May 27, 2009 Network Meeting

IMPROVING OUR CRAFT AS COACHES

"Put one Foot in Front of the Other"
…. slowly, carefully, strategically…

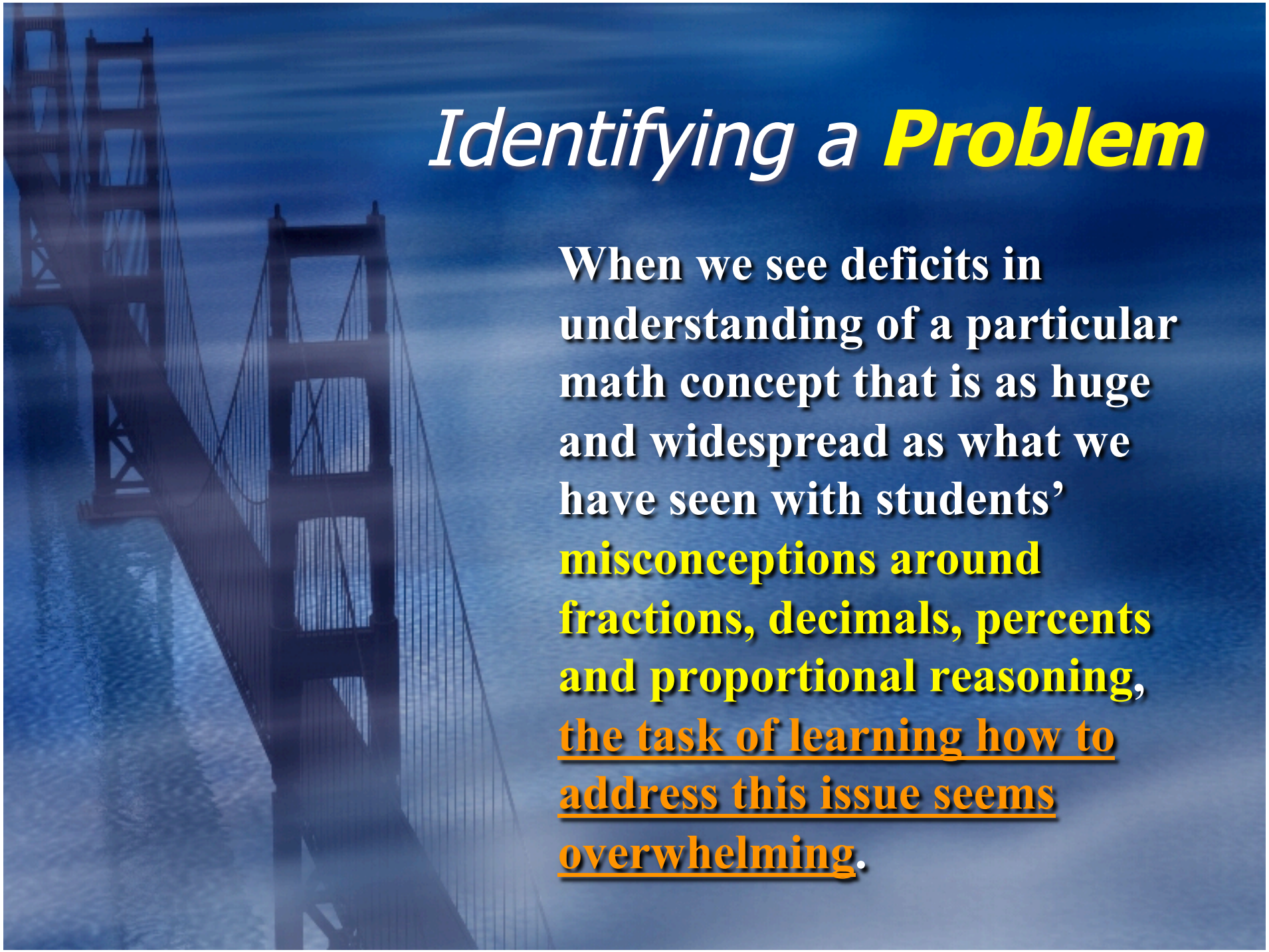
Norms…… The Social Culture of Our Network

SEEK to UNDERSTAND

RESPECTFULLY SPEAK your TRUTH

MONITOR your AIRTIME

NO ONE IS AS SMART AS ALL OF US TOGETHER


Identifying a Problem
When we see deficits in understanding of a particular math concept that is as huge and widespread as what we have seen with students' misconceptions around fractions, decimals, percents and proportional reasoning, the task of learning how to address this issue seems overwhelming.

Moving Toward Solutions

What we are sharing with you today is some of the work we have started and

a plan or model that might be used to address similar problems

in understanding big mathematical ideas uncovered through our use of performance assessments to inform instruction.

How Might We Do This? One Way…..

- Look at the 6th, 7th, and 8th grade assessments to identify the big mathematical ideas with which most students are struggling. Choose the most glaring of the problem areas.
- Analyze the tasks and identify the key concepts students need to understand in order to solve the problem.
- In this problem area/strand, identify the roadblocks within the task(s) where students are having problems.
- Look at student work to identify successful strategies.
- Look at MARS released tasks across the grades to identify how these key concepts build from 2nd through 8th grades.

Moving on.....Work with Colleagues(Coaches/Teachers)

- Use these tasks to design re-engagement prompts through the grades for teachers to use to develop these key concepts.

- Design a strategic plan across the grades to explore and develop key ideas that must be understood in order for students to be successful in 7th and 8th grades. For example, what would instruction look like at each grade level?

The Strategic Plan Should:

- identify grade-appropriate strategies, materials, tasks, investigations and models that would build understanding of the key mathematics of this concept that we expect students to have by 8th grade.

- organize these ideas by grade level(s)

- show the development of these ideas through the grades……. how each connects/supports each other in developing the key ideas

- develop a structure with colleagues to implement this work district wide

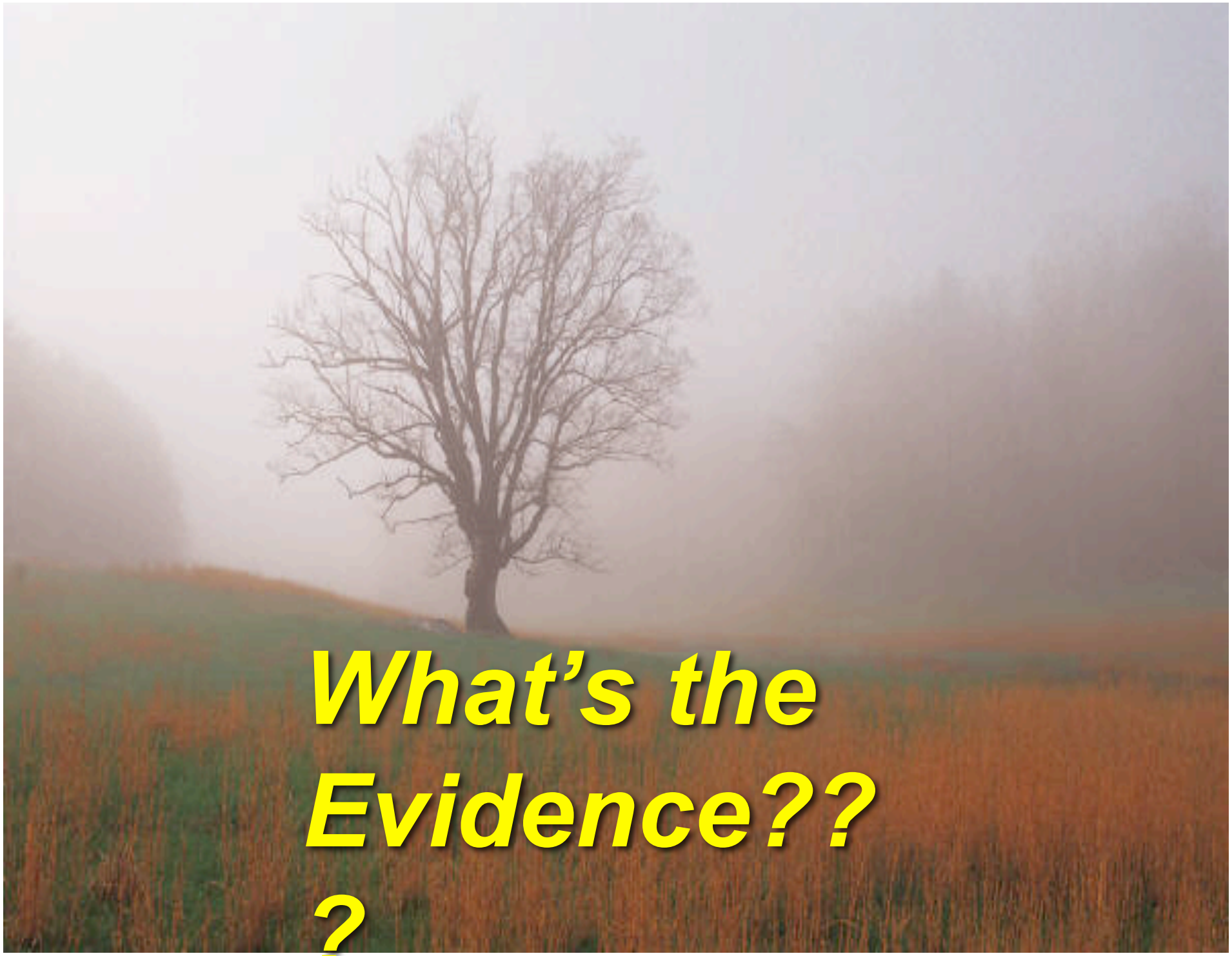
This work can be ……..

