Math Reader

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The Ant's Pantry

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Math Reader

Contents

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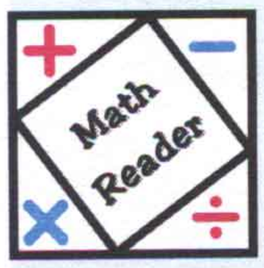

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Archimedes

by Hiroko Warshauer
Hiroko Warshauer teaches mathematics at Southwest Texas State University. She enjoys music and the arts, as well as working with students on math puzzles, problems, and activities.

"Eureka, eureka!," cried Archimedes, as he ran naked through the streets of Syracuse. By observing the amount of water that spilled over the bathtub as he bathed, Archimedes discovered that a floating body loses in weight the same amount as the water that it displaces. This often-told story may give us an idea of how Archimedes could become absorbed in his work and forget everything else, including his clothes.

Archimedes is considered one of the greatest Greek mathematicians of all times. He was born in the Greek city of Syracuse on the island of Sicily in 287 B.C. Though he lived over two thousand years ago, the ideas and methods that he used were rather modern.

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Archimedes' contributions to mathematics include finding a method for calculating the number π, a number that is used to find the area and circumference of a circle. He also invented many devices and machines, including the compound pulley and Archimedian screw that is used even today for raising water. Many ancient Greek texts contain his writings on plane figures, parabolas, spheres and cylinders.

During the Second Punic War, when Syracuse was being attacked by Marcellus and the Roman Army, it was Archimedes who devised machines for the defense of the city. The famous historian of the first century A.D., Plutarch, relates that it was during one of the sieges of Syracuse that a Roman officer became angry and impatient when Archimedes did not respond to him, continuing to work on his problems. Archimedes was killed as a result. It is also said that Marcellus felt very bad for Archimedes' death and sent favors to Archimedes' family to make amends.

[B] Bell, E. T., *Men of Mathematics*, Simon and Schuster, NY, NY, 1965.
[Ho] Hollingdale, Stuart, *Makers of Mathematics*, Penguin Books, NY, NY, 1989.

Decimals in Dollars Make Sense

by Hiroko Warshauer

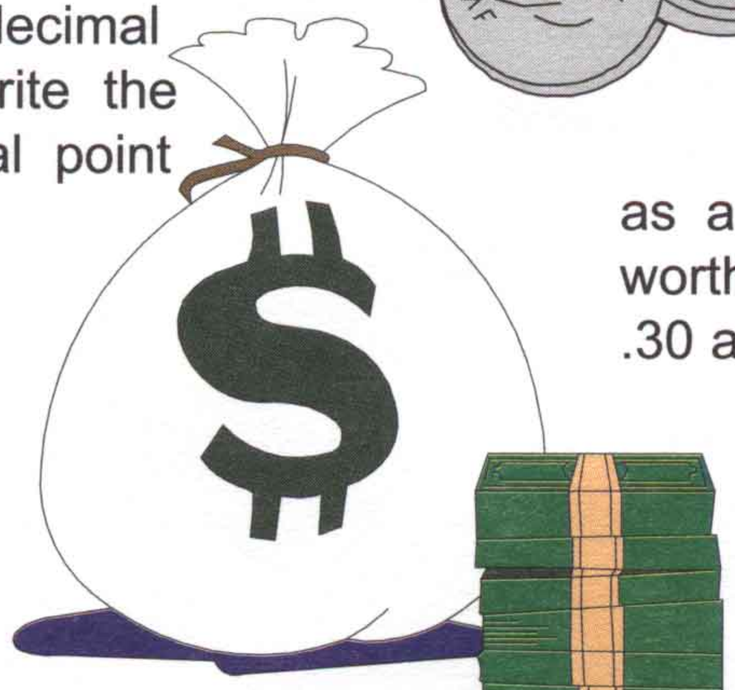
What is half of one dollar? What is one fourth of one dollar? How about one third of a dollar? Let's see how we can answer these questions in perhaps more than one way.

We usually write one dollar as $1 or $1.00. Sometimes we write 100¢ or one hundred cents. When we use the notation $1.00, notice that there is a dot to the right of 1. This dot is called a **decimal point**. Most of the numbers we have worked with so far have not involved decimal points. For example, numbers like 7, 15, and 208 do not need decimal points. If we were to write the numbers using a decimal point then we would have

7 = 7.

15 = 15.

208 = 208.



Putting digits left of the decimal point gives us numbers that mean the same as if we did not write the decimal point. The first place value to the left of the decimal is the one's place, the second place value to the left is the ten's and so on. What does it mean to put a number to the right of the decimal point?

