# Multiplying and Dividing Fractions

## Multiplication

$3 \times 4 = 12$

$3 + 3 + 3 + 3$

multiplication = repeated addition

## Types of Fractions

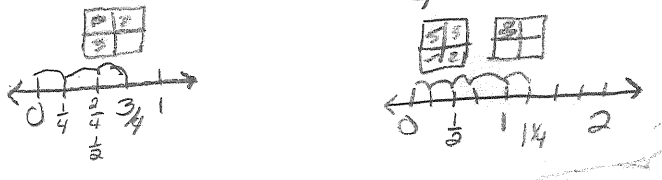
**Proper**

parts → 3 numerator

whole → 4 denominator

**improper** **mixed number**

$\frac{5}{4} = 1\frac{1}{4}$




## partial numbers

$\frac{1}{2} = .5 = 50\%$

fractions decimals percents

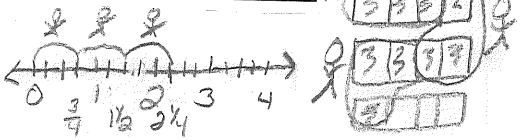
## Division

$6 \div 2 = 3$

## Whole number by a fraction

3 students each ate ¾ of a candy bar. How many candy bars did they eat?

$3 \times \frac{3}{4} = 2\frac{1}{4}$ candy bars

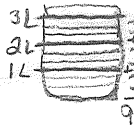


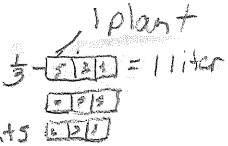


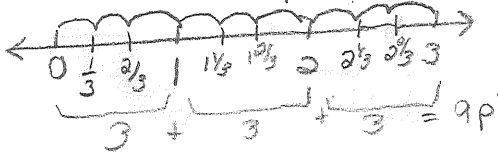

## Whole number by a unit fraction

The container holds 3 liters of water. Each plant needs 1/3 liter. How many plants can we water?

$3 \div \frac{1}{3} = 9$ plants



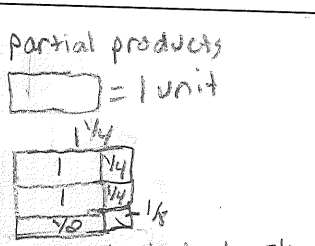



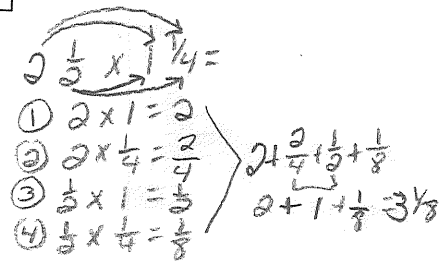

## mixed number by a mixed number

Juan bought 2 ½ pounds of grapes. He also bought bananas that were 1 ¼ times the weight of the grapes. How much did the bananas weigh?

$2\frac{1}{2} \times 1\frac{1}{4} = 3\frac{1}{8}$ pounds

partial products



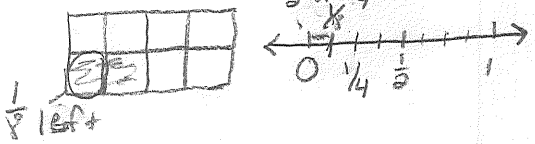

## fraction by a fraction

I have ¼ of a lasagna left. If we eat ½ of it for dinner. How much do we have for lunch tomorrow?

$\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$ left of the lasagna

part of a part

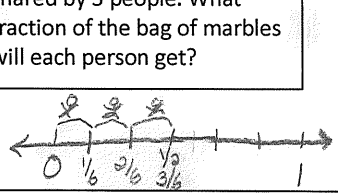
↑ of




## unit fraction by a whole number

½ of a bag of marbles is shared by 3 people. What fraction of the bag of marbles will each person get?

$\frac{1}{2} \div 3 = \frac{1}{6}$ of the bag





## Mathematical Standards and Practices

1) We will use modeling to explain our mathematical thinking when multiplying and dividing fractions.

2) We will solve real-world problems involving multiplication and division of fractions by making sense of problems and persevering in solving them.

## Inquiry Chart

**What we know about _____?**

multiplying and dividing fractions

**What we want to learn about _____?**

AIM4S³™

**UNIT PLANNING TOOL**

**Planning Focus:** Fractions: Multiplication and Division **Grade Level:** 5th

**CCSSM: MGSE5.NF.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
**MGSE5.NF.6** Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
**MGSE5.NF.7** Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions (includes solving real-world problems).