- **accomplished by:**
  …..groups of coaches
  …..started by coaches and developed with district teacher leaders and/or teachers

- **shared with** this collaborative of coaches to the benefit of all

Getting Started

- We will model a way to get started today.
- We will start with one GLARING problem....the lack of understanding that has surfaced with tasks involving fractions, decimals, percents, and proportional reasoning.
- We will illustrate the power of incorporating mathematical models to build deeper understanding of key mathematical concepts.


What's the Evidence??
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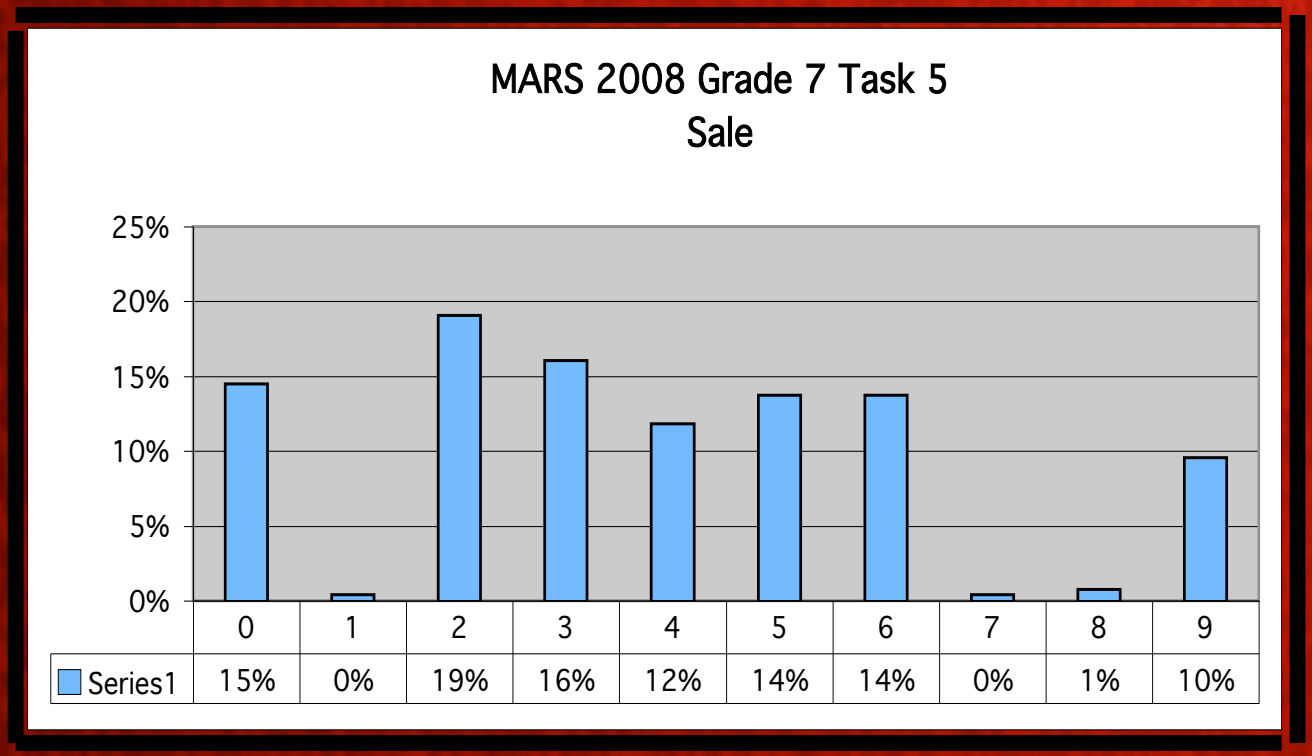
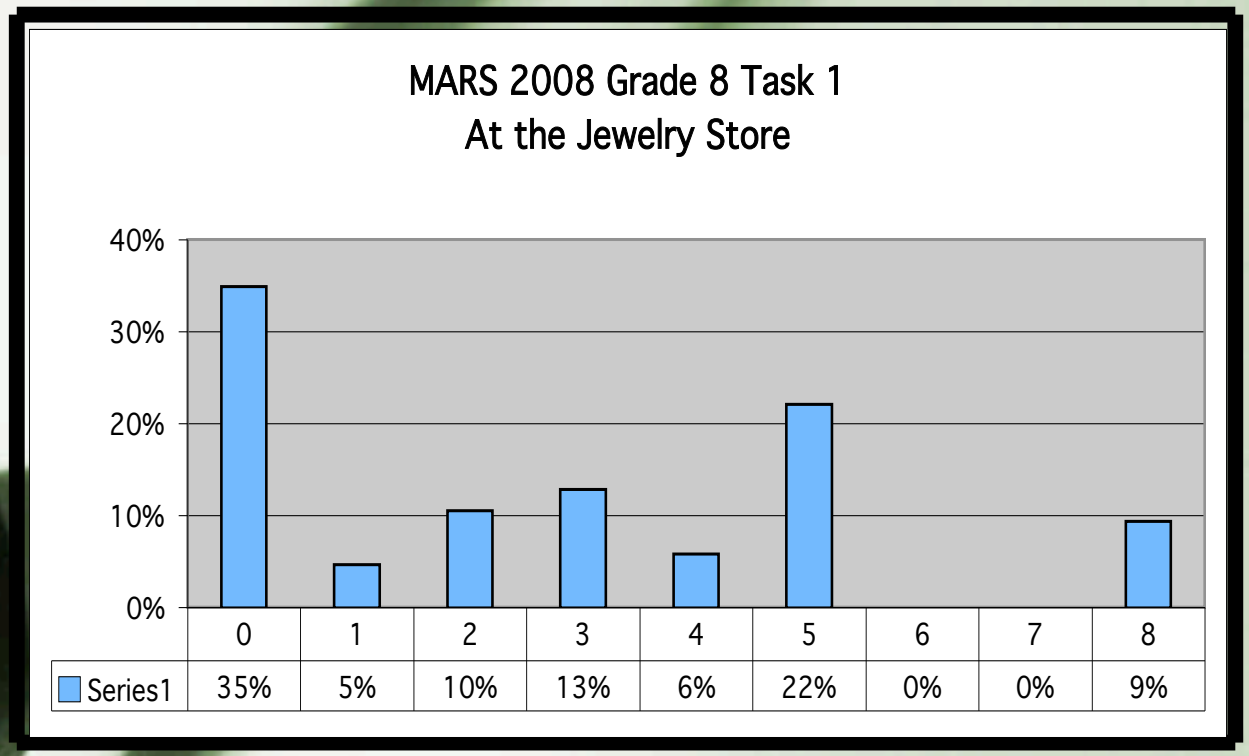
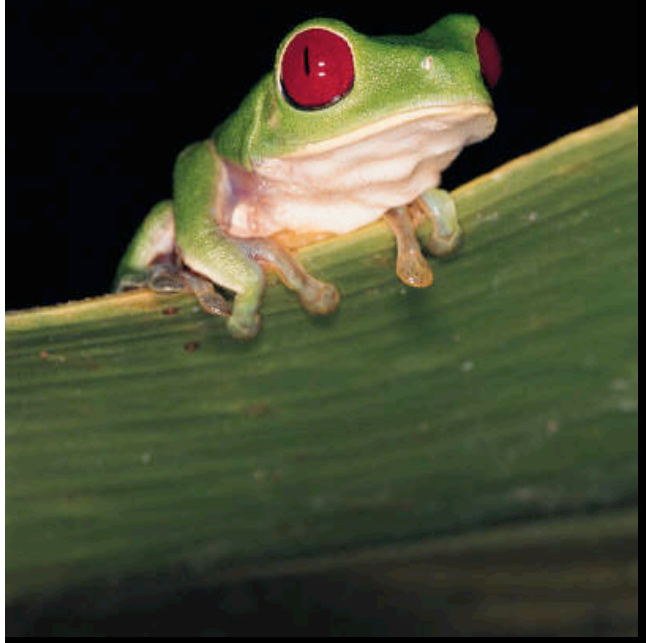
'08 Sale 7th Grade