Let's see if studying how we write our money values will help. Half of one dollar, which we write as $1/2$ of $1, can be expressed as 50¢, or as $.50. In other words, one way to write the fraction $1/2$ is .50.

How many quarters does it take to make a dollar? Exactly four. So a quarter is $1/4$ of a dollar. We write the value of a quarter as 25¢, or as $.25. The fraction $1/4$ is equivalent to .25. Numbers written like .50 and .25 are called decimal numbers. In money value we call it half of a dollar or a quarter of a dollar, respectively, but as a decimal we read **.50** as **fifty hundredths** and **.25** as **twenty-five hundredths**.

Since a dollar is worth ten dimes, one dime is one tenth of a dollar. We can write $1/10$ as a decimal number .10 and read it as ten hundredths. Notice that a dime is worth 10¢ and that one dime in a dollar is 10¢ out of 100¢ or $10/100$ which we read as ten hundredths.

How can we write the value of three dimes as a decimal number? Since three dimes are worth 30 cents or $3/10$ of a dollar, we write $30/100$ as .30 and read this as thirty hundredths.

We have $3/10 = 30/100$ in fractions. As decimals we write .3=.30.

Let's now consider the third question that we posed at the beginning of the article. What is one third of a dollar, or $1/3$ of 1? $1/3$ of a dollar must be more than .30 since .30 is 30 cents and it takes more than three sets of 30¢ to make a dollar. Yet it must be less than .50 since that would be 50 cents and three sets of 50¢ is clearly more than a dollar.

Let's try 40¢. If $1/3$ of $1 is 40¢, then let's look at three sets of 40¢ Three sets of 40¢ makes 120¢ which is more than $1!

How about 35¢. Look at three sets of 35 . 3 x 35¢ = 105¢ , which is more than $1, though not by much!

Can you find a decimal expression for $1/3$? Write us what you think $1/3$ should equal.

PROBLEMS OF THE MONTH

Send your solutions to ***Math Reader***! We will publish the best solutions each month and send a free ***Math Reader*** pen to everyone whose solution we publish.

1. Suppose there is a group of 4 girls and 3 boys. How many ways can you pick a girl and a boy?

2. Can you find a fraction which is greater than 1/2 and less than 3/4? Explain your answer with a picture.

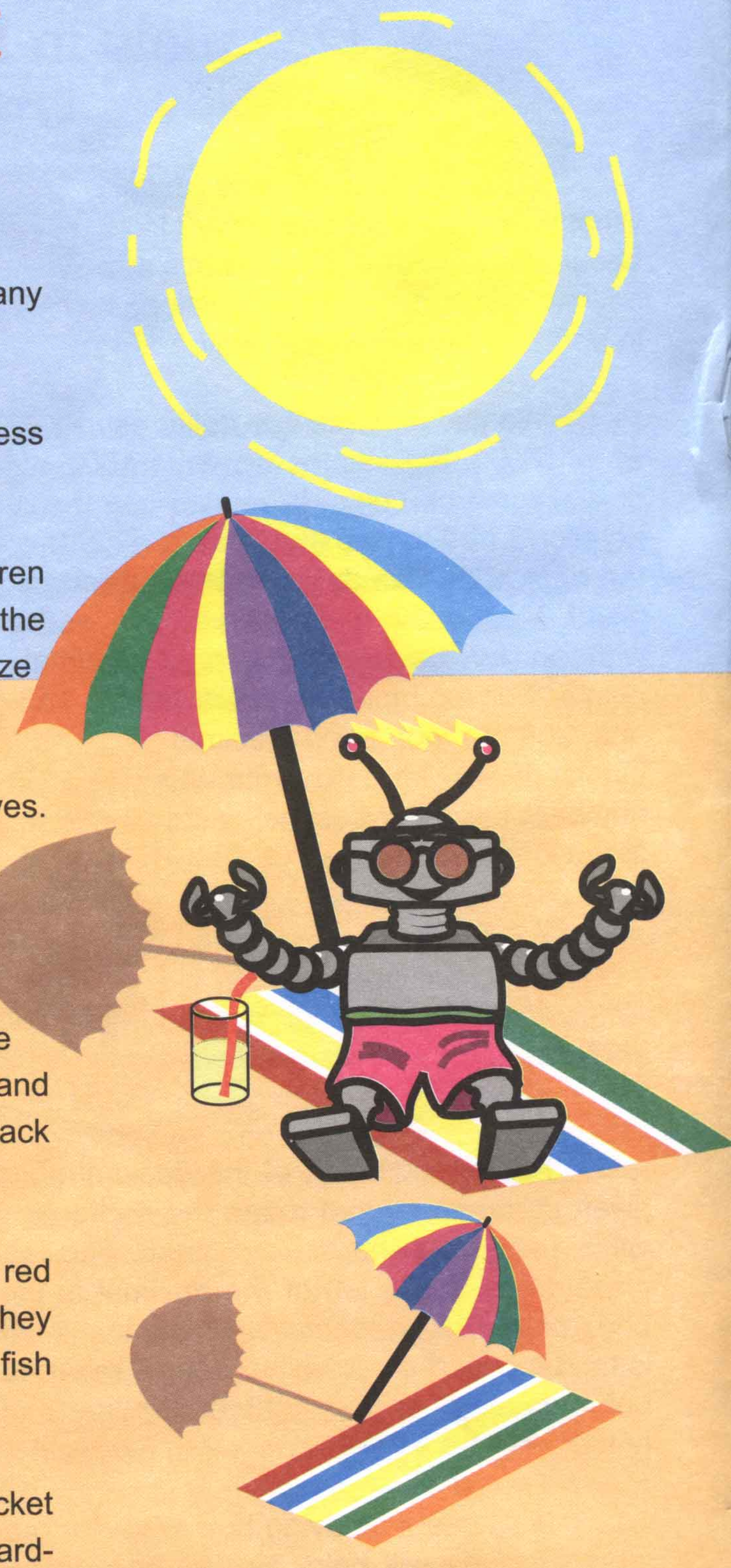
3. Grandma baked a pie. By the time her two grandchildren came to visit, only 1/3 of it was left. They want to split the piece into two equal pieces (to eat, of course). What size piece does each of her grandchildren get?

