Learn to Read Like a Mathematician

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FOSTERING MATH PRACTICES

www.fosteringmathpractices.com

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Goal

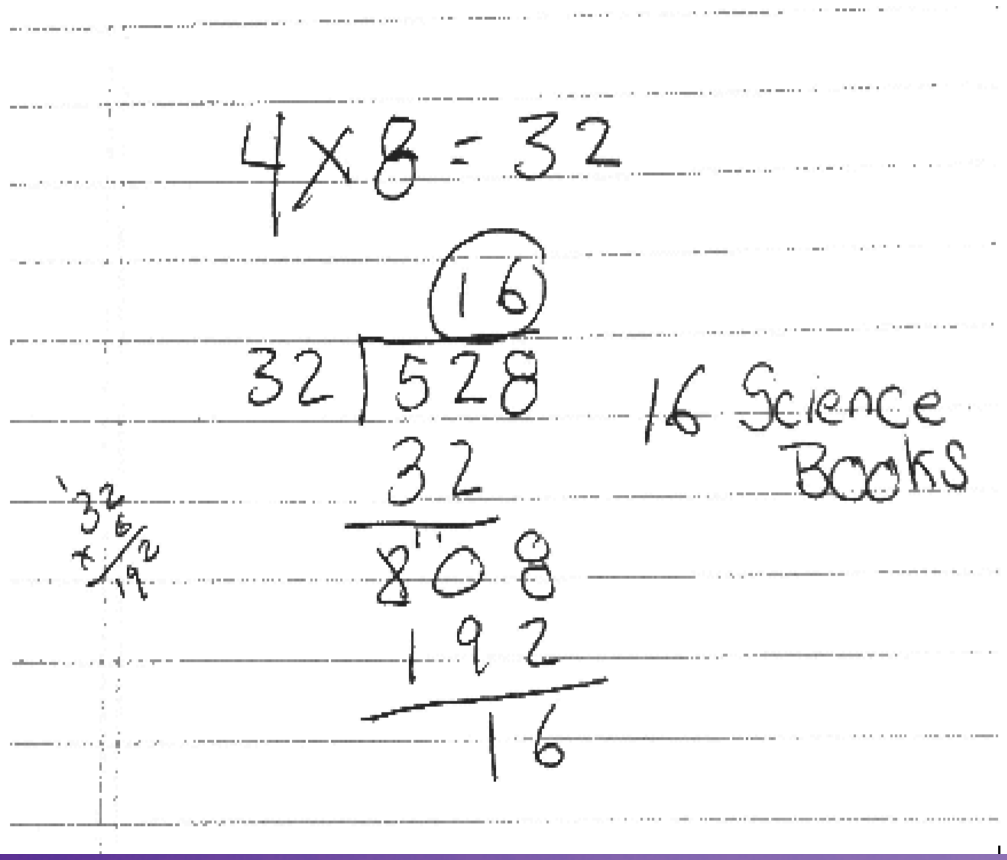
Learn how to teach students to read like mathematicians.

- Know what makes reading in math different than reading in other subject areas
- Know what kind of information is important to pay attention to when reading a word problem
- Understand the flow and purpose of the 3-Reads Instructional Routine

Agenda

1. Framing
2. A few words on reading in Math
3. Experience the *Three-Reads* Instructional Routine
4. Unpack the *Three-Reads* Instructional Routine

A school bought some math books and 4 times as many science books. The cost of a math book was $12 while a science book cost $8. Altogether the school spent $528. How many science books did the school buy?



Instructions:

