



Session 70

Sense Making: Aren't We Already Doing That in Literacy?

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#NoticeWonder, #NCTMVirtual21

Before We Start

Too much talking - sorry! But...

Some think time—take advantage
(you might want pencil/paper)

Tweet at me any time—use
@MFAnnie and #NCTMVirtual21

I'll post the slides after my talk goes live
(see my handout for instructions)

Before We Start

There will be homework

Tweet at me any time—use
[@MFAnnie](#) and [#NCTMVirtual21](#)

“Office Hours”
(see my handout for instructions)

Before We Start



“Not for ourselves only,
but for all.”

**Sense Making: Aren't We
Already Doing That in Literacy?**

Yes.

**But we need to do
more of it in math.**

Sample Grade 3 Test Question

The corner deli sells roses in bunches of 6. If Dylan buys 3 bunches of roses, how many roses does he have?

A.6 18%

B.9 46%

C.18 31%

D.24 4%

Combined scores of the 160 third graders in a group of four low-performing schools I used to support.

Sample Test Question Revised

The corner deli sells roses in bunches of 6. Dylan bought 3 bunches. Draw a picture of the story.



Sample Grade 3 Test Question

Hot dog buns come in packages of 8. Michael buys 6 packages of hot dog buns. How many hot dog buns does Michael have in all?

- A. 14 43%
- B. 36 8%
- C. 48 40%
- D. 56 5%

“Cracking the Math Code”

ADDITION

Add
Altogether
And
Both
How many
How much
In all
Increased by
Plus
Sum
Together
Total

SUBTRACTION

are not
change
decreased by
difference
fewer
have left
how many did not
have
how many more
less than
remain
subtract
take away
Taller/shorter

MULTIPLICATION

By (dimension)
Double
Each group
Multiplied by
Of
Product of
Times
Triple

DIVISION

as much
cut up
divided by
each group has
half (or other
fractions)
how many in each
parts
quotient of
Separated
Share something
equally
split

(document from the web site of a large Eastern US metropolitan school district)

Sample Grade 3 Test Question

Hot dog buns come in packages of 8. Michael buys 6 packages of hot dog buns. How many hot dog buns does Michael have **in all**?

