

Using Reading and Writing Strategies in Math

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READING Topics

- Language and vocabulary of a reading teacher
- Reading rate and metacognition
- Strategies to improve comprehension
- Vocabulary instruction
- Connect literature and math

WRITING Topics

- Writing in math
- Interactive Writing
- Attacking problem solving with the writing process
- Riddles, rhymes and other writing projects

Use the Language and Vocabulary of a Reading Teacher

- Identify character(s) and setting (activate schema)
- Identify main idea, implied main idea, supporting details
- Make an inference
- Draw a conclusion
- Summarize

Identify Characters and Setting

Activate Schema

Garrett and Chelsea

went to a movie.

Tickets were \$4.25
each.

How much change did
Garrett receive if he
paid for both tickets
with a \$10 bill?

- Who are the characters?
- What is the setting?
- Activating the buying/getting change schema

Identify Main Idea, Implied Main Idea, Supporting Details

- The **main idea** of math problem can be thought of as the skill to solve it.
- Students often need to use the information in the **details (facts)** to make an **inference**.
- Example: Liam is replacing the tiles in his foyer. He is using 1 square foot tiles. The entry is 6 feet by 6 feet. How many tiles does he need for the foyer? (**area problem**)

Make an Inference or Draw a Conclusion

- Math problems often need more than what is explicitly written.
- Example: Samantha and 3 friends went to Pizza Palace. They all chose the buffet combo meal for lunch. Each buffet combo meal is \$4.50. How much did they pay for lunch?
- \$13.50? No. There are 4 people!

Reading Rate and Metacognition

- Adjust reading rate for your purpose
- Rereading is a good strategy of a good reader
- Think aloud or self talk

Adjusting Reading Rate

- Reading is **not** a race to “The End”!
- Teach adjusting rate **explicitly**.
- Model, model, model.
- Analogy:
 - Tourist
 - Detective
 - Reviewer

Rereading

- Rereading is a strategy of a **GOOD** reader!
- The idea that “rereading is a good thing” is foreign to some kiddos.
 - Some think it means they are stupid.
 - Others think they are cheating!
- Ciara’s story...

Think Aloud or Self Talk

- Model, model, model.
- Encourage students to use this strategy.
- Example: Rodney bought 6 packs of pencils. Each pack had 12 pencils in it. How many pencils did Rodney buy?
- Excellent strategy for long division!
- Great for modeling test-taking strategies.

Strategies to Improve Comprehension

- DRTA – Directed Reading-Thinking Activity
- Prereading ideas
- During reading ideas
- After reading ideas

DRTA- Directed Reading-Thinking Activity

Steps of DRTA

1. Make prediction from title clues.
2. Make predictions from picture clues.
3. Read the material.
4. Assess the accuracy of the predictions.
Make adjustments and continue for longer reading tasks.

DRTA- Directed Reading Thinking Activity

Predict from
the title.

Predict
from the
pictures/
graphics.

MATHEMATICS: *Library Fines*

1. The libraries at Lincoln School and King School both charge their students fines for overdue books.

Fines at King School

Number of days overdue	1	2	3	4	and so on
Fine	\$.01	\$.02	\$.04	\$.08	and so on

Fines at Lincoln School

Number of days overdue	1	2	3	4	and so on
Fine	\$.15	\$.23	\$.31	\$.39	and so on

- a. If you returned a book to Lincoln School that was 5 days overdue, how much would your fine be? Explain how you figured this out.
- b. If you returned a book to King School that was 5 days overdue, how much would your fine be? Explain how you figured this out.
- c. Kendra and Brian are each returning a book that is 8 days overdue. Kendra's book is from the Lincoln School library, while Brian's book is from the King School library. Who will pay the greater fine? Explain how you figured this out.

Prereading Strategies

- Preview/Survey (includes reading the graphics)
- Reaction/Anticipatory Guides
- Mysterious Possibilities
- Webbing or Clustering

Preview/Survey

- It's like a **picture walk** or book walk...
- It **activates prior knowledge**.
- It helps the reader **set the purpose** for reading.