1. Solve the textbook task.
2. Analyze the student work.
3. Talk with a partner about how the student was thinking.

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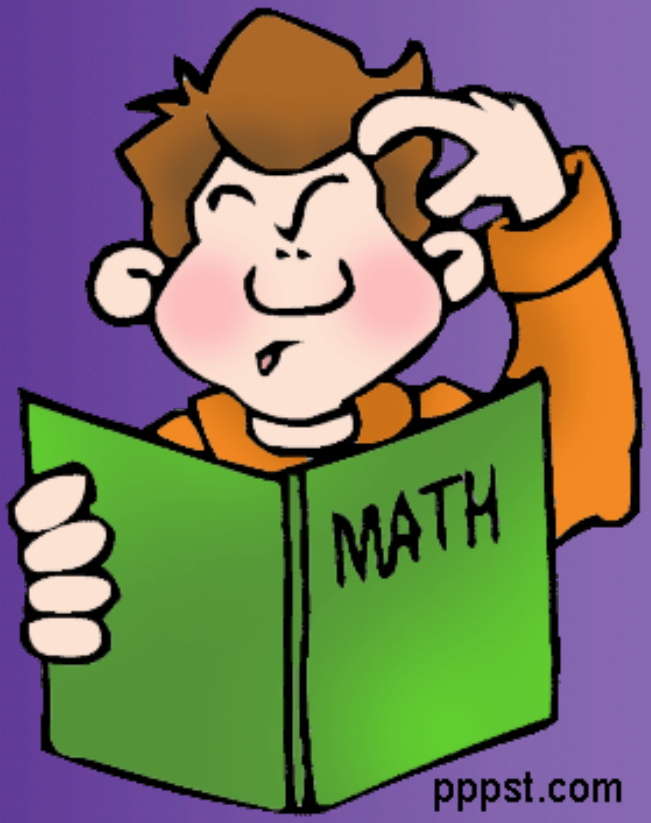
Why is reading a math problem challenging for students?



I don't get it!

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Mathematicians read the problem more than once!

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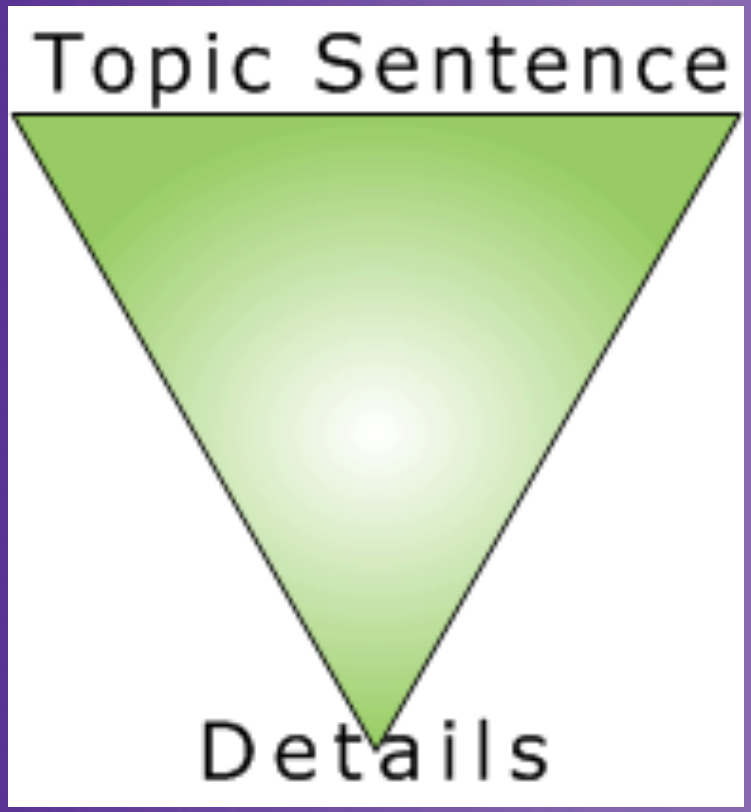
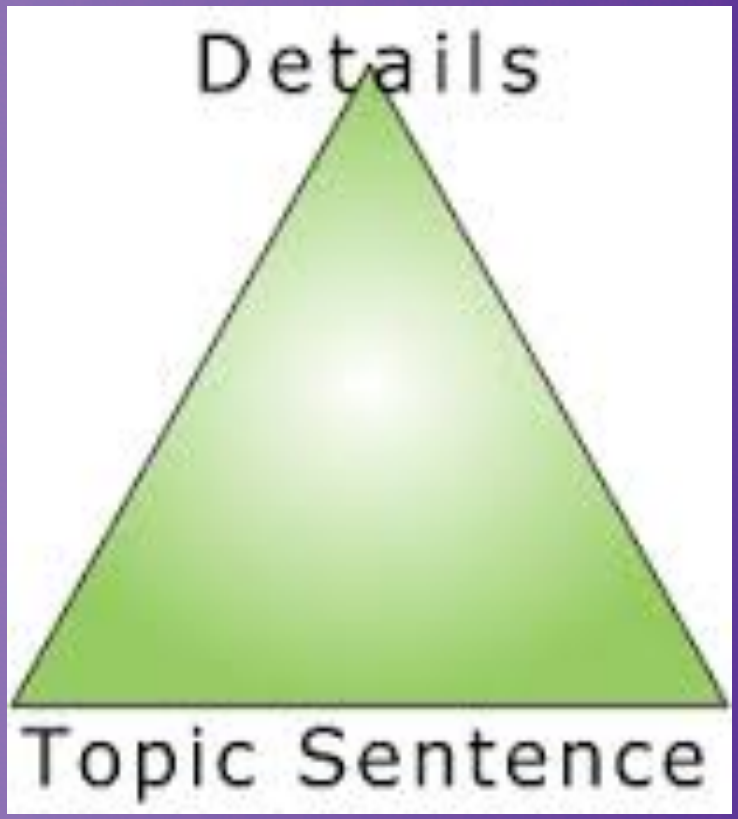
Math problems are written differently

