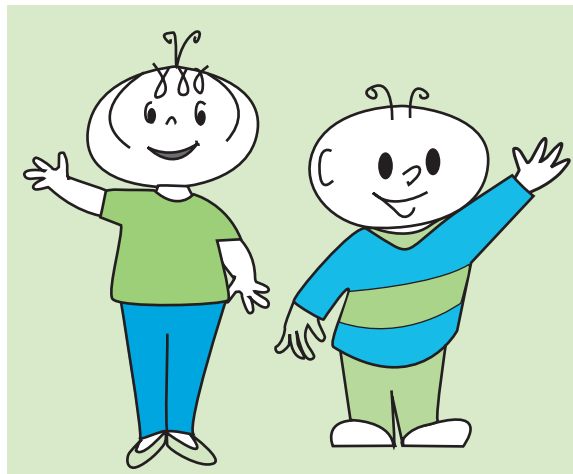


Alphabet Number Soup: Mmmm, Mmmm, Good

Integrating Math and Language Arts Using Headline Stories

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A Sample Headline Story

It is almost the end of the school year and 20 Kindergartners familiar with the Math Workshop program look at this headline. There is calm, no anxious faces or kids saying, "I can't do that". The Teacher, who is the scribe, poses the question, "What can we say about this and can someone begin for us?"

Here are some student responses:

$5 - 3 =$

There were 5 tadpoles, but I took 3 away. Now I have 2 tadpoles. (ZW)

I had 5 green frogs. 3 jumped away into a different pond. I have 2 frogs left. (BB)

I had 5 eggs. 3 hatched. Now it would leave 2 eggs.

Joey was 5. His little brother was 3. Joey was 2 years older than his brother. (PG)

Jaqui was 3. Her older sister was 5. Jaqui was 2 years younger than her sister. (ER)

Mosey was 5 years old. 3 years ago he was 2. (MH)

I was 3. My brother was 5; and he was 2 years older than me. (AH)

I had 5 minutes to get dressed and get to the park. It took 3 minutes to get dressed. I had 2 minutes to get to the park. (EH)

I had 5 minutes to catch the bus. It took me 3 minutes to brush my teeth. I had 2 minutes left to catch the bus. (TM)

I had 5 plants next to the pond. 3 died. 2 are left. (GS)

I had 5 alligators. 2 swam away. I had 3 alligators left. (FG)

I had 5 worms. 3 got eaten by a bird. I had 2 left. It was 5 o'clock. ~~at school~~ We left school at 3:00 that ^{was 2 hours ago.} (TM)

In the first three responses we see how children at this age level are impressionable and so attach their learning to teacher and peer driven words and language. In this case, the children change the main words to give themselves ownership of the idea and yet still approach the headline with the idea of separating or pulling apart the number 5.

The next four responses approach the headline differently. The first in this category begins with a new idea of age and compares the different ages using the headline numbers. They use comparison language such as "older than," "younger than," and "years ago" to express finding the difference. This is a more complex approach to working with the headline.

The next two examples relate time to the numbers. Children break down 5 minutes into 3 minutes used and 2 minutes left, which shows that they can apply their thinking to alternate representations to help make sense of the math.

Notice that at the early elementary level children's thinking often draws upon responses and ideas from other students. They may not entirely copy an idea but will often use some connecting feature. The second child's response has moved on from tadpoles to frogs although the flavor of the response is similar in thinking. Students often make sense of Math when they have real world examples set in the context of their learning. The numbers are representative of real life items to the students and so the learning is not separate from the world around them. This headline provides an open-ended invitation to students to think about subtraction and so students use multiple approaches to make sense of it.

ALL of the examples on this page represent typical Kindergarten student responses. Some talk about their siblings, their frog pond, getting dressed in the morning, catching the bus to school, playing at the park, brushing their teeth, imaginative worm collections and alligators. Kindergartners are very imaginative and so try to make sense of the math world around them through the real world they know and experience.

What are Headline Stories?

Headline Stories prepare children to be creative problem solvers and logical thinkers. A Headline Story can be any open-ended situation about which you can make many true statements and in which specific mathematical ideas are given. Like a headline in a newspaper, Headline Stories give clues about content but they leave out the details. Part of the learning goal is to have students figure out what they can ask and answer in any given situation. Children approach mathematics in multiple ways and headline stories allow for these differences. The stories require 5 to 10 minutes and may or may not be connected to a lesson theme.