Without a Preview/Survey

4 How many Go Paks were sold in 1998?

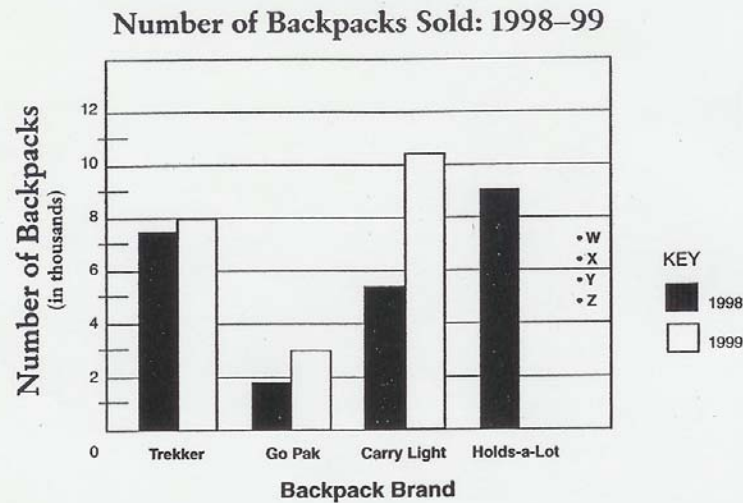
- Ⓕ fewer than 1000
- Ⓖ between 1000 and 2000
- Ⓗ between 2000 and 3000
- Ⓙ more than 3000

6 Which company sold nearly the same number of backpacks in 1998 and 1999?

- Ⓕ Trekker
- Ⓖ Go Pak
- Ⓗ Carry Light
- Ⓙ Holds-a-Lot

5 A total of 5100 Holds-a-Lot backpacks

With Preview/Survey



4 How many Go Paks were sold in 1998?

- (F) fewer than 1000
- (G) between 1000 and 2000
- (H) between 2000 and 3000
- (J) more than 3000

6 Which company sold nearly the same number of backpacks in 1998 and 1999?

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Reaction or Anticipatory Guides

- Teacher creates 3 to 7 statements about the material, hitting key concepts.
- Students read the statements and respond—yes/no, true/false, agree/disagree, etc.
- “I don’t know” is not acceptable.
- Students share and discuss.
- Read material. Revisit statements... Prove it

Sample Anticipatory Guide

From *Hershey's Weights and Measures*:

- ___ 1. A mile is more than 12,000 Hershey's Milk Chocolate bars with almonds long.
- ___ 2. An almond weighs about a gram.
- ___ 3. A miniature candy bar is about an each.
- ___ 4. One Reese's piece is about a centimeter.

Mysterious Possibilities

- Teacher selects “mysterious” item – object, photo, picture, etc.
- Teacher shares item with class...
- Students are asked to **solve the mystery** by brainstorming and predicting the connection between topic and item.
- Teacher generates list, springboards to lesson.

Mysterious Possibilities



Webbing or Clustering

Common strategy

- What do we know?
- What predictions do we have?
- What connections can we make?
- What questions do we have?

- Also used during and after reading.

During Reading Strategies

- X Marks the Spot
- Graphic Organizers
- Visualize or Draw Pictures

X Marks the Spot

- The teacher introduces and models the response code.
- Students read silently using the code.
- Code: X means key point, ! means new or interesting information, ? means confused.
- Teacher specifies what to look for...
- Responses used as basis for discussion.

X Marks the Spot

"All five were on the floor, stretched out. I had unrolled them and set them out to be vacuumed and shampooed."

"Were all of these rugs the same size?" asked Cal.

"Yes."

The Chief cut in. "This is an awfully small warehouse, Shady — I mean, Sadee. What are the dimensions?"

X "It's 40 feet by 50 feet, 2000 square feet."

Cal jotted the information in his notebook. "You said all of the rugs were the same size. What size would that be?"

X "Each was 20 feet by 18 feet."

The Chief fished a calculator out of his coat pocket and did a few calculations. "20 times 18 equals 360, and 360 times 5 equals 1800. So, the five carpets have a total of 1800 square feet. That means there's plenty of room for the carpets to fit."

?

"Yes," said Sadee. "Your figures are correct, Chief. I had plenty of room for the carpets. In fact, there were a couple of feet between any two carpets."

