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**Please respond to the  
pre-assessment prompts  
located at the entrance.**



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# Inquiry Strategies to Support Mathematical Instruction in the PYP



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**Starting with a little  
humor.**





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## **LEARNING GOALS**

How inquiry can be used to support the Common Core State Standards.

How inquiry can support math as part of a trans-disciplinary Primary Years Programme

# STRATEGIES

- How do inquiry strategies support the Common Core and a trans-disciplinary approach to teaching math?

# *Knowledge* *VS.* *Understanding*

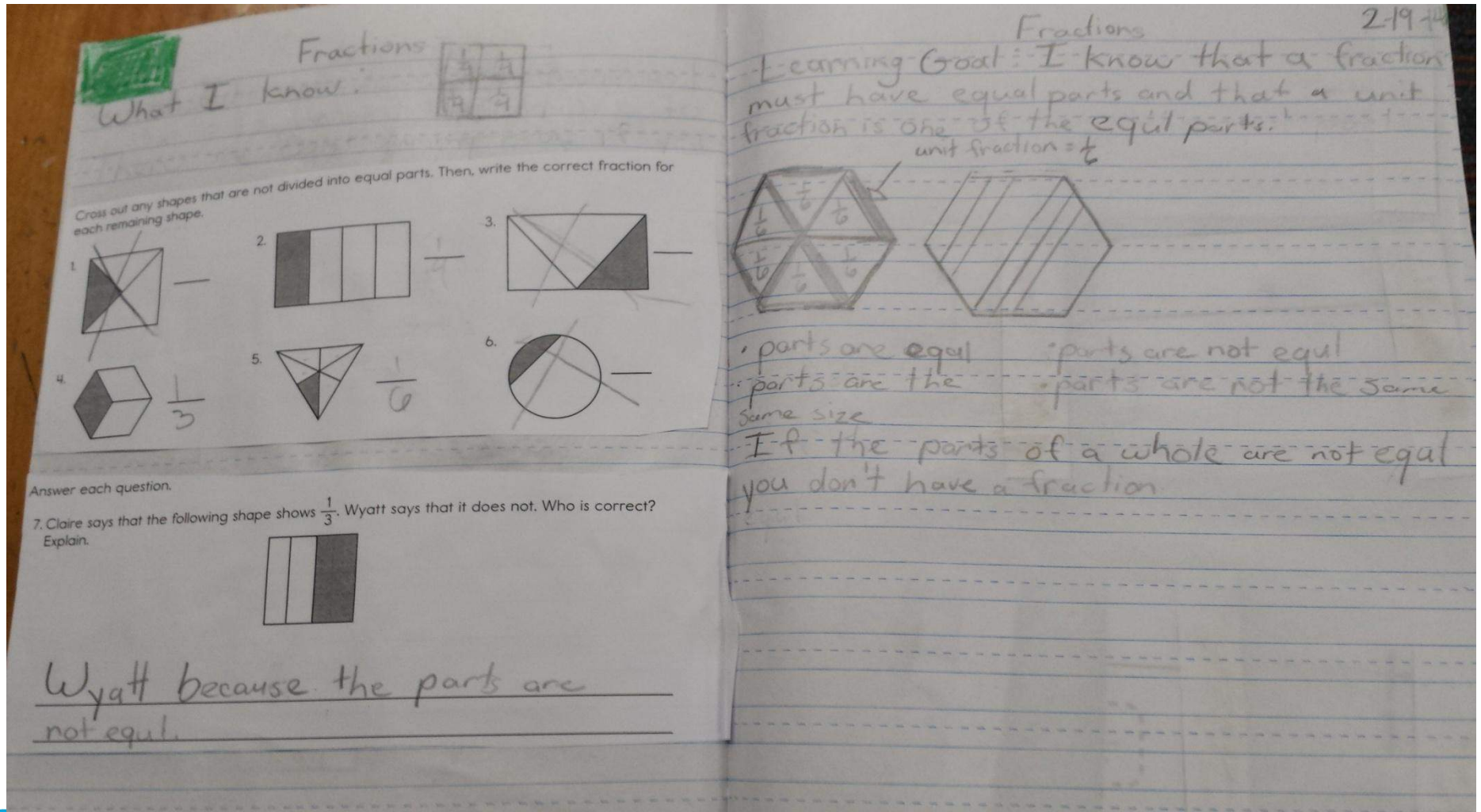


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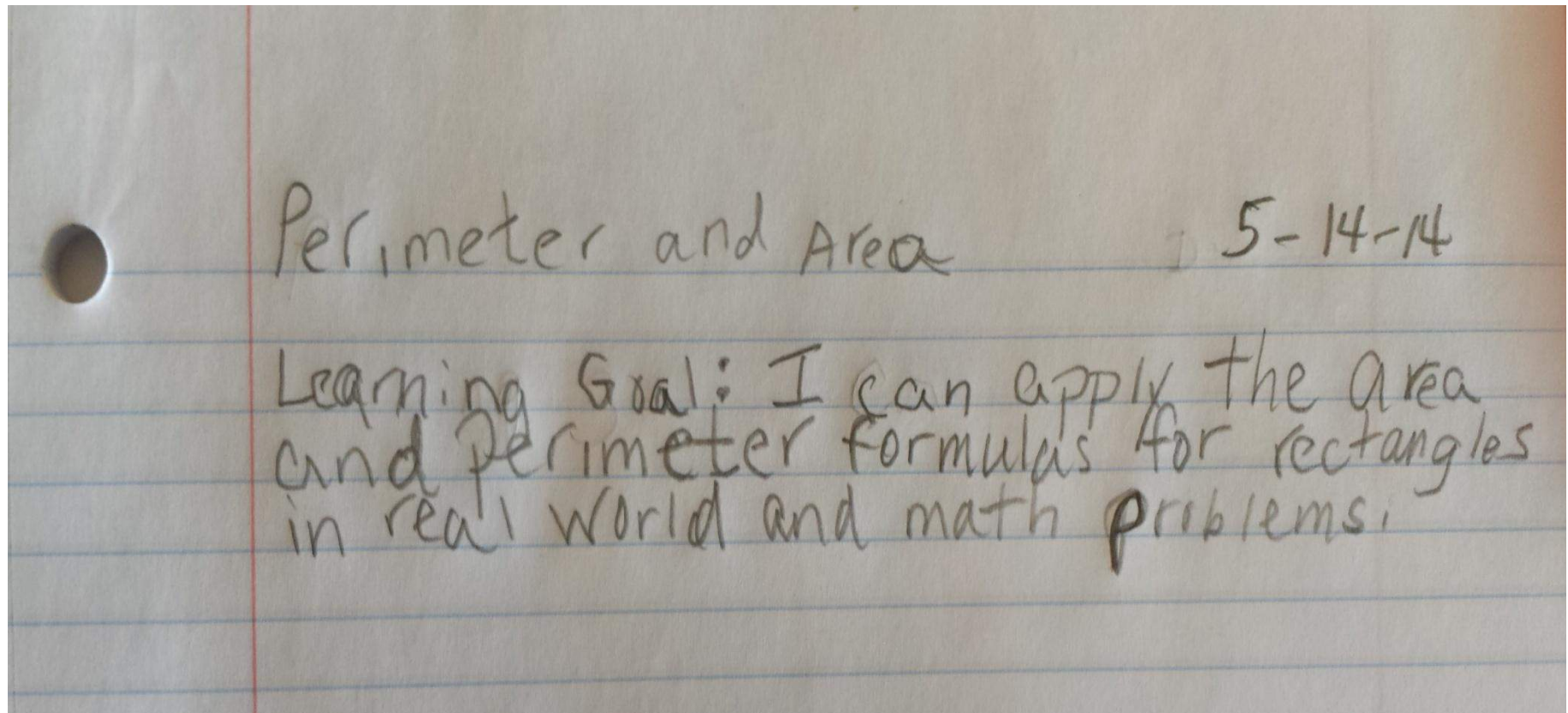
# STRATEGIES:

