Math Solutions® PROFESSIONAL DEVELOPMENT

One Hundred Hungry Ants

A Lesson with Sixth and Seventh Graders

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In One Hundred Hungry Ants, *by Elinor J. Pinczes (Houghton Mifflin, 1993), one hundred ants are marching toward a picnic and trying to figure out the marching formation that will get them there the quickest. Initially they march in a single-file line of one hundred ants, then in two lines of fifty ants, four lines of twenty-five, five lines of twenty, and, finally, ten lines with ten ants in each. In this lesson, taken from Jennifer Bay-Williams and Sherri Martinie's* Math and Literature, Grades 6–8 *(Math Solutions Publications, 2004), students represent arrays using dot paper to learn about prime, composite, and square numbers.*

Read *One Hundred Hungry Ants* aloud. Each time the ants rearrange themselves, ask students to predict what the next arrangement might be. After finishing the book, visit the story again and list the different ant formations on the board:

1 x *100*

2 x *50*

4 x *25*

5 x *20*

10 x *10*

Ask different students to represent each array on dot paper by thinking about each dot as an ant and drawing a frame around an array to illustrate the arrangement. (See end of lesson for blackline master of dot paper.) Students who represent 1 x 100 and 2 x 50 will have to cut and paste the dot paper to show them.

Then talk with the students about other possible ant arrangements, such as 20 x 5 and 25 x 4. List other possibilities on the board. For one hundred ants, there are nine different formations in all.

20 x *5*

25 x *4*

50 x *2*

100 x *1*

Explain how arrays with the same numbers but in different order—for example, twenty lines of five (20 x 5) and five lines of twenty (5 x 20)—would be different formations in the story. When ants march in five lines of twenty, five ants in front each lead a line of twenty ants; however, when they march in twenty lines of five, twenty ants in front each lead a line of five ants. Also talk with students about how arrays relate to another with the same numbers in reverse order; for example, if an array of four rows of twenty-five is possible, then an array of twenty-five rows of four is also possible. This is because four and twenty-five are a factor pair for one hundred. Point out that 10 is its own factor pair because 10 x 10 = 100.

Pose a question: "What if there were a different number of ants? Could we figure out how many formations would be possible?" Have students work in pairs and investigate this for the numbers from one to thirty. Assign two to three different numbers to each pair, either by distributing cards with the numbers from 1 to 30 on them or listing the numbers from 1 to 30 on the board and writing students' names next to them. Ask the pairs of students, for each of their numbers, to cut out all the arrays possible from dot paper, label their dimensions, and tape or glue them to a large piece of paper titled with that number of ants. If you think it would be useful, make color tiles or counters available for students to use to build the arrays. Post the students' displays in order from one to thirty.

A Class Discussion

As a class, examine the arrays posted and look for patterns that occur across the numbers. Use the following questions for discussion, incorporating appropriate vocabulary.

- Which numbers can be formed in exactly two ways—for example, seventeen rows of one and one row of seventeen? (These are prime numbers; all others except one are composite.)
- Which numbers have more than two possible arrays? (These are composite numbers.)
- Which numbers can be built in only one way? (Only the number one can be built in only one way; it is not prime or composite.)
- Which numbers have arrays that are also squares? (These are square numbers. These numbers have an odd number of factors.)
- Which numbers have an even number of arrays? (These are non-square composite numbers.)