**Mathematical Practices being emphasized:**
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.

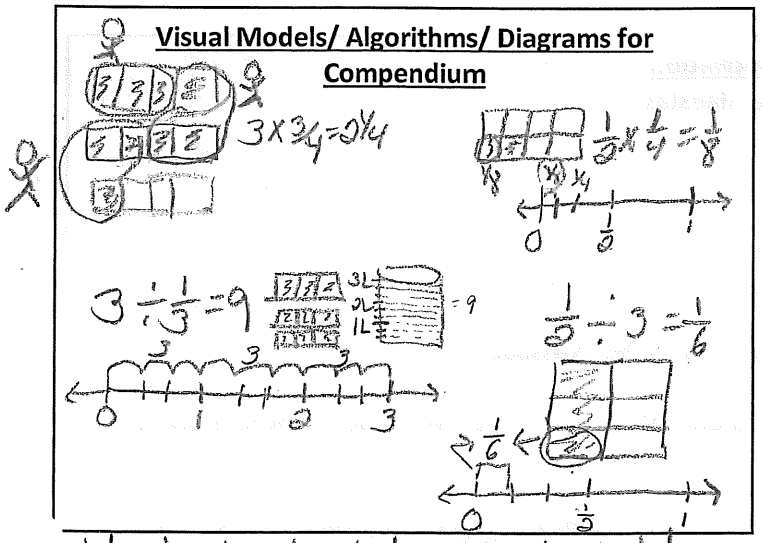
**Essential Questions**

How can a fraction model help us make sense of a problem?
How can real-world situations helps us understand what is means to multiply and divide fractions?

**Key Concepts**

- Benchmark fractions
- Plotting fractions on a number line
- Use visual models to compare and find equivalent fractions
- Multiplication and division of whole numbers

**Visual Models/ Algorithms/ Diagrams for Compendium**




Want to include a real-world context with each.

**Pre and Post Assessments**

Pre and post assessments in unit.
Exit slips (teacher developed and from unit)

Preassessment for classroom demo – see attached. (Preassessment based on concepts that will help the teachers know students' current understanding of fractions.)

Other formative assessment opportunities:

- Simultaneous Numbered Heads
- Inquiry Chart
- Work on unit lessons
- Guided math group

## Connections (Real World Applications)

- Dividing food (candy bars, cakes)
- Weight of food (2 ½ pounds of grapes X 1 ¼ times that weight in bananas)
- Bags of marbles, boxes of pencils, yards or feet of wrapping paper or ribbon
- Increasing or decreasing recipes, fraction of students on buses
- 2/3 of the class are boys. ½ are wearing tennis shoes. What fraction of the boys are wearing tennis shoes?

## Language Functions/Structures

**Describe** First we _____. Then we ___. Finally, we ____

**Explain** We decided to _____ because _____. To divide ___ by ____ you ...
To solve the problem, we ____ and then ____.
The product of ___ times ___ is ____ because ...
The quotient of ___ divided by ___ is _____ because ...
The answer to ____ divided by ___ is ____ because ...

**Basic structures** ___ times ____ equals ____. _____ of ____ is _____. What times ___ is ___?
___ divided by ___ is _____. How many ____ in ____?

## Vocabulary

fraction, numerator, denominator, operations, multiplication/multiply, division/divide, mixed numbers, product, quotient, partition, equal parts, equivalent, factor, unit fraction, benchmark fraction

## Focus and Motivation

**Chants:** Yes Ma'am: Fractions, Decimals, Percents by Annette Maestas
Fractions Cadence by Evelyn Chávez

**Video and quizzes** on Brainpop for fractions

**Literature:** *Inchworm and a Half* by Elinor J. Pinczes
*The Wishing Club* by Donna Jo Napoli
*Engineering Marvels: Roller Coasters: Dividing Fractions* by Ben Nussbaum

**Activity with pattern blocks or cuisenair rods:** If ___ is ___, then what is ___? What would be one whole? What would ___ be?

**YouTube -** Fractions in real life https://www.youtube.com/watch?v=5AVjBFP4MRg&t=36s (possible start for doing a fraction hunt)

# Fraction Check-in

Name _____

Solve. Draw a picture or use a number line.

$12 \div 4 =$

What happens when you divide a number by another number?

Put these numbers on the number line. ¾ 1 ½ 1/3 3 2 ¼


Write or draw what you now about **fractions**.

Solve. Show your work.

$4 \times ½ =$

## Yes Ma'am: Fractions, Decimals, Percents

by Annette Maestas

| | |
|---|---|
| Is this a fraction? | Yes, Ma'am |
| Is this a fraction? | Yes, Ma'am |
| How do you know? | Part of a whole |
| How do you know? | Numerator and denominator |
| Give me an example. | ¾ (3 out of 4) |
| Give me an example. | ¼ (1 out of 4) |

| | |
|---|---|
| Is this a decimal? | Yes, Ma'am |
| Is this a decimal? | Yes, Ma'am |
| How do you know? | Part of a whole |
| How do you know? | Tenths, hundredths, thousandths |
| Give me an example. | 0.16 (sixteen hundredths) |
| Give me an example. | 0.075 (seventy-five thousandths) |

| | |
|---|---|
| Is this a percent? | Yes, Ma'am |
| Is this a percent? | Yes, Ma'am |
| How do you know? | Parts of a whole |
| How do you know? | Compares a number to 100 |
| Give me an example. | 25% |
| Give me an example. | Means 25 out of 100 |

| | |
|---|---|
| Are they all alike? | Yes, Ma'am |
| Are they all different? | Yes, Ma'am |
| Explain yourself | All parts of a whole |
| Explain yourself | Represented differently |