4. Policemen riding bicycles are chasing tricycle thieves. There are exactly 10 wheels in this chase. How many tricycles were stolen?

5. Black Widow opens a school for young spiders on one of the branches of a weeping willow. Seven little spiders take fly-catching, nine take web-weaving, and four take both lessons. How many students does Black Widow have?

6. Sam and Matt went fishing and caught only 5-pound red fish and 3-pound trout. If they weighed all the fish they caught and the total was 22 pounds, how many red fish and how many trout did they catch?

7. **Ingenuity** At the beginning of the winter, Fred the Cricket cast covetous glances upon the pantry of the hard-working ants. So the ants told him: "If you figure out how many bowls of fruit there are on the shelves now, you can take a fourth of them. Here is your clue: If we ate 5 bowls of fruit every day, then in two weeks we would have only 6 bowls left." How many bowls of fruit will Fred the Cricket get if he answers correctly?



The Beach Towel Problem

How many different beach towels can you make where each towel has five stripes of different colors, using red, blue, yellow, green and orange?

Math Notes

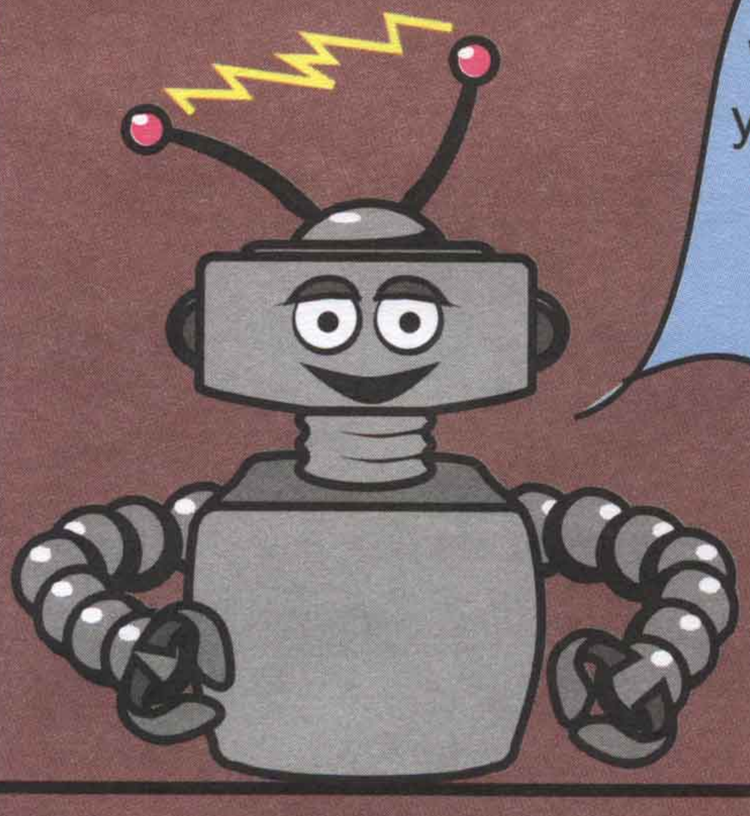
Dear Dr. Warshauer,

My name is Kaarin Gerber. I am in the second grade, but I am also in Mrs. Brown's third grade algebra class. I like soccer, basketball, playing the piano, and I really like math class. My favorite thing to do in algebra class is working with positive and negative numbers. I can do these problems...can you?