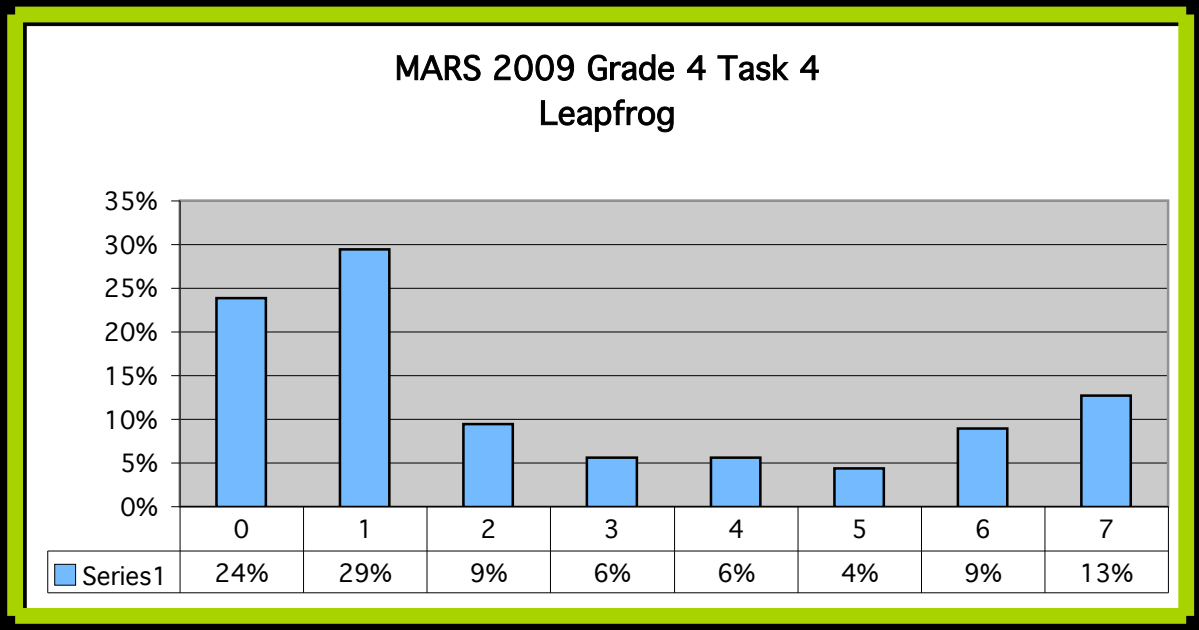


‘08 At the Jewelry Store 8th Grade

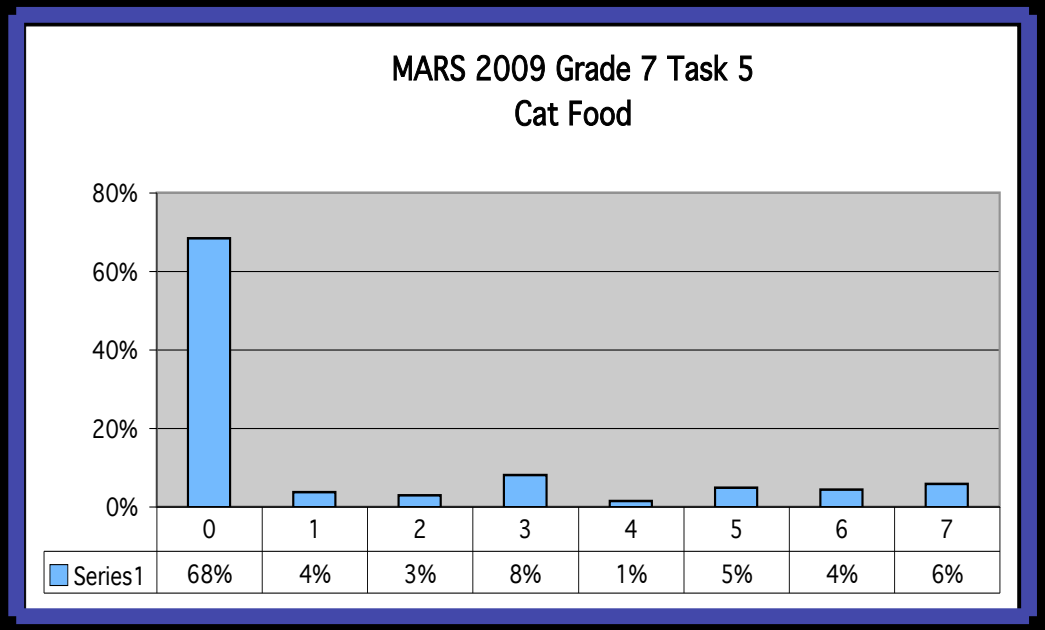


“Leapfrog Fractions” 5th Grade 2009





“Cat Food” 2009 7th Grade



Today: What's going on with…….

Fractions, Decimals, Percents, and Proportional Reasoning???

Step 1: Examine some 2008 tasks in 6th, 7th, and 8th grades related to these concepts.

- **Identify and record the key mathematical understandings.**
- **Look for evidence of successful strategies and roadblocks.**

Share findings whole group.

Step 2: Look at MARS tasks 2nd - 8th (1999 to 2009).

- **Record all mathematical concepts relating to understanding of fractions, decimals, percents and proportional reasoning being assessed across the grades.**
- **Connect these to strands and grade level curriculums.**

Share findings whole group.

Getting Started - First Step

- Look at the 6th, 7th, and 8th grade '08 assessments and identify the big mathematical ideas with which most students are struggling around fractions, decimals, percents , and proportional reasoning.
- Analyze the tasks and identify the key concepts they need to have in order to solve the problem.
- In this problem area/strand, identify the roadblocks within the tasks, where are they having problems.
- Look at student work to identify successful strategies.
- Share out whole group.

Second Step

- **Look at MARS released tasks across the grades to identify how these key concepts look from 2nd through 8th grades.**

- **Share out whole group.**

What *Roadblocks* Interfere With Understanding of Fractions, Decimals, Percents, and Proportional Reasoning?

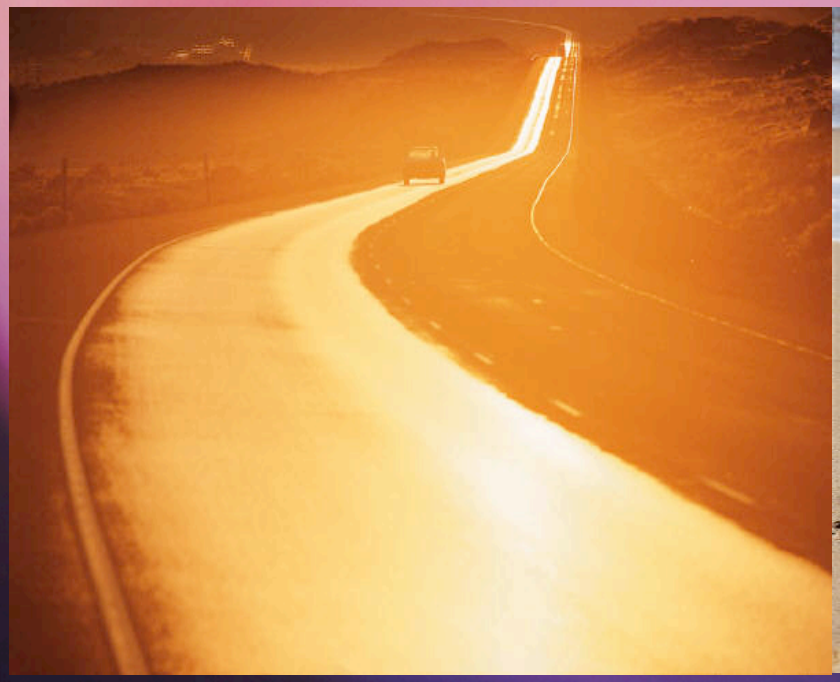
- seeing equal parts of a whole
- keeping track of *the whole*
- understanding relationships between different numerical representations
- not labeling parts and whole

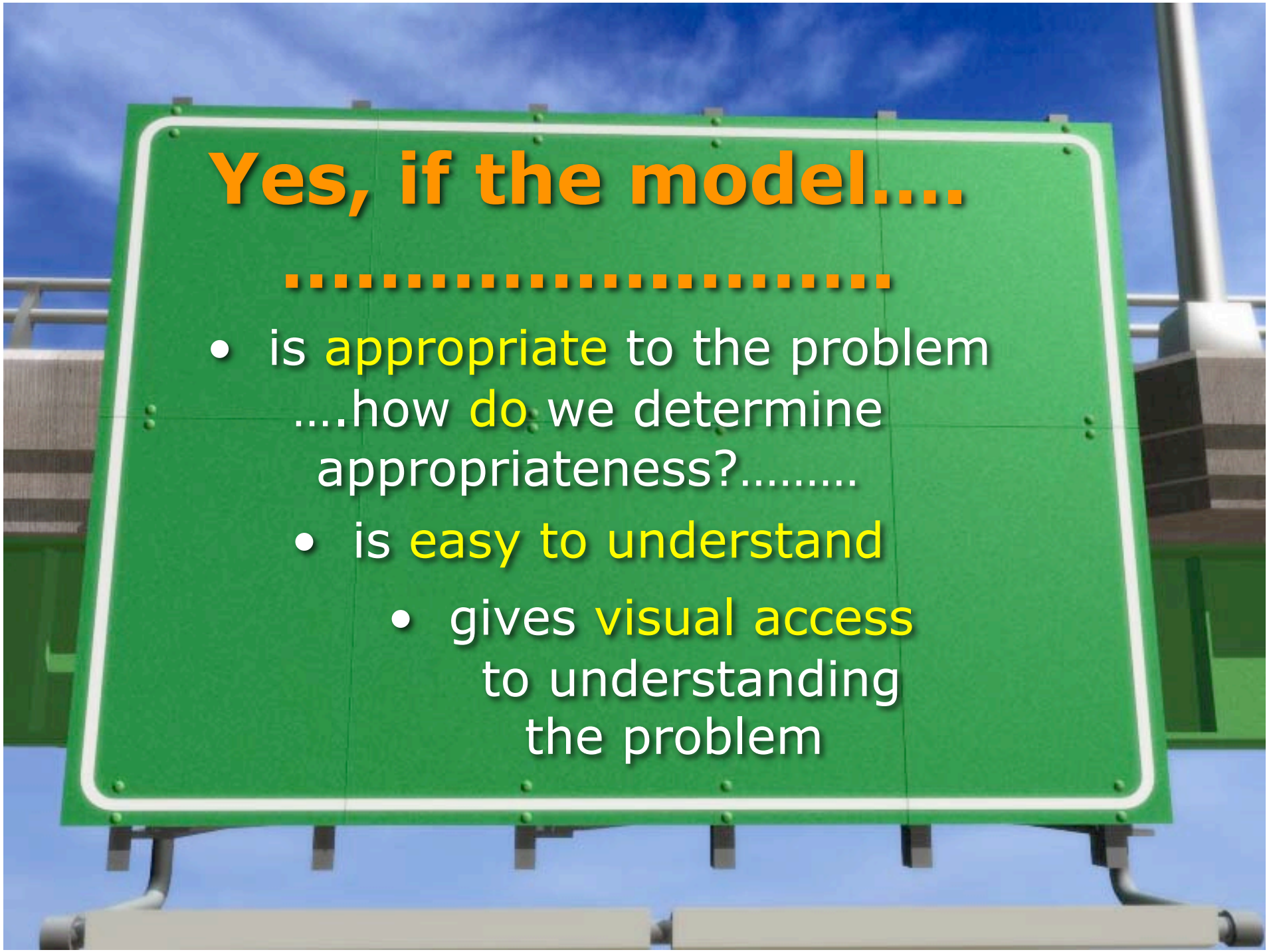
What Can *Help*?

