**One Hundred Hungry Ants**

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| In this lesson, students interact with a read aloud and apply their knowledge of factors, multiples, and arrays to solve division problems. Students will be introduced to remainders. |

**NC Mathematics Standards:**

 **Number and Operations in Base Ten**

**NC.4.NBT.6** Find whole-number quotients and remainders with up to three-digit dividends and one-digit divisors with place value understanding using rectangular arrays, area models, repeated subtraction, partial quotients, properties of operations and/or the relations between multiplication and division.

**Standards for Mathematical Practice:**

1. Make sense of problems and persevere in solving them.

2. Reason abstractly and quantitatively.

3. Construct viable arguments and critique the reasoning of others.

4. Model with mathematics.

6. Attend to precision.

8. Look for and express regularity in repeated reasoning.

**Student Outcomes:**

* I can solve division problems using the area model.
* I can use factors and multiples to understand division.
* I can use arrays to solve division problems.
* I can determine when a number would have a remainder based on factors and multiples.

**Math Language:**

* factor
* multiple
* array
* area model
* remainder

**Materials:**

* Book: *One-Hundred Hungry Ants* by Elinor J. Pinczes
* Materials such as counters, blocks, grid paper

**Advance Preparation**:

* Read through and familiarize yourself with the book.
* Have manipulatives available for students.

**Launch:**

1. Introduce Problem (5-8 minutes)

Today we are going to be reading the book *One Hundred Hungry Ants* by Elinor J. Pinczes.

As we read, you are going to be interacting with the text in the book and figuring out how the ants are marching to the picnic.

Begin by reading the first 6 pages aloud to students. Stop at the words: “*with two lines, we’d get there soon, I know!*” After stopping, ask students these questions:

* There are 100 ants and they're going to get into 2 lines. How many would be in each line?
* Have students turn and talk with a partner or group about how many ants would be in each line.
* Briefly discuss, how they knew there would be 50 in each row. What background knowledge did they use to solve the problem? Hopefully, students will bring up arrays or their knowledge of multiplication or money.

**Explore 1:**

1. Solving the Problem (15 minutes)

Read the next section of text, pages 7-12. Stop at the words: “*There might be a yummy for a grumbling tummy, A hey and a hi dee ho!*” After stopping, asking students these questions:

* There are 100 ants and they're going to get into 4 lines. How many would be in each line?
* This time have students draw a representation of what this would look like. You will want to see complete arrays, open arrays, and other representations.
* Discuss how did they knew there would be 25 in each row. Pull several students to show their solutions to the class. Be sure to share complete drawn out arrays and open arrays. Have students look for how they are alike and different. Discuss which one is more efficient and concise.

Finish reading the remaining text to students for enjoyment.

**Explore 2:**

1. Solving the Problem (15 minutes)

Ask, “Could the ants get into 7 rows?”

* Here you want students to start thinking about remainders.
* 7 will not work because there would not be an equal number in each row. 7 is not a factor of 100.
* Have students work with a partner to determine how many ants would be in each row if there was an equal number in each row and how many would remain.
* What might we do with those extra 2 ants? (They would need to be put in an 8th row that wouldn’t be full.)
* Those extra two ants are going to be remainders.

**Discuss:**

1. Discussion of Solutions (10 – 15 minutes)

Point out to students that we learned that the little ant talked the other ants into getting into 2, 4, 5 and 10 lines. Continue the discussion by focusing on how factors and multiples help with division and the meaning of remainders. Some possible questions to discuss:

* Why did the author choose those number of lines?
* How do the numbers relate to 100?
	+ You want students to think about earlier understanding of factors and multiples of 100. 2, 4, 5, and 10 are all factors of the number 100.
	+ If the ant was using factors of 100, what other number of rows could he have put them into?
	+ Could the ants go into 12 rows? Why or why not?
* How do factors and multiples help you with division?
* What is a remainder?

Close the lesson by having students write about these 2 questions: How do factors and multiples help you with division? and What is a remainder?

**Evaluation of Student Understanding:**

**Informal Evaluation:**

* Can students use factors and multiples to solve division problems?
* Can students use arrays to solve division problems?
* Can students understand remainders as a leftover after dividing?

**Meeting the Needs of the Range of Learners:**

**Interventions:**

* Continue to draw on students understanding of factors, multiples, and arrays.
* This would be a good time to pull in graph paper and manipulatives to help your visual learners with seeing the area model.

**Extensions:**

* What other rows could the ants get into where there would be an equal number in each row?
* What other rows could they not go into because they would have a remainder?
* What is the difference between those numbers?

**Possible Misconceptions/Suggestions:**

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| **Possible Misconceptions** | **Suggestions** |
| * Students do not understand the problem.
* Students don’t see the connection between factors and multiples.
* Students are struggling to understand remainders.
 | * Have students visualize the problem and think about what the question is asking.
* Have students think about what factors and multiples are and how they relate to division. Continue bringing them back to factors and multiples to help them with division.
* Give students manipulatives to help them see the remainders. After they put them in the rows, they will see that they have leftovers. This will help them see that the leftovers are remainders.
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**Special Notes:**

* The book can be used to teach just the area model for division. You can create two more questions about rows of 5 and 10 as you stop in the book.
* Lesson was adapted from ideas like this one <https://mathsolutions.com/ms_classroom_lessons/one-hundred-hungry-ants/>
* Additional problems for remainders can be found at: <https://www.k-5mathteachingresources.com/support-files/interpret-the-remainder-whole-numbers.pdf>