- Inquiry Journals
- Visible Thinking Routines
- Project Based Learning
- Argument Writing
- Key Concepts

# INQUIRY JOURNALS

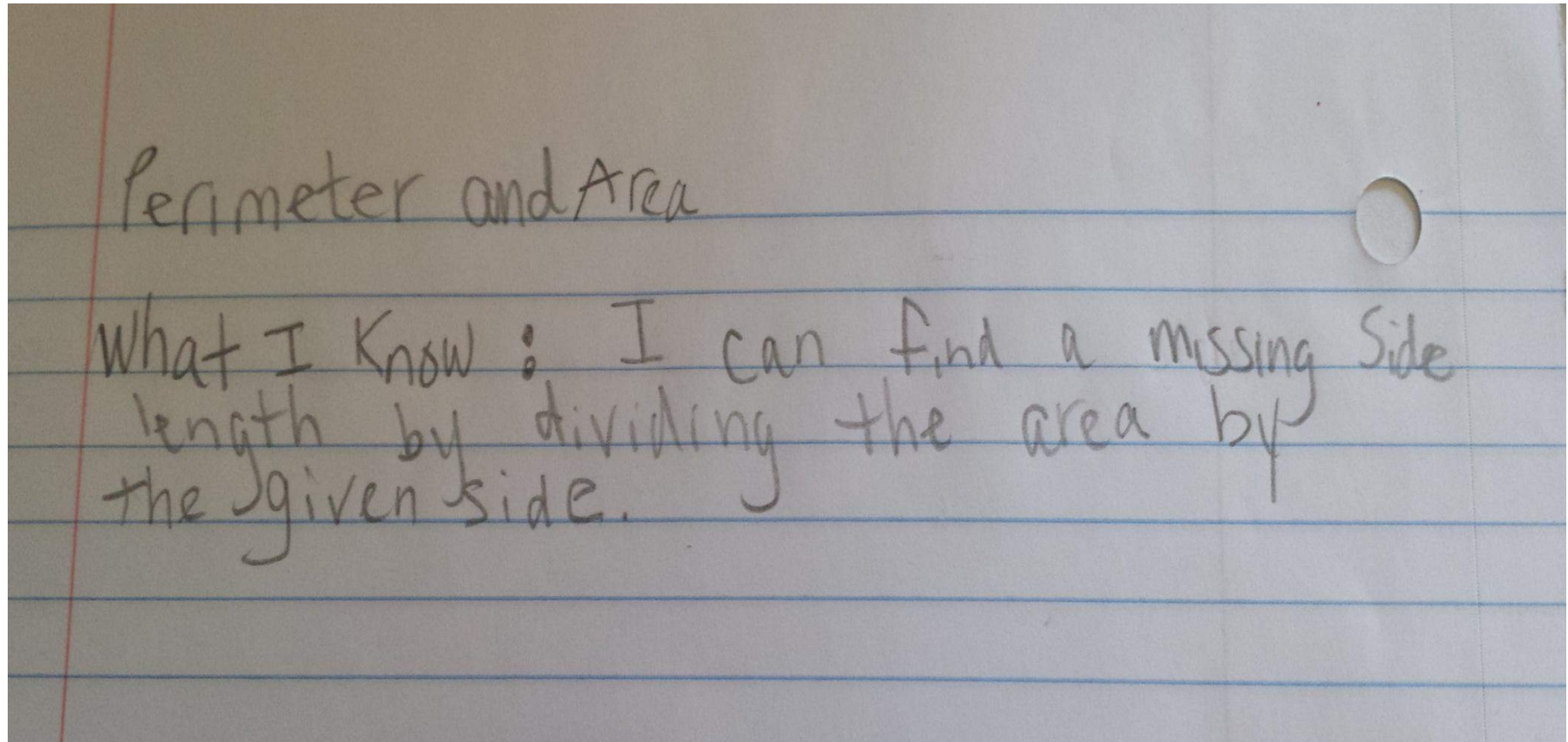


# INQUIRY JOURNALS





# INQUIRY JOURNALS

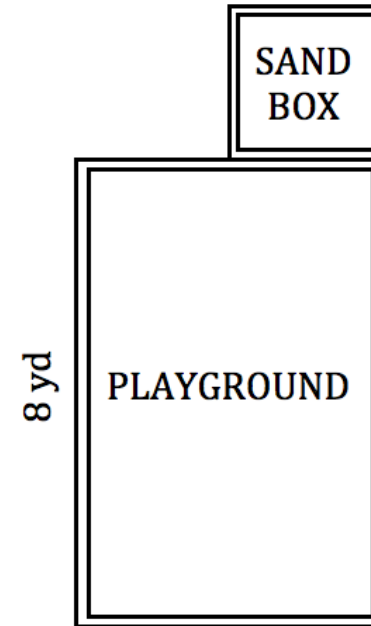


# INQUIRY JOURNALS

The park in Alyssa's neighborhood had new equipment and play areas added. The picture to the right shows part of the new park.

