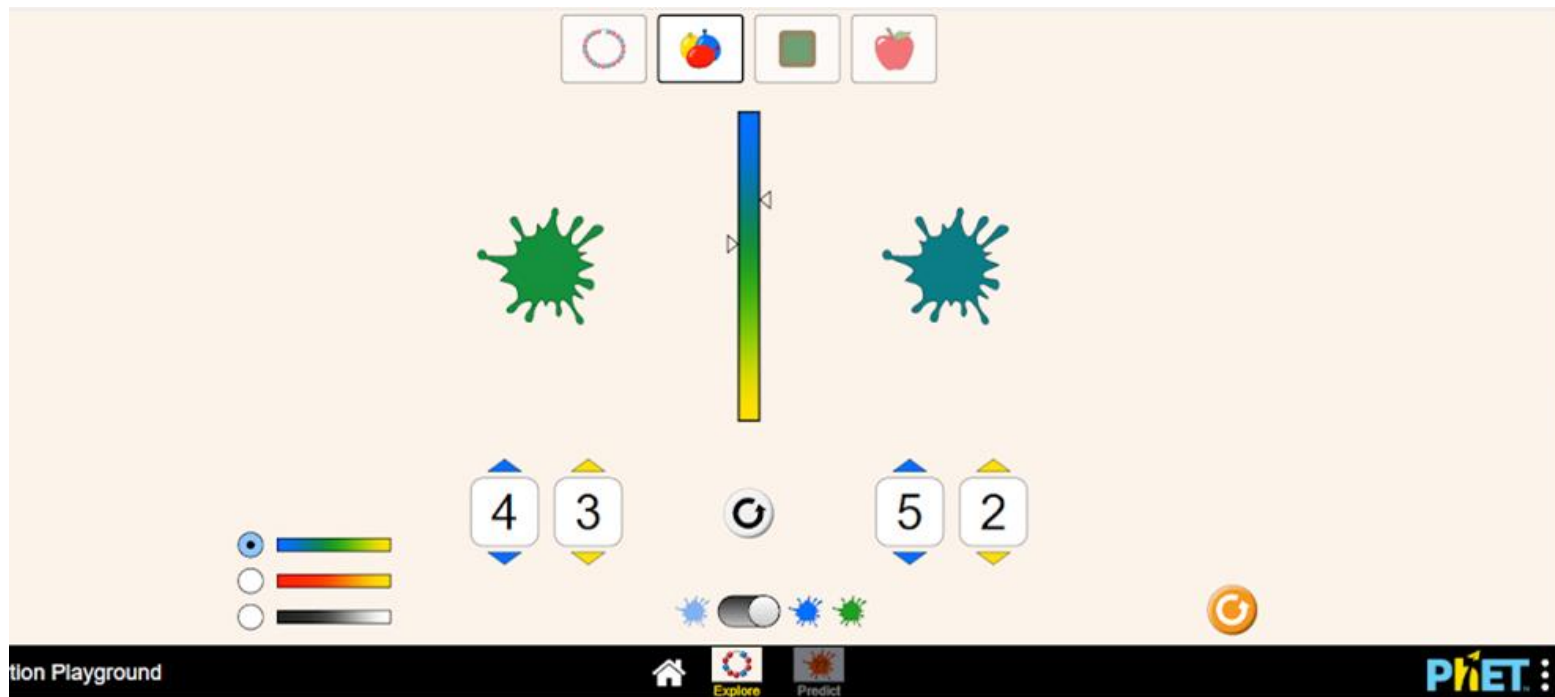
# Let's Do Math- Technology



<https://phet.colorado.edu/en/simulation/proportion-playground>

# Let's Do Math- Technology

## Splat Math



<https://phet.colorado.edu/en/simulation/proportion-playground>

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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

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[www.kentuckymathematics.org](http://www.kentuckymathematics.org)

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## KCM Goes Virtual

The KCM is hosting free, online mini-classes for elementary, middle and high school educators. Check out our [KCM Virtual](#) page for a full listing of all planned sessions. If you can't make it "in person", session recordings and handouts will be available.

[Elementary: Make 'n Take Supporting Number Sense and Fluency - Mar. 23-27](#)

[Middle: Fractions, Decimals & Percents - Mar. 30-Apr. 3](#)

[High: Algebra & Geometry - Thursdays, Mar. 26 - Apr. 16](#)

# KCM Support for Educators



Contact me

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