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KENTUCKY CENTER FOR MATHEMATICS

Let's Do Math with KCM- Middle Grades

More Proportional Reasoning

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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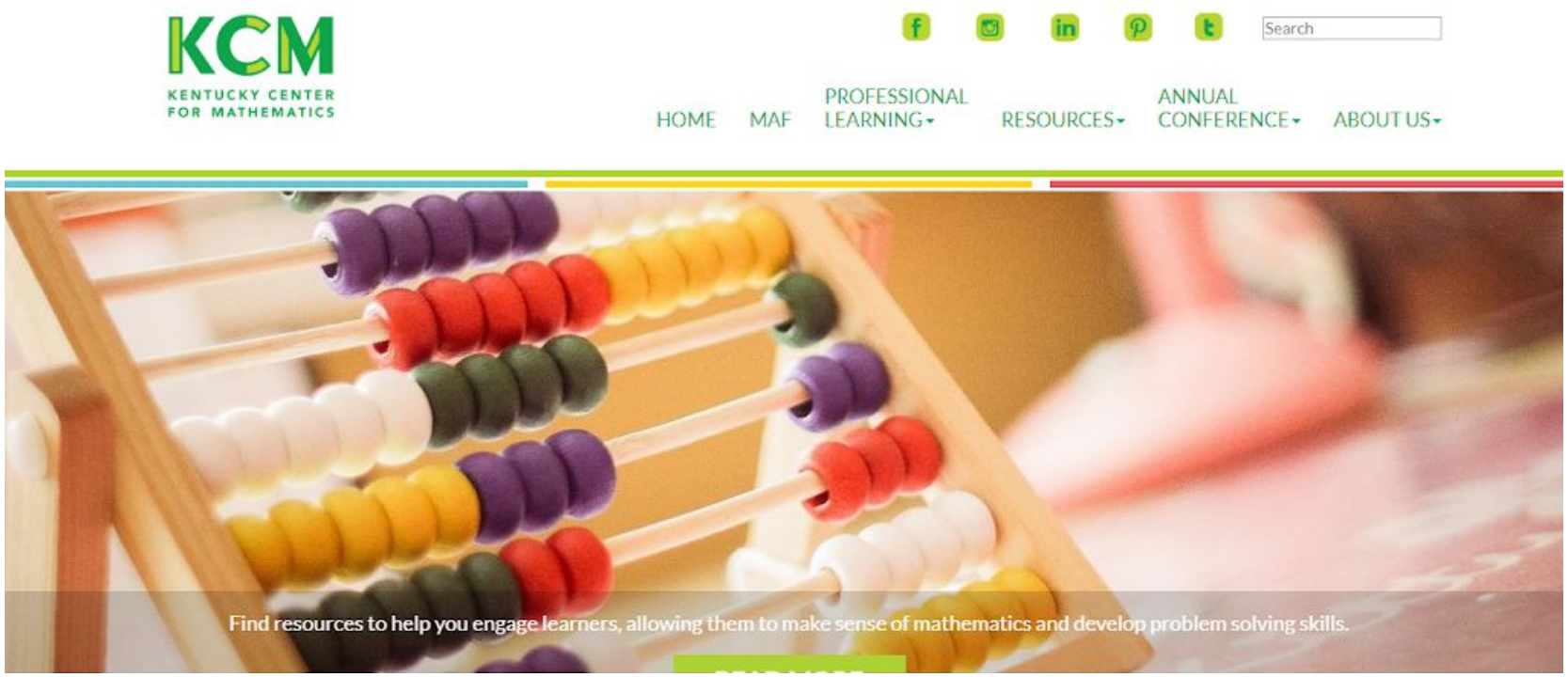
Visit Our Website

www.kentuckymathematics.org



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Today's Goal

Let's Do Math together

To share tasks and resources that:

- Promote reasoning and problem solving
- Allow for multiple entry points
- Encourage students to play with mathematical ideas
- Can be used when remote teaching

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Today's Agenda

- What's the research?
- Review content standards
- Proportional Visuals Match
- Proportional Reasoning Tasks
- KCM here to support teachers
- #BetterTogether #TeamKCM

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Proportional Reasoning

From Wednesday's session:

Reasoning up and down in situations where there is a constant relationship between two quantities that are linked and varying together.