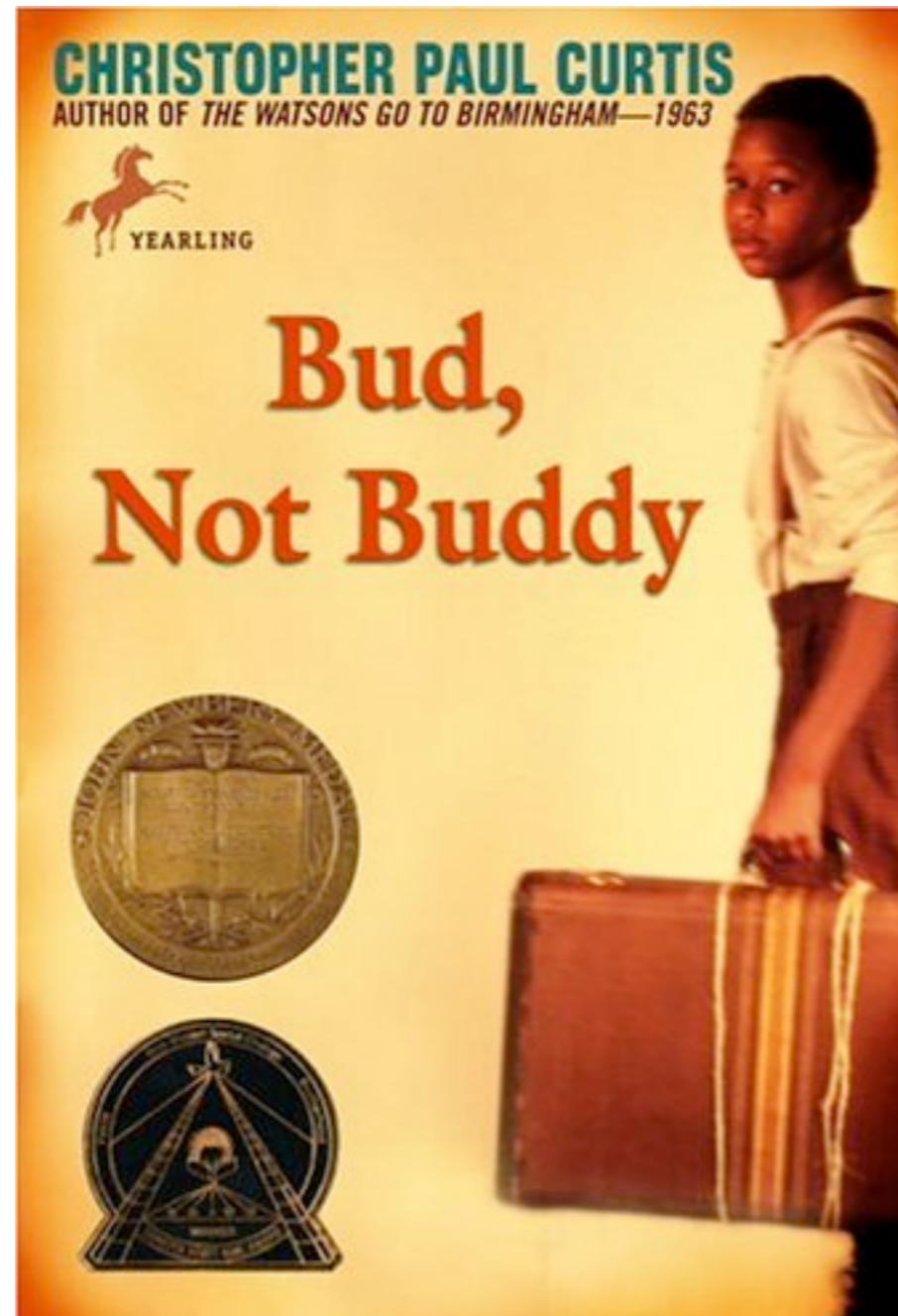
A. 14 43%

B. 36 8%

C. 48 40%

D. 56 5%

Dr. Jekyll and Mr. Hyde



Sense Making: Aren't We Already Doing That in Literacy?

Yes.

**In what ways should we make math
instruction look more like literacy?**

Or other subjects?

Connect Sense Making Strategies Used in Other Subject Areas



Marilyn Burns
@mburnsmath



Replying to [@MarkChubb3](#) and [@LanaSteiner4](#)

I'm on the search for overlaps so we can help teachers use their skills in one area to inform their teaching in the other.

12:02 PM · Mar 30, 2018 · Twitter Web Client

Reading Strategies

What are some reading strategies that you've taught or seen taught so far this year?

