

MATH WITH MARY LEE: FRACTIONS / INSTRUCTOR INFO

Summary

This lesson includes vocabulary, content, examples, and activities to help students learn how to about fractions, including finding equivalent fractions, common denominators, adding and subtracting, and multiplying or dividing fractions by whole numbers. Students will use their knowledge to complete activities based on OCEARCH data and real world situations.

Part 1. Parts of a Fraction

Part 2. Fractions & Number Lines

Part 3. Equivalent Fractions

Part 4. Addition & Subtraction

Part 5. Multiplying & Dividing

Activity 1. Fractions with Mary Lee

Goals & Objectives

The students will:

- Recognize fractions from whole numbers;
- Understand why fractions are used and when it can be applied to a situation;
- Learn how to identify fractions in halves, thirds, fourths, sixths, and eighths;
- Learn how to add, subtract, multiply, and divide fractions to;
- Develop research skills and use their knowledge of fractions to complete a final activity.

// STANDARDS

This lesson aligns with the following TEKS:

Grade 3 Math: 1A, 1B, 1C, 1D, 1E, 1G, 3A, 3B, 3C, 3D, 3E, 3F, 3G, 3H

Grade 4 Math: 1A, 1B, 1C, 1D, 1G, 3A, 3B, 3C, 3E

Grade 5 Math: 1A, 1B, 1C, 1D, 1E, 1F, 1G, 3A, 3H, 3I, 3J, 3L

STEM

This lesson plan aims to assist teachers in implementing a STEM-based program into their classroom while inspiring the next generation of explorers, scientists, and stewards of the ocean. Based on real science and the Global Shark Tracker™, “Fractions” is intended to promote environmental awareness and to prepare students for STEM careers.

Helpful Tips

1. The content in this lesson is related to OCEARCH and the Global Shark Tracker. Spend a few minutes getting familiar with the website and the tracker if you have not done so already. The Global Shark Tracker is also available as an app for iPhone and Android.
2. This lesson plan is designed to be adaptable to suit your specific needs. Use the entire lesson plan or just parts of it. This material can be expanded to be an entire unit or condensed for just one day in the classroom.
3. Vocabulary words will be underlined as they appear in the lesson plan. A complete list of vocabulary words is included as well.
4. Answers to questions and prompts for discussions will appear in italics.
5. Optional activities and content (side notes) will appear in a box. Use these to enhance your lesson and adapt it to suit your needs!
6. Have questions for OCEARCH Expedition Leader, Chris Fischer? Email info@OCEARCH.org to schedule a Skype session and let your students/child talk directly to Chris and the OCEARCH crew!
7. Email all questions about this lesson to info@OCEARCH.org.

MATH WITH MARY LEE: FRACTIONS / VOCABULARY

Common Denominator – A denominator that is shared by all the fractions in a group or problem.

Denominator – The number in a fraction that is below the fraction line and divides the number above the line.

Equivalent – Having the same value.

Fraction – A number that represents a partial whole number, indicated by one number being divided by another.

Number Line – A picture of a straight line that shows increasing numbers left to right.

Numerator – The number in a fraction that is above the fraction line and is divided by the number below the line.

Vocabulary Game (15 – 30 minutes)

Try this fun game to practice and review vocabulary words!

Materials – For this game, students should make vocabulary cards with index cards or cut up paper. Write the word on one side and the definition on the other.

Select one student volunteer to be the game host then divide the rest of the students into two teams. Give the list of vocabulary words and definitions to the host for reference. Have every student spread out his/her cards on their desk word side up. The host announces the definition of one of the words and the students race to pick up the word that matches that definition. The first team with all students holding up the correct word wins a point! It is certainly fair for teammates to help each other out. Tell students to place each card word side down after it has been announced. Once all words have been announced, reverse the procedure and announce the word and students pick up the definition. For an added twist, make a rule where the teams play silently!

MATH WITH MARY LEE: FRACTIONS / PRE-LESSON ASSESSMENT

Use the following true/false and multiple-choice questions as an introduction/warm-up to the lesson topics. You can do this in a verbal or written format, as a game, individually, or as a whole class!