PARAGRAPH STRUCTURE



MATH WORD PROBLEMS



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DETAILS

A school bought some math books and 4 times as many science books. The cost of a math book was $12 while a science book cost $8. Altogether the school spent $528. How many science books did the school buy?

Purpose

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Read the Problem 3 Times

1st Read What is the problem about?

2nd Read What is the question?

3rd Read What information is important?

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What information do mathematicians think important?

Quantities & Relationships

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Students typically attend to number

7

1/2

Does the number tell me something about a **quantity** or is it describing a **relationship**?

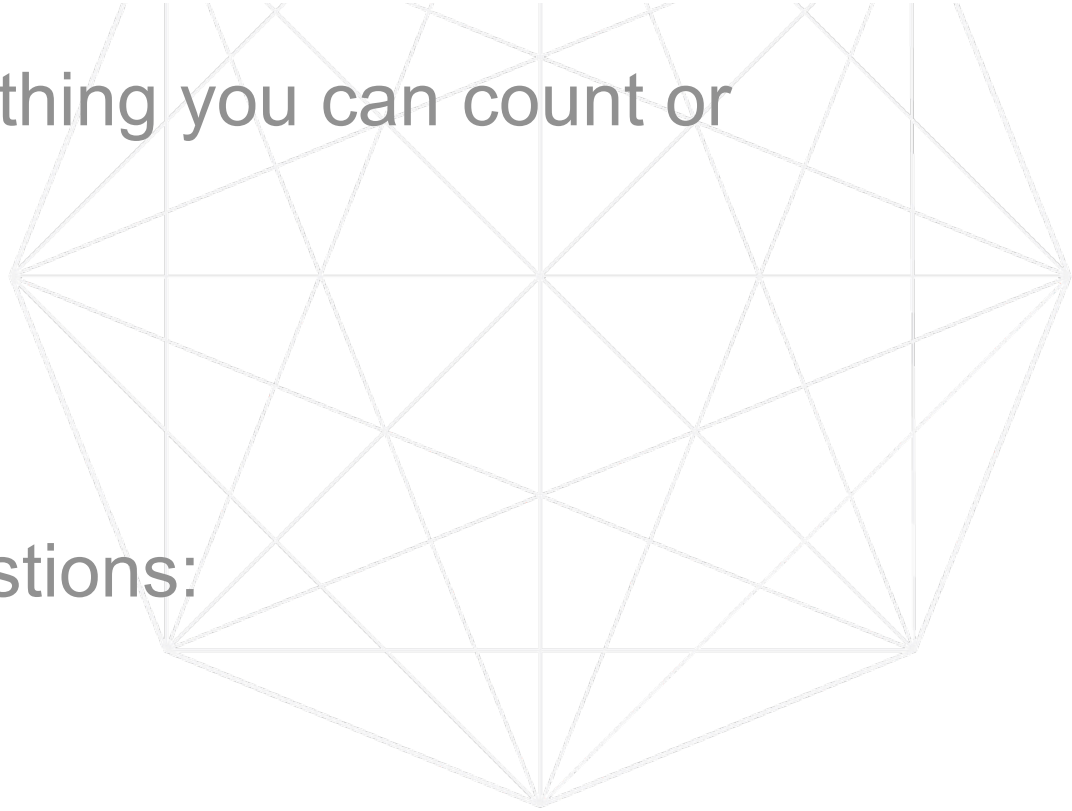
Quantity or Relationship?

- Grace has 7 cookies
- Amy has 7 more cookies than Grace

- Grace ran ½ mile
- Amy ran ½ as far as Grace

What's a Quantity?