Two Minutes Think Time

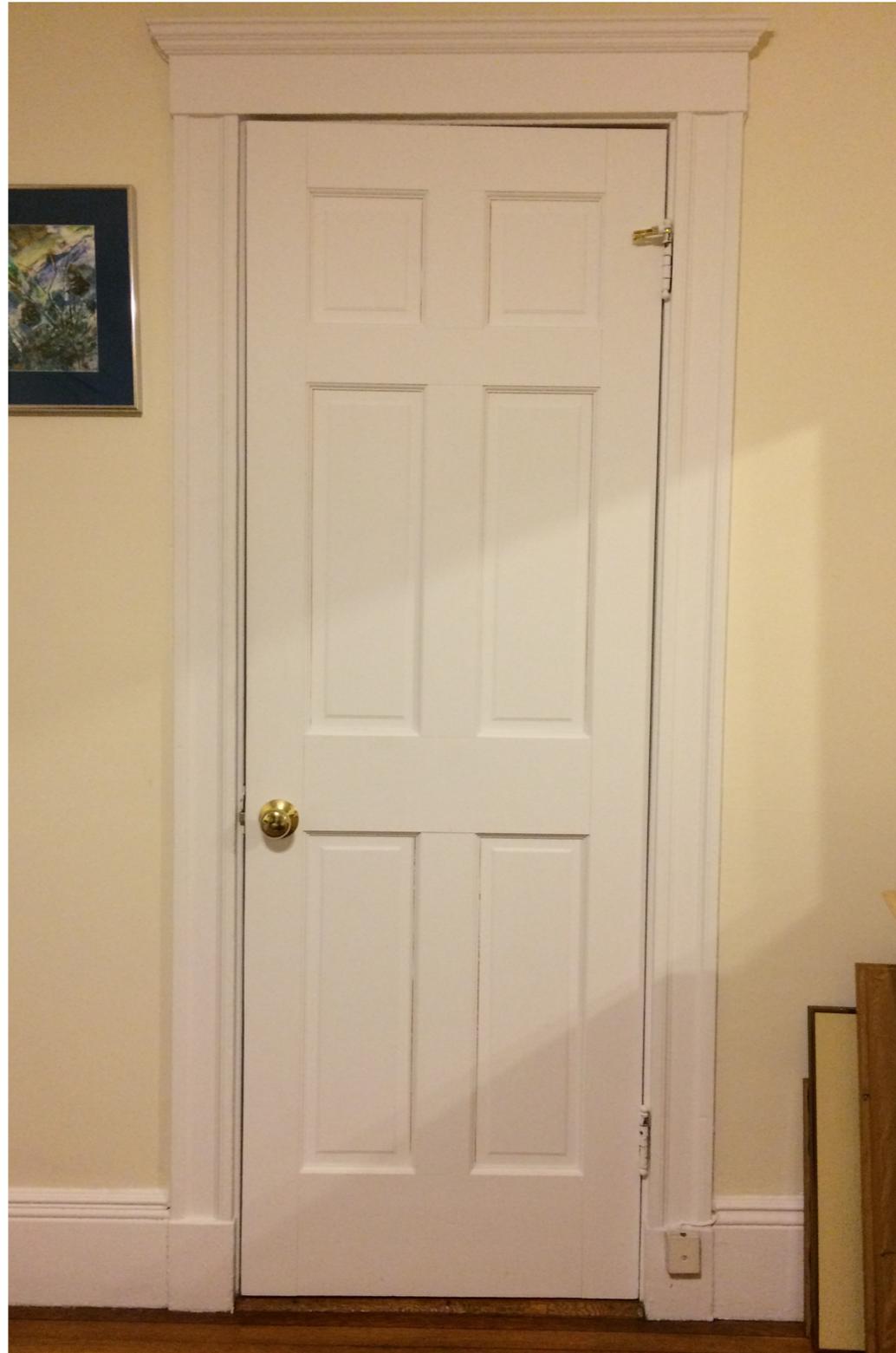
Strategies - Unfamiliar Words

- Sound it out
- Context clues
- Apply known patterns to a new situations

Strategies - Comprehension

- Predicting
- Estimating
- Hypothesizing
- Make a movie in your mind
- Storyboarding (beginning, middle, end)
- Story elements (character, setting, problem, solution)

Making a Movie in Your Mind



How is the Room Different?

“Oh, I can’t use small group work during math.”

Defining Our Role(s)

What is your/the teacher's role during the literacy block?

One Minute Think Time

What is your/the teacher's role during the math block?

One Minute Think Time

Characteristics of Strong ~~Readers~~ Mathematicians

- They are motivated to ~~read.~~ tackle problems
- They are able to ~~read words~~ accurately and automatically. recite facts
- They comprehend what they read.
- They are able to read with expression.
- They use a variety of strategies to tackle ~~words~~ they don't recognize. problems
- They use active problem solving strategies to search for information, to determine meaning, to make sense of words, to make connections.

What Are We Really Teaching?

Most *reading* skills and strategies are really *thinking* skills and strategies.

CCSS Math Practice 1

Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution.

They analyze givens, constraints, relationships, and goals.

They make conjectures about the form and meaning of the solution and plan a solution pathway **rather than simply jumping into a solution attempt.**

They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution.

