



# Pizza Fraction Pie Graph

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**Target Grade:** 3<sup>rd</sup>-4<sup>th</sup> Grade Math

**Time Required:** 60 minutes

## Standards

*Common Core State Standards (CCSS)*

- CCSS.MATH.CONTENT.4.NF.A.2: Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as  $\frac{1}{2}$ . Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols  $>$ ,  $=$ , or  $<$ , and justify the conclusions, e.g., by using a visual fraction model.
- CCSS.MATH.CONTENT.3.NF.A.1: Understand a fraction  $\frac{1}{b}$  as the quantity formed by 1 part when a whole is partitioned into  $b$  equal parts; understand a fraction  $\frac{a}{b}$  as the quantity formed by parts of size  $\frac{1}{b}$ .

## Lesson Objectives

Students will be able to:

- Interpret a class data set and create a pie graph based on correlating fractions.
- Compare two fractions with different numerators and denominators to determine the class's favorite pizza topping.

## Central Focus

In this lesson plan, students will be using pizza slices to investigate fractions with different denominators. Throughout the class, students will collect data on the class's favorite pizza toppings. Based on the data, students will create pie graphs to determine the class favorite. Throughout the lesson, students will be working both in groups and individually to convey their understanding.

Key words: numerator, denominator, math, difference, game, graphing, quantity



## Background Information

This lesson is used for students to visualize and interpret the difference between fractions with different denominators. Throughout the lesson, students will begin to understand that each fraction is part of a whole.

Vocabulary words students should recognize prior to the lesson:

- Whole number: an integer, also called a counting number since these are the numbers we use when we count
- Fractions: A numerical quantity that is not a whole number
- Denominator: The divisor, which is the number below the line in fraction
- Numerator: The number above the line in the fraction indicating how many parts of the denominator are taken

Students should also be aware that a fraction is another way to show a number being divided by another number. Students throughout this lesson will begin to recognize how fractions can be greater than, less than, or equal to each other.

When making comparisons, it is helpful to have benchmark numbers with which students can compare fractions. For example, 1 and  $\frac{1}{2}$  are good benchmark numbers.

This lesson can be taught at the 3<sup>rd</sup> or 4<sup>th</sup> grade level and edited appropriately for each. For example, for 3<sup>rd</sup> grade, the teacher can take out the activity comparing the two pie graphs and modify the exit ticket questions. These sections focus on the idea that comparisons can only be made when fractions refer to the same whole.

## Materials

- Fraction Cards (2 per page)
- Scissors
- Surveys
- Pencil
- Paper
- iPads/laptops/tablets (ideally whole class)
- Exit ticket
- Class survey Google form
- Survey example data
- Projector/smart board



## Instruction

### *Introduction (10 minutes)*

- Ask students the question, “How many pieces are usually in one pizza?”
  - Discuss how pizzas are often cut into 8 pieces.
  - Ask the following questions: If you have one piece of pizza, what fraction of the pizza do you have? If you have two pieces, what fraction of the pizza do you have? If you have four pieces, what fraction of the pizza do you have?
  - Ask a student to come to the board to order the numbers  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$  in order from least to greatest. Make sure to emphasize that  $\frac{1}{8} < \frac{1}{4}$  even though 8 is bigger than 4. Ask a student to explain this idea to the class.
- Pass out the activity cards and give one to each student. Have the students answer the question on the card. Once you check their answer, have them cut out their piece of the pizza.
- Instruct students that they must organize themselves into groups of 4. The rules are as follows:
  - The groups must have exactly 4 students.
  - Each group must have cards that make up one whole pizza.
  - There can be no more than 2 repeat cards in the same group (ex. there cannot be a group of four  $\frac{1}{4}$ s).
  - Once students get into their groups, they must write out the equation for their pizza, adding each of their portions up.
- After all the groups finish, have one student come up to the board to write out the equation and compare to the result of the other groups. If the teacher wants, they can make this a competition so that the first group with a whole pizza wins.