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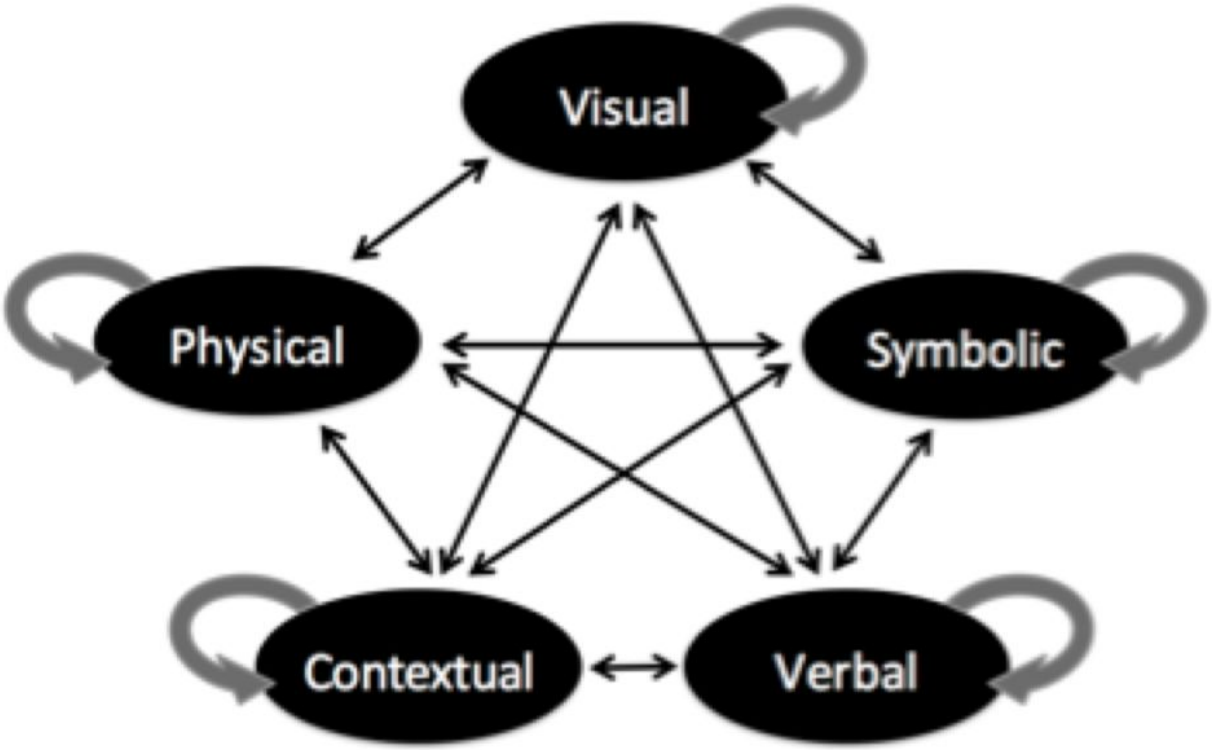

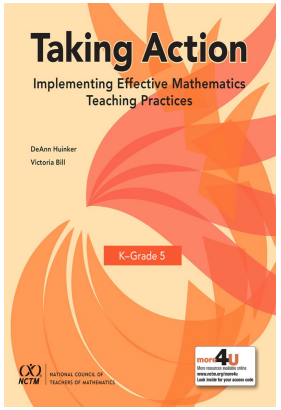

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DeAnn Huinker, 2015, p. 6

Ratios and Proportional Relationships	
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: Understanding ratio concepts and use ratio reasoning to solve problems.	
Standards	**Clarifications**
KY.6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. **MP.2, MP.6**	Students use the concept of ratios as a comparison between related quantities; students also express these relationships in equivalent ratios in lowest terms, where appropriate. Coherence KY.5.NF.5→KY.6.RP.1
KY.6.RP.2 Understand the concept of a unit rate a/b associated with a ratio *a:b* with B ≠ 0 and use rate language in the context of a ratio relation **MP.2, M**	Expectations for unit rates in grade 6 are limited to non-complex fractions; additionally, students reduce ratios of two whole numbers to
KY.6.RP. mathem a. M nu th co b. So co c. Us an qu **MP.1, M**	