They monitor and evaluate their progress and change course if necessary.

The Five Strands of Mathematical Proficiency

National Research Council, 2001, *Adding it up: Helping children learn mathematics*.

1. Conceptual understanding
2. Procedural fluency
3. Strategic competence
4. Adaptive reasoning
5. Productive disposition

“Productive disposition is the inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy.”

Your Main Job: Do Your Students Think Math Makes Sense?

*The blog post I mentioned by Emily, the Kindergarten Teacher,
and her mom, the math supervisor*

Ways to Avoid Calculation Compulsion

Encouraging Sense Making

Q: What's one way to cultivate a classroom focused on *sense making* rather than *answer-getting*?

A: Get rid of the question. Literally.

Get Rid of the Question

Apple juice costs 50¢. The juice machine accepts quarters, dimes, and nickels.

I Notice

I Wonder

One Minute Think Time

Get Rid of the Question

Mr. Gavin has a ladder that is 100 centimeters tall.

Ms. Cornell has a ladder that is 2 meters tall.

Encouraging Sense-Making

Q: What's another way to cultivate a classroom focused on *sense making* rather than *answer-getting*?

A: Get rid of the question *and* the numbers.

Get Rid of the Question and the Numbers

Raul had some pet mice. Xavier gave him some more mice.

Raul had some pet mice. Xavier gave him 3 more mice.

Raul had some pet mice. Xavier gave him 3 more mice. Now Raul has 8 mice.

Raul had some pet mice. Xavier gave him 3 more mice. Now Raul has 8 mice. How many mice did Raul have to start with?

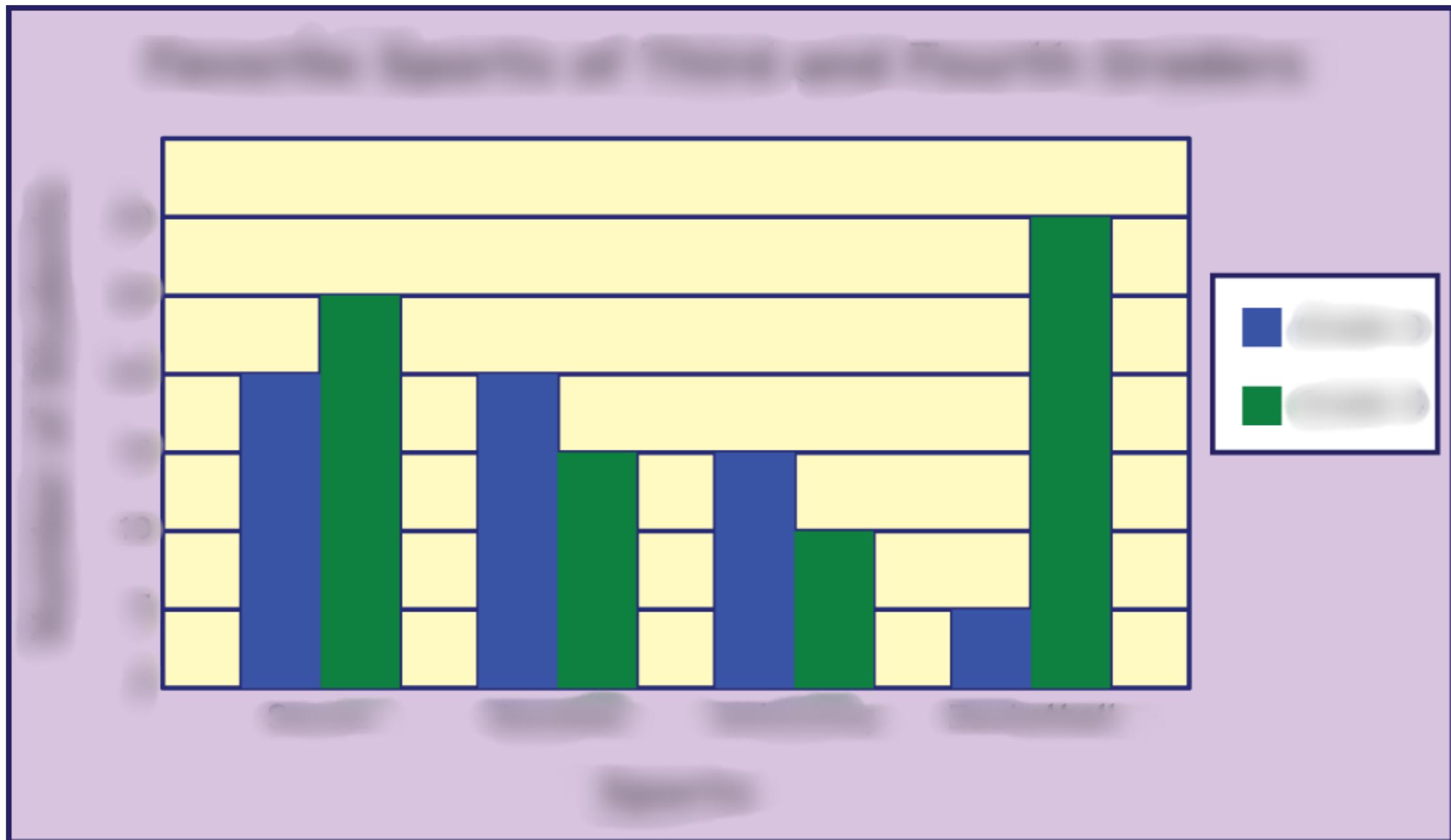
A Numberless Word Problem from Brian Bushart, bstockus.wordpress.com