3 - x = 2

-2 + (13 + 24) = ?

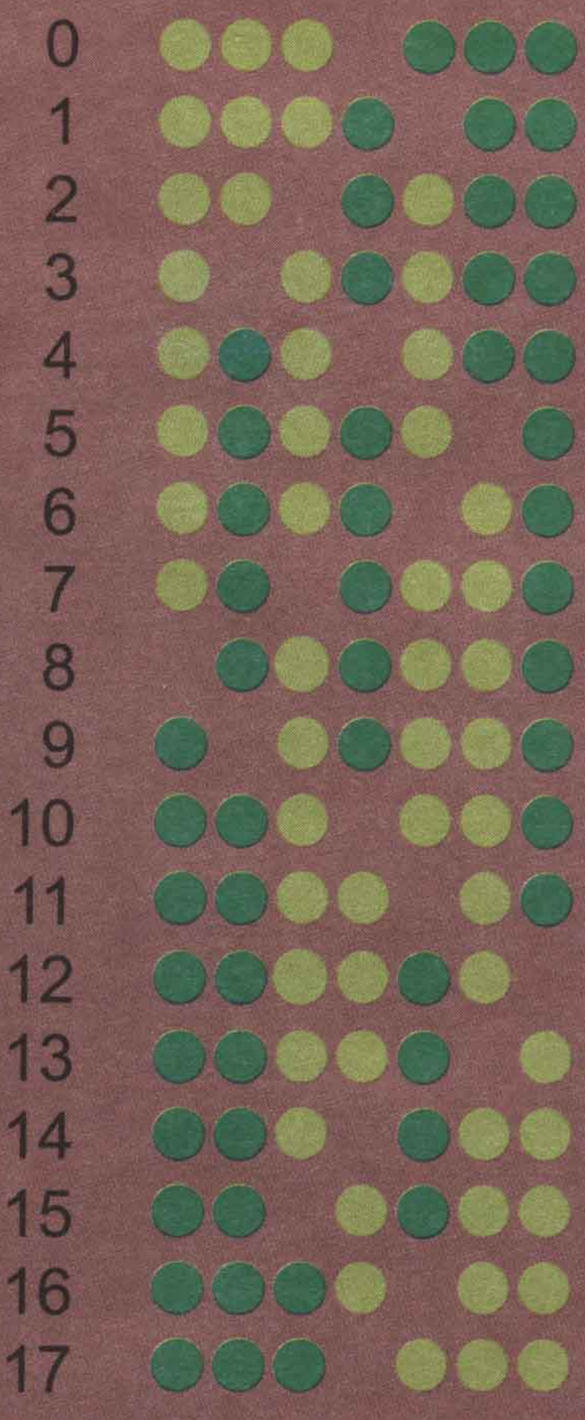
3 + x = -2



Thanks guys! Keep up the good work! **Don't forget**: when you send in your solutions, also include your name, age, address, teacher's name, and **YOUR PICTURE**!

Dear Dr. Warshauer,

My name is Kevin Jia. I am a second grader in Mrs. Speckman's class at Kiker Elementary School in Austin. I solved the problem "Jumping Frogs" from the March issue. The frogs can switch positions in 17 jumps, as shown in the following table.



Puzzle Page

Math Readers,

We want to print your work! Send us your own math games, puzzles, problems, and activities. If we print them, we'll send you and your math teacher free *Math Reader* pens.

WORD SEARCH

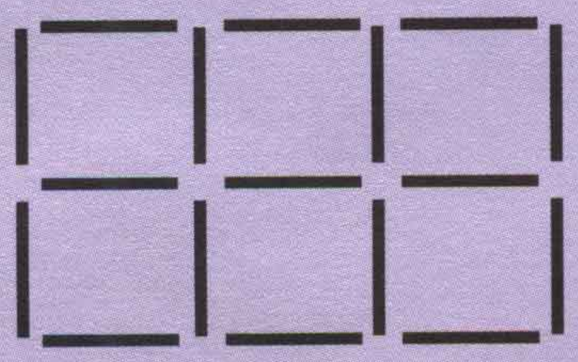
Forwards or backwards, up, slanted, or down. Where can the words in this puzzle be found?