Cluster: **Understand** Ratio Concepts and use **Ratio Reasoning** to Solve Problems

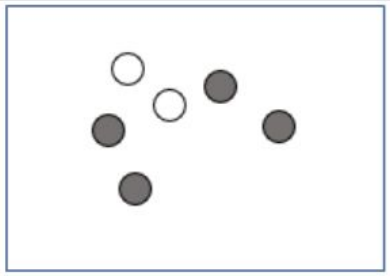
KY.6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

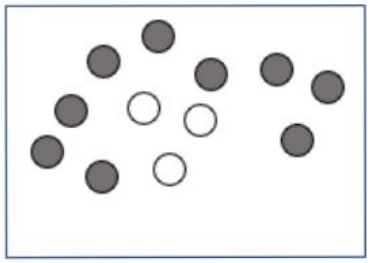
Ratios and Proportional Relationships	
Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics.	MP.5. Use appropriate 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: Analyze proportional relationships and use them to solve real-world and mathematical problems.	
Standards	**Clarifications**
KY.7.RP.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. **MP.2, MP.6**	For example, if a person walks ½ mile in each ¼ hour, compute the unit rate as the complex fraction ½/¼ miles per hour, equivalently 2 miles per hour. KY.6.RP.2 Coherence KY.6.RP.3→ KY.7.RP.1
KY.7.RP.2 Recognize and represent proportional relationships between quantities. a. Decide whether two quantities represent a proportional relationship. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. d. E r a **MP.1,**	a. Students test for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. b. Students understand finding the unit rate in a table or graph is equivalent to the constant of proportionality in an equation or verbal description. KY.8.F.2 KY.8.F.4 quantities.

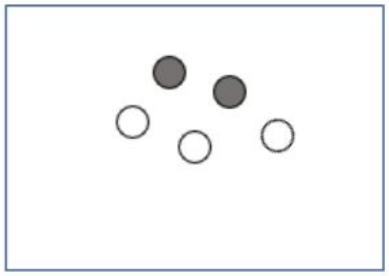
Cluster: **Analyze** proportional relationships and **use** them to solve real-world and mathematical problems.

Connecting Representations

https://jamboard.google.com/d/1xoAwgkgUVaeL7gR0R1INKuZKgfXOpP5zijEcuI5Yc7M/viewer







$\frac{3}{4}$ of the set is grey

$\frac{2}{5}$ of the set is grey

The ratio of grey to white is 2:1

The ratio of grey to white is 3:1

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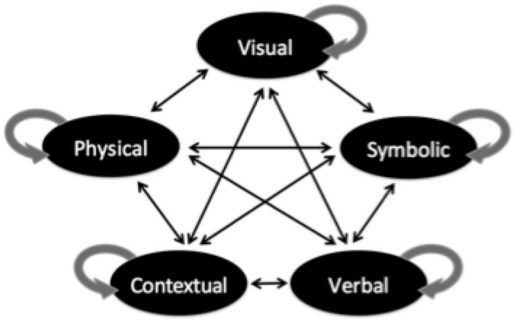
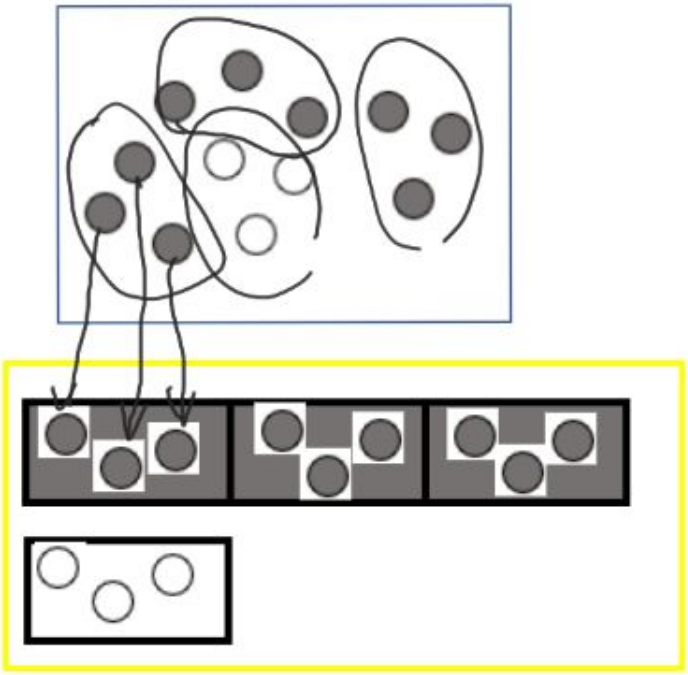
Adapted from an activity shared by MrBartonMaths:
https://www.tes.com/teaching-resource/ratio-and-proportion-match-cards-6030096