The questions do not need to be graded. They are intended to give the students an idea of what they will be learning and to see what they already know.

1. True or False

The fractions $\frac{2}{4}$ and $\frac{3}{6}$ are equal to each other.

Answer: True

2. True or False

The denominator is the number in a fraction that is above the line.

Answer: False

2. Lydia eats squid, fish, and seal. If $\frac{1}{8}$ of her diet is seals, and $\frac{5}{8}$ of her diet is fish, how much of her diet is squid?

- a. $\frac{1}{4}$
- b. $\frac{4}{8}$
- c. $\frac{1}{8}$
- d. $\frac{1}{2}$

Answer: a

2. What is 2 multiplied by $\frac{1}{2}$?

- a. 4
- b. 1
- c. 5
- d. 0

Answer: b

2. If 8 sharks have pinged in this week, and 6 of those were female sharks, what fraction of those sharks were male?

- a. $\frac{6}{8}$
- b. $\frac{4}{1}$
- c. $\frac{2}{6}$
- d. $\frac{1}{4}$

Answer: d.

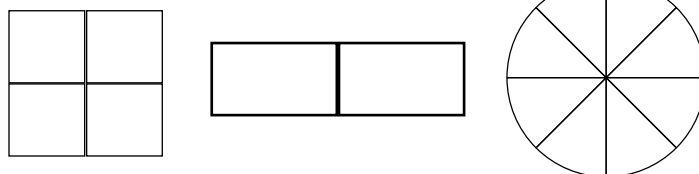
MATH WITH MARY LEE: FRACTIONS

/ LESSON PLAN

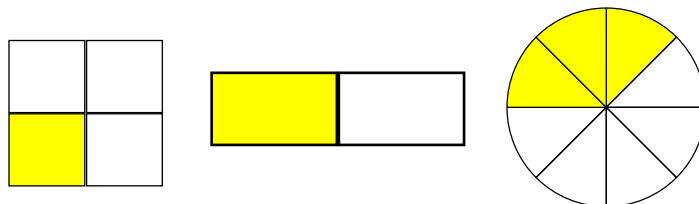
PART 1. PARTS OF A FRACTION 10-20 mins

Fractions are used to represent numbers that are less than a whole number, but more than zero. Because it represents a part of a number, it can also be thought of as one number being divided by another. For example, if a cake is divided into 8 pieces, *Draw a circle divided into 8* on the board then each piece is one eighth. To write one eighth as a fraction, the number above the line is divided by the number below the line. So the number one will be the number above the line, called the numerator, and the eight will be the number below the line, known as the denominator.

Draw the following shapes on the board. Which of these shapes has 2 pieces? Which of these shapes has four pieces? Now which shape has eight pieces? Do you think the 2, 4, and 8 goes on top or below the fraction line? It goes below the fraction line because it is the denominator.



Now fill in the previous shapes as shown below. Let's write the colored portions as fractions. Since we have already determined that the 2, 4, and 8 are the denominators, we should write those down to begin with. Draw the fraction line on the board and fill in the denominators for each shape. We write in the numerator by looking at how many parts are filled in. Allow the students to raise their hand and answer for each shape.



There is one square filled in for the box with 4 portions. So we would write that as $\frac{1}{4}$. For the rectangle that is has two portions with only one filled, we would write $\frac{1}{2}$. The circle has eight portions in total and three of those portions are filled in. We would write this fraction as $\frac{3}{8}$.

Now fill in the rest of the portions in the circle. How would we write this as a fraction? Allow students to raise their hands and answer. If there are eight portions, and all eight of those are filled in, then the number would be written as $\frac{8}{8}$. When the number in the numerator matches the number in the denominator, the answer will always be 1. This is because the numerator is divided by the denominator. So back to the example of the circle, 8 divided by 8 is 1.

In Class Activity: Reading Fractions

Pass out activity sheets with different shapes divided into equal sections to each student. The divided shapes should represent halves, thirds, fourths, sixths, and eighths. The shapes can be round, square, or any fitting polygon that can be divided in equal portions.