- using models to develop conceptual understanding
- labeling
- other ideas……

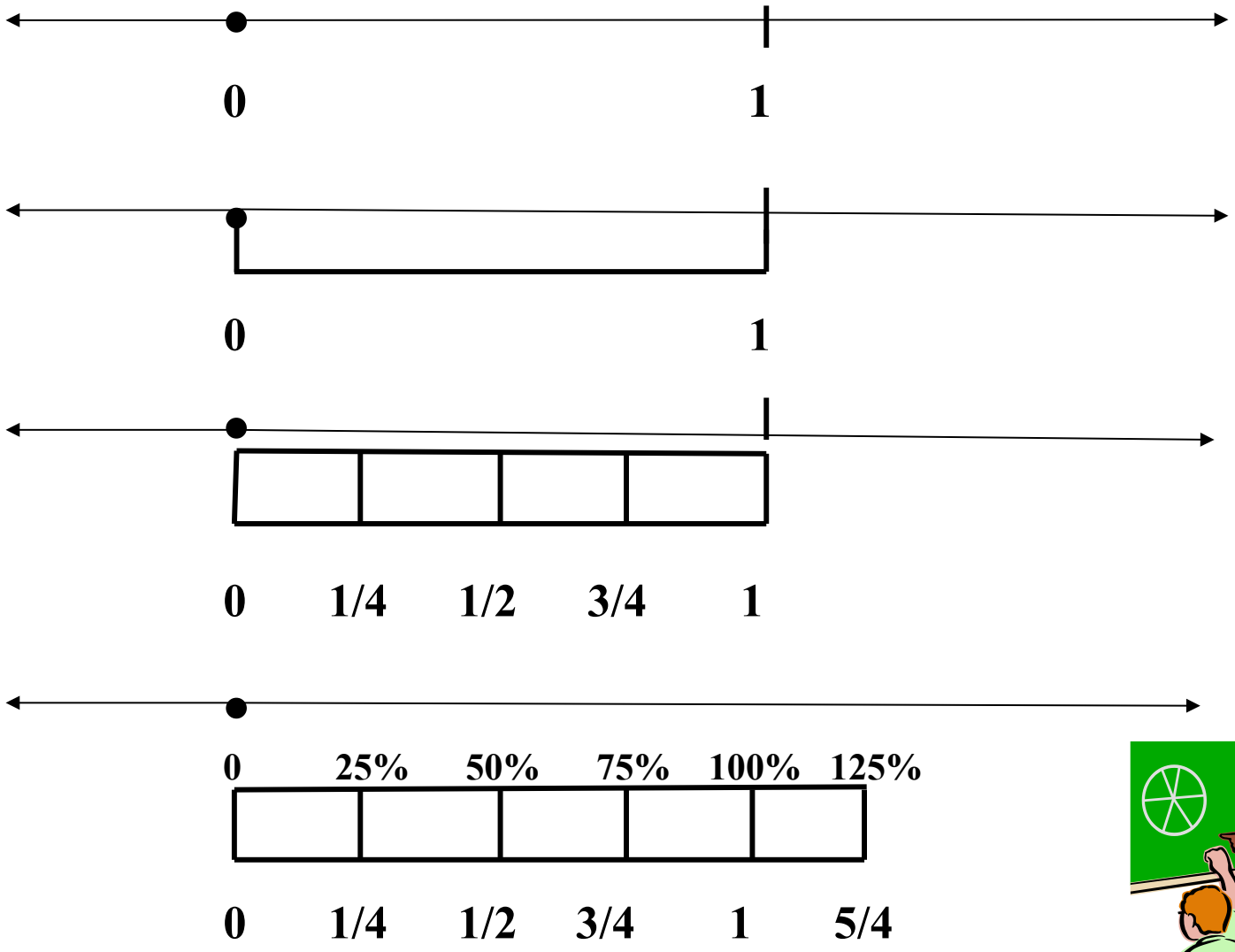
Can Mathematical Models Help?

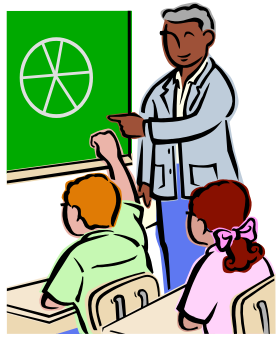
Yes…… Maybe……..

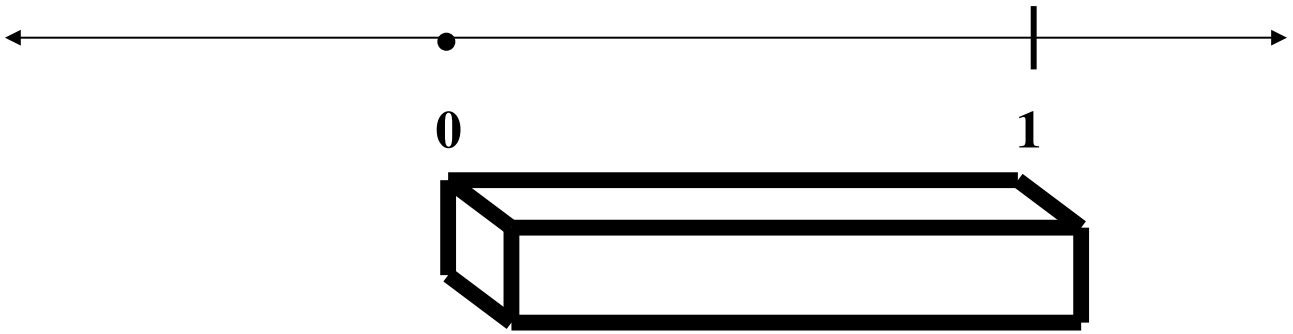



Yes, if the model....
.....
• is appropriate to the problem
....how do we determine appropriateness?.....
• is easy to understand
• gives visual access to understanding the problem

Number Line to Bar Model



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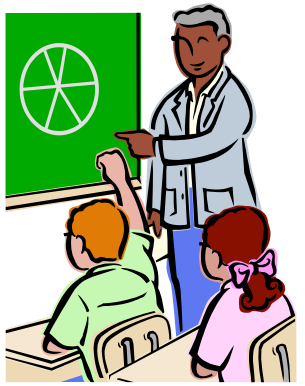

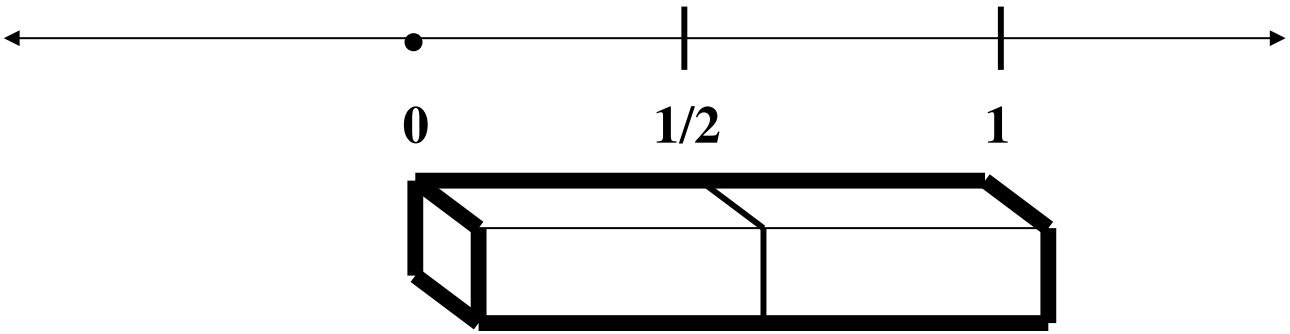
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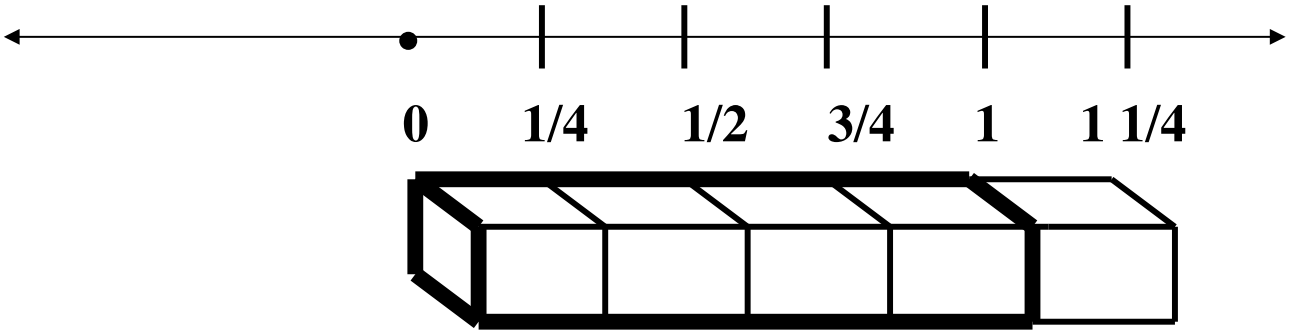
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1 1/4

A note on Access....

A number of researchers have worked to learn more about the relationship between pedagogy and mathematics achievement….
Ladson-Billings (1994-1995) argues that students whose teachers use Culturally Relevant Pedagogy will achieve more academically, will demonstrate cultural competence and will understand and critique the existing social order.