The new playground space has a length of 8 yards and an area of 48 square yards. Attached to the playground is a square sandbox. The width of the sandbox is half the width of the playground.

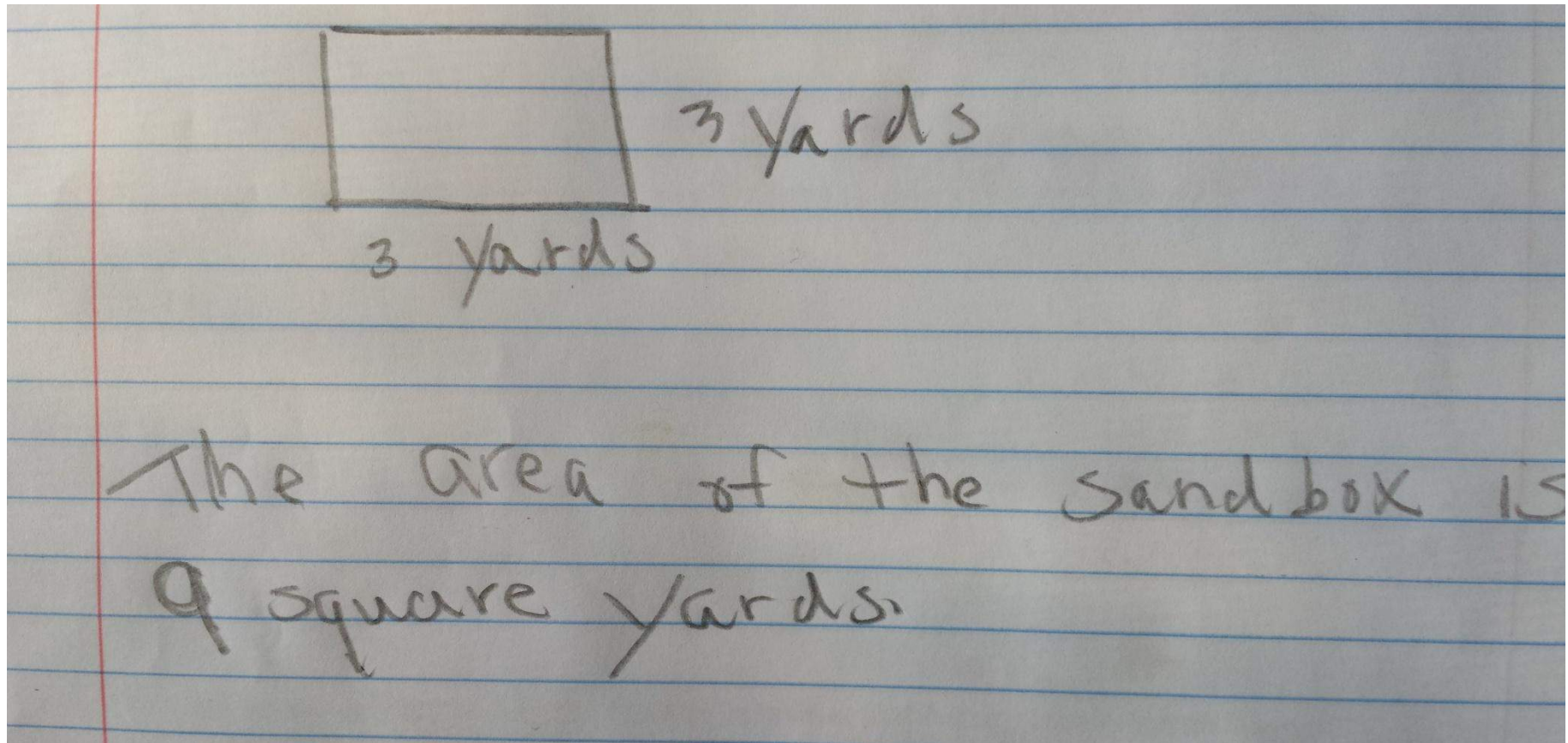
Alyssa was wondering about the area of the sandbox. Show the steps that Alyssa could follow to find the area of the sandbox



