

Lesson 4: Fractions and Number Lines

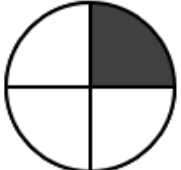

Objectives

- To understand the parts of a fraction.
- To place fractions on a number line.
- To perform operations using fractions.
- Use the fraction rules to simplify expression and solve equations.

Terms

- Numerator
- Denominator
- Form of one
- Mixed Number
- Least Common Multiple
- Least Common Denominator
- Reciprocal

Think about this: How can you express the following value numerically?

Figure	How many parts does the figure have?	How many of the parts are...	Write a fraction that represents...
1 circle 		Shaded?	The shaded part(s) of the circle.
1 6-pack of soda 		In the box?	The boxed part(s) of the 6-pack.

Definitions

Numerator: How many _____ of the unit you actually have.

Denominator: If we had 1 unit of something, the _____ of parts of the unit is broken into.

****Note:** The numerator can be...

-
-
-

... than the denominator.

Form of one: Any number or expression

Examples: $\frac{5}{5}$ $\frac{x+2}{x+2}$ $\frac{\log(2x)}{\log(2x)}$

What is the purpose of "Form of one"?

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Plotting Fractions on a Number Line

- Plot _____ and _____ on the number line.
 - Count the number of parts between each whole number.
 - Convert fractions by using a form of one, if needed.
 - Plot each number at the appropriate tick mark.



Consider this: What is a mixed number? How can you convert fractions from mixed numbers to fraction form?

Example: How many cans of soda do you have in each pack?

Write the value as a fraction.



There are two ways to write this value:

Mixed Number

Fraction

Think about: What does the denominator mean for each of these fractions?

- What does it mean when the denominator = _____?
- What does it mean when the denominator = _____?

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Definition:

- **Mixed Number:** when a number is expressed as a _____ and a _____.

Example:

- **Proper Fraction:** When the numerator of a fraction is _____ the denominator.

Example:

- **Improper Fraction:** When the numerator of a fraction is _____ or _____ to the denominator.

Example:

- **Simplified Fraction:** When the numerator and denominator of a fraction have a common factor that has been factored out and simplified.

Example:

Converting between Mixed Numbers and Fractions

Mixed Number to Fraction:	
Multiply the whole number by the denominator	
Add the product to the numerator	
Write the total over the denominator	
Simplify the fraction if needed.	

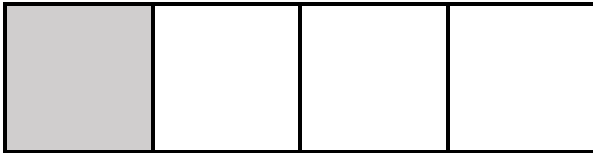
Fraction to Mixed Number:	
Divide the numerator by the denominator. Do not write a decimal!	
The quotient is the whole number	
The remainder is the numerator	
Write as a mixed number. Simplify the fraction if needed.	

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Think about this: What needs to be true to add two fractions?

Example: Fred eats one slice of a flatbread pizza that was cut into four pieces and George eats one slice of a flatbread pizza that was cut into three pieces. How much pizza did Fred and George eat total?

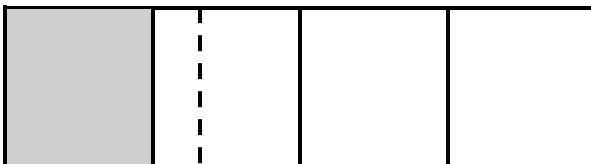
Fred's Original Pizza



George's Original Pizza



Fred's Pizza: Where should you add cuts?



George's Pizza: Where should you add cuts?



Answer each question in the space below.

If each of them is eating one slice from their pizza, are they eating the same amount of pizza?

How can we cut each pizza so that all slices are the same size?

What is this called, in math terms?

- **Translation:** Translate each part of the word problem into a mathematical expression.

Word Problem	Expression
Fred eats one slice of a pizza that was cut into four pieces.	
George eats one slice of a pizza that was cut into three pieces.	
Once we cut the pizza into the same size slices, how much pizza did Fred and George eat total?	

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Rules for Fraction Addition & Subtraction: What did we do to add the two fractions?

$$\frac{1}{4} + \frac{1}{3} = \frac{3}{12} + \frac{4}{12} = \frac{7}{12}$$

- Determine the common denominator.
- Multiply each fraction by a _____ (if needed).
- Add the numerators.
- Keep the denominator the same.

What did we multiply the following by:

$$\frac{1}{4} \quad \text{and} \quad \frac{1}{3}$$

Definitions

- **Remember: Least Common Multiple (LCM)** is the smallest value that a set of number and/or values can go into.

LCM of 4 and 7 is _____

LCM of 4 and 24 is _____

- **Common Denominator or Least Common Denominator:** to add or subtract fractions, they need to have a common denominator, typically the Least Common Denominator (LCD). This is the smallest multiple that the denominators have in common (their Least Common Multiple).
 - When adding or subtracting fractions, you need to find the Least Common Denominator.
 - The LCD of $\frac{1}{4}$ and $\frac{1}{3}$ is:

Practice

1. Use the expression to complete the following:
 - a. What is a common denominator?
 - b. Multiply each fraction by a form of one to rewrite with a common denominator.
 - c. Simplify the expression by adding the fractions.

$$\frac{1}{2} + \frac{3}{7}$$

Answer:

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2. Simplify the expression.

- What is a common denominator?
- Multiply each fraction by a form of one to rewrite with a common denominator.
- Simplify the expression by adding/subtracting the fractions, then simplifying forms of one.

$$\frac{12}{13} - \frac{1}{3}$$

Answer:

3. Translate the scenario into an expression or equation and answer the question.

- Felipe made a shirt using $\frac{1}{4}$ meters of red fabric and $\frac{4}{5}$ meters of yellow fabric. How many more meters of yellow fabric did Felipe use?

How would you do the following?

Practice:

1. Simplify the expression.

- Simplify the expressions by multiplying the fractions.
- Factor each term in the numerator and denominator.
- Identify forms of one.
- Simplify forms of one to one and write your final answer.

$$1) \frac{7}{25} \cdot \frac{3}{35}$$

Answer:

$$2) \frac{12}{77} \cdot \frac{10}{21}$$

Answer:

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Simplify the expression.

- Simplify the expression by multiplying by the reciprocal.
- Factor each term in the numerator and denominator, if possible.
- Identify forms of one.
- Simplify forms of one to one and write your final answer.

$$1) \frac{14}{9} \div \frac{16}{15}$$

Answer:

$$2) \frac{81}{64} \div \frac{36}{16}$$

Answer:

Definition

- **Reciprocal:** When you _____ a fraction by interchanging the _____ and the _____.
 - The reciprocal of a whole number:
 - A whole number can be rewritten as an improper fraction, with a denominator of _____.
 - Example:
 - When you divide one fraction by another, you:
 - Convert to a multiplication problem.
 - Take the _____ of the second fraction.
 - Change the division to _____.
 - Follow the rules developed for fraction multiplication.

Where will you see this in upcoming material?

What are the calculator skills you needed?

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