

## **August Teacher Directions: One Hundred Hungry Ants**

### **The story:**

One hundred ants are off to a picnic, in one long line. The littlest ant encourages them to make 2 lines of 50, so they will get there faster. But the littlest ant doesn't stop there. The next suggestion is to make 4 lines of 25, then 5 rows of 20, and 10 rows of 10. By the time the ants get to the picnic, the food is all gone!

### **The math:**

A multiplicative array is a rectangular arrangement of objects, placed in rows and columns. The main topic of the book is figuring out ways to make multiplicative arrays for making a total of 100 ants. The math lesson extends this idea to include making multiplicative arrays for other numbers besides 100. [A good class goal is to make arrays for the numbers 1 to 25, or 1 to 36.] To succeed at this task, students need to think about factors for the different numbers. This, in turn, requires that they think about their multiplication and division facts. For example, "If I want to make 2 lines, how many ants would be in each line?" "What if I want to make 4 lines?" "Why didn't the littlest ant suggest marching in 3 lines? or 6 lines? or 7 lines?"

This lesson is good for young students who are just learning their multiplication facts. It is also good for older students who still need practice with multiplication and division. It is also a good lesson for helping students learn factors, and contemplate the nature of prime numbers.

### **The activity:**

The hands-on part of this lesson is to make the actual arrays. Try making arrays for each of the numbers, 1 to 25, or 1 to 36. Put the numbers on separate pieces of paper and have each student pick a number. If they work in pairs, students can help each other make squares and/or rectangles for the numbers that they each selected. For some numbers, there is just one way to make the array. For example, 13 or 17 can be made only one way: one long line. (These are the prime numbers.) For others, like 16, there are several ways:  $1 \times 16$ ,  $2 \times 8$ ,  $4 \times 4$ ,  $8 \times 2$ , and  $16 \times 1$ . Students will notice that the  $2 \times 8$  looks a lot like the  $8 \times 2$ . Aha! Look on the multiplication table and see how the 16 is found in two different places, representing  $2 \times 8$  and  $8 \times 2$ ! Furthermore, some numbers (like 16) are special because they actually make a square. See if students notice that the square numbers form a diagonal line in the chart!

There are two good ways to make arrays. (You may want to do BOTH.)

1. Use grid paper. Color the arrays, or cut them out. (The ant grid paper will allow you to make arrays of ants!)
2. Use some kind of linking cubes, like Unifix Cubes or Multilink Cubes. Photocopy the time cards (preferably on cardstock).

To maximize the learning, make a class display showing all the arrays that have been found for each number. Paper arrays can be cut out and glued to pieces of construction paper. (Some arrays may be too long to fit, especially the prime numbers!) Put the construction paper around the room so you can see all the numbers, 1 to 25 (or 1 to 36). The square numbers and prime numbers will be obvious. If you use blocks, make an exhibit by putting the pieces of construction paper on the floor and placing the blocks on top of the paper instead of gluing.

If students are very shaky with their multiplication facts, they may need help finding factors that will allow them to make rectangles or squares. This is why we included a list of factors in the file called "Factors for 1 to 100."

### Related Books:

**Amanda Bean's Amazing Dream**, by Cindy Neuschwander. Amanda Bean likes to count things, but she is starting to think that multiplication might be a faster way to count.

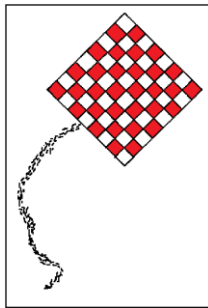
**A Remainder of One**, also by Elinor J. Pinczes. Soldier Joe is odd-man-out when 25 soldiers arrange themselves into rows and columns 2x12, 3x8, 4x6. This changes when the array is 5x5!

**The 512 Ants on Sullivan Street**, by Maryann Wicket and Marilyn Burns. The math topic is doubling. Children can practice doubling by adding or multiplying. Use the book to introduce older students to the topic of binary code and base 2! See if you can find this one at the library or on your back shelf, because it is currently out of print!

### An Adaptation for Very Young Children (PK-K):

Enjoy reading the book about the ants going to a picnic. Emphasize the rhyming words. Instead of making arrays, though, have children estimate what 100 ants would look like by doing the following activity: Get some chocolate sprinkles to represent "the ants." Have each child count out 10 sprinkles, and then try to make a pile "about the same size." (Depending on their agility, they can count or estimate.) When the children each have ten little piles of "ants" count the piles by tens, from 10 to 100.

Now for the fun: Give each child a piece of white cardstock paper. At the top, glue a 4"-5" square of red gingham, to represent a tablecloth. Treat the sprinkles like glitter! Using liquid glue, have an adult make a squiggly line coming from the table cloth down into the "grass." Then have students "sprinkle" the ants on the picture to show the ants marching to the picnic. (You may need a few extra sprinkles as a "snack." )



### Websites of Interest:

*Electronic grid paper.* Click and drag to make arrays and find the factors.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=64>

*Concentration.* Use for practicing multiplication, fractions and percent.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=73>

*Sieve of Eratosthenes.* An animation to show how the sieve works.

<http://www.hbmeyer.de/eratclass.htm>

### Extras in the Book-of-the-Month Packet:

If you decide to order the July packet (for \$19.99), you will get a paperback copy of this month's featured book, **One Hundred Hungry Ants**, by Elinor J. Pinczes. In addition, you will get:

- A multiplication chart with missing numbers. Students can find the missing numbers by skip counting, or by finding the two matching rectangular products, like 2x8 and 8x2. (2x8=8x2 is an example of "the commutative law of multiplication"!) )
- An illustration showing arrays for the numbers 1 to 16 (for visualizing how to make arrays).
- Directions for using the "Sieve of Eratosthenes," for finding prime numbers under 100. (Have students compare the primes from the Sieve with the list of factors in the free chart "Factors for 1 to 100.") Using the Sieve is an activity for older students.

**To Order Your Packet:** Purchase online with a credit card, or fax/email your purchase order to:

*Projects in Education, 2102 N. Crescent Blvd, Yardley, PA 19067 FAX: 215-321-7224*