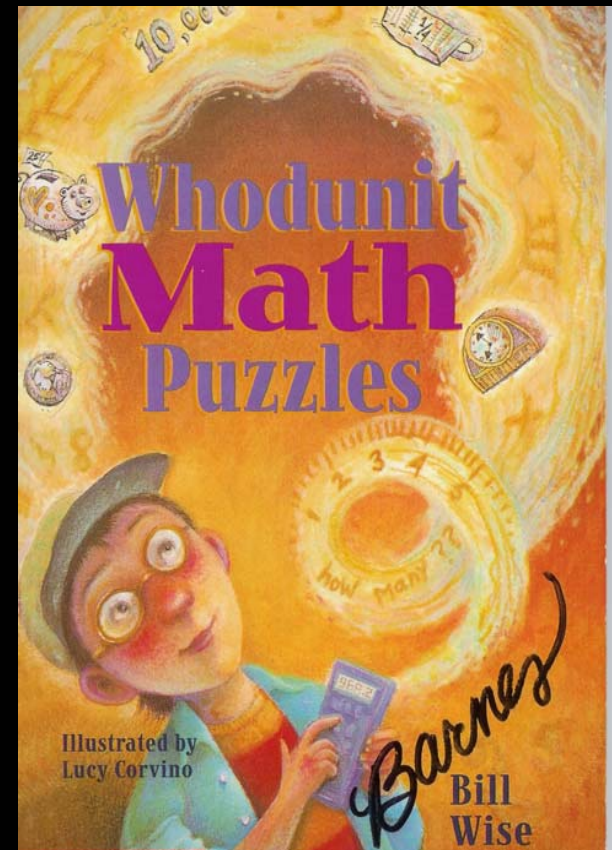
"Well, Sadee, I'll put my best officers on this," said the Chief.

Cal grabbed the Chief by his coat sleeve. "Wait a second, Chief. I've just drawn a picture that you need to see. Things are not what they might seem as far as the math of this matter is concerned."

The Chief snatched the paper from Cal and took a look. "Well, I'll be," he said, shaking his head. "Look's like Sadee is still Shady after all." The Chief turned to Sadee. "Nice try, Shady. You almost pulled this one off. But it's off to police headquarters for you."

!

What did Cal figure out by drawing a picture?
(Solution on page 92.)



Visualize or Draw Pictures

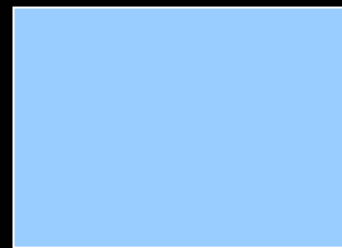
- As with reading stories, visualization allows students to become **involved with the text**.
- For some students, drawing is a better strategy.
- For either strategy, students must **adjust reading rate!**

Visualize or Draw Pictures

Marie is making a tent for her children to play in. The floor of the tent is a **rectangle** that measures **4 ft. by 6ft.** How much binding does Marie need to bind the edges of the tent floor?

Draw it.
Label it.

4 ft.



6 ft.

After Reading Activities

- Connect and Reflect
- Find the Fake
- Restate/Summarize and Generalize

Connect and Reflect

- Important for kiddos to make connections...
 - Text to self: What math experience was it like?
 - Text to text: How did it connect to previous work?
 - Text to world: How do people use this?
- Reflect
 - What part of the strategy went well?
 - What can I do differently?
 - What did I learn from other students?

Find the Fake

- Students work in groups of four.
- Individually, students write 3 statements: 2 true and 1 fake.
- Within the groups, students take turns reading their cards and challenging their partners to find the fake.
- Each group may select 1 card to challenge the class.

Find the Fake

1. Octagons have 8 sides.
 2. Pentagons have 6 sides.
 3. A right angle is exactly 90° .
-
1. All quadrilaterals have 4 sides.
 2. Every square is a rectangle.
 3. A rhombus is never a square.

Restate/Summarize and Generalize

- Restate/Summarize:
 - What did you do?
 - What did you learn?
- Generalize: How can you use what you learned to solve other problems?

Vocabulary Instruction

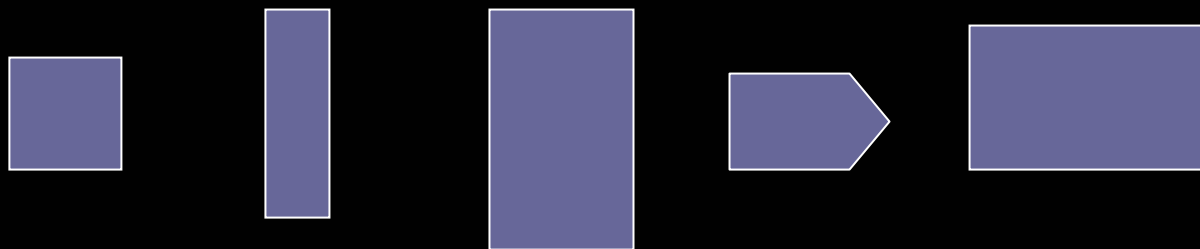
- Structural Analysis
- Context Clues
- Analogies
- Graphic Organizers
- Manipulative Materials
- Kinesthetic Vocabulary
- Songs and Cheers
- Word Walls

Structural Analysis

- Word chunks have meaning...
- Try to include word origins and histories.
- Examples
 - FRACTION
 - GEOMETRY
 - QUADRILATERAL
 - ISOSCELES TRIANGLES

Context Clues

- Definition clues: **defined** in context
- Example: Which two figures are congruent (**same size, same shape**)?



