Thinking Mathematically

A Newsletter for New Hampshire Adult Educators • Issue 1 • September 2005

From the Editor…

Greetings from Ouagadougou, Burkina Faso! Although I can't be with you in person, I would like to continue sharing math ideas that you might be able to use with your students. This first issue is geared towards basic number skills. Future issues will have more difficult concepts. Keep in mind that even if you teach GED level math, the activities in this issue are good warm-up activities to start out a class.

As I begin this monthly endeavor, I would like to ask for your feedback. Does this format – an email attachment – work for everyone? Would you prefer that it be a hard copy? There is also the possibility of putting this information on a web site as well. Please email me to let me know what works best.

If there are topics you seem to struggle with more than others and you would like specific teaching ideas on these topics, let me know, and I'll see what I can come up with for the next newsletter.

And finally, if you would like to share an activity that worked well in your classroom, please send it to me - I would love to include it in the following newsletter.

Please e-mail me with any and all suggestions, ideas, criticism, or comments. My e-mail address is: restabrook@yahoo.com

Thanks!
~Ruth

Problem of the Month

Place the numbers 7, 8, and 9 in such a way that each row, column, and diagonal will have the same total.

	1	6
3	5	
4		2

AN UNFORTUNATE MIX-UP IN THE SIGN PAINTING DEPT.

"A Question of Questions"

The richness and variety of types of mathematical communication used by your students depends on the type of questions that you ask them. Do your questions require at least a sentence as an answer, or just one word or symbol? Can your students be creative in finding various solutions, or do they expect there to be just one answer? Here are three ideas for types of questions which are open-ended and likely to develop language and thinking skills.

"Tell all you know…"
Tell all you know about the number 24.

"What is the question?"
The answer is 15 cents. What could the question be?

"Give Three Problems…"
Give three problems that could be solved using

$2 \times \square + 3 = 15$

From "What's HOT in Math", Brooklyn College School of Education, Spring 1993

"THERE'S A 70% CHANCE OF RAIN TOMORROW. ... THAT'S 21% CELSIUS."

Questions, Please…

Concepts are reinforced and more connections are made if students have a chance to approach a topic from many angles. The following problems give the answers, and ask for the questions. You can easily create problems like this of your own, focusing on the topic you are teaching. (© 1991, Cook.)

PIZZA, PIZZA
There are 7 pizzas – 4 pepperoni pizzas and 3 mushroom pizzas. Each pizza is cut into 8 slices.
If the answer is … what could the question be?

56

8

24

28

32

EGGS AND MORE EGGS

On the counter are 8 loose eggs, an empty carton (for a dozen), and 3 full cartons of eggs.
If the answer is … what could be the question?

28

36

48

4

11

Clues

This activity works well for a group of four students working with a pile of coins or other manipulative. The group is given a set of four cards, each of which has a different clue. The students try to arrange the manipulatives so that all of the clues are satisfied.

Each student is given a card that no other student can look at. A student is responsible for reading her clue aloud when asked.

Students can be challenged to see if they can find more than one solution for a set of clues. Students can also be challenged to design a set of four clues for varied manipulatives such as geoboards, tangrams, pattern blocks, or coins.

Here are two examples using coins.

Example 1:

Just two of the coins are the same.

There are five coins.

The value of the coins is an even number.

With the coins you could buy one pencil which costs 30¢ but not two.

Example 2:

There are five coins.

Three of the coins are the same.

The total is a multiple of 5.

If an eraser costs 25¢, you could buy two erasers but not three.

Make 12

Shuffle a deck of 52 cards and place the top 12 cards face up in a grid of 3 by 4. The object of the game is twofold:

1. to collect cards whose sum is 12
2. to accumulate as many cards as possible

For example, suppose the grid looked like this:

Q (12)	9	6	5
7	8	8	1
4	J (11)	3	7

If it were my turn, I would remove the 6+5+1 and the 9+3. I would have 5 cards in my pile, and the grid would look like this:

Q (12)			
7	8	8	
4	J (11)		7

Replace the empty spaces with cards from the deck. Now it would be the next player's turn. Play is stopped when the last card is used, four kings appear, or a player can no longer make 12.