Connecting Representations





$\frac{9}{12}$: $\frac{3}{4}$ of the set is grey

The ratio of grey to white is 3:1

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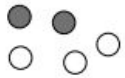
Card Sort Option

Student Cards Page 1

Cut apart cards then sort into sets of 3.
Fill in the missing numbers.



$\frac{3}{5}$ of the set is grey

$\frac{3}{4}$ of the set is grey

[ ] of the set is gr

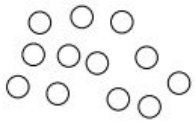
The ratio of grey to white is 3:2

The ratio of grey white is 2:1

Student Cards Page 2

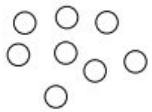
Match Bar Model cards to the sets from Page 1. Draw your own bar model on the blank card.

Use the spaces below to create 2 matching sets. Color some of the circles grey. Fill in the missing values, then draw a bar model in the last card of each set.



[ ] of the set is grey

The ratio of grey to white is __:__



[ ] of the set is grey

The ratio of grey to white is __:__

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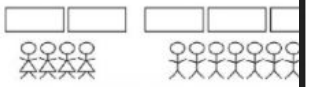
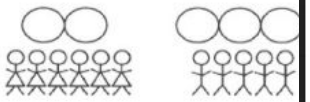
Rich Proportional Reasoning Tasks

Solve the following problems without

(1) Boys or girls... who gets more. Explain



(2) Boys or girls... who gets more. Explain



(3) 24 people go in a restaurant and orde
tables so that 12 are seated at one table, 6 a
table. Determine how the pizzas should be sp
the same amount. (Lamon, page 182)

(4) If 6 cats can catch and kill 6 rats in 6 m
100 rats in 50 minutes? (Hyde, page 96)

(5) The ratio of boys to girls in a class is 3
boys? (Lamon, page 251, #13)

(6) If 3 pizzas serve 9 people, how many

(7) Mac can mow Mr. Greenway's lawn i
long to do the same lawn. How long will it ta
together? (Lamon page 11 - #4)

Additional Questions (Work on these only after completing problems 1 to 7)

(8) 3 people can make 5 electrical seismometers in 8 hours, how many people are needed to make 100 seismometers in 24 hours? (Hyde, page 99)

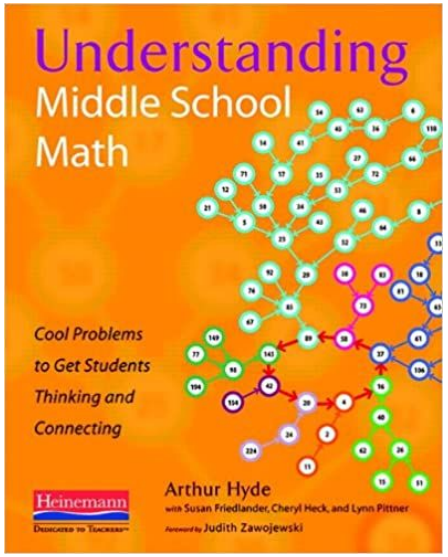
(9) Sandra wants to buy an MP3 Player costing $210. Her mother agreed to pay $5 for each $2 Sandra saved. How much will each contribute? (Lamon, page 7, #7)