- A Quantity is something you can count or measure
  - The number of…
  - The amount of...
- It answers the questions:
  - How many?
  - How much?



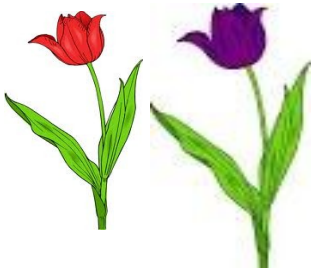
What's a Quantity?

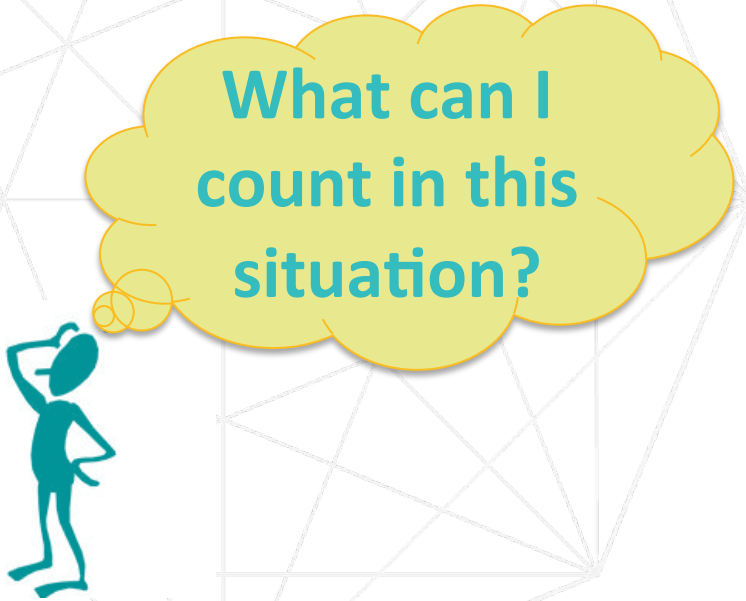
A Quantity has three parts…

- Value (e.g. 7 or ½ or 2π or ✗)
- Unit (e.g. cookies or miles)
- Sign (+ / -)

What are the Quantities in Gina's Garden?

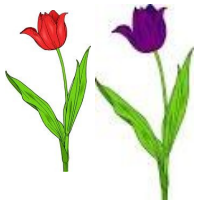
Gina planted 24 flowers in her garden. Some of them were red and some of them were purple.





Finding Quantities in Gina's Garden

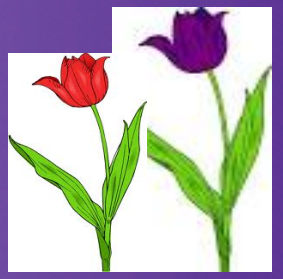
Gina planted 24 flowers in her garden. Some of them were red and some of them were purple.



The number of…

- The number of red flowers
- The number of purple flowers
- The total number of flowers
- The number of flowers that are neither red nor purple

Gina's Garden



Gina planted 24 flowers in her yard. Some of them were red and some of them were purple.

There were twice as many purple flowers as red flowers.