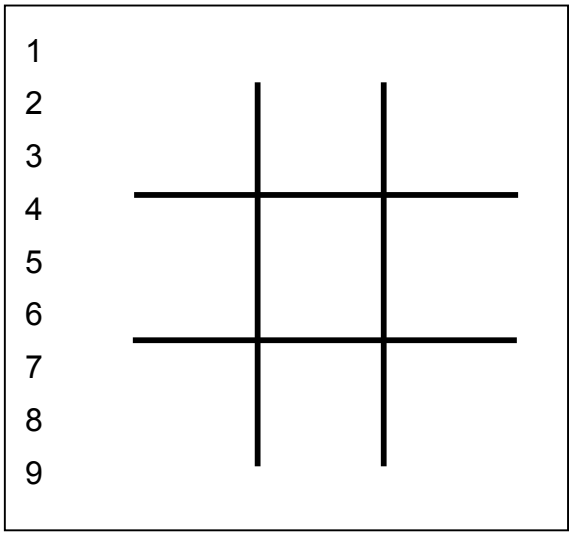
For a variation, change the sum from 12 to 15.

Tic-Tac-Toe Addition

In this version of tic-tac-toe, players take turns putting numbers on a tic-tac-toe board. The player who completes any row, column, or diagonal that "adds up" wins. Numbers "add up" if ANY two numbers in the row, column, or diagonal add up to the third number. For example, 4, ___, 3 may be completed with either a 1 (3 + 1 = 4) or a 7 (3 + 4 = 7).

The person who goes first cannot start in the center square, and no number may be used twice.

Use the numbers to the left of the tic-tac-toe board to keep track of which numbers have been used, crossing out ones that have been used.



You may want to make a board on an 8 ½ by 11 sheet of paper, and make nine number tiles, so the game can be played over and over. You can also put the game sheet in a plastic sheet protector and players can mark their numbers with dry erase markers.

Number Squares

Suppose you have five squares of paper with the numerals 1, 3, 5, 7, and 2 written on them. Using any combination of numerals, arrange them so as to produce the numbers listed in the chart.

1.	Largest possible number
2.	Smallest possible number
3.	Largest even number
4.	Largest odd number
5.	Smallest even number
6.	Smallest odd number
7.	Largest number divisible by three
8.	Largest number divisible by four
9.	Largest number divisible by five
10.	Largest number divisible by seven
11.	Smallest number divisible by three
12.	Smallest number divisible by four
13.	Smallest number divisible by five
14.	Smallest number divisible by seven
15.	Smallest number divisible by two

Try the same problem but use squares of paper marked with the numerals: 2, 4, 6, 8, and 9.

Source: Brain Drain, Creative Teaching Associates, 1975.

Answers

Problem of the Month

8	1	6
3	5	**7**
4	**9**	2

A Question of Questions

"24" sample answers:
- is even
- has factors of 1, 2, 3, 4, 6, 8, 12, and 24
- is twice as much as 12
- is half as much as 42
- is the number of hours in a day
- is 2 dozen

15¢ sample answers:
- If a pen costs 85¢ and I pay with a dollar, how much change will I get?
- If an item costs $3.00 and there is a 5% tax on it, how much is the tax?
- Max has 5¢. If Leo has 10¢ less than 5 times as much as Max, how much does Leo have?

"Three Problems" sample answers:
- I'm thinking of a number. If you double my number and add 3, you will get 15. What number am I thinking of?
- If you give me as many quarters as I already have, then I find three more quarters in a soda machine, I will have 15 quarters. How many quarters did I have to begin with?
- Each package of Munga Mints has the same number of mints. If I have two packages of Munga Mints and you give me three more mints, I will have 15 mints altogether. How many mints are in a package?

"Pizza, Pizza" Sample Answers

56 – How many slices are there altogether?
8 – If Barb ate half of a pepperoni pizza and half of a mushroom pizza, how many slices did she eat?
24 – How many slices of mushroom pizza are there?
28 – If each pizza feeds four people, how many people can be fed by these 7 pizzas?
32 – How many slices of pepperoni pizza are there?

"Eggs and More Eggs" Sample Answers

28 – If I scramble 2 full cartons of eggs plus half of the loose eggs, how many eggs is this?
36 – How many eggs are in cartons?
48 – If all 4 cartons were full, how many eggs would this be?
4 – If I put the loose eggs in the empty carton, how many empty spaces would there be?
11 – If I broke an egg in a full carton, how many eggs would there now be in the carton?

Clues

Example 1: One quarter, two dimes, one nickel, and one penny.

Example 2: Three nickels, one dime, and one quarter.

Number Squares

With 1, 3, 5, 7, and 2:

1. 75,321	2. 1	3. 75,312
4. 75,321	5. 2	6. 1
7. 75,321	8. 75,321	9. 73,215
10. 72,513	11. 3	12. 12
13. 5	14. 7	15. 2

With 2, 4, 6, 8, and 9:

1. 98,642	2. 2	3. 98,642
4. 86,429	5. 2	6. 9
7. 9,864	8. 98,624	9. none
10. 98,462	11. 6	12. 4
13. none	14. 28	15. 2