You can use Headline Stories to:

- enable children to see a connection between mathematical ideas and the real world around them. Too often mathematics is taught in isolation so that children are unable to make sense of how their learned skills can be practically applied.
- help children to develop the skill of using language to describe ideas from mathematics.
- help children understand how word problems are built so that they are better able to solve them.

Types of Headline Stories

There are three types of headline stories I would like to share. Each type is different and requires a unique frame of thinking.

1. Story about a picture, a number, or a number sentence.



$$4 + 2 = \underline{\quad}$$

- There are 5 shapes: 3 black and 2 white.
- There are 5 shapes: 3 squares and 2 circles.
- 2 shapes are on top; 3 are on the bottom.
- If I draw a white square in the middle of the top row, then the top and bottom rows will be the same, only different colors.
- My brother is 4 years old. In 2 years, he'll be 6.
- It's 4 o'clock. In 2 hours, it'll be 6.
- I have 4 cats and 2 dogs. That's 6 animals.
- I had 4 books. I got 2 more at the library. Now I have 6 books.

2. What are the possibilities?

I have ___ coins worth ___ cents.

- I have 3 coins worth 7¢: I have a nickel and two pennies.
- I have 2 coins worth 50¢: I must have two quarters.
- If I know how many coins and the total amount, can I always tell which coins I have?
- If I have 6 coins, I can't have less than 6¢.

There are 6 cookies. _____ children could have _____ cookies each.

- 3 children could have 2 cookies each, or 6 children could have 1 cookie each.
- 4 children could have a cookie each, and 2 cookies would be left over.
- Up to 12 children can have half a cookie each.

3. What can you say?

I have 12 cents.

- It's impossible to tell for sure how many coins you have.
- You have at least two pennies.
- You have at least three coins.
- You have no more than 12 coins.
- You might have 4 coins.
- If you spend 7 cents, then you'll have 5 cents left.
- That's a dime less than 22 cents.

In one of my pockets I have an even number of marbles; in the other pocket I have an odd number of marbles.

- I might have 1 marble in one pocket and 2 marbles in the other.
- I might have 3 marbles in one pocket and 6 marbles in the other.
- What do I know for sure? (I know that if I combine the marbles in both pockets, then I'll have an odd number of marbles; I know that if I take one away from the odd number, then I'll have an even number; I know that if I take one away from the even number, then I'll have an odd number.
- What can't I tell for sure? (I don't know for sure how many marbles I have in each pocket; I don't know for sure which pocket has more marbles.

Creative Strategies and Types of Responses

It takes time for students to become familiar and comfortable with the problem solving involved in *Headline Stories*. *Headline Stories* expose children to the many ways that word problems are constructed, providing students with language and vocabulary that may be new. Once there is familiarity, students solve problems using different strategies.

A creative strategy is to add information ("If I had one more penny...") or to invent problems ("If I bought gum for 5¢..."). It takes time for students to become creative in their responses and to develop a good sense of what are relevant responses. However, this time pays off as students develop their language skills, become good logical thinkers, and begin moving fluently between a real-world situation and its mathematical description.

Responses do not have to include numbers. In general, good responses:

- describe a pattern implied by the given information
"It looks like he doubles each day."
- describe a result that can be derived logically
"By Thursday, he earned \$15."
- pose a question or a new problem
"How much will he earn next Monday?" or "Could this pattern continue?"
- clarify or extend the situation
- make a prediction that seems relevant and likely
"I think he'll earn \$16 on Friday."

Examples of Headline Stories

Examples from Grade K

Students make stories about a number or groups of numbers, which helps them relate numbers to the real world, develops their language skills, and sets the ground for more complex headline stories that involve problem posing and problem solving.

The headlines below grow in complexity. Write one headline on the board each day and ask students to tell a story about it, such as, “Tell me a story with 1 in it.”

You might have students draw pictures about the numbers and then tell a story using their pictures as a reference. Examples of headline stories students might create are next to each headline. Try to get a variety of different responses. Depending on the level of your students and your preferences, feel free to skip or repeat a headline.

| Sample Responses | |
|-------------------------|---|
| Headline 1: 1 | I have 1 bicycle; the tooth fairy left me 1 quarter; I have 1 sister. |
| Headline 2: 2 | We all have 2 eyes (ears, arms); my bicycle has 2 wheels; it’s two o’clock. |
| Headline 3: 3 | A tricycle has 3 wheels; I have 3 pennies; here are 3 fingers; a knife, a fork, and a spoon make 3. |