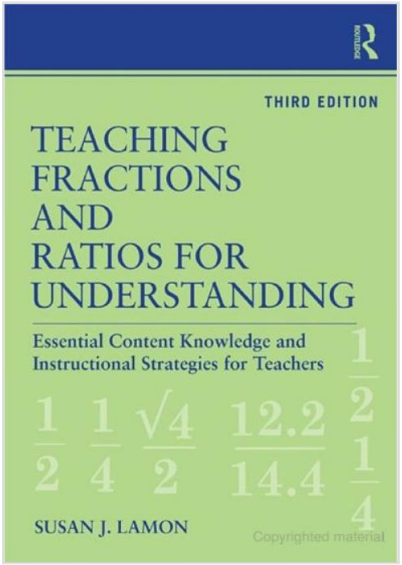
(10) A company usually sends 9 men to install a security system in an office building and they do it in about 96 minutes. Today they only have 3 and do the same job. How much time should be scheduled to complete this job? (Lamon, page 11, #8)

(11) You decided to check the accuracy of the speedometer in your car by timing your travel between miles markers on the highway. If you found that it was 50 seconds between markers, what would you know? (Lamon, page 252, #20)

Hyde, Arthur A. *Understanding Middle School Math: Cool Problems to Get Students Thinking and Connecting*. Portsmouth, NH: Heinemann, 2009. Print.

Lamon, Susan J. *Teaching Fractions and Ratios for Understanding: Essential Content Knowledge and Instructional Strategies for Teachers*. 3rd ed. New York: Routledge, 2012. Print.





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Pizza Party

https://jamboard.google.com/d/1xncYAdWQHPIhJkbiTZwMu9tQlzh8oOAt8VU4XMqDFxY/viewer

24 people go in a restaurant and order 18 pizzas. The people are seated at 4 different tables so that 12 are seated at one table, 6 at a second table, 4 at a third table and 2 at a final table. Determine how the pizzas should be split among the tables so that everyone may have the same amount.

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Mac & his brother

https://jamboard.google.com/d/1xncYAdWQHPIhJkbiTZwMu9tQlzh8oOAt8VU4XMqDFxY/viewer

Mac can mow Mr. Greenway's lawn in 45 minutes. Mac's little brother takes twice as long to do the same lawn. How long will it take them if they each have a mower and they work together?

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Pizza Party

https://jamboard.google.com/d/1xncYAdWQHPIhJkbiTZwMu9tQlzh8oOAt8VU4XMqDFxY/viewer

If 3 people can make 5 electrical seismometers in 8 hours, how many people are needed to make 100 seismometers in 24 hours? (Hyde, page 99)

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Desmos

⚠ **Warning!** Tile Pile is built using old Desmos technology. It doesn't include our new dashboard features, like the our Conversations Toolkit, or Snapshots. Use at your own risk!

Classes

Create Class Code

CLASS CODE	STUDENTS	DATE	
6FK7NS	1	Apr 2, 2020 at 10:13 am	View Dashboard

WHAT WE HAD IN MIND | GOALS OF THIS ACTIVITY | SUPPORTED DEVICES

Tile Pile

ABOUT THIS ACTIVITY

This lesson helps students count large numbers of things by using the mathematical structures of area and proportionality. Students use a ratio table to keep track of their work as they count the number of tiles required to cover a floor, and the time required to put those tiles in place.