Get Rid of the Question and the Numbers

A store has the floor plan shown. The area of the women's department is



Get Rid of the Question and the Numbers



Get Rid of the Numbers

Caitlyn is still trying to make brownies for the class. She has the mix and milk but needs to go get eggs. A carton of eggs weighs some **24** pounds. Each carton has **12** eggs. Each carton costs a **1** dollar amount.

How much does one egg weigh?
(in ounces)

6

Caitlyn realized that she needs one more ingredient. She forgot the vegetable oil. The oil is sold in **2** liter bottles. She needs a certain number of **6** bottles for the brownies. Each bottle cost a **6.25** dollar amount. Caitlyn brings \$20 with her to the store.

\$5 **1p** **4c**

From Kat Kulis, grade 5, Windham Center School, Windham, CT

Encouraging Sense Making

Q: What's another way to cultivate a classroom focused on *sense making* rather than *answer-getting*?

A: Give the answer.

Give the Answer

◆ Math Message Follow-Up

WHOLE-CLASS ACTIVITY

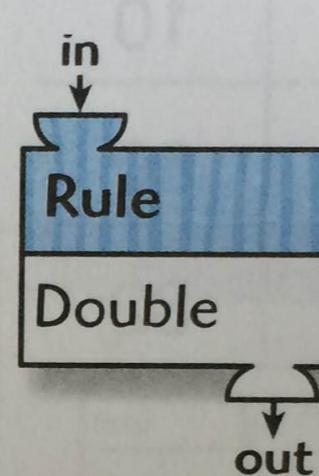
Draw or display a function machine and “What’s My Rule?” table. (See Advance Preparation.)

Ask children to imagine that the **function machine** works like this:

- A number (the **input**) is dropped into the machine,
- the machine changes the number according to a rule,
- and a new number (the **output**) comes out the other end.

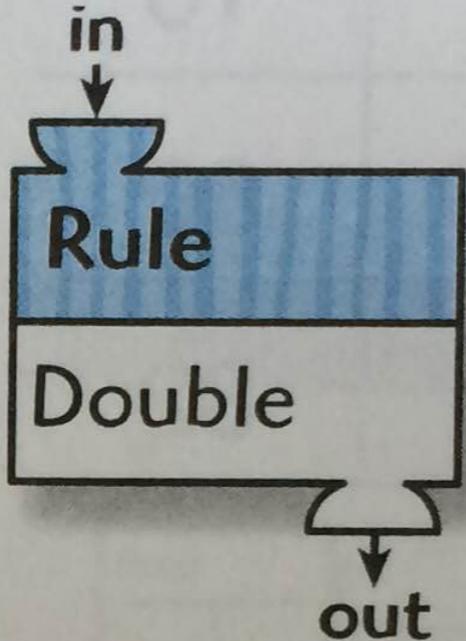
The **rule** for the Math Message problem is “Double the number.” Write the word *Double* in the function machine.