### *Whole Group Lesson (10 minutes)*

- Using a projector or smartboard, show students the Example Data for pizza toppings.
- First, show students the pie graphs on the Example Data page.
- Ask, “What fraction of Ms. Mozzarella’s class prefers pepperoni?” and “How about Mr. Basil’s class?”
- Next, ask, “Does that mean the same number of students prefer pepperoni in Ms. Mozzarella’s class and in Mr. Basil’s class?” and have students do a think-pair-share to answer.
  - Make sure to discuss how, even though both fractions are  $\frac{1}{2}$ , they are not necessarily equal because the total number of students in each class is different.
- Next, explain the table showing topping and number of students who chose that topping.
- Help show the relationship between the numbers of people in relationship to the pie graph.
  - $\frac{10}{20}$  or  $\frac{1}{2}$  of the people like pepperoni,  $\frac{5}{20}$  or  $\frac{1}{4}$  like mushrooms,  $\frac{4}{20}$  or  $\frac{2}{10}$  or  $\frac{1}{5}$  like plain, and  $\frac{1}{20}$  like pineapple



- Get out tablets/laptops/iPads for the students.
  - If sharing devices, tell students they will need to share when filling out the form once students submit the survey you can click “submit another response.”
- Have students fill out the google form asking them what their first and second favorite pizza toppings are.
  - Example form: [https://docs.google.com/forms/d/e/1FAIpQLSe-yJRxN79GS0w7wvWu6C9k\\_Mf0ncs3WFcygYaJUiHZZuXHwQ/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSe-yJRxN79GS0w7wvWu6C9k_Mf0ncs3WFcygYaJUiHZZuXHwQ/viewform?usp=sf_link)

#### *Exploration (10 minutes)*

- Show the class the results of their survey.
  - When clicking on responses on the forms, make sure you click on questions when showing the students. This will break down the number for each topping and separate it by the question.
- Tell students that you want them to take this data and create a pie graph like the one from the example and create a fraction for each type of topping.
- Separate students into small groups around the room. Walk around the room and help students when needed.

#### *Elaboration (10 minutes)*

- Have volunteers share their pie graph.
- On the projector or smartboard, show students the pie graph that Google Forms generated automatically by clicking on “summary” under responses.
- Ask students questions related to the results:
  - Which topping is the most liked in this class? What fraction represents this group?
  - Is this topping more or less popular than this topping? (Ask for fractional amounts so that students are comparing fractions).
  - Which topping did more than one-half of the class like?
  - Which topping did one-fourth of the class like?

#### *Explain (10 minutes)*

- Show the results under question two.
- Individually, have students create a pie graph based on the data from the second question, “What is your second favorite topping?”
- Ask students to write out a fraction for each portion of the pie graph. Then have students order these fractions from least to greatest.
- As the facilitator in the room, walk around the room and make sure students are understanding the values of each fraction and answer any questions.
- Have students turn in their pie graph.



### *Closure (10 minutes)*

- Come back together and ask for volunteers to show their pie graphs to the whole group.
- Ask students questions related to the results again. Always ask students to use fractions when they answer. Use the following questions, when applicable:
  - Which topping is the most liked in this class?
  - Is this topping more or less popular than this topping?
  - Which topping did more than one-half of the class like?
  - Which topping did one-fourth of the class like?
- For an exit ticket, give each student a fraction card and have them label the fraction that is on the fraction card.

### **Differentiation**

- **Heterogeneous grouping:** Groups can be specific to students' needs. There are several different groupings throughout the lesson.
  - Put students who need a little extra support in strategic groups.
  - If there is another student or students whom a struggling student works well with, keep those students together so they may help one another.
- **Classroom arrangement**
  - While working with the whole group, make sure to seat students in an area that is in a spot with the least distractions for them for optimal instruction.
  - Make a seating chart so that students who work well together are close for the think-pair-share activity.
- **English-Language Learners**
  - Add labels and pictures of the pizza toppings and fractions.
  - Provide worksheets and handouts in the students' native language.
  - Provide a vocabulary sheet.
  - Allow students to use online translation services when necessary.
- **Students with IEPs/504 plans**
  - Include print-out examples of the pie graphs as well as frequent checks-ins and guidance prompts.
  - Provide worksheets with blank pie graphs for students to use.
  - During the first activity, the teacher can give students the hint that their sheets are numbered, and that each group must have numbers 1-4.
- **Advanced Learners**
  - Ask students to write fractions in different forms if they finish activities early (ex.  $10/20 = 1/2$ ,  $6/24 = 1/4$ ).
  - Ask advancing questions: "Why is  $1/2$  a relative term or why does  $1/2$  not always refer to the same number?"