Langlie, Mary
Northeastern University
Boston, Massachusetts
May, 2008

Making Sense of "Cat Food"
2009 7th Grade

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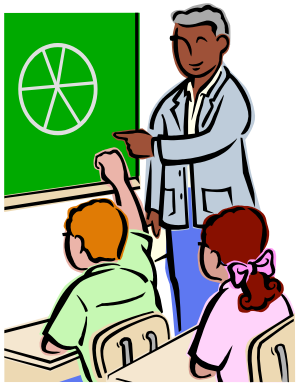
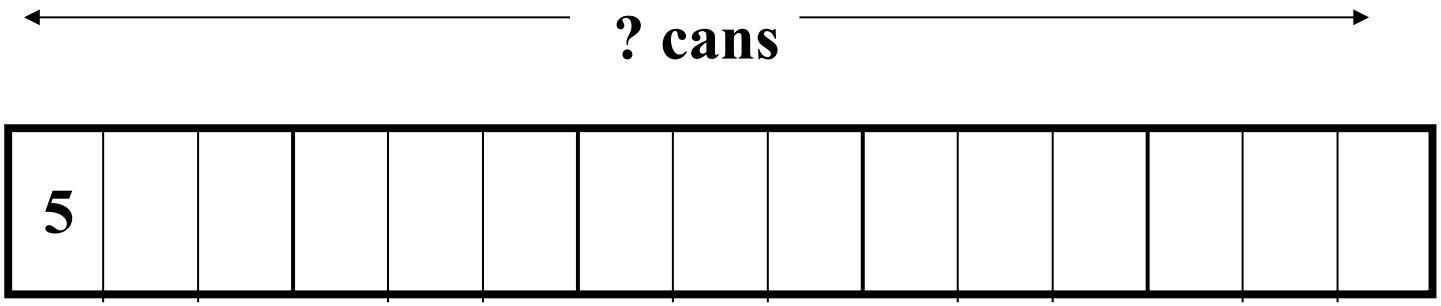
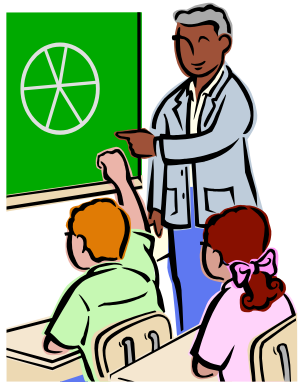
4 ⟵ ? groups of ⟶





5 cans x 15 groups of 4 days = 75 cans

- **The first step is to find the total number of cans of cat food needed for the two cats.**
- **The next step is to find out how many packages of cat food are needed.**
- **The final step is to find the cost.**



75 cans

3	

? groups

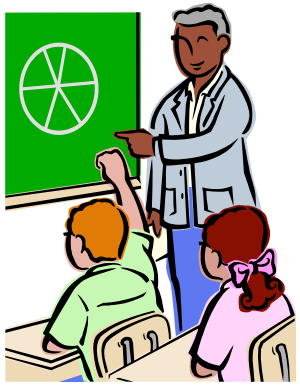
75 cans ÷ 3 cans per package = 25 packages

? $ cost

$ 5	

25 packages

25 packages x $ 5 = $ 125



OR $\frac{}{}$ **75**

75 cans ÷ 3 cans = 25 packages packages

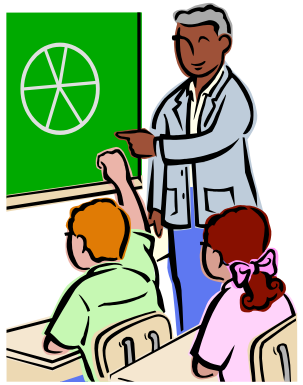
25 packages x $ 5 = $125

OR

$$\frac{5}{4} \times 60 \text{ days} = \frac{300}{4} = 75 \text{ cans}$$

75 cans ÷ 3 cans = 25 packages

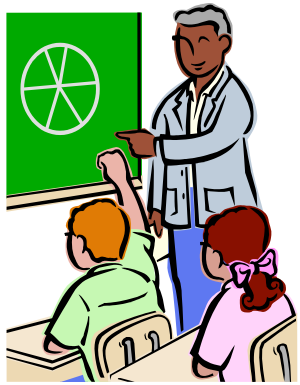
25 packages x $ 5 = $125



Two other ways you can set up the relationship between number of cans and number of days are:

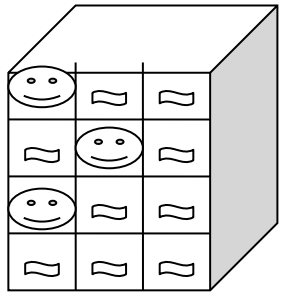
$$\frac{4 \text{ days}}{5 \text{ cans}} \times 15 = \frac{60 \text{ days}}{\boxed{75} \text{ cans}}$$

$$\frac{4 \text{ days}}{60 \text{ days}} = \frac{5 \text{ cans}}{\boxed{75 \text{ cans}}} \qquad \frac{4 \div 4}{60 \div 4} = \frac{1}{15} \qquad \frac{1 \times 5}{15 \times 5} = \frac{5}{\boxed{75}}$$

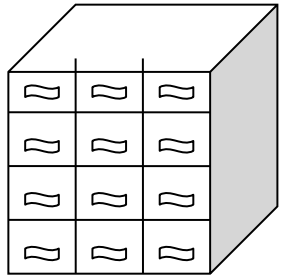


"Filing Cabinets" 2009
5th Grade

This filing cabinet takes up too much space, so the school clerical assistant is putting the data onto a computer.
As she completes each drawer she puts a smiley sticker onto the drawer

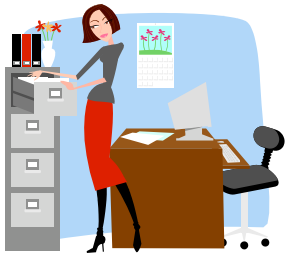


1. **What fraction of the cabinet has she completed? Write this as a decimal.**

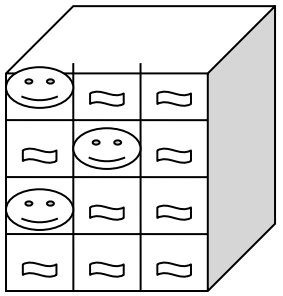


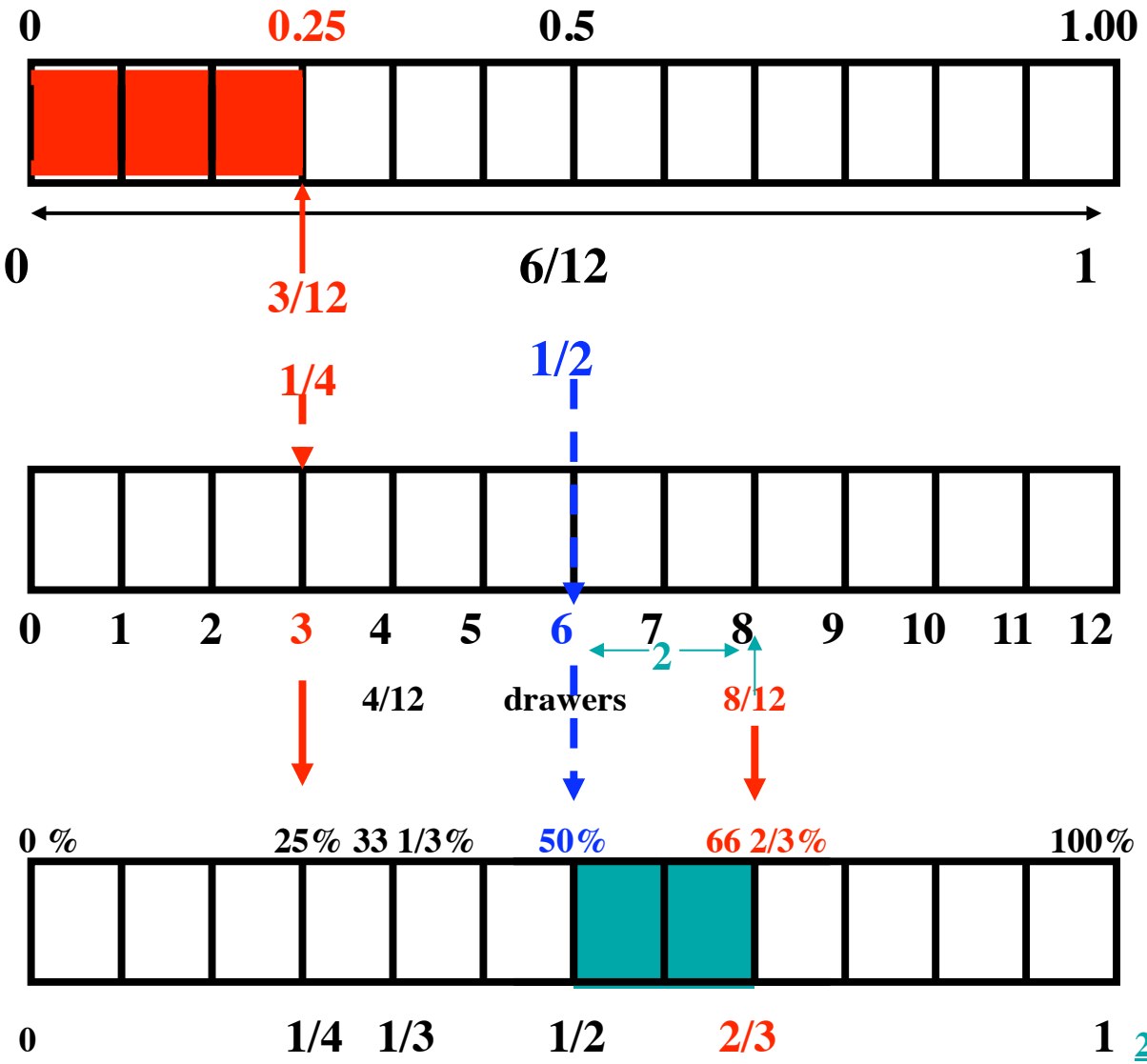
2. **Draw a smiley face on the drawers to show what the cabinet might look like when she has completed half of the records. Write this as a percent.**

