**Dinner Party**

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| In this lesson, students explore finding the number of tables and forks needed at 2 dinner parties to develop the concept of multiplication and division. |

**NC Mathematics Standard(s):**

**Operations and Algebraic Thinking**

**3.OA.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem

**Standards for Mathematical Practice:**

1. Makes sense and persevere in solving problems.

4. Models with mathematics.

6. Attends to precision.

**Student Outcomes:**

* I can find the products, quotients, or sums of whole numbers by counting in groups.

**Math Language:**

**What words or phrases do I expect students to talk about during this lesson?**

* product
* quotient
* sum
* repeated addition

**Materials:**

* Printed activity sheet and concrete manipulatives if needed

**Warm-Up:**

Counting around the Room (10 minutes)

Review skip counting by counting around the room. *“Today we are going to count around the room by multiples of 5. Everyone will have a chance to say a number. Each person in the room will say a number only once. Before we begin, what number do you think the last person will say?* Collect responses from students, being careful not to allow too much time for them to count children in the room. “*Let’s check and see.”* This activity is conducted quickly but in a non-threatening way. Students should be allowed to use a visual hand signal, like a thumb at the chest to indicate their readiness to share the next multiple. While students are counting the teacher records the multiples that are stated aloud.

**Suggested Questions:**

* What number do you think the last student will say?
* How many people have counted if the number that was just said was 25? 50? (be sure to stop the counting to ask this question)
* How do we know?

**Launch:**

1. Introduce Problem (5 minutes)

Today we are going to be thinking about having a big dinner with friends. When we plan for a dinner what are some things we might need to plan for? Allow a minute or so for children to turn and talk about this and share ideas out loud.

* + Number of people
  + Amount of food
  + Number of plates, forks and spoons

Give one activity sheet to each student. Read part A-D aloud.

**Explore:**

1. Solving the Problem (15-20 minutes)

Allow students time to work individually and then work with partners or in groups to solve the task. As students work, observe students to see how they are solving the task. Encourage students to share their strategies with one another and describe how they are answering each question. Carefully select students to present to the class.  Look for students who modeled the problem and kept track of their thinking.  Also look for strategies that will generate discussion to help others move toward a deeper understanding of the mathematical goal.

Observe:

* + How students organize and represent their thinking.
  + How students make sense of the story.
  + What vocabulary terms students use as they solve the task.

**Suggested questions to ask while students work:**

**If students struggle to get started:**

* What is happening in this problem?
* Could you answer a “how many” question with details from this problem?
* What were you thinking of drawing first to help you visualize the problem?
* Do you think you can use a math tool to help you think about these problems?

**If a student is not making thinking visible:**

* Where are the guests in your representation?
* Where are the forks in the representation?
* Can you show me in your picture what the 8 stands for from your equation?
* Are we looking for an answer that is larger or smaller?
* Are there more or fewer forks than people? (for Part B or Part D)
* If you can’t think of a multiplication equation, can you rewrite this as addition?
* Tell me about your answer, what do the numbers mean?
* How do you know?
* Does that number seem reasonable? Why or why not?

Look for use of appropriate strategies, such as multiplication strategies:

* Part A, such as drawing 7 circles with 6 dots each, skip counting, repeated addition, or use of related facts.
* Part B, look for appropriate strategies such as adding 42 and 42 by breaking them apart or multiplying 42 by 2 using the distributive property.
* Part C, look for division strategies such as drawing a picture, skip counting by 6 up to 66, or turning the division into a multiplication problem with a missing factor.
* Part D, look for multiplication and addition strategies similar to part B.

**Discuss:**

1. Discussion of Solutions (15-25 minutes)

Bring the group back together and have selected students share their strategies for solving the task.  Note: Before beginning the lesson prepare a list of possible strategies you will see during the lesson. Use these observations to determine the order for sharing strategies during discussion.As the discussion is happening in the class each group should be showing their work on the board so that the other groups can see their thought process. This will also help the class to see how each group’s strategy relates to the other.

* The first group to present could be the one who used only pictures to find their answer. This will give the class a visual representation of the thought process to use while finding the answer.
* The next group to present could be the group who used repeated addition. This is the beginning of understanding multiplication.
* The last group could be the one who used a multiplication problem to find the answer to the question. This group understands what operation is the most efficient of the strategies. As the discussion is happening in the class each group should be showing their work on the board so that the other groups can see their thought process. This will also help the class to see how each group’s strategy relates to the other.