- Have students perform additions of different fractions to practice finding common denominators (ex.  $1/4 + 1/6 = 3/12 + 2/12 = 5/12$ ).

### Assessment

#### *Formative assessments:*

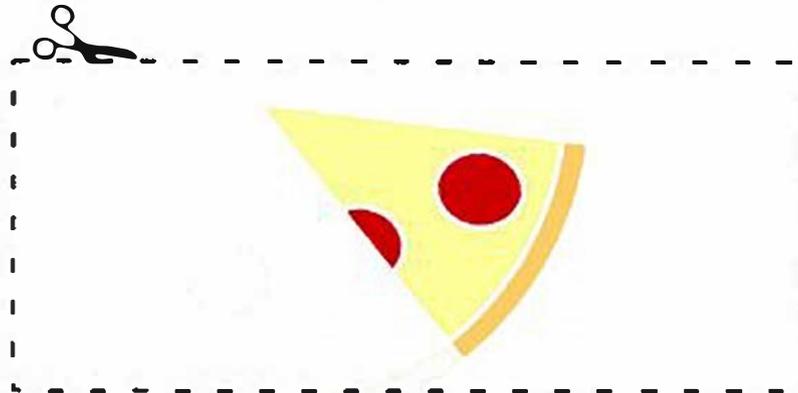
- Throughout the lesson, the teacher should survey each group to check for understanding and to see which students need additional support.
- The *Frac to Whole* activity can be used to quickly gauge the students' background knowledge and understanding of using fractions to make a whole.
- When students present their graphs, the teacher can assess each group's understanding.

#### *Summative assessments:*

- The teacher can use the individual's responses to the creation of the pie graph for the class's second favorite topping to gauge and score each individual student's understanding of the general topic of using fractional data to create a pie graph and interpret the data.
- The final exit ticket can be used to determine students' understanding of the complete class topic.

# LEARNING FRACTIONS

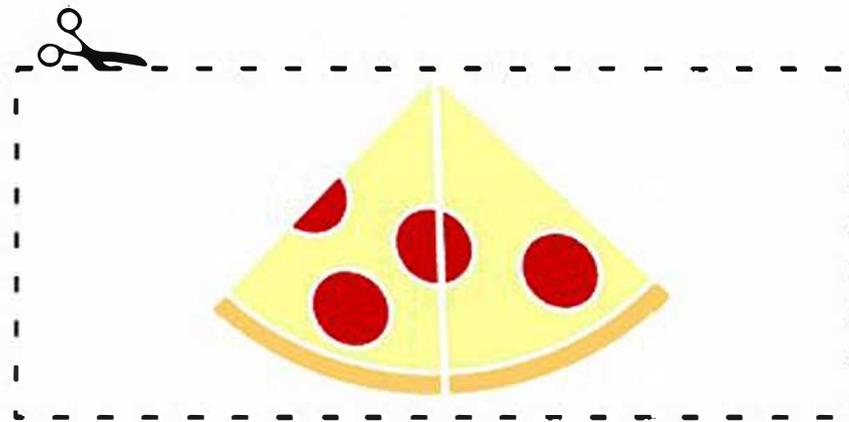
**What  
fraction of  
the pizza do  
you have?**