(from Lashanna Parish, Rebecca Osburn, Katie Bergvall, and Kaycee Fields from Mrs. Shirley Horsley's class in Midlothian, TX)

MULTIPLY	O W I D T H E O P X M B L
MEASUREMENT	P C P Y R A M I D Z O P P
PERIMETER	E P T A C B Q Y T C P M T
DIVIDEND	D E C A O I R K C E F U N
LENGTH	F R T D G R S T I N U L E
WIDTH	T I V D M O Y J R T D T M
OCTAGON	E M A I A A N X T I N I E
SUBTRACT	R E L T T C Y R E M E P R
ADDITION	E T P I H L R M M E D L U
GEOMETRIC	H E Y O N P E O O T I Y S
SPHERE	P R T N I L E N E E V L A
PYRAMID	S Z R T L P F I G R I M E
UNITS	C B L T T A R Z L T D U M
MATH	S U B T R A C T P S H H S
CENTIMETER	

READER'S PROBLEM

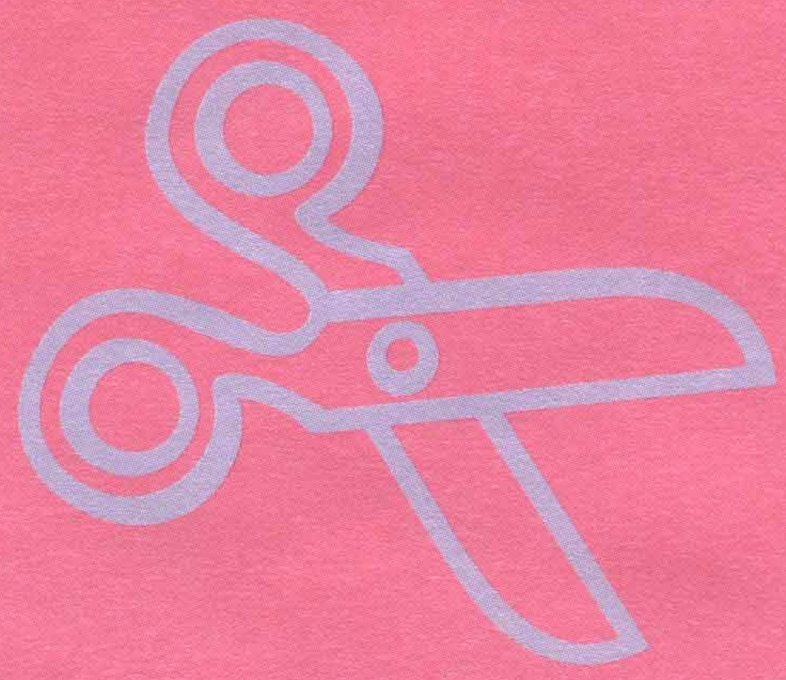
Remove 5 lines to make 3 equal connected squares.



Submitted by: Julio Trujillo
Brown Middle School Mrs. Carlin's Class

CUT THAT SQUARE

Cut a square into as many parts as you can using 3 straight lines. How many parts can you get?



A 24

7 1 9 5

Example Solution:
(7 - 1) x (9 - 5) = 24

Can you find others?

2 2 2 3

Example Solution:
(2 + 2) x 2 x 3 = 24

Can you find others?

Hey **Math Readers!**

Here's a fun and challenging card game that you can play with three friends. First, get a deck of cards and remove all the face cards (K,Q,J) and the jokers. Now you have a deck with the numbers 1 (the aces) through 10. All you need now is four people. Shuffle the cards and deal a stack of 10 to each player, face down. To start each round, all four players put their top card face up on the table. Try to use all four numbers to make 24, by adding, subtracting, multiplying, or any other math operation. See the examples on this page. The first player to figure it out slaps the table and then explains to the other players how to get 24. If the answer is correct, that player picks up ***all*** the cards on the table and puts them on the bottom of his deck. If no one can get an answer, all four cards go into the jackpot. Whoever wins the next round also wins all the cards in the jackpot. If a player runs out of cards, that person is "out". Play continues, but whoever won the last time must put down 2 cards.

2 2 2 2

Yikes!!!

Some deals just don't have a solution.

When a second person becomes "out", both remaining players must put down 2 cards on each round. Play continues until all but one person runs out of cards. That person is declared the winner.

Math Reader wishes you a great summer!

Here's a game to play over your summer break! Don't forget to send us your puzzles and solutions over the summer. We'd love to hear from you.
And always include your picture!

A

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