**Evaluation of Student Understanding**

**Informal Evaluation:**

The teacher circulates through the class, observing students’ written work, choice of strategies, and verbal explanations. Make note of any artifacts to share with the class and the order in which to share them.

**Formal Evaluation/Exit Ticket:** Choose from the following exit ticket questions:

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| Task extension:  Each table at the Smith family’s dinner party can seat 6 guests. Each guest will need a plate for salad, a plate for the main course, and a plate for dessert. How many plates will each table need? Represent your solution with an equation and show your strategy using pictures, words, or other equations.  Written response:   * Did you use the same strategy as the first Smith family dinner party task? Why or why not? * Multiplication is the counting of groups of things to come up with a total number. What are some other real-world situations in which it might be useful to count groups of things? |

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

**Intervention:**

* Provide students with manipulatives to help them find the number of guests at the dinner party.
* Change numbers to 5 tables with 4 guests on part A and 30 guests for part C for students who may struggle with the larger numbers presented in this lesson.
* Practice skip counting to help students find how many guests there are.

**Extension:**

* For the Smith and Jones dinner party, ask students to find how many more forks there are at one dinner party than the other.
* If each dinner party guest had 2 forks, 1 knife, and 1 spoon, how many utensils would there be at each dinner party?
* Ask students to write additional story problems that could be solved with this scenario.

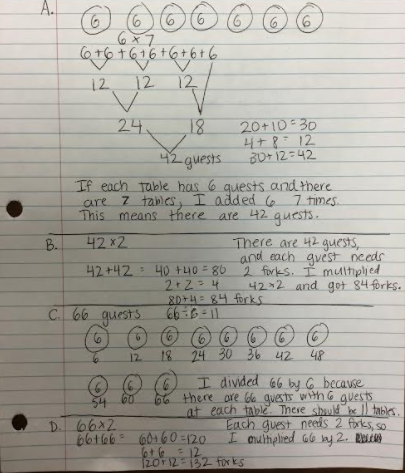
**Possible Misconceptions/Suggestions:**

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| **Possible Misconceptions** | **Suggestions** |
| * Students may multiply the 2 dinner forks by 6 or 7 instead of 42. * If using repeated addition, students may miscount their answer when adding 7 six times. * Students may try to multiply or divide 66 by 7 or another number instead of dividing 66 by 6 to find the number of tables needed for the Jones family. | * Ask students to make meaning of the problem by rewording what it is asking and also by explaining what each number in the equation represents. * Ask students to make meaning of the problem by rewording what it is asking and also by explaining what each number in the equation represents. Ask students to relate this back to their picture representation. |

**Special Notes:**

* Provide manipulatives for students to use if needed.
* Provide graph paper if students want to draw arrays to solve multiplication problems.

**Possible Solutions:**



**Activity Sheet**

1. The Smith family is hosting a dinner party. They set up 7 tables, and each table has 6 seats. How many guests could there be?

* Draw a picture representation of the table setup.
* Write an equation to represent the problem.
* Explain your strategy in words.

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| Represent your solution with an equation. | Explain your strategy using words, pictures, or computations. |
| **A.** | **A.** |

1. Each guest needs a salad fork and a dinner fork. How many forks will the Smith family dinner party need altogether?

* Draw a representation to represent the forks
* Write an equation to represent the problem.
* Explain your strategy in words.

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| Represent your solution with an equation. | Explain your strategy using words, pictures, or computations. |
| **B.** | **B.** |

1. The Jones family is having a dinner party next week. They will have 66 guests. How many tables will they need?

* Draw a picture representation of the table setup.
* Write an equation to represent the problem.
* Explain the first two steps you used to create a representation using words.

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| Represent your solution with an equation. | Explain your strategy using words, pictures, or computations. |
| **C.** | **C.** |

1. If the salad and dinner forks are needed, how many forks will the Jones family dinner party need altogether?

* Write an equation to represent the problem.
* Explain your strategy in words.

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| Represent your solution with an equation. | Explain your strategy using words, pictures, or computations. |
| **D.** | **D.** |