Context Clues

- Appositive Clues: **Synonym** or description given
- Example:
Record your **multiplication answers** in the boxes. No two **products** should be the same.

Context Clues

- Example Clues: an example is provided!

The Guessing Game

Ms. Engle's class is playing a guessing game. One student makes a pattern. Then the other students find the next 3 numbers in the pattern and tell how the pattern was made.

Andrew made this pattern: 5, 9, 13, 17, 21.

Jana correctly said that the next numbers are 25, 29, and 33 and that Andrew made the pattern by starting with 5 and adding 4 over and over.

a. This is Ruth's pattern: 1, 7, 13, 19, 25, 31.

- Write the next 3 numbers in Ruth's pattern.
- Explain how Ruth made her pattern.

Analogies

- Analogies help students make **connections** and **clarify relationships**.
- Practice doing them...
- Then write them.

Numerator is to top as denominator is to _.

Circle is to cylinder as ___ is to cube.

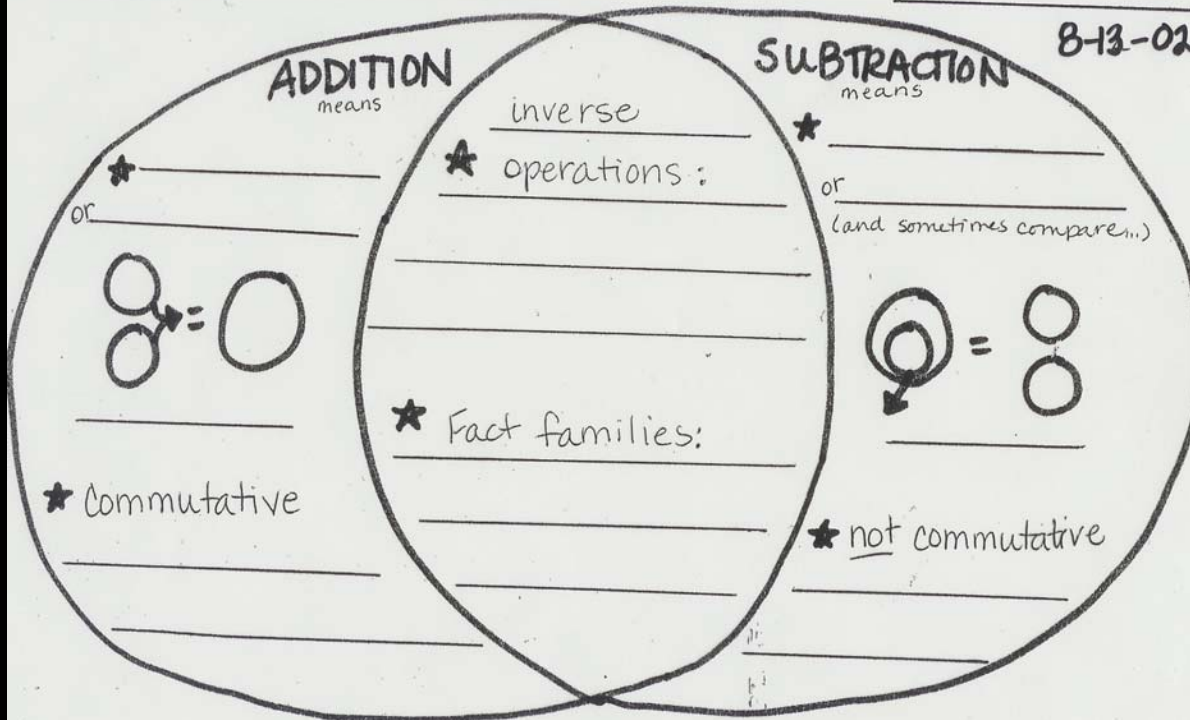
Graphic Organizers

- Venn Diagrams
- Word Maps
- Frayer Model
- Other Graphic Organizers

Venn Diagrams

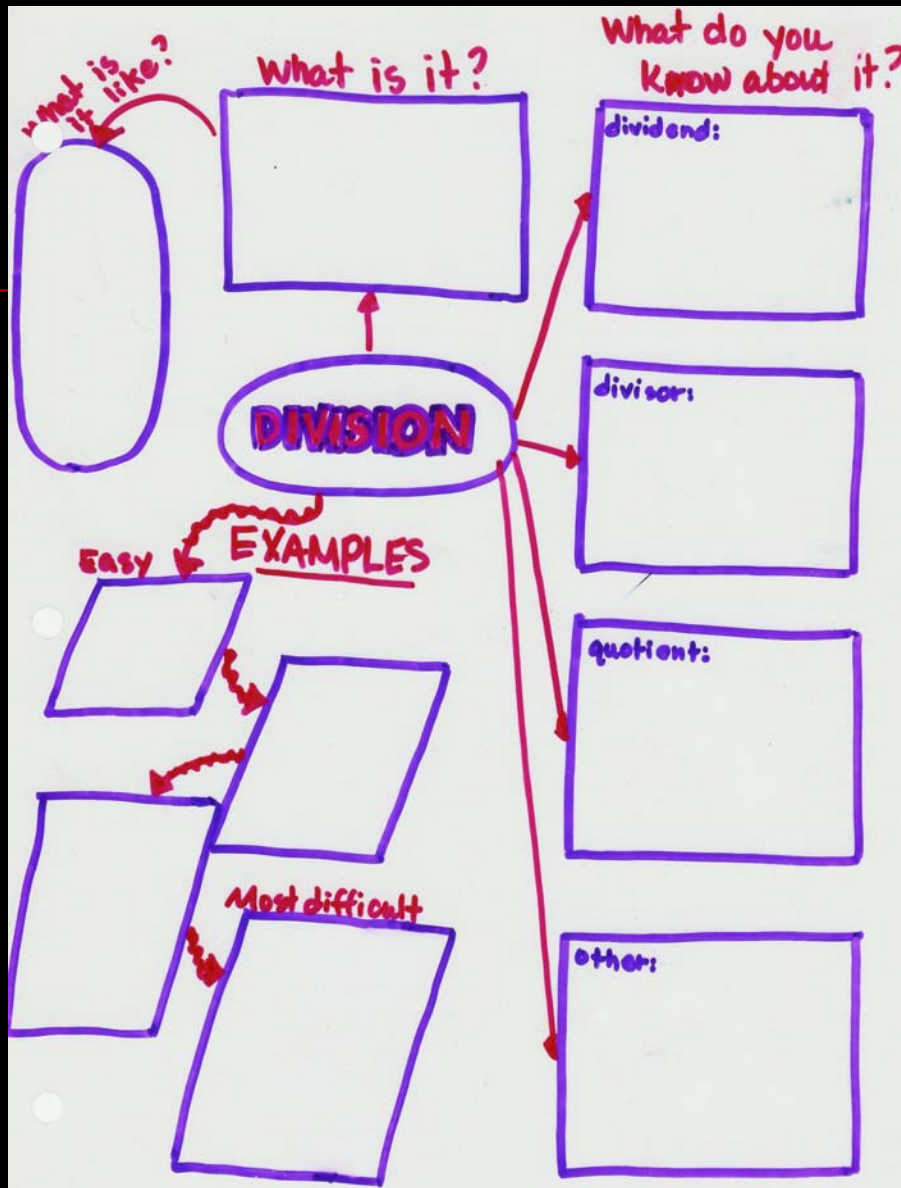
Fact Families and Equations

8-13-02

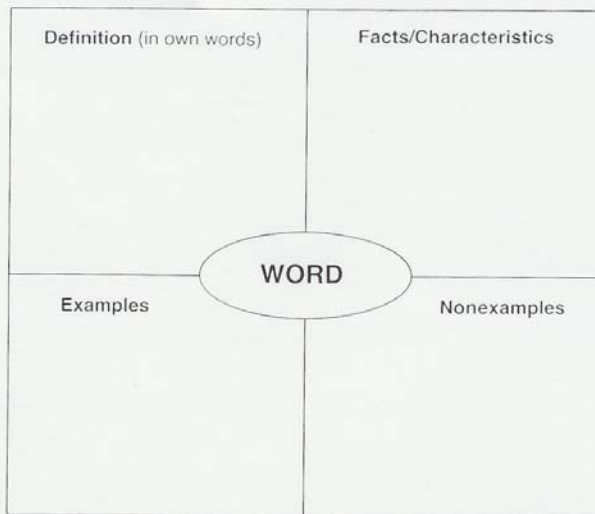


ORGANIZER: Venn Diagram

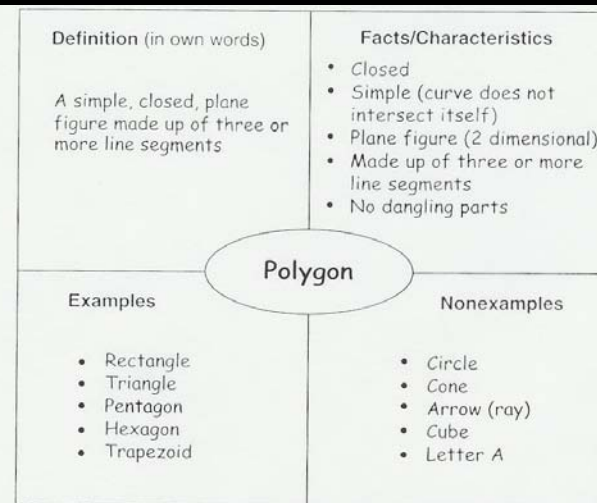
Word Map



Frayer Model