**1**

# LEARNING FRACTIONS

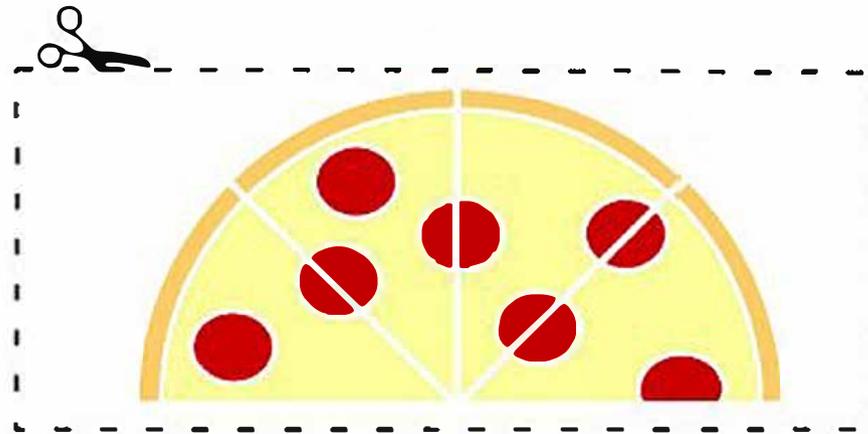
**What  
fraction of  
the pizza do  
you have?**



**2**

# LEARNING FRACTIONS

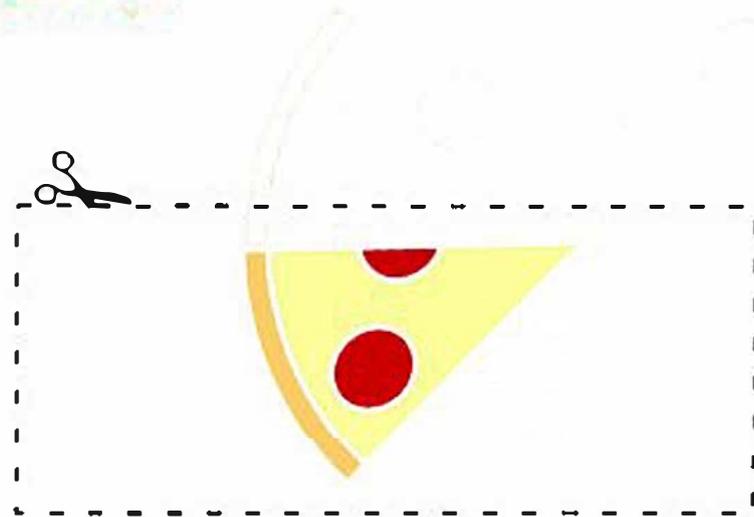
**What  
fraction of  
the pizza do  
you have?**