# INQUIRY JOURNALS

1. Area = 48 square yards
2. length = 8 yards  
width = ?
3. Area =  $L \times W$
4.  $48 = 8 \times W$   
 $W = 6$  yards
5. Width of sandbox is half of width of playground
6. To find half of something you divide by 2.
7.  $6 \div 2 = 3$
8. Sandbox is square  
In a square all sides are equal

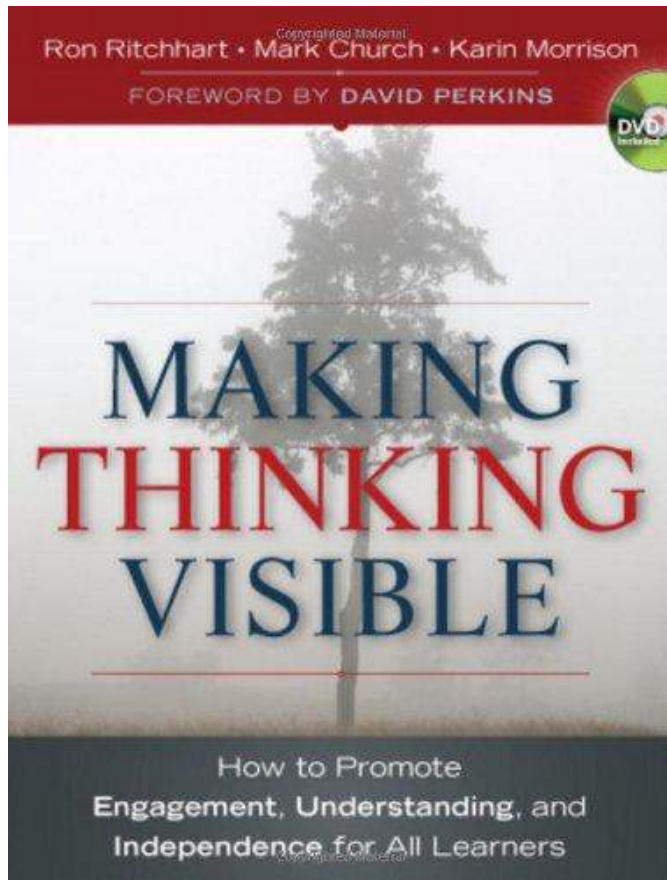
# INQUIRY JOURNALS



# INQUIRY JOURNALS

**An *Inquiry Journal* supports inquiry in math because it forces students to show their thinking, prior knowledge and what they have learned.**