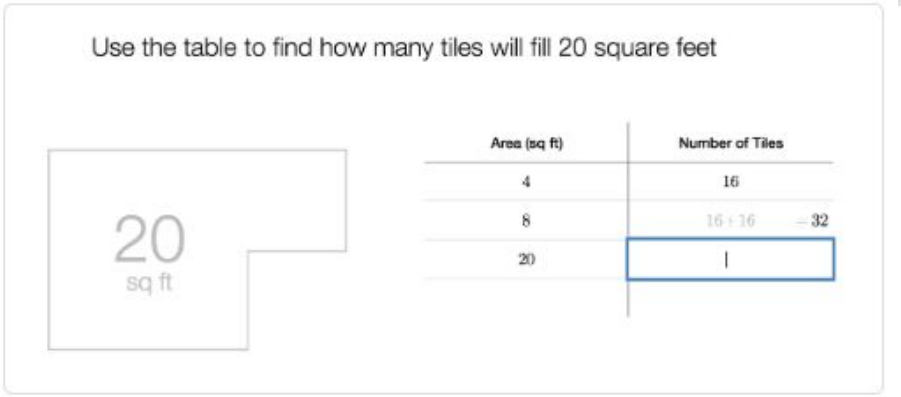
How the activity works:

1. Tile
Each student tiles a square and learns the number of tiles that fit.

2. Estimate
Students estimate the total number of tiles and the total time required to tile a large area.

3. Compute
Using ratio tables, students compute these values.

4. Analyze
Students are given ratio tables to analyze and correct.



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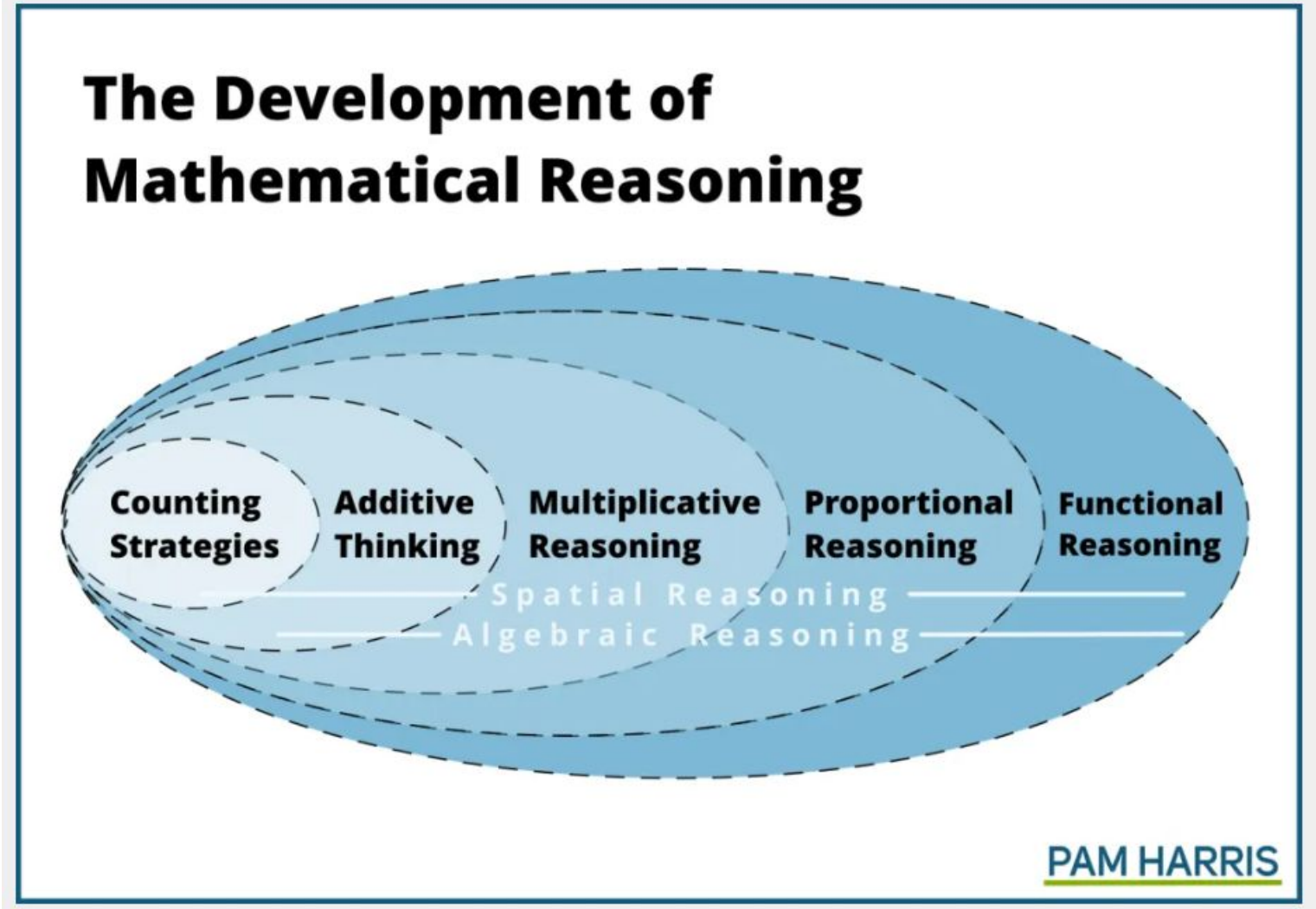

