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Mississippi Mathematics Manipulatives Manual Featured Activity



“Pizza Parlor”

5.NF.1 & 5.NF.2

Spring 2021

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As we continue our efforts to develop high-quality instructional materials (HQIM) and resources, the Mississippi Department of Education (MDE), through the Academic Education Office, would like to showcase instructional practices and activities that foster conceptual understanding through the use of manipulatives in the mathematics classroom.

The **Mississippi Mathematics Manipulatives Manual** features activities meant to serve as short, hands-on procedures that may be implemented before, during, or after a lesson to support the teaching and learning process of the Mississippi College- and Career-Readiness Standards (MCCRS) for Mathematics. Alignment with the MCCRS Scaffolding Document has been included for additional support. Teachers may contact staff at the MDE if they would like to borrow manipulatives for classroom use.

Teachers may modify these activities to meet the needs of the students they serve and their instructional delivery model (virtual, in-person, or hybrid).

Special Thanks:
Teresa Banks, Ed.D.
Mississippi Valley State University

Pizza Parlor



MANIPULATIVE(S):

- Pizza Boxes*
- Pizza Toppings (See the "**Resources**" section below to access these items online or use colored construction paper. See Image 1 for a visual representation.)
- Brown and Yellow Butcher Paper

GRADE LEVEL OR COURSE

TITLE:

CCRS Mathematics Grade 5

DOMAIN AND CLUSTER HEADING:

Numbers and Operations-Fractions (NF):

Use equivalent fractions as a strategy to add and subtract fractions

STANDARD(S):

5.NF.1: Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, $\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$. (In general, $\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$.)*

5.NF.2: Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result $\frac{2}{5} + \frac{1}{2} = \frac{3}{7}$, by observing that $\frac{3}{7} < \frac{1}{2}$.*

PREREQUISITE SKILLS:

- Know adding fractions is joining separate parts referring to the same whole.
- Know how to create an equivalent fraction for a given fraction using visual fraction models.
- Know how to find common denominators and create equivalent fractions to compare fractions.
- Know a unit fraction has a numerator of 1 and can be combined with other unit fractions with the same denominator.
- Know how to estimate a fraction to the nearest benchmark 0, $\frac{1}{2}$, and/or 1.
- Know how to solve word problems involving addition and subtraction of fractions with like denominators by using visual fraction models, equations, and a number line.
- Know how to use bar models, visual models, a number line, and equations to solve addition and subtraction problems involving fractions with like denominators and fractions with unlike denominators.
- Know how to compare fractions with like and unlike denominators.

ACTIVITY:

Note: Activity Sheet Attached

1. Prior to the lesson, you will need to have sufficient quantities of the following items: pizza boxes*, brown butcher paper cut in the shape of circles to represent the crust, yellow butcher paper cut into slightly smaller circles to represent the cheese base of a pizza, and pizza toppings (sausage, pepperoni, bell peppers, mushrooms, olives, tomatoes, and onions. Use the online template located in the "**Resources**" section below or cut colored construction paper as seen in Image 1.) You may also want to distribute black magic markers which can be used by students to show the pizza slices when the time comes.



Image 1

2. Place students in pairs or in groups of no more than four (4). (**Depends on your supply quantities.**)
3. Review with students how to find the least common denominator (LCD) of two fractions and how to use the LCD to create equivalent fractions to solve addition and subtraction problems with fractions that have unlike denominators.
4. Provide each team with a pizza box*, a "pizza", and pizza toppings. And, provide **each** student with an Activity Sheet. (This will allow you to monitor individual student understanding.)
5. Encourage students to work together to answer the given problem. All students must show their work within the given Workspace on the Activity Sheet to model finding the LCD, creating equivalent fractions, and the addition and subtraction of fractions.
6. Once students have completed the Activity Sheet correctly, allow them to model their work by completing the pizza based on the work they have done. This includes "creating" /showing the appropriate number of slices (the LCD) and the correct slices with specified toppings (numerators).
7. After all students have completed the pizza order, have them present their pizza to the rest of the class, and to justify their work. (They may want to select a team spokesperson to do this.)

QUESTIONS TO CONSIDER:

- What is a fraction?
- How do you know when to add or subtract fractions when solving a word problem?
- When comparing two fractions with unlike denominators, how do you find the LCD?
- Extension Question: How does Kaden's (or his sisters') section of the pizza compare to the benchmark fraction $\frac{1}{2}$ using the phrases "greater than", "less than", or "equal to"?