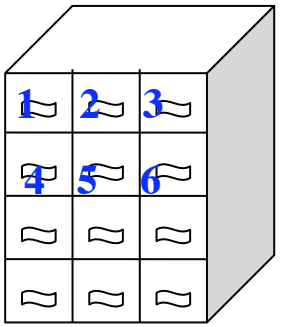
3. **How many more drawers will she need to complete before she has done 2/3 of the work? _____ drawers**

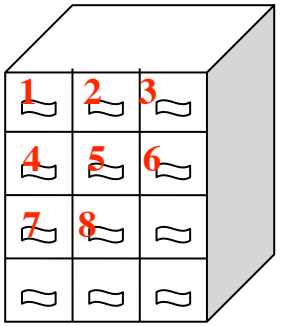


Double Number Line







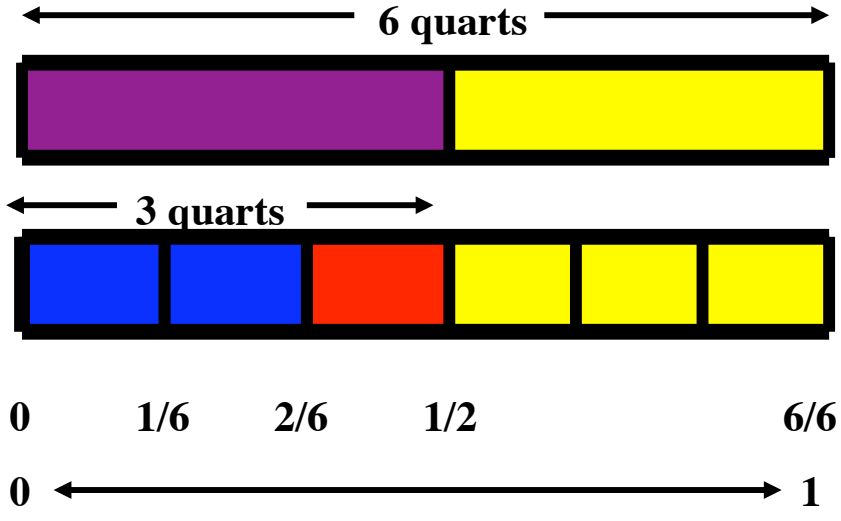


2/12 = 2 drawers more

‘03 Mixing Paints 7th Grade

Wayne is mixing paint. He makes 6 quarts of brown paint by mixing equal quantities of yellow and violet paint. The violet paint is made from one-third red paint and two-thirds blue paint.

1. **How much red paint does he use?**
3. **How much blue paint does he use?**
4. **What percentage of the brown paint is made from blue paint?**



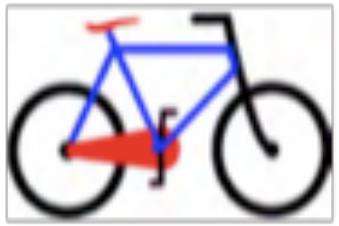
2/6 = 1/3 = 33 1/3 %

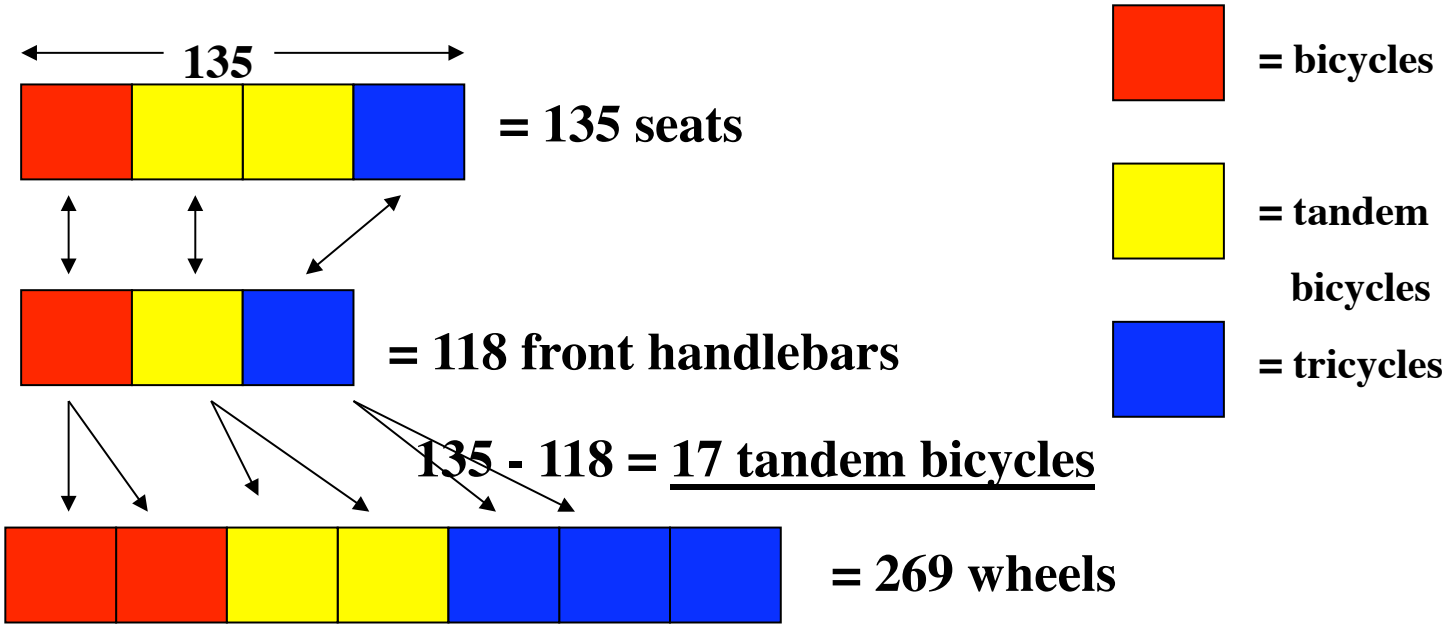
“The Wheel Shop” - POM

Level C……..

Three months later some vehicles have sold and new models have been brought into the Wheel Shop. Now, there are a different number of bicycles, tandem bicycles, and tricycles in the shop. There are a total of 135 seats, 118 front handlebars (that steer the bike), and 269 wheels.

How many bicycles, tandem bicycles and tricycles are there in the Wheel Shop?





135 - 118 = <u>17 tandem bicycles</u>

2 x 118 = 236

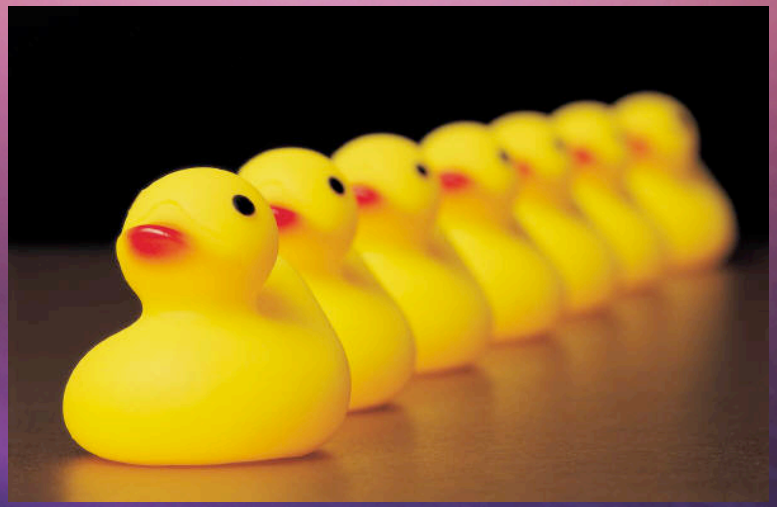
269 - 236 = <u>33 tricycles</u>

bicycles + 17 + 33 = 118

118 - 50 = <u>68 bicycles</u>

What Can Be Done For Professional Development?

Ideas by Sally…….



A Work in Progress.....

Re-engagement on Fractions, Decimals, Percents, and Proportional Reasoning

- San Carlos Work
- Share the Project

- Re- engagement
- Investigation

"The Tile Shoppe"

"The Tile Shoppe"

This Investigation grew out of our look across the grades at the 2009 MARS exams.

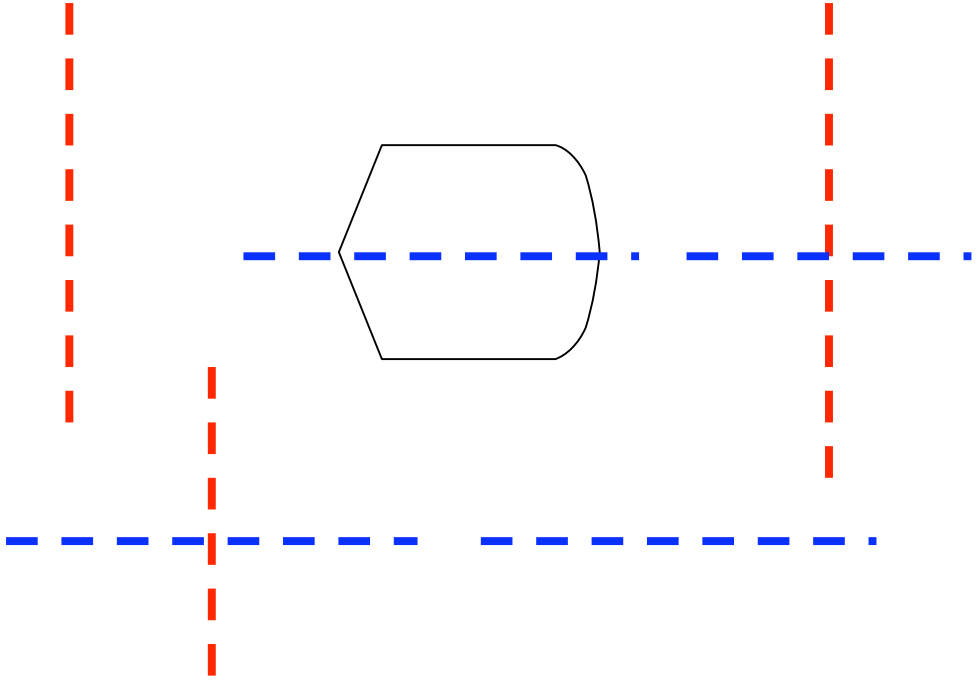
To be successful in making sense of fractions or **equal parts of a whole** in different tasks at many grades, students had to do things such as:

- divide shapes in half with a line
- know a diagonal line would divide a rectangle into equal parts……
- use models to represent the whole and equal parts ……

“Aunt Em’s Cookies” 2009 2nd Grade

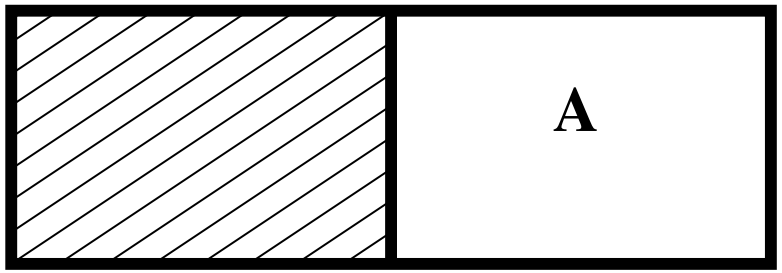
Auntie Em is making interesting cookies for Holly and David. She wants to cut the cookies so each child gets half a cookie.

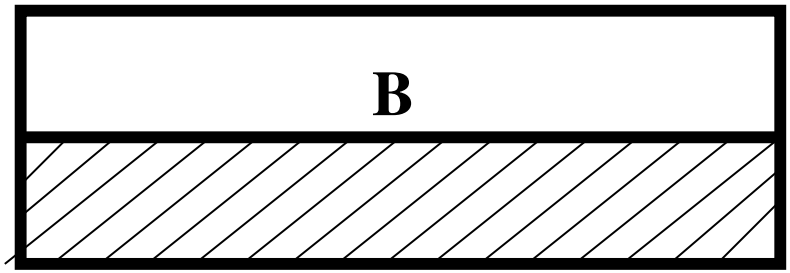
1. **Use a dotted line to show Auntie Em how to cut each cookie below.**



“Fair Play” 2009 4th Grade

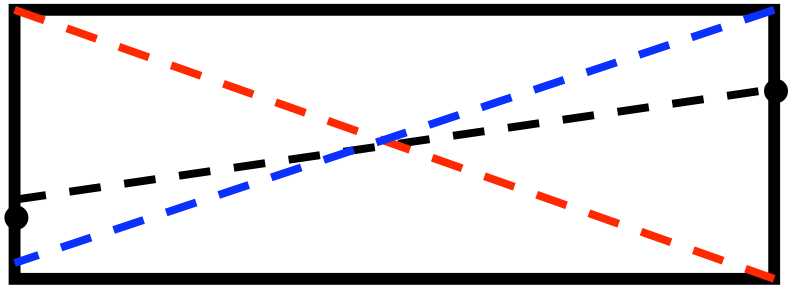
3. The girls say that the boys take up too much space with their ball games. They want the area to be split into two equal parts. Here are two possible ways of dividing the area.





.....

4. Draẅ a straight line that divides the play area into two equal parts in a **different** way.



“Leapfrog Fractions” 2009 4th Grade

These leaping frogs are playing a fraction game.

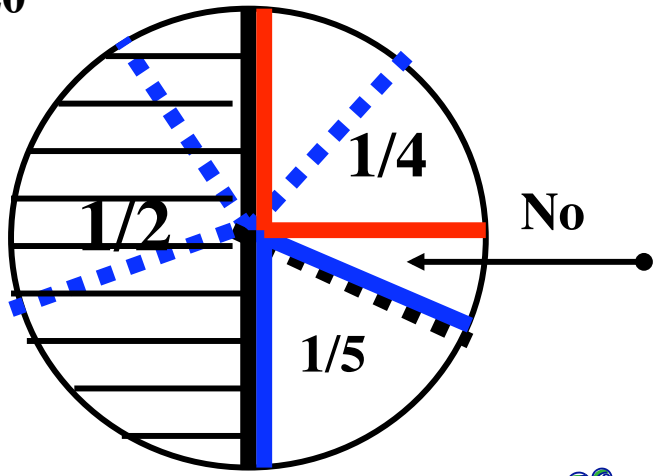
They leap from lily pad to lily pad adding up the fractions as they go.

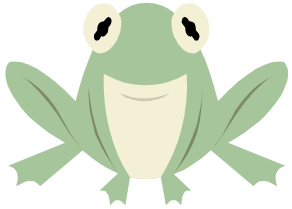
They have just three lily pads each.

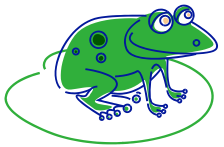
When they have counted up to one whole, and no more, they can reach the island in the center of the lake.

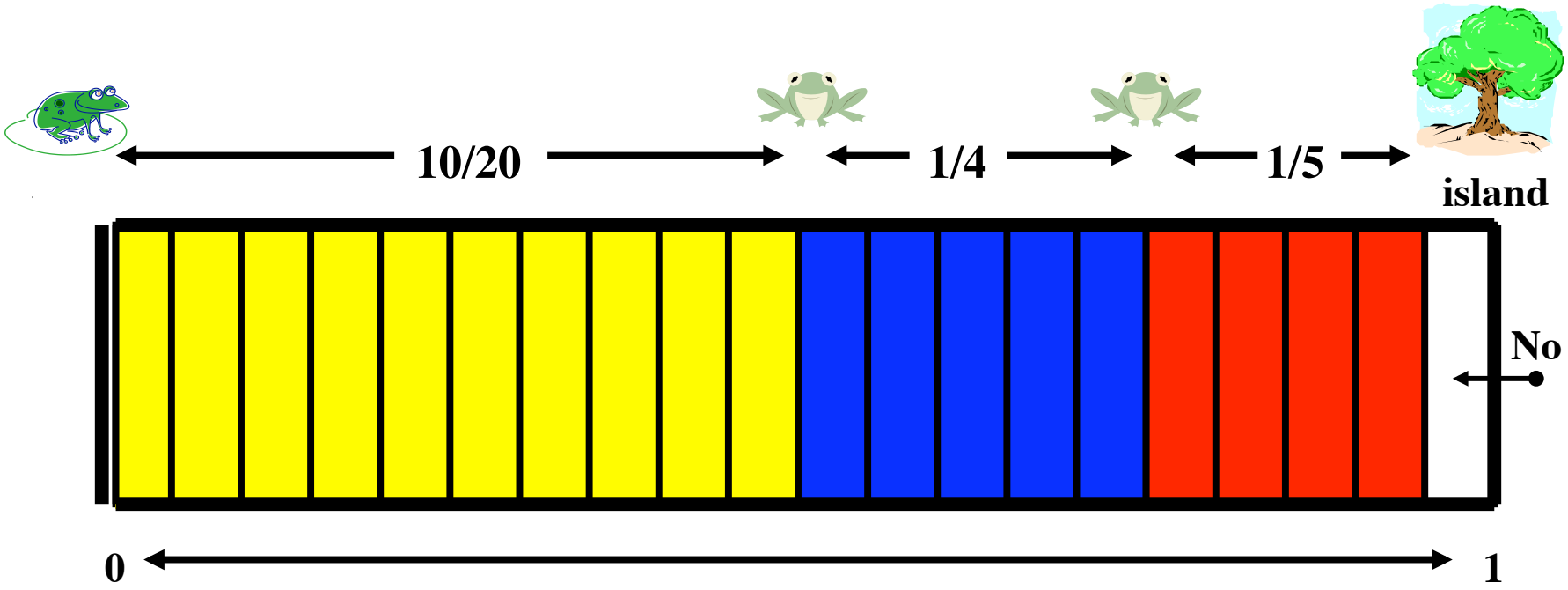
Frog Number 6 wants to join his friends on the island.
His three lily pads are: 1/4 + 1/5 + 10/20

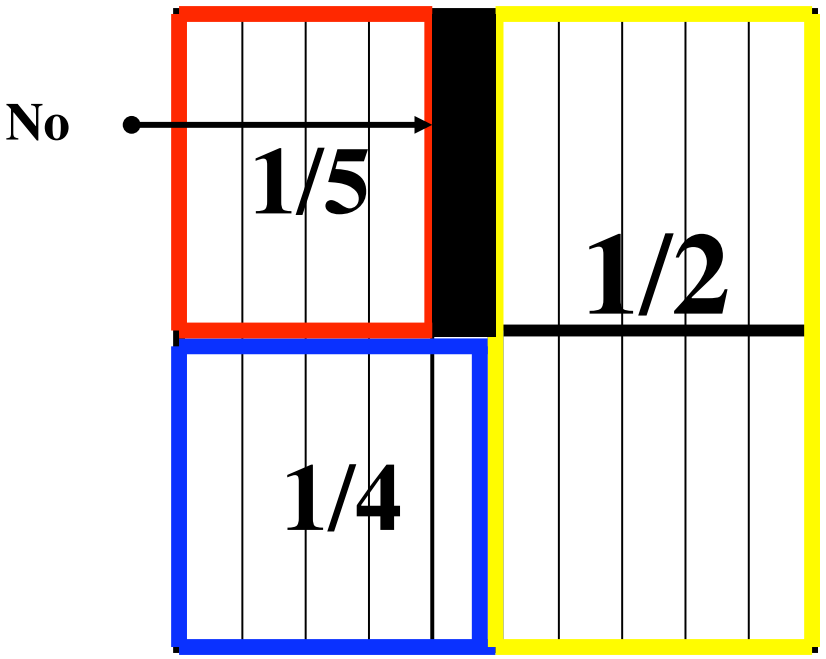
Can he make it?