Point out the “**What’s My Rule?**” table. Discuss the 8 in the *in* column and the 16 in the *out* column. Explain to children that numbers in the *in* column represent the numbers of bacteria now. Corresponding numbers in the *out* column represent the numbers of bacteria 20 minutes from now.



in	out
8	16
50	100
200	400
75	150
150	300

Give the Answer



The diagram shows a rectangular block with two sections. The top section is shaded blue and labeled "Rule". The bottom section is white and labeled "Double". An arrow labeled "in" points into the top of the block. An arrow labeled "out" points out from the bottom of the block.

in	out
8	16
50	100
200	400
75	150
150	300

Give the Answer (or Several!)

Rachel bakes cookies and delivers them to her friends.

- It takes 8 minutes to mix the batter.
- The cookies bake for 9 minutes.
- For 6 minutes they cool.

If the answer is 23 minutes, what is the question?

If the answer is 3 minutes, what is the question?

If the answer is bake, what is the question?

Ask for Questions

Solve & Share

493

A pet store has 162 goldfish, 124 angelfish, and 53 pufferfish. How many fish are there in all? How might an estimate help you solve the problem? *Solve this problem any way you choose.*

When you are finished, turn to page 497, circle numbers 1-8, 9, 12, and 13, carefully rip it out and put it in your take-home folder.

If you finish early complete the Look Back.

0:01:44

Ask for Questions

Thursday

A pet store has 162 goldfish 124 angelfish, and 53 pufferfish. What questions could **you** come up with?

00:03 39

5 minutes on your own
3 with a partner
All together

The image shows a digital whiteboard interface. At the top, there is a toolbar with various icons for navigation and editing. The main content area displays the text 'Thursday' followed by a word problem: 'A pet store has 162 goldfish 124 angelfish, and 53 pufferfish. What questions could you come up with?'. The word 'you' is highlighted in red. In the bottom right corner, there is a timer showing '00:03 39' and a list of activity options: '5 minutes on your own', '3 with a partner', and 'All together'.

Ask for Questions

pufferfish. What questions could you come up with?

How much more does the goldfish's has more than the angelfish?

What is the total of all fishes?

How much does the pufferfish and the goldfish have altogether?

How much does the angelfish and

Ask for Questions

What could the questions be now?

how much more is

blah blah blah than blah

blah blah?

Encouraging Sense Making

Q: What's another way to cultivate a classroom focused on *sense making* rather than *answer-getting*?

A: Ask about ideas, not answers.

This can be really simple:

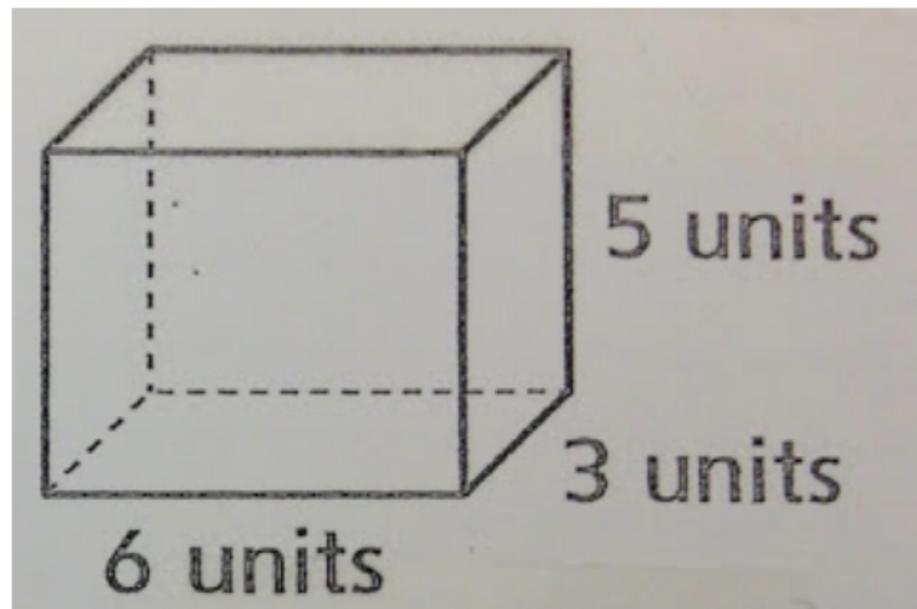
“Tell me something about number 7.”