Note: From *A Schema for Testing the Level of Concept Mastery* (Working Paper No. 16), by D. A. Frayer, W. C. Frederick, and H. G. Klausmeier, 1969, Madison, WI: University of Wisconsin Research and Development Center for Cognitive Learning. Copyright 1969 by the University of Wisconsin. Reprinted with permission.



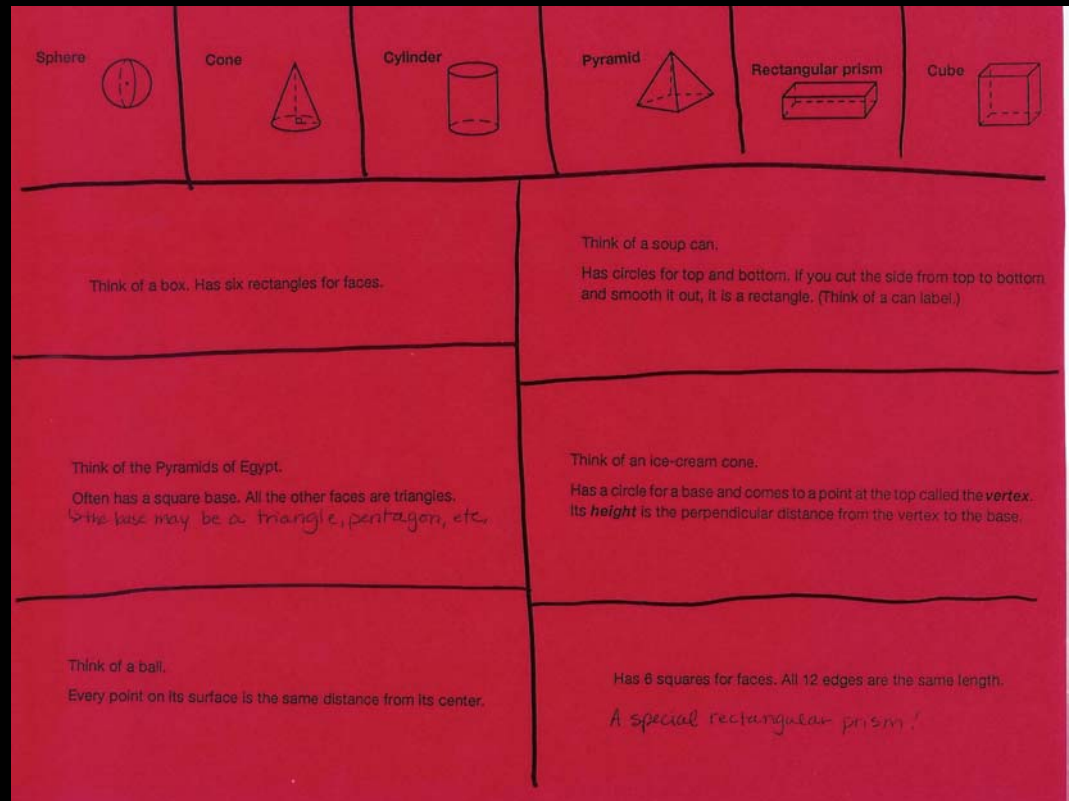
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Other Graphic Organizers

- Semantic Feature Analysis
- Semantic Map
- Flow Chart
- Analogy Map
- Web resources
 - www.eduplace.com/graphicorganizer/
 - www.teachervision.fen.com/lesson-plans/lesson-6293.html
 - www.enchantedlearning.com/graphicorganizers/

Manipulative Materials

- Manipulative materials help you reach the kinesthetic/tactile learners.
- Others think they are playing a game!



