**Sandwich Shop**

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| **This lesson provides opportunities for students to explore contexts related to multiplying a whole number by a mixed number.**  |

**NC Mathematics Standards:**

NC.5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction, including mixed numbers.

* Use area and length models to multiply two fractions, with the denominators 2, 3, 4.
* Explain why multiplying a given number by a fraction greater than 1 results in a product greater than the given number and when multiplying a given number by a fraction less than 1 results in a product smaller than the given number.
* Solve one-step word problems involving multiplication of fractions using models to develop the algorithm.

**Standards for Mathematical Practice:**

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

4. Model with mathematics.

6. Attend to precision.

**Student Outcomes:**

* I can work with a partner to solve math problems.
* I can communicate problem solving strategies to my classmates and my teacher.

**Math Language:**

* Difference, Factor, Group, Product, Representation

**Materials:**

* Graph paper

**Advance Preparation**:

* Gather materials

**Routine/Number Talk:**

Put the following expressions on the board:

 ¼ + ¼ + ¼ = \_\_

 ¼ x 5 = \_\_

 ¼ x 6 = \_\_

**Launch:**

1. Introduce the task.
* Display the Sandwich Shop Task for students.
	+ The sandwich shop starts selling kits so that people can make their own subs at home. The turkey kit comes with 2 and 1/2 pounds of turkey. The ham kit comes with 1 and ¾ pounds of ham. If the James family purchases 3 turkey kits and 3 ham kits how much of each type of meat did they purchase?
	+ Part 2: In the three kits, how much more turkey was there than ham?
* Have students do a turn and talk and converse about the following:
	+ What is the problem asking?
	+ What are some strategies that you could use to get started?

**Explore**

1. Students explore the Sandwich Shop task.
* Allow time for students to work together on the activity.
* Observe students as they work.

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| --- | --- |
| **Observation** | **Questions to Ask** |
| Students are unable to get started. | * “Can you draw a picture or tell me the information that they give you in the task/problem?”
* “What is the action or context about the amount of turkey? How can that help us figure out how to get started?”
 |
| Students add the numbers instead of multiplying them.  | * “What is the action or context about the amount of turkey? What operation should we use based on that action or context?”
* “Does your answer make sense?”
* “If we have equal groups how can we find the total amount?”
 |

**Discuss:**

1. Bring students together to discuss their strategies for solving the Sandwich Shop problem.

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| **Sample Questions** | **Possible Responses****(in order of least to most sophisticated)** |
| * “What strategy did you use to determine the amount of turkey/ham?”
 | * Have multiple students share their strategies.
* Strategies may include: repeated addition, drawing a picture and adding up the parts, partial quotients, or using a multiplication equation.
 |
| * “How are these strategies similar?
 | * Students may comment that for turkey 2 and 1/2 x 3 student work includes: 3 copies of 2 and 1/2, the connection between repeated addition and multiplication, and the idea that 3 can be multiplied first by 2 then by 1/2
 |
| * “How are these strategies different?”
 | * Students may comment about how the strategies and representations look different, or that 2 and ½ x 3 was represented in different ways.
 |

1. Say: *As we move into centers we will continue to explore situations involving the Sandwich Shop.*

**Additional Activities:**

These activities can either be done by everyone in the class or as part of centers/math workshop.

 **More Sandwich Shop Situations**

Use the activity sheet More Sandwich Shop Situations. Students may benefit from doing this at a teacher-facilitated small group table.

**Multiplication Compare – Fractions by a Whole Number**

Students play in pairs or groups of three. Each student rolls two number cubes and determine where to put each number in the template: \_\_ / 4 \* \_\_ = \_\_. Students draw a model to represent the situation and determine the answer.

**Pattern Block Explorations**

Use the activity sheet and pattern blocks to model and determine the product for each situation.

**Evaluation of Student Understanding:**

**Informal Evaluation:**

* Observe and ask questions as students are working on the Sandwich Shop task and during the Additional Activities in Centers.

**Formal Evaluation:**

* If you choose you may collect the More Sandwich Shop Situations or the opening task as a formal evaluation.

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

**Interventions:**

* For students who struggle have them look at only 2 packs of the Turkey and Ham instead of 3 packs.

**Extensions:**

* Allow students to create word problems that match equations in the Additional Activities/Centers part of the lesson.

**Possible Misconceptions/Suggestions:**

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| --- | --- |
| **Possible Errors****and Misconceptions** | **Suggestions** |
| Students are unable to get started. | * “Can you draw a picture or tell me the information that they give you in the task/problem?”
* “What is the action or context about the amount of turkey? How can that help us figure out how to get started?”
 |
| Students add the numbers instead of multiplying them.  | * “What is the action or context about the amount of turkey? What operation should we use based on that action or context?”
* “Does your answer make sense?”
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 |

**Special Notes:**

* The Additional Activities can be completed as centers at various times during the year.

**Solutions:**

Explore task:

 More Sandwich Situations

|  |  |  |
| --- | --- | --- |
| Mustard | 10 cups | 20 cups |
| Mayonaise | 9 cups | 18 cups |
| Vinegar | 6 and ¾ cups | 13 and ½ cups |
| Oil | 33/4 = 8 and ¼ cups | 16 and ½ cups |

 Pattern Block Puzzles:

1. 4/3
2. 8/3 = 2 and 2/3
3. 16/3 = 5 and 1/3
4. 32/3 = 10 and 2/3
5. ¾
6. 9/4 = 2 and ¼
7. 21/4 = 5 and ¼
8. 33/4 = 8 and ¼
9. 55/4 = 13 and 3/4

**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**



 **More Sandwich Situations**

The Simmons’ Sandwich Shop uses the following amounts of supplies during the week.

|  |  |
| --- | --- |
| Mustard | 4 bottles, 2 and ½ cups each  |
| Mayonaise | 4 bottles, 2 and ¼ cups each  |
| Vinegar | 3 bottles, 2 and ¼ cups each  |
| Oil | 3 bottles, 2 and ¾ cups each |

How much of each did the Simmons’ Sandwich Shop use during the week?

If they use the same amount of supplies each week how much of each will they use in 2 weeks?

**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Pattern Block Puzzles**

Solve each pattern block puzzle by making the amount, drawing a picture, and writing an equation.

1. The whole is 1 hexagon. What is the product of 1/3 and 4?
2. The whole is 1 hexagon. What is the product of 2/3 and 4?
3. The whole is 1 hexagon. What is the product of 1 and 1/3 and 4?
4. The whole is 1 hexagon. What is the product of 2 and 2/3 and 4?
5. The whole is 2 hexagons. What is the product of ¼ and 3?
6. The whole is 2 hexagons. What is the product of ¾ and 3?
7. The whole is 2 hexagons. What is the product of 1 and 3/4 and 3?
8. The whole is 2 hexagons. What is the product of 2 and 3/4 and 3?
9. The whole is 2 hexagons. What is the product of 2 and ¾ and 5?