

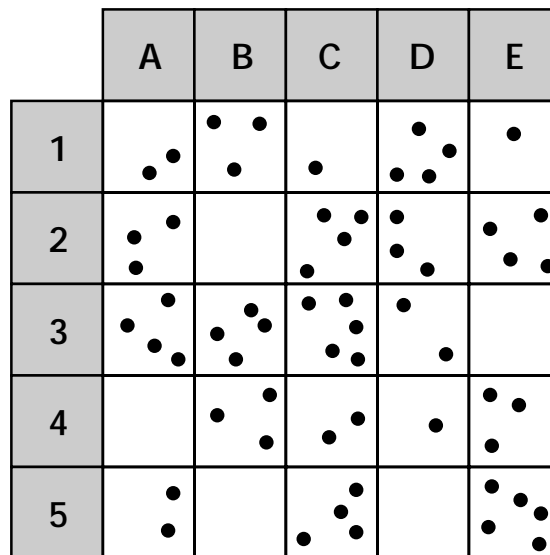
- Addition
- Subtraction
- Multiplication
- Division
- Averages
- Fractions
- Percentages
- Geometry

## *Random Samples: Estimating Population*

**Use your math skills to learn about the use and accuracy of random population samples.**

“Why did we bother with a picnic anyway? These ants are everywhere,” Gina complained. “There must be a million ants on our blanket!” Dylan agreed. Of course, Gina and Dylan were exaggerating. But suppose they really did want to know how many ants were in the park. How could they find out? Counting each ant would be very difficult; ants are tiny, and they live in a large area, have a large population, and move around a lot. To solve this problem, Gina and Dylan could use a mathematical tool called a **random sample** to estimate the total population of ants in the park. To take a random sample, they would count the ants in a particular region of the park. To estimate the total population of ants in the park, they would first divide the total area of the park by the area of the sample region. Then they would multiply that number by the number of ants they counted in the random sample.

The following diagram shows the section of the park where Gina and Dylan had their picnic. Each dot represents 25 ants. Use the diagram to answer the questions.



- Each square on the grid represents 1 m<sup>2</sup> of the picnic area. What is the size of the picnic area?

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### **Taking a Random Sample**

In order to get a closer population estimate, count the number of ants in a selection of squares that are chosen at random. Then answer the following questions. Each square can be identified by a letter and a number. For example, the first square at the top left is square A1.

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2. The following is a randomly chosen selection of squares. Calculate the number of ants found in each of these squares. (1 dot = 25 ants)

- |             |             |
|-------------|-------------|
| a. D2 _____ | b. E4 _____ |
| c. E2 _____ | d. B1 _____ |
| e. D3 _____ | f. C5 _____ |
| g. C3 _____ | h. A4 _____ |

3. What is the average number of ants per square meter in the sampled area?

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4. Using the average from item 3, estimate the ants' total population.

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**How Accurate Was the Estimated Population?**

You can check the accuracy of the estimated population by finding the percent error. The closer your percent error is to zero, the more accurate your estimate is. In order to calculate the percent error, you must know the exact population, so count all of the dots to find the exact population of the ants before continuing.

5. Use the following equation to find the percent error of your estimate. (Hint: If the value you determine by subtracting the exact population from the estimated population is negative, use the absolute value in your calculations.)

$$\text{percent error} = \frac{\text{estimated population} - \text{exact population}}{\text{exact population}} \times 100$$

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6. Make a random selection of five squares from the grid, and determine the estimated population based on your random sample. Then calculate the percent error as you did in question 5. How does your percent error compare with the percent error found in question 5?

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