Once your students are fluent with one-number headline stories, ask them to tell stories about headlines with two numbers. At this time don’t insist on the idea of addition in the stories. Students should simply relate numbers to the real world:

| | |
|----------------------------------|---|
| Headline 4: 1, 2 | I have 1 dog and 2 cats; here is 1 finger and here are 2 fingers; I have 1 backpack and 2 shoes. |
| Headline 5: 1, 3 | There is 1 big ball and 3 small balls; we have recess at one o’clock and go home at 3 o’clock; I have 3 coins in my one piggy bank. |
| Headline 6: 2, 3 | A bicycle has 2 wheels, a tricycle has 3 wheels; I have 2 power bars for snack today—tomorrow I’ll ask Mommy for 3. |
| Headline 7: 1, 2 -> 3 | There is 1 apple and 2 bananas, that makes 3 fruits; my baby brother is 1 year old now, in 2 years, he’ll be 3 years old. |
| Headline 8: 2, 1 -> 3 | John and I played tag and Laura joined, so all 3 of us played; It is two o’clock now, it will be three o’clock in an hour; I had 2 coins and today I found 1 coin, so now I have 3 coins. |
| Headline 9: 2, 2 | I have 2 arms and 2 legs. I found 2 pennies in 2 days. |
| Headline 10: 2, 2 -> 4 | 2 pairs of socks make 4 socks; 2 bicycles have 4 wheels. I have 2 pennies and 2 nickels, that’s 4 coins. |

Students continue to make stories about numbers, which helps them relate numbers to the real world, develops language skills, and promotes problem posing and problem solving. Write one headline on the board each day and ask students to tell a story about it. You might write each story on the board following the author's name. Feel free to skip or repeat a headline.

To get a variety of responses, you might start several stories for students to finish or have students draw pictures of their stories before sharing them with the class. Also, explain that students can make up pretend stories—their stories don't have to be true.

Sample Responses

Headline 41:

$$3 + 2 = \underline{\quad}$$

$3 + 2 = 5$. My sister is 3. In 2 years, she'll be 5, and then she'll start kindergarten.

Headline 42:

$$6 + 2 = \underline{\quad}$$

$6 + 2 = 8$. It's 6 o'clock. In 2 hours, it will be 8 o'clock, and then I'll go to bed.

Headline 43:

A squirrel jumped by 2s from 0 to 10.

It jumped from 0 to 2, 2 to 4, 4 to 6, 6 to 8, and 8 to 10. After jumping two times, it was at 6. It made 5 jumps in all.

Headline 44:

$$5 - 1 = \underline{\quad}$$

$5 - 1 = 4$. I had 5 cookies. I ate 1, and now I have 4 left.

Headline 45:

$$10 - 5 = \underline{\quad}$$

$10 - 5 = 5$. The cake was cut into 10 pieces. My family ate 5 pieces, and now there are 5 pieces left over.

Headline 46:



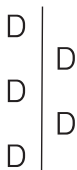
There are 3 Cs inside the rectangle. There is 1 C outside the rectangle. There are 4 Cs in all.

Headline 47:

$$5 > 3$$

I'm 5 and my sister is 3, so I'm older than my sister (my sister is younger than I am).

Headline 48:



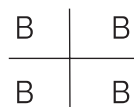
There are 3 Ds to the left of the line. There are 2 Ds to the right of the line. There are 5 Ds in all.

Headline 49:

$$10 > \underline{\quad}$$

$10 > 5$. The pile of 10 crayons is bigger than the pile of 5 crayons.
 $10 > 3$. The pile of 3 crayons is smaller than the pile of 10 crayons.

Headline 50:



There are 2 Bs above the line. There are 2 Bs below the line. There are 4 Bs in all.

Examples from Grade 1
Lesson 31

Headline Story

Bettina arranged her pennies into a square. What can you say?

Sample responses: If her square is filled in, then she has 1, 4, 9, 16, 25... pennies. If her square is empty, then she might have 1, 4, 8, 12, 16, ... pennies.

Lesson 39

Headline Story

One red rod is as long as 2 white rods, so ___ red rods are as long as ___ white rods.

Sample responses: 2 red rods are as long as 4 white rods; 5 red rods are as long as 10 white rods; 10 red rods are as long as 20 white rods.

Examples from Grade 2
Lesson 28

Headline Story

If pencils cost 10¢ each and erasers cost 5¢ each, what could you buy for \$2.00?

Sample responses: You could get 20 pencils or 40 erasers. You could get 10 pencils and 20 erasers. You could get 19 pencils and 2 erasers. You could get 10 pencils and 10 erasers and have 50¢ left.