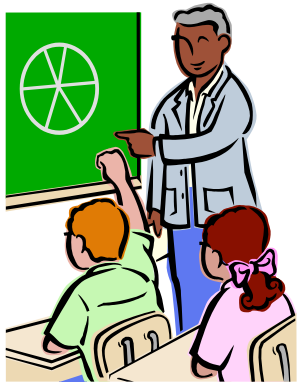
1/5 = 4/20

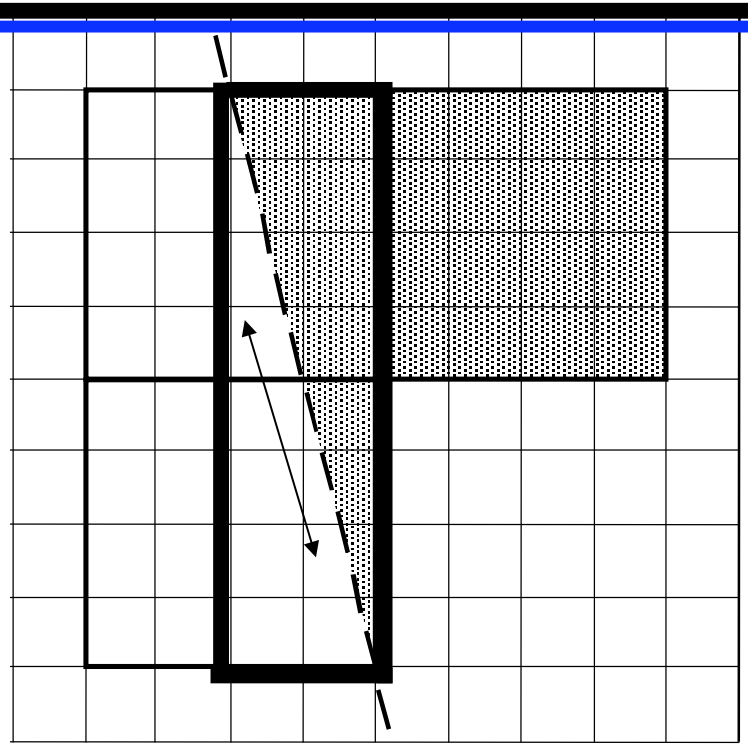
1/4 = 5/20

1/2 = 10/20

= 19/20

“Halves” 2009 Grade 5

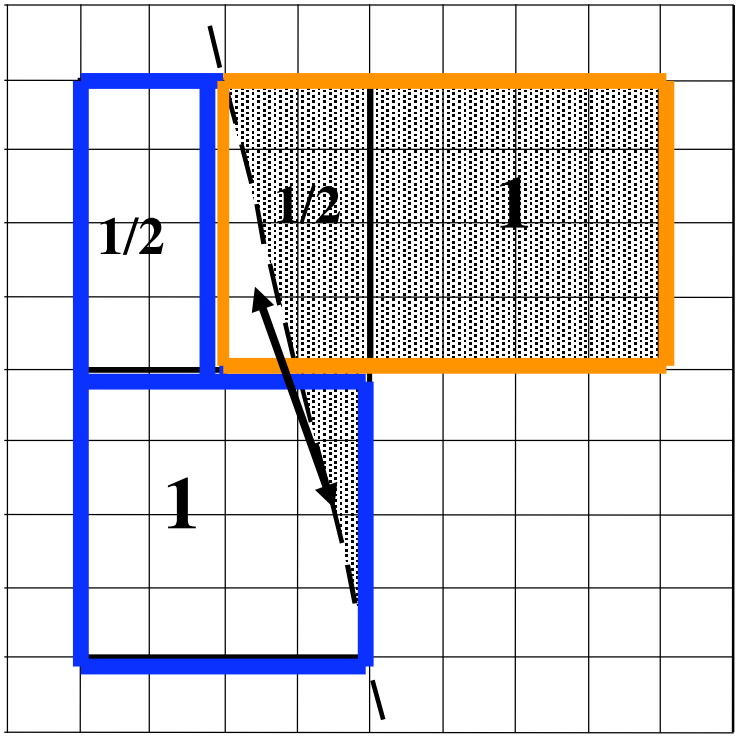


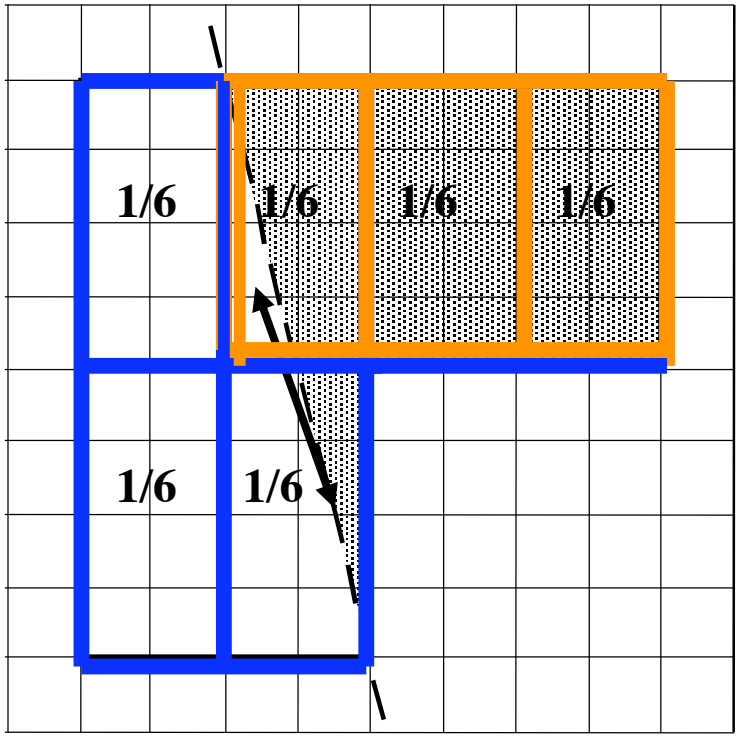


Here is a shape made from three big squares.

1. A straight line cuts the shape. Explain why the area shaded is equal to the area that is not shaded.

These are examples of how understanding that a diagonal divides a rectangle in half gives access to making sense of a half of this area……





1 1/2 is blue and 1 1/2 is orange

3/6 are blue and 3/6 are orange


The Tile Shoppe

THE TILE SHOPPE

"You are the owner of a specialty shop that designs unique tile tops for tables. A customer has ordered a table top with specific requirements for the design. The ***border*** must be made of tiles that have a ***design in black and white***, and the ***center*** section must be made of tiles that have a ***design with three or more different colors***.

Because the tile colors have different costs, you need to be able to tell the customer the exact *percent* of *each color* in the *border tile design* and the *fraction* of each color in the *center tile design*. The customer provided you with a template that shows the overall tabletop layout with the number of tiles that will be needed in both the border and the center of the table design.

Your job is to create a number of different designs to show the customer so he can decide which one he will order.

The Key to Success on this Investigation is……

- the knowledge that a diagonal line divides a square or rectangle into two equal pieces
- seeing the border as a whole and the center as a whole
- ability to represent parts of a whole as fractions and percents

Challenge Task:

Each square on the design plan represents one 8” by 8” tile. Find the total cost of the table top design in Tasks 1, 2, and your own design in Task 3 if the cost per 8” by 8” tile for the colors is as follows:

Black	= $5.00
White, Yellow	= $1.25
Red, Orange, Pink	= $3.75
Blue, Green	= $2.50

If you used additional colors for your own design in Task 3, list those colors below and decide on a price for each of these colors.

Next……..

- **Individual Quiet Time for Quick Write to record ideas of tasks, models, investigations, lessons, materials etc. that could be used to deepen student understanding and address misconceptions around fractions, decimals, percents and proportional reasoning.**
- **Pair Share**
- **Group of Four Share**
- **As you share, make a list of your group's ideas; we will collect and copy to give to everyone at a network meeting.**
- **Group Round Robin Protocol**

Next Steps .....

Work with Colleagues .....

- Use these tasks to design re-engagement prompts through the grades to develop key concepts.

- Design a strategic plan to address the key ideas that must be understood at each grade level in order for students to be successful at 7th and 8th grades. That is, what might this instruction look like at each grade level?

The Strategic Plan Should:

- identify grade-appropriate strategies, materials, tasks, investigations and models that would build understanding of the key mathematics of this concept that we expect students to have by 8th grade.

- organize these ideas by grade level(s)

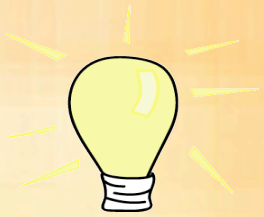
- show the development of these ideas through the grades……. how each connects/supports each other in developing the key ideas

- develop a structure with colleagues to implement this work district wide

Afterwards……

- **Continue thinking about things to add to the list; brainstorm with your own teachers.**

- **Bring back ideas, examples of best practices (instructional ideas, materials, models, investigations etc.), strategic plans and re-engagement prompts to a future network meeting next school year so we can put the work together in a format that might be useful to coaches.**



What's the Gain?

IF….we can help our **TEACHERS** to:

- ***identify*** **key concepts** **from multiple strands that are connected to the understanding of fractions, decimals, and percents**
- ***identify*** the **grade levels** **where these are developed**
- ***broaden*** **instruction** **so students can** **make connections** **about the mathematical relationships between and among fractions, decimals and percents…**

What's the Gain?

THEN… we will have taken steps toward changing instructional practice in mathematics from "a mile wide and an inch deep" to teaching based on making connections and seeing relationships between big ideas in mathematics

Working Together We Can Make a Difference

"Put one Foot in Front of the Other"

…. slowly, carefully, strategically…