Allow the students to color in the number of sections of their choosing. Once the students are done coloring, the shapes should be collected at the front of the room.

One at a time, students come up to the front of the class to choose a shape, then read (or write on the board) what fraction is represented by the filled in portions on the shape.

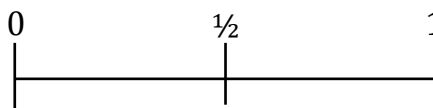
For Example: The shape below is a triangle in three sections. Only one section is filled in. The student would read (or write) this fraction as $\frac{1}{3}$.



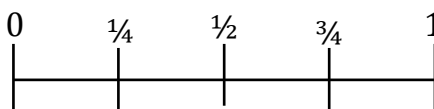
Students should take turns practicing until all of the shapes have been read.

PART 2. FRACTIONS & NUMBER LINES 5-10 mins

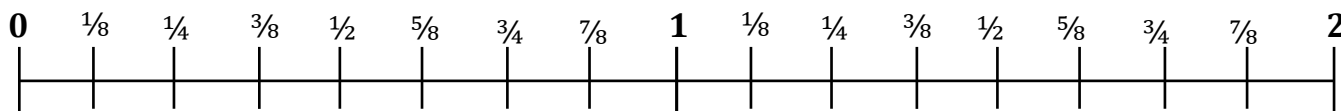
How can a fraction be represented on a number line? Because fractions are a portion of a whole number, they are represented on a number line between whole numbers. The midpoint between the numbers zero and one, would be $\frac{1}{2}$.



The midpoint between 0 and $\frac{1}{2}$ is $\frac{1}{4}$. Likewise, the midpoint between $\frac{1}{2}$ and 1 would be $\frac{3}{4}$ since fourths would be dividing zero to 1 into 4 equal portions.



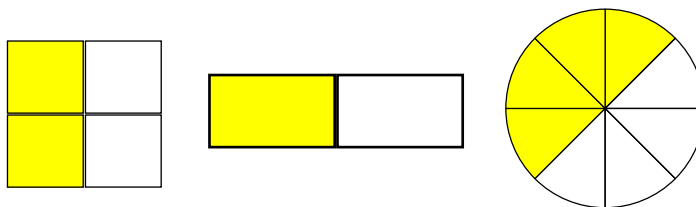
Each of the quarters can be divided in half again into eighths as shown below. The fractions are read from left to right and will start over again between each whole number.



Look at the markings on your rulers. *Students should take out their rulers and observe.* Your ruler is 12 inches long, and each inch is divided into smaller sections. How many sections is each inch divided into? *Allow the students to raise their hand to answer.* Each inch is divided into 8 sections. Find the part on your ruler that is exactly 3 and $\frac{1}{2}$ inches. Now point to the part on your ruler that is 7 and $\frac{1}{4}$ inches. Let's try a little challenge. Find the part that is 6 and $\frac{7}{8}$ inches in length.

PART 3. EQUIVALENT FRACTIONS 5-10 mins

Because fractions are parts of a whole number, represented by a numerator divided by the denominator, fractions can be equal to each other, even if shown as different numbers. For example, the shapes below are divided into 4, 2, and 8 sections. If these are written out as fractions, they would be $\frac{2}{4}$, $\frac{1}{2}$, and $\frac{4}{8}$. Even though these are written as different numbers, each shape is half filled in. These would be considered equivalent fractions.