Lesson 61

Headline Story

Ella has an allowance of \$12.00 a week. She promised $\frac{1}{2}$ of her allowance to her little sister for making her bed every day. She promised $\frac{1}{3}$ of her allowance to her brother for letting her watch her favorite television show. She promised to pay her neighbor $\frac{1}{4}$ of her allowance every week for a window that she broke. Does Ella have any money left? Is Ella going to have trouble paying everyone? How do you know?

Sample answer:

Ella is supposed to give her sister \$6.00, her brother \$4.00, and her neighbor \$3.00. She's \$1.00 short of the amount she needs unless she has some savings.

Lesson 35

Headline Story

In 2001 I turned 6 years old.

Sample responses: In 2000 I turned 5 years old. I was born in 1995. In 2003 I will become 8 years old. This year, I'm...

Examples from Grade 3
Lesson 1

Headline Story

Make a story to fit the number sentence $6 + 4 = 10$.

At this stage of the year, you may need to help students get started, or help them move away from stereotyped repetitions of essentially the same problem. Here are some sentence starters you may want to use:

- I wake up at 6 o'clock. (Four hours later...)
- Ten children were on line at lunch... (Six were girls...)
- I ended at the 10 on the number line after one jump. (I started at...)
- I rolled two dice...

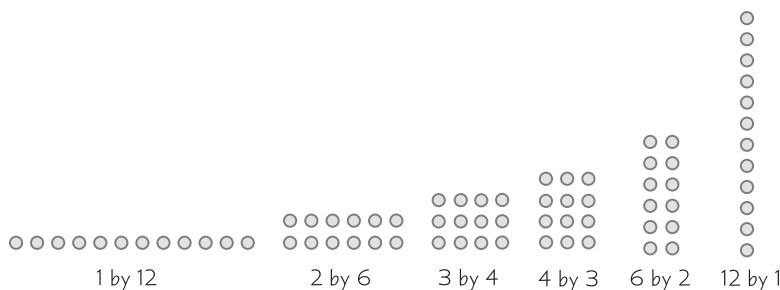
Sample responses: It is 6 o'clock now, so in 4 hours it will be 10 o'clock; I am at 10 on the number line now, but I started at 6, so I jumped forward 4 spaces; I have 10¢ all together, and I have 4¢ in one hand, so I have 6¢ in the other hand; There were 6 kids at the swing set, and after some more came there were 10. How many more kids came?

Lesson 11

Headline Story

John arranged 12 counters in a rectangle. What can you say?

Sample responses: It's impossible for one of the rows in the rectangle to have 5 counters in it; The rectangle could have one row that is 12 counters long; John could have arranged the counters in 6 different ways.



Lesson 91

Headline Story

Fill in the blanks to complete the pattern: 700, 685, 670, __, __, __, __, __, __, __, 550.

Sample responses: 700, 685, 670, 655, 640, 625, 610, 595, 580, 565, 550; Each number is 15 less than the number before it; The ones digits alternate between 0 and 5; All the numbers are multiples of 5.

Learning mathematics within a story/context that catches children's interest can be very powerful. Many trade books provide mathematical problems woven into the framework of the story. Children can relate to adventure stories like Stuart J. Murphy's *The Penny Pot*, for example, in which a character needs to know the value of coins and count her money so she is able to pay for her face to be painted. Children enter into the story and enjoy the embedded mathematical ideas as they relate to the characters.

In later grades, students may be given the task to write their own stories that contain the math problems. They could work in groups and create a storybook for others to read, listen to and solve the problems contained in them. This strategy has been shown to be effective in helping children understand arithmetic operations and become more effective problem solvers (Ford 1990). This type of activity allows for an interesting integration of language development, mathematics and art for children.

Tips

- To keep mathematics alive the whole day, use a regular time for Headline Stories that isn't directly before or after the math lesson.
- Read a headline to the class or write it on the board for students to read themselves.
- Ask questions to prompt students to think about the headline and share their ideas: What can you say about the situation? What questions can you ask? What problems can you pose? What can you figure out or predict?
- Record the most mathematically relevant responses so the class can see them (even if they aren't yet reading well). In doing so, you call special attention to them while accepting a wide range of other responses.
- In the beginning of the year, give students ideas about what kinds of things are relevant to say. For example, give headlines with sentence starters to complete, such as, "My sister is two years older than I am. When I was 4..." When students have more experience, you can present the same headline story more briefly as, "My sister is two years older than I am."

References

Ford, Margaret I. "The Writing Process: A Strategy for Problem Solvers." *Arithmetic Teacher* 38 (November 1990): 35-38

Murphy, Stuart J. "The Penny Pot". MathStart Series , (September 1998) Harper Collins Children's Books.