- Ask yourself: How are the quantities related?
- Think: Quantity 💜 Quantity

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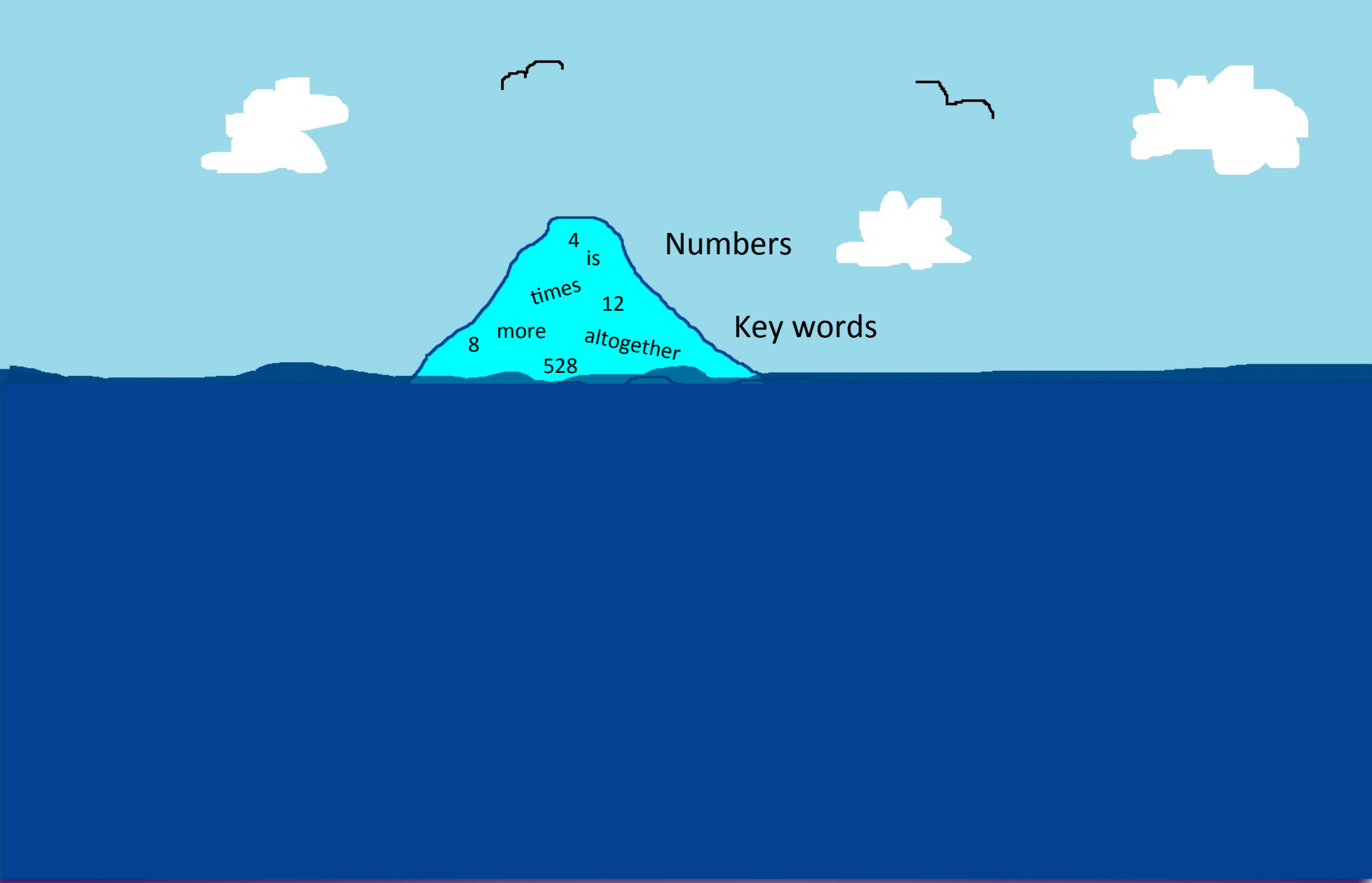

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Iceberg image from
http://drawingimage.com/art/8308

Pause

Three Reads

An Instructional Routine to Develop
Reading Like a Mathematician

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Lesson Goal

Learn to “read like a mathematician”.

Pay attention to quantities in the problem statement.

Read the Problem 3 Times

1st Read What is the problem about?

2nd Read What is the question?

3rd Read What information is important?

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1st Read

What is the problem about?

CREATE A PICTURE IN YOUR MIND

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2nd Read

What's the question?

What's the Question?

Rick keeps his trading cards in a box. Rick's uncle gave him 6 packs of 8 trading cards to add to his box. Rick found that 29 of the trading cards from his uncle were different than any of the cards he already had in the box. The rest of the trading cards from his uncle were the same as those he already had. How many of the trading cards from his uncle were the same as those Rick already had in his box?

State the question **in your own words.**

What quantity am I trying to find?

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3rd Read

What's the important information?

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What's the Important Information?

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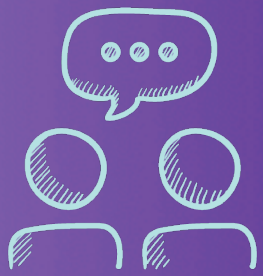

What are the important quantities?

The number of...

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Student A

Rick keeps his trading cards in a box. Rick's uncle gave him 6 packs of 8 trading cards to add to his box. Rick found that 29 of the trading cards from his uncle were different than any of the cards he already had in the box. The rest of the trading cards from his uncle were the same as those he already **had**. How many of the trading cards from his uncle were the same as those Rick already **had** in his box?