instead of

“What's the answer to number 7?”

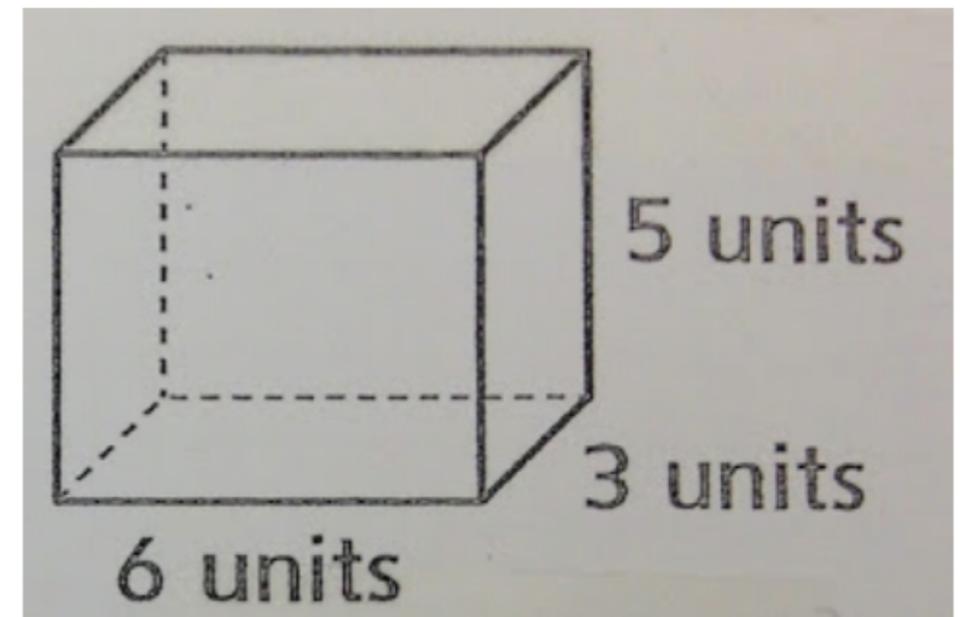
Ask About Ideas, Not Answers

It can be a little more complex:



Tell me everything you can about this figure.

instead of



Find the volume of the rectangular prism.

(from Joe Schwartz's blog, exit10a.blogspot.com, October 10, 2016)

Ask About Ideas, Not Answers

1. Suppose 5 U.S. dollars (5 USD) can be exchanged for 64 Mexican pesos. What operation would be used to find the value of 1 USD in pesos?

Find the value of 1 USD in pesos. 1 USD = _____ pesos

Tell everything you can about this statement: 5 U.S. dollars (5 USD) can be exchanged for 64 Mexican pesos.

Teacher Questions

“Why?”

“How do you know?”

“How did you decide?”

“Tell me more about that.”

Ways to Encourage Sense Making Rather Than Answer Getting

- Get rid of the question.
- Get rid of the question *and* the numbers.
- Give the answer.
- Ask about ideas, not answers.

Reflection Questions

Write down maybe even tweet at me:

- two sense-making strategies you're going to try in your class, or shifts you want to make in your role during math block
- two things you're wondering

Thank you!

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See handout for instructions for
getting the slides and signing up for office hours