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https://www.mathisfigureoutable.com/development/

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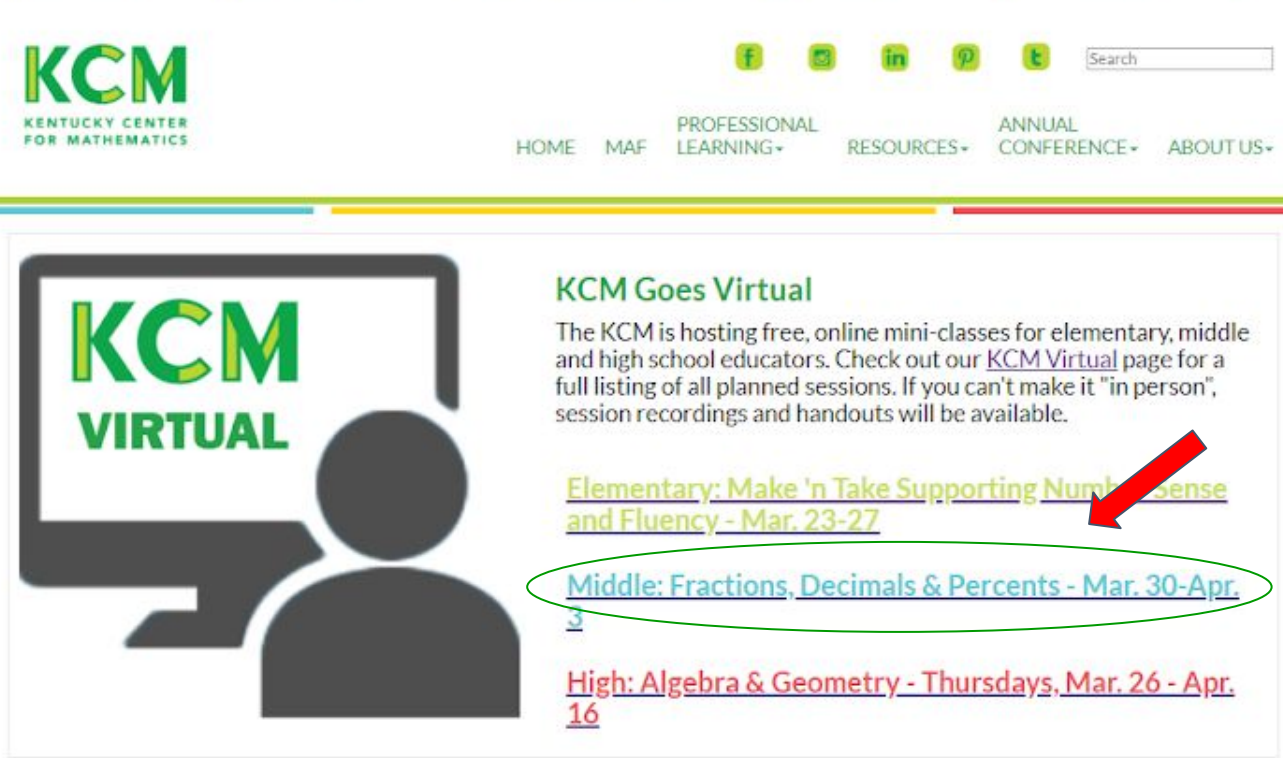

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KCM is here to support you!

Contact me:

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