$6 \times 8 = 48$

$$\begin{array}{r} {\scriptstyle 1} \\ 48 \\ +\ 29 \\ \hline 77 \end{array}$$

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$$\begin{array}{r} 6 \\ \cdot\ 8 \\ +\ 29 \\ \hline 33 \end{array}$$

Student B

3 Reads Instructional Routine

Take Two

Lesson Goal

Learn to “read like a mathematician”.

Pay attention to quantities in the problem statement.

Read the Problem 3 Times

1st Read What is the problem about?

2nd Read What is the question?

3rd Read What information is important?

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1st Read

What is the problem about?

CREATE A PICTURE IN YOUR MIND

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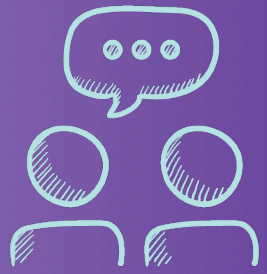
2nd Read

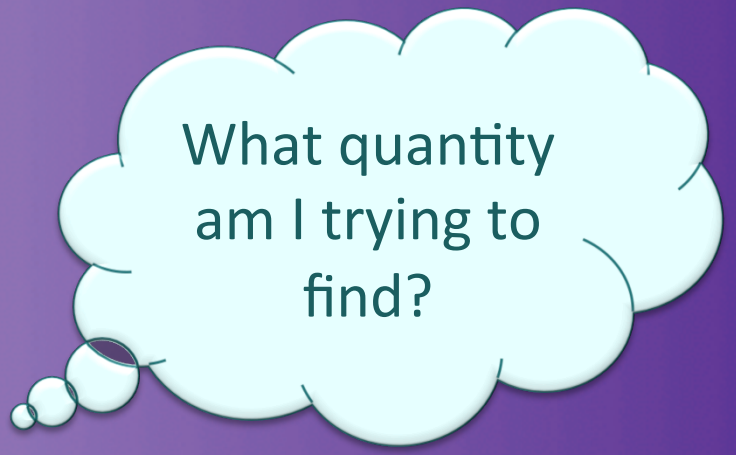
What's the question?

What's the Question?



Alicia, Emma, and Nick dive into an extremely deep pool. Alicia dives to a depth of –9/4 meters from the surface of the pool. Emma's depth is twice as far from the surface as Alicia's dive. Nick's depth is 2/3 the depth of Alicia's dive.

State the question **in your own words.**



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3rd Read

What's the important information?

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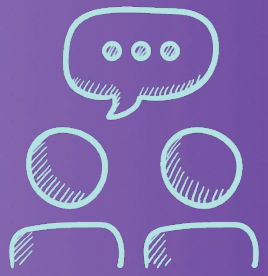
What's the Important Information?

Alicia, Emma, and Nick dive into an extremely deep pool. Alicia dives to a depth of – 9/4 meters from the surface of the pool. Emma's depth is twice as far from the surface as Alicia's dive. Nick's depth is 2/3 the depth of Alicia's dive.



What are the important quantities?

The number of…

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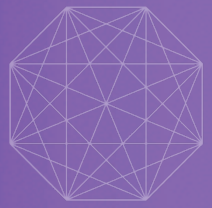
Three Reads

What was the same each time?



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Structure of the 3 Reads Routine