# VISIBLE THINKING ROUTINES



**See, Think, Wonder**

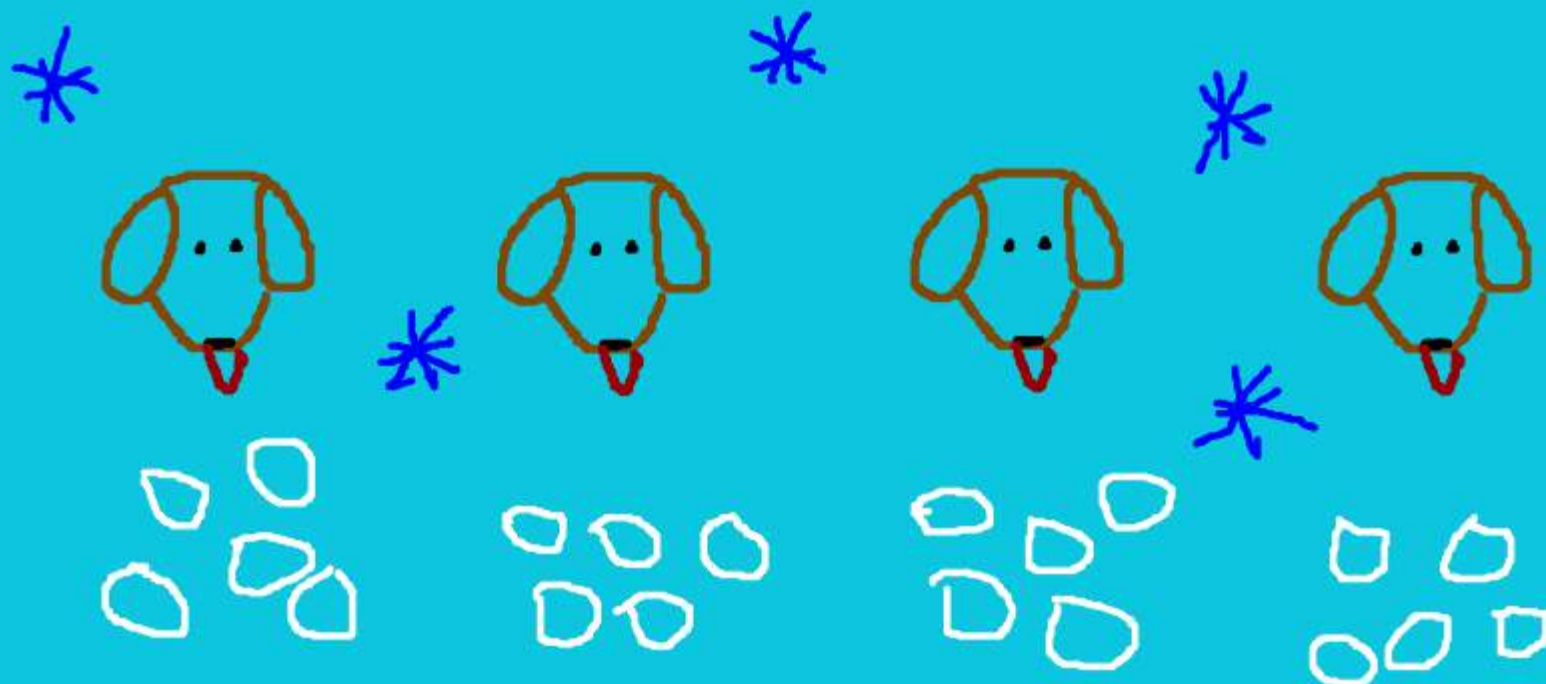
**Claim, support, question**

**Chalk Talk**

**Generate, Sort, Connect, Elaborate**

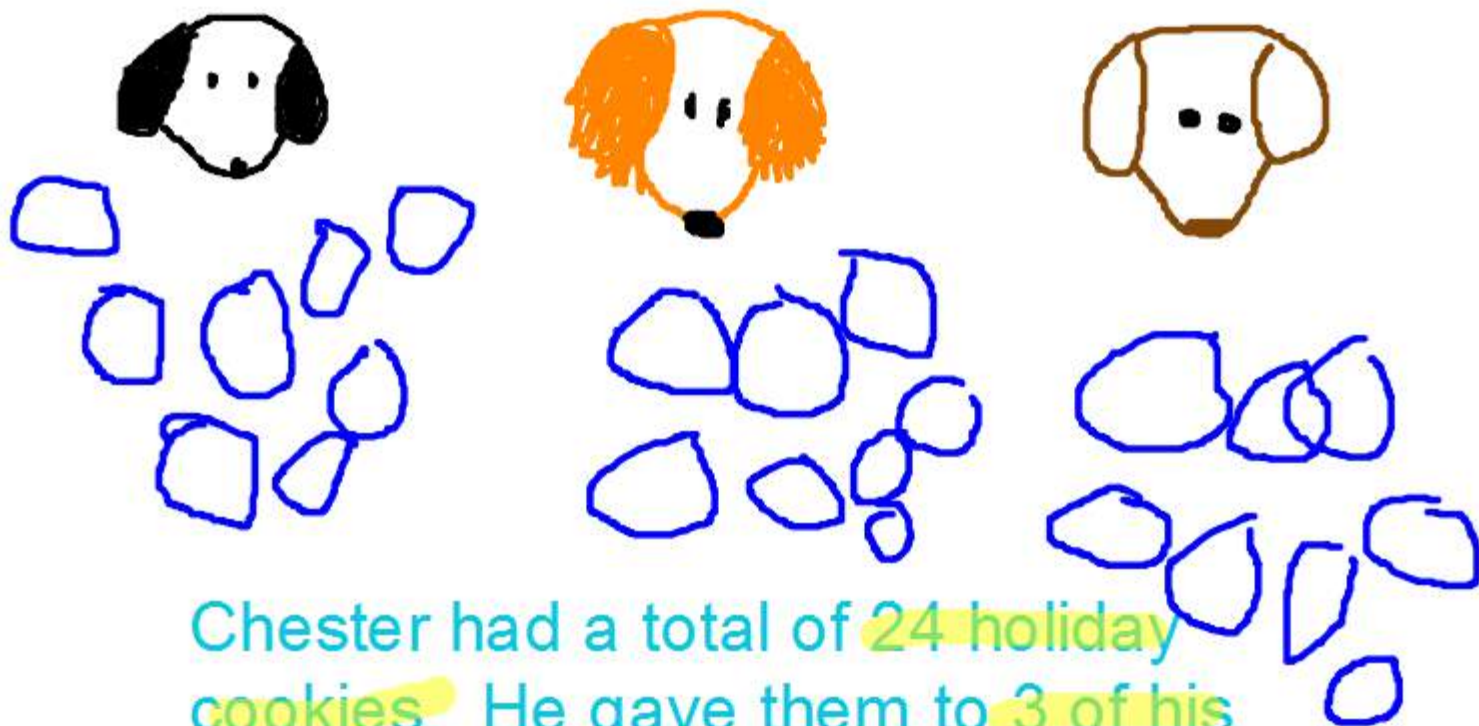
<http://ronritchhart.com>

What do you see?  
What do you think?  
What do you wonder?



Chester loves to play in the snow. He also really likes to eat snow. He played in the snow 4 times. Each time he played he ate 5 snowballs. How many snowballs did Chester eat in all?





Chester had a total of 24 holiday cookies. He gave them to 3 of his doggie friends. How many cookies did each dog get?




# VISIBLE THINKING ROUTINES

- Generate, Sort, Connect, Elaborate

**JENNY ROSSI INCORPORATES THE THINKING ROUTINE: GENERATE, SORT, CONNECT, ELABORATE INTO HER 3RD GRADE MATH LESSON**

Jenny Rossi is the Cultures of Thinking coordinator and resource teacher at Way Elementary in Bloomfield Hills, Michigan. To help teachers at the school learn from one another, Jenny and others made videotapes of their use of thinking routines to share and discuss amongst the staff. Principal Adam Scher was kind enough to share this video with me.