**3**

# LEARNING FRACTIONS

**What fraction  
of the pizza do  
you have?**

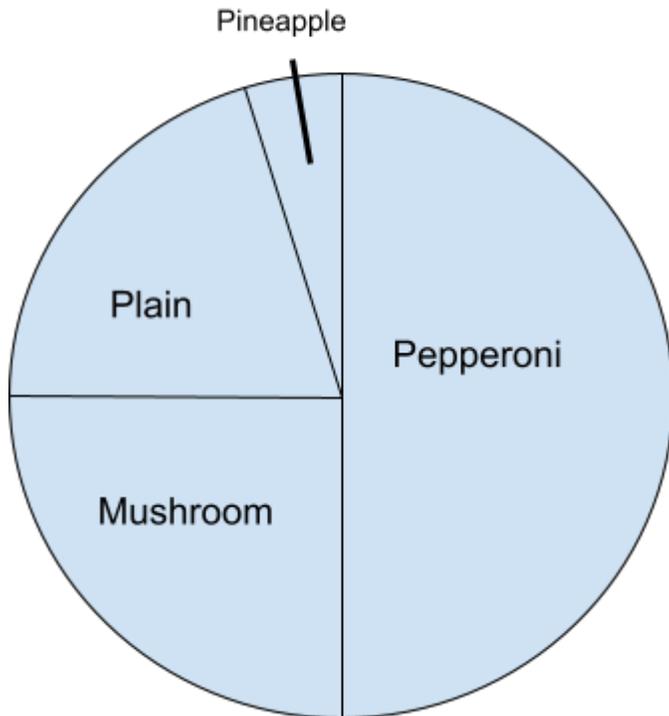


**4**

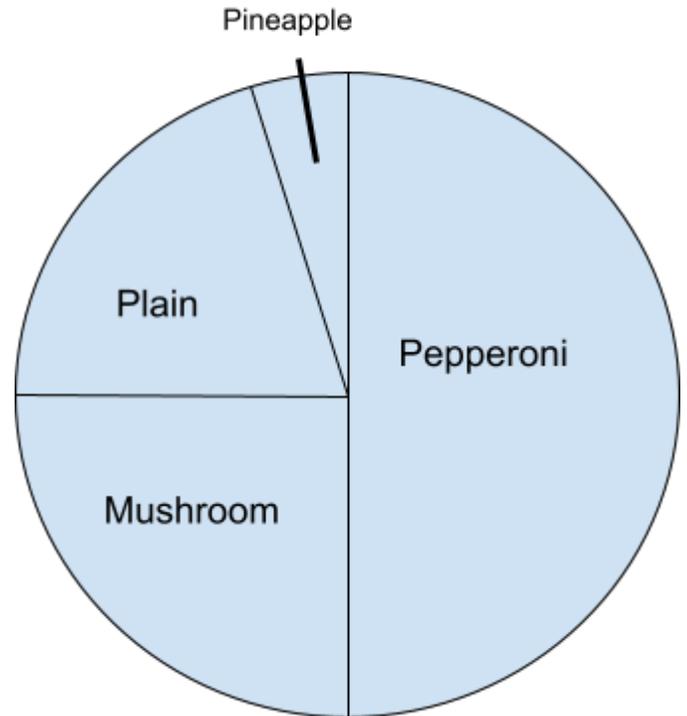
## Pizza Survey Example Data (Ms. Mozzarella's Class)

Topping	Number of Students
Plain	4
Pepperoni	10
Sausage	0
Onion	0
Mushroom	5
Pineapple	1