Kinesthetic Vocabulary

- Get them up and get them moving.
- Find **active** definitions or make them up.
Let students create some of the definitions.
- Examples:
 - ODD AND EVEN
 - LESS THAN
 - CIRCLE PARTS

Songs and Cheers

- Why?
- Find them, use them, write them.
- Examples:
 - Gallon Guy Song
 - Perimeter and Area Song
 - Volume Cheer

Word Walls

- Keep an area specifically for **math words**.
 - Some do words only.
 - Some do words, definitions and examples.
- Set YOUR rules for math word wall words.
- “Just another brick in the wall...”

Connections to Literature

- Read Alouds
- Guided Reading
- Reader's Theater



Read Alouds

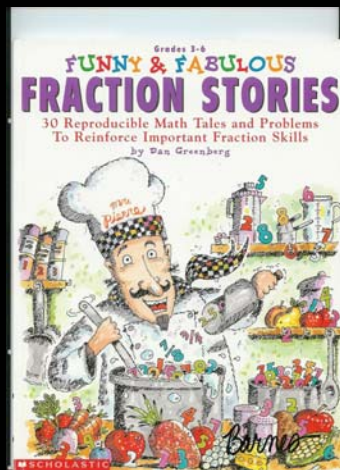
- Introduce a topic
 - Goldilocks and the Three Bears
- Tool for reviewing
 - Hershey Fraction book
- Use a problem in a book or related problem
 - Pigs Will Be Pigs
- An activity to improve listening skills
 - Pigs Will Be Pigs

Guided Reading

- According to **Fountas and Pinnell**
 - Look around at the conference...
 - Great leveled materials are available
- According to **Four Blocks**
 - Use your math book or other math materials.
 - Resources like Readers Handbook (Great Source) are good tools.

Reader's Theater

- Using materials that are out there...




- Or create your own!

SKILL 3:
Drawing and Identifying Fractions

Name _____

The History of Fractions: A Play in One Act

Written and Performed by the Students in Ms. Webster's Class



NARRATOR: Experts believe this method of dividing cookies was used for thousands of years. But as the Iron Age dawned, kids began to squabble over the size of the cookie pieces they got.

IRON AGE KID: His piece is bigger than mine!

OTHER KID: No, hers is bigger!

IRON AGE KID: Hey, what's going on in there?

IRON AGE MOM: (to Dad) Let me borrow your ax. (She cuts another cookie into two equal pieces.)

DAD: What do you call this strange new method of peacemaking?

MOM: I call them HALVES.

BOTH KIDS: Wow.

NARRATOR: And so it was discovered that two halves of something had to be of equal size. (And so did three thirds, and four quarters, and five fifths.) Following this discovery, fractions flourished in the Ancient World. True, there were those years during the time of the Romans when fractions were very difficult to write and use.

ROMAN MOM: (shopping at Roman store) Let's see...I'd like a VIIIth of a

NARRATOR: No one knows for sure who discovered fractions. But experts suspect it had something to do with the invention of the cookie, back in the Stone Age.

STONE AGE MOM: Look, kids! It's one of those newfangled cookie things!

STONE AGE KID: I want it.

OTHER KID: No, I want it.

MOM: Now look what you did. You broke the cookie in two different-sized parts. Hmm—that gives me an idea. You take this part. And you take this other part. (She gives a part to each kid.)

BOTH KIDS: Gee, thanks.