**GENERATE, SORT, CONNECT, ELABORATE**  
**3RD GRADE**





# VISIBLE THINKING ROUTINES

- CLAIM, SUPPORT, QUESTION

Multiplying by 10:

T O   T O        H T O

72 x 10 = 720

The diagram illustrates the multiplication  $72 \times 10 = 720$ . Above the numbers, place value labels are shown: T O for 72, T O for 10, and H T O for 720. Colored arrows indicate the shift of digits: a red arrow from the 7 in 72 to the 7 in 720, a green arrow from the 2 in 72 to the 2 in 720, and a blue arrow from the 0 in 10 to the 0 in 720.

What will you learn?

10 x 0 = 0  
10 x 1 = 10  
10 x 2 = 20  
10 x 3 = 30  
10 x 4 = 40  
10 x 5 = 50  
10 x 6 = 60  
10 x 7 = 70  
10 x 8 = 80  
10 x 9 = 90  
10 x 10 = 100

multiplied by  
multiple of  
times  
multiply  
groups of  
+

Extend Page

- To multiply by ten, do you just add a zero?



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# What makes you say that?

# COOPERATIVE, PROJECT BASED LEARNING

- Garden Project



# ARGUMENT WRITING

- Using argument writing for reflections





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**You can't divide by zero,  
why not?**



# Key Concepts



## KEY CONCEPTS

# Order of Operations Lesson

- Jake has 2 cartons with 6 eggs in each. As he opens the cartons, he drops two eggs. How many unbroken eggs does Jake have left?
- FORM (what form does the equation take?)
- FUNCTION (of parentheses)

# KEY CONCEPTS

## Perimeter and Area Lesson

- PERSPECTIVE:
  - attributes of a rectangle, ([can a square be a rectangle?](#))

## Kindergarten video

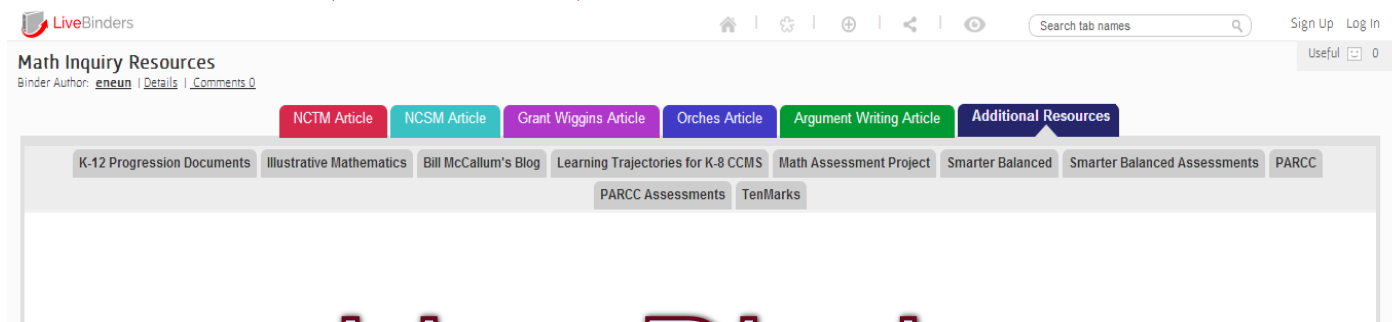
- CONNECTION:
  - role of the equal sign,
  - addition and subtraction.
- CHANGE: converting equivalent fractions
- Other ideas?

# ADDITIONAL RESOURCES

- Inquiry cycle



# ADDITIONAL RESOURCES



## Live Binders

- <http://bit.ly/1ISdBB0>
- access key: math inquiry resources

# Summing Up

- **LEARNING GOALS**

How inquiry can be used to support the Common Core State Standards.

How inquiry can support math as part of a trans-disciplinary Primary Years Programme.

“Yes, we must simplify and scaffold the work for the novice and make direct instruction clear and enabling - but in so doing we *invariably* sow the seeds of misconceptions and inflexible knowledge if we do not also work to attain genuine understanding of what the basics do and do not mean.”

~Thoughts on education by Grant Wiggins

# CONTACT INFORMATION

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Live Binder Access Key: Math Inquiry Resources

Bloomfield Hills Schools  
-Lone Pine Elementary  
-West Hills Middle School