We can tell these will be equivalent fractions by finding the lowest common denominator. This is done by dividing both the numerator and the denominator by the same numbers until you cannot divide it any further. For example, the fraction $\frac{2}{4}$ can be reduced by dividing the numerator and denominator by 2. Starting with the numerator, 2 divided by 2 is equal to 1. Now for the denominator 4 divided by 2 is equal to 2. Our new fraction is $\frac{1}{2}$ which is equal to $\frac{2}{4}$.

$$\frac{2 \div 2}{4 \div 2} = \frac{1}{2}$$

Finding a lowest common denominator can be done with any fraction that can be reduced by the same number on the top as on the bottom. The fraction $\frac{3}{6}$ is reduced by dividing the numerator and the denominator by 3, your answer is $\frac{1}{2}$. Therefore $\frac{2}{4}$ and $\frac{3}{6}$ are equivalent fractions.

$$\frac{3 \div 3}{6 \div 3} = \frac{1}{2}$$

PART 4. ADDITION & SUBTRACTION 10-20 mins

Being able to find a common denominator is important when considering other mathematical operations such as adding or subtracting fractions. To be able to add or subtract a fraction, the denominators of both fractions must be the same. This is because you must add or subtract equal sections of a whole. If the denominators are matching, you simply add or subtract the numerators to find the answer.

$$\frac{1}{4} + \frac{2}{4} = \frac{3}{4} \quad \text{OR} \quad \begin{array}{|c|c|} \hline \text{shaded} & \text{shaded} \\ \hline \text{shaded} & \text{white} \\ \hline \end{array}$$

If the denominators of the fractions are not the same, you must multiply or divide the numerator and denominator of each fraction by equal numbers so that both fractions have the same denominator.

$$\frac{1}{4} + \frac{1 \times 2}{2 \times 2} = \frac{1}{4} + \frac{2}{4} = \frac{3}{4}$$

Imagine that a scientist aboard the OCEARCH must take a blood sample from a shark and analyze the contents. If $\frac{1}{3}$ of the

Grade Level: 3-5

sample is red blood cells, $\frac{1}{4}$ of the sample is white blood cells, and the rest is water, what fraction of the sample is water?

The first step is to write out the question into fractions.

$$\frac{1}{3} + \frac{1}{4} + \frac{?}{?} = \frac{1}{1}$$

The second step is to find a common denominator. In this case, the common denominator for this fraction is 12.

$$\frac{1 \times 4}{3 \times 4} + \frac{1 \times 3}{4 \times 3} + \frac{?}{?} = \frac{1 \times 12}{1 \times 12} \longrightarrow \frac{4}{12} + \frac{3}{12} + \frac{?}{12} = \frac{12}{12}$$

Next, add the fractions together.

$$\frac{4 + 3 + ?}{12} = \frac{12}{12} \longrightarrow \frac{7 + ?}{12} = \frac{12}{12}$$

Finally, subtract to find the answer.

$$\frac{12 - 7}{12} = \frac{?}{12} \longrightarrow ? = \boxed{\frac{5}{12}}$$

The answer is that $\frac{5}{12}$ of the sample is water.

PART 5. MULTIPLYING & DIVIDING 15-20 mins

When multiplying or dividing a whole number by a fraction, it is important to keep in mind that a fraction is a representation of a number that is already divided. Before multiplying or dividing, write whole numbers as fractions by filling in a 1 as the denominator under the whole number

$$1 = \frac{1}{1} \quad \text{OR} \quad 2 = \frac{2}{1} \quad \text{OR} \quad 8 = \frac{8}{1}$$

When multiplying a whole number by a fraction, simply multiply the numerators and the denominators. First, write out your whole number as a fraction next to the fraction you are multiplying.

$$4 \times \frac{1}{2} = ? \longrightarrow \frac{4}{1} \times \frac{1}{2} = ?$$

Grade Level: 3-5

Next, Multiply the numerators across the top, and the denominators across the bottom.

$$\frac{4}{1} \times \frac{1}{2} = \frac{4}{2}$$

After you have multiplied, simplify your answer to the lowest common denominator.

$$\frac{4}{2} \longrightarrow \frac{4 \div 2}{2 \div 2} = \frac{2}{1} \longrightarrow \boxed{2}$$

Dividing a whole number by a fraction is similar to multiplying, with only one other simple step! Again, write out your whole number as a fraction next to the fraction you are multiplying.

$$4 \div \frac{1}{2} = ? \longrightarrow \frac{4}{1} \div \frac{1}{2} = ?$$

This is where the extra step comes in! Flip the numerator and denominator for the fraction on the right side.

$$\frac{4}{1} \div \frac{1}{2} \longrightarrow \frac{4}{1} \div \frac{2}{1}$$

Now multiply across the numerators and denominators to find your answer.

$$\frac{4}{1} \div \frac{2}{1} = \frac{8}{1}$$

Lastly, simplify your answer.

$$\frac{8}{1} = \boxed{8}$$

In Class Activity: Spaghetti Fractions

This activity will help students understand multiplying and dividing fractions.