Ms. Mozzarella's Class  
20 students



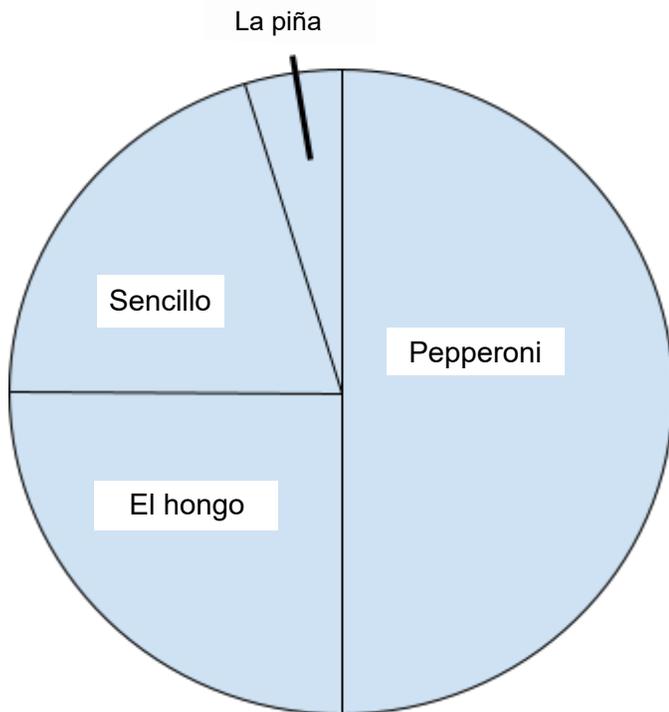
Mr. Basil's Class  
22 students



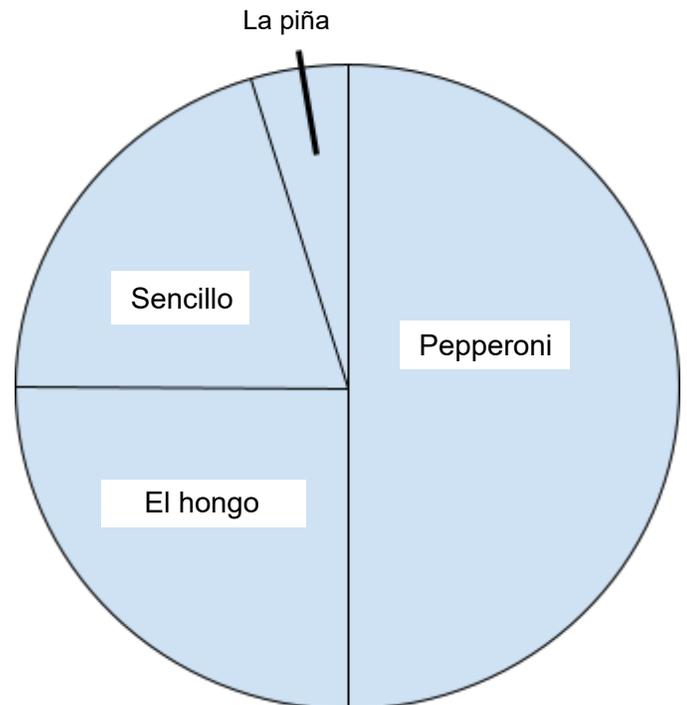
## Datos de Ejemplo de La Encuesta de Pizza (clase de la Sra. Mozzarella)

El Ingrediente de La Pizza	Numero de estudiantes
Sencillo	4
Pepperoni	10
La salchicha	0
La cebolla	0
El hongo	5
La piña	1

Alumnas de la clase 20 de la Sra. Mozzarella(



Estudiantes de la clase 22 del Sr. Basil

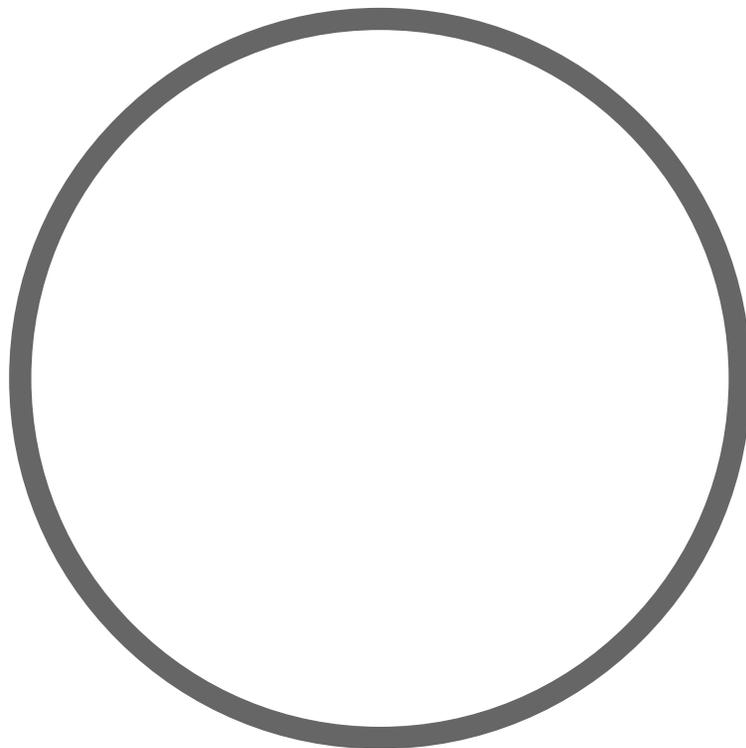


NAME \_\_\_\_\_

DATE \_\_\_\_\_

# EXIT TICKET

Mrs. Peppers asked her class, "What is your favorite pizza topping?"  $\frac{1}{2}$  of the class liked pepperoni,  $\frac{1}{4}$  of the class liked sausage, and  $\frac{1}{4}$  of the class liked cheese. Color the pizza to show which portion of the class liked each topping.



If there are 24 students in the class, how many students chose cheese?

If there are 28 students in the class, how many students chose cheese?