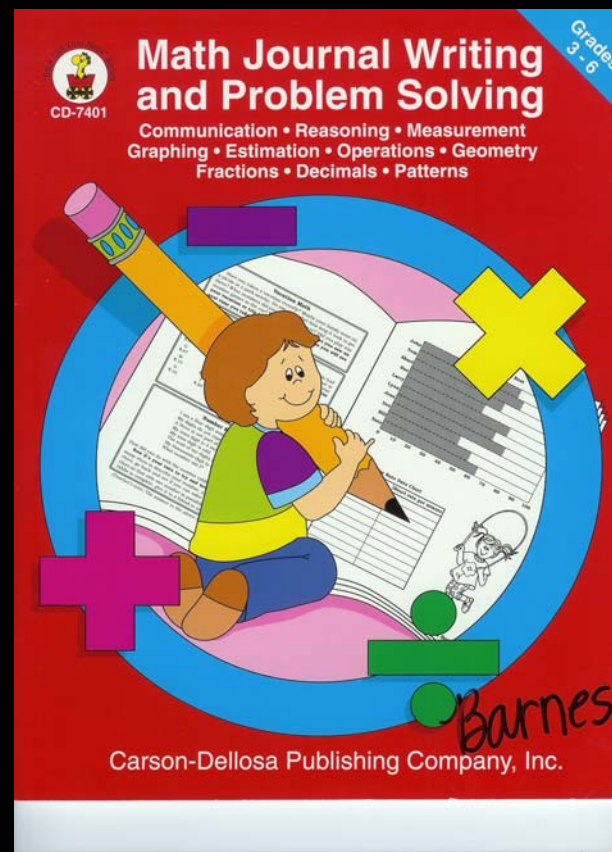
18

Writing in Math

- For many of us, open response or open-ended questions are part of our **state assessment**. Thou shalt...
- Even without such assessments:
 - Writing is an important part of learning.
 - Writing is an important part of assessment.

Journals and Learning Logs

- Help students clarify their thinking. (problem solving logs)
- Help students become effective communicators (organization and notation) in math. (letters)
- Opportunities for assessment abound.



Quick Writes

- Quick writing is **short, focused writing** in response to a specific prompt.
- Often used to bridge old learning to new.
- Good tool for **reflecting**.
- Example: 3-2-1
 - 3 things you have learned at the conference
 - 2 freebies that you have picked up
 - 1 thing you would change

Using Interactive Writing

- Like the LEA or Language Experience Approach
- Not just for the younger ones...
GREAT scaffolding for those early open response math problems!
- Chart paper, graph paper, or the overhead

Attacking Problem Solving With the Writing Process

1. Understand
2. Plan
3. Solve
4. Look Back
(Check and Reflect)

Attacking Problem Solving With the Writing Process

1. Understand:

Read the problem...

What are the facts?

What is the question?

Writing Process:

Researching during the pre-writing.

May begin to put ideas on paper.

Attacking Problem Solving With the Writing Process

2. Plan

What can I do to solve this problem?

What strategies can I use?

Estimate my answer.

Writing Process:

Pre-writing: Using a graphic organizer to put ideas on paper.

Attacking Problem Solving With the Writing Process

3. Solve

Do all the steps.

Make sure you include your pictures or diagrams.

Writing Process:

Drafting: Reeeeeally getting your ideas on paper.

Attacking Problem Solving With the Writing Process

4. Check your solution.

Is it reasonable?

Is my math correct?

Did I answer THE question?

Writing Process:

Revise and edit. Did I leave anything out?

Can I say it more clearly or precisely?

Attacking Problem Solving With the Writing Process

4. Reflect – Look back...

What did I learn?

Summarize and generalize...

Writing Process

Reflections...

Attacking Problem Solving With the Writing Process

Publish?

- Share the solution with a partner, the group, the class or the teacher.
- With testing, students share the writing with a scorer.

(Talk about writing to an audience!)

Riddles, Rhymes and Other Writing Projects

Riddles

- Math version of I-Spy
- Use your math word wall words
- Writing riddles for quilt squares
- Who is home? Who is behind the fence?

Riddles, Rhymes and Other Writing Projects

Rhymes

- Math poems
- Math songs
- Math cheers

Riddles, Rhymes and Other Writing Projects

Other Writing Projects

- Alphabet Books
- How-to Books
- Career Investigations
- Mathematicians (Research & Timeline)
- Fractions in Action Project
- Budget Project

READING Topics

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WRITING Topics

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- Interactive Writing
- Attacking problem solving with the writing process
- Riddles, rhymes and other writing projects

In closing...

- Questions, comments, concerns?
- Please complete the evaluation form.
Thanks!

Frequently Used Resources

- *A Handbook of Content Literacy Strategies: 75 Practical Reading and Writing Ideas* by Elaine Stephens and Jean Brown. Published by Christopher-Gordon in 2000.
- *Content Area Literacy: Interactive Teaching for Active Learning* by Anthony Manzo, Ula Manzo, and Thomas Estes. Published by John Wiley & Sons in 2001.
- *Teaching Reading in Today's Elementary Schools* by Paul Burns, Betty Roe, and Sandy Smith. Published by Houghton Mifflin in 2002.