RESOURCES:

- [Mississippi Mathematics Scaffolding Document](#) (Grade 5, Pages 20-23)
- [2016 MCCRS for Mathematics](#)
- [Pizza Toppings: Mrs. Merry's Make a Pizza-Printable Pizza Cutouts](#)

Optional: The University of Mississippi's Center for Mathematics and Science Education has an extensive inventory of math (and science and technology) tools and manipulatives that teachers may borrow for classroom use at no charge. Click the link below to access the inventory list and complete a check-out request.

- [CMSE Manipulatives](#)

BEYOND THE ACTIVITY:

- **Accommodations:** Provide a visual aid with step-by-step instructions.
- **Extension:** Change each fraction in the problem to an improper fraction or mixed number and have students work with adding and subtracting fractions with unlike denominators; and, converting between mixed numbers and improper fractions.

Activity Sheet

Pizza Parlor



Standards:

5.NF.1: Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.

5.NF.2: Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

Task Description:

Students will find the least common denominator to create equivalent fractions to add and subtract fractions while solving a multi-step real world contextual problem.

Sample Student Pizza



Image 2

Teacher Copy - KEY

Problem:

Kaden called to order a pizza for his family. Most of the members of his family like sausage on their pizza, so Kaden ordered $\frac{2}{4}$ sausage. Kaden is the only one who likes pepperoni and bell peppers, so he ordered $\frac{1}{6}$ pepperoni and bell peppers. His sisters like vegetable pizza, so he also ordered $\frac{3}{12}$ mushrooms, olives, tomatoes, and onions. How many slices are on the pizza? Will any part of the pizza be only cheese?

Workspace

Students will first have to convert $\frac{2}{4}$, $\frac{1}{6}$, and $\frac{3}{12}$ to fractions with like denominators.

$$\begin{array}{l} \text{Sausage:} \\ (\frac{2}{4}) \times (\frac{3}{3}) = \\ (\frac{6}{12}) \end{array}$$

$$\begin{array}{l} \text{Pepperoni \& Bell Peppers:} \\ (\frac{1}{6}) \times (\frac{2}{2}) = \\ (\frac{2}{12}) \end{array}$$

$$\begin{array}{l} \text{Vegetable:} \\ (\frac{3}{12}) \times (\frac{1}{1}) = \\ (\frac{3}{12}) \end{array}$$

Students should be able to determine the number of slices will be **12** based on the **least common denominator**. They should also determine that based on the **numerators**, **6** slices will have sausage on them, **2** slices will have pepperoni on them, and **3** slices will have the vegetable combination as stated in the problem.

Next, students should add the fractions $\frac{6}{12}$, $\frac{2}{12}$, and $\frac{3}{12}$ to determine if the entire pizza has toppings and what part of the pizza has only cheese (i.e. there are no additional toppings).

$\begin{array}{l} \text{Add each topping section:} \\ (\frac{6}{12}) + (\frac{2}{12}) + (\frac{3}{12}) = \\ (\frac{11}{12}) \end{array}$	$\begin{array}{l} \text{Subtract the total topping} \\ \text{sections from the whole:} \\ (\frac{12}{12}) - (\frac{11}{12}) = (\frac{1}{12}) \end{array}$	$\begin{array}{l} \text{Answer:} \\ (\frac{1}{12}) \text{ of the pizza} \\ \text{is cheese only} \end{array}$
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Solution:

a. Model how the pizza will look when it is delivered to Kaden's family. (*See Image 2.*)

b. Explain how to find the **total** fraction of the pizza that Kaden **and** his sisters ate. $(\frac{2}{12}) + (\frac{3}{12}) = (\frac{5}{12})$. (Have students explain this in words.)

Student Copy

Student Name: _____

Problem:

Kaden called to order a pizza for his family. Most of the members of his family like sausage on their pizza so Kaden ordered $\frac{2}{4}$ sausage. Kaden is the only one who likes pepperoni and bell peppers, so he ordered $\frac{1}{6}$ pepperoni and bell peppers. His sisters like vegetable pizza, so he also ordered $\frac{3}{12}$ mushrooms, olives, tomatoes, and onions. How many slices are on the pizza? Will any part of the pizza be only cheese?

Workspace

Solution:

- a. Model how the pizza will look when it is delivered to Kaden's family.
- b. Explain how to find the **total** fraction of the pizza that Kaden **and** his sisters ate.