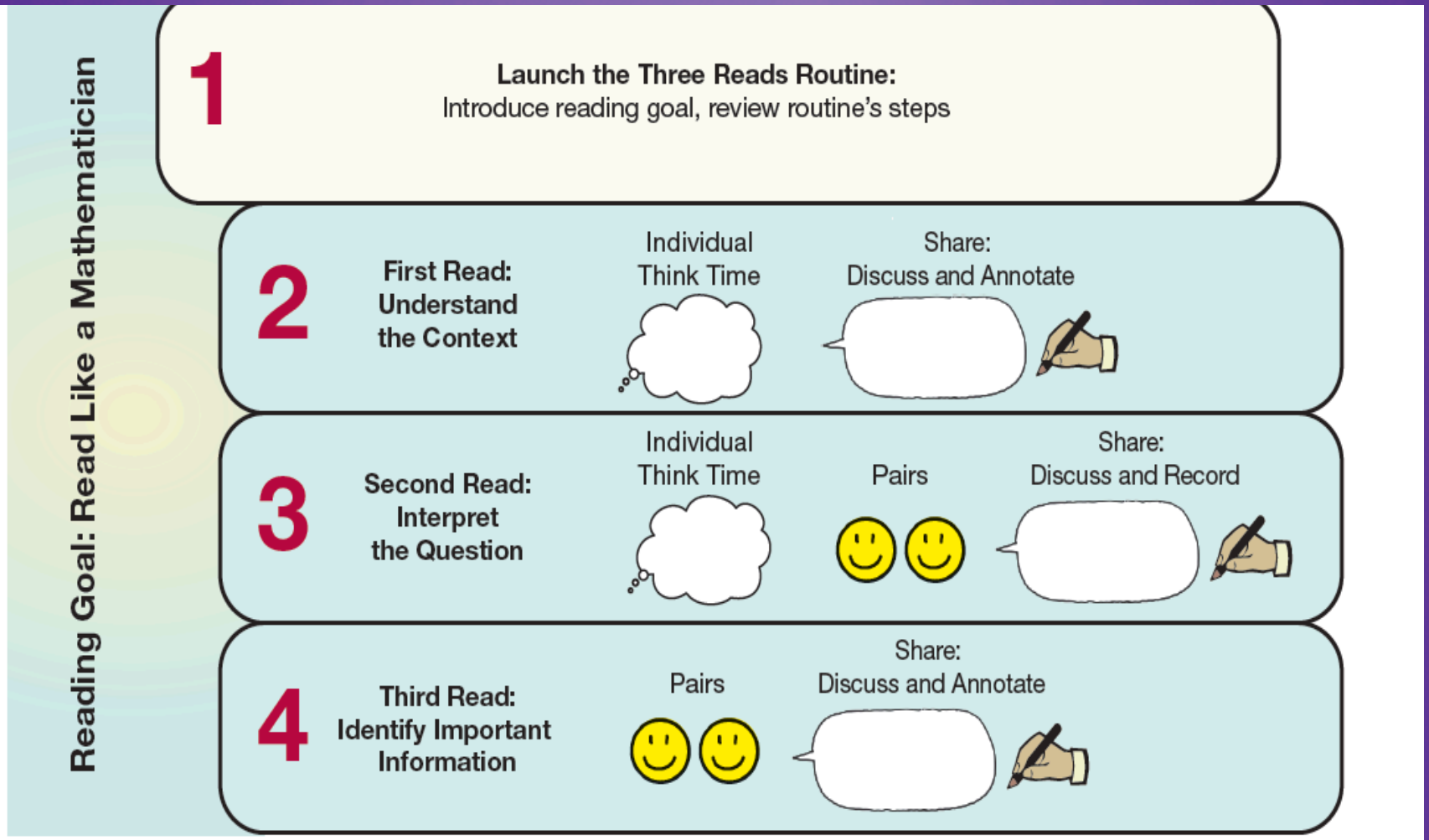

Figure 6.6

Next Steps

- REPRESENT the SITUATION
  - Model with manipulatives
  - Represent the problem visually
  - Write a number sentence
  - Write an algebraic expression or equation
- SOLVE the PROBLEM
- REFLECT on reading like a mathematician

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For More on 3 Reads and Other Instructional Routines

Reach Out

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AmyLucenta@gmail.com

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#3Reads
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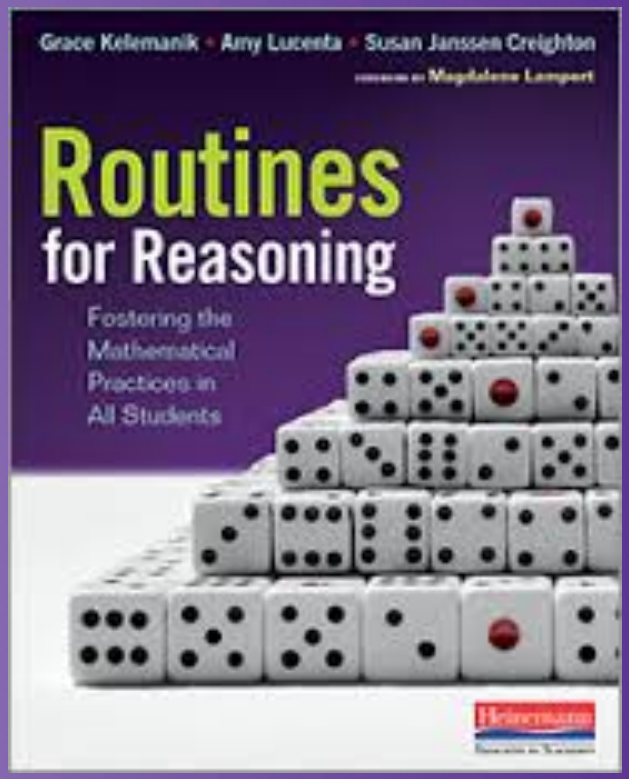