Pass out 5 pieces of dried spaghetti to each student. Using two pieces of spaghetti, we will demonstrate what happens when you divide 2 by $\frac{1}{2}$. Break two of the spaghetti pieces in half. How many pieces of spaghetti are left? Four!

Break the remaining three pieces of spaghetti in half. Now we will demonstrate what happens when you multiply 6 by $\frac{1}{2}$. Pick up 6 halves of the spaghetti. With these six half pieces, how many whole pieces do you have? Three!

Grade Level: 3-5

Time Estimate: 20-30 mins

MATH WITH MARY LEE: FRACTIONS

/ACTIVITY 1. FRACTIONS WITH MARY LEE

INTRODUCTION

This activity will allow students to use the Global Shark Tracker™ to collect information and fill in the activity sheet provided using their knowledge of fractions. Students may work individually or in groups.

MATERIALS

- Computer with internet access.
- Pencil or markers
- Activity sheet (Provided)

INSTRUCTIONS

Give students time to explore and familiarize themselves with the Global Shark Tracker™ (www.ocearch.org). Use the information taken from the shark tracker to fill out the activity sheet provided.

TIPS

- This activity can be done in class or as a take home assignment.
- This activity is designed to be completed individually, in small groups, or as a whole class.

FRACTIONS WITH MARY LEE

Name: _____

Date: _____

Use information from the OCEARCH Global Shark Tracker™ to fill in the spaces below.

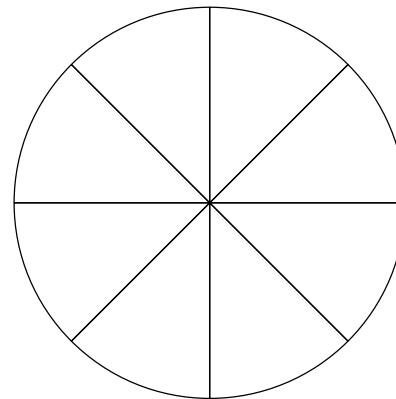
Look at the last 8 times that Mary Lee pinged in.
Write down the times in the spaces below

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Using a fraction, how many times did Mary Lee Ping in the AM? _____

Using a fraction, how many times did Mary Lee Ping in the PM? _____

Color in the chart below to match these fractions. Label which color is the AM and which is the PM.


☐ Pings in the AM

☐ Pings in the PM

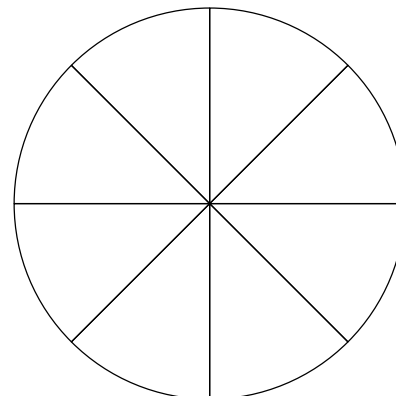
Look at the last 8 sharks that pinged in. Write
down their names and circle whether they are
male or female below

- | | | |
|----------|------|--------|
| 1. _____ | Male | Female |
| 2. _____ | Male | Female |
| 3. _____ | Male | Female |
| 4. _____ | Male | Female |
| 5. _____ | Male | Female |
| 6. _____ | Male | Female |
| 7. _____ | Male | Female |
| 8. _____ | Male | Female |

Using a fraction, how many of the sharks were female? _____

Using a fraction, how many of the sharks were Male? _____

Color in the chart below to match the fractions. Label which color
are female sharks and which are male.


☐ Male sharks

☐ Female sharks