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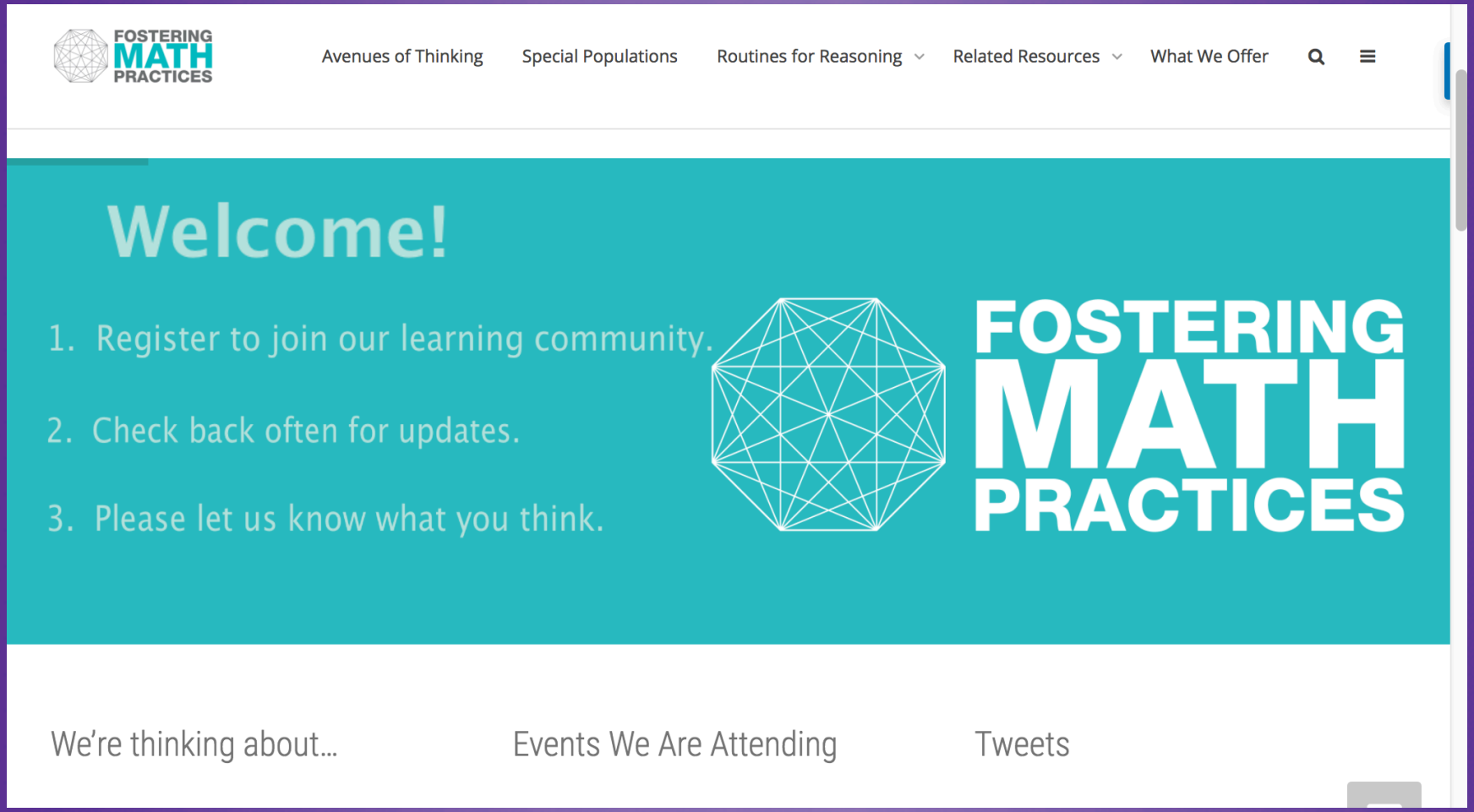
Using On-line Resources