

Section 1.2: FRACTIONS IN ALGEBRA

When you are done with your homework you should be able to...

- π Convert between mixed numbers and improper fractions
- π Write the prime factorization of a composite number
- π Reduce or simplify fractions
- π Multiply fractions
- π Divide fractions
- π Add and subtract fractions with identical denominators
- π Add and subtract fractions with unlike denominators
- π Solve problems involving fractions in algebra

WARM-UP:

Evaluate the following algebraic expressions at the given value(s):

1. $\frac{3x-8}{5(x-1)}, x=4$

2. $6x-2y+5, x=0, y=-2$

VOCABULARY

Numerator: The _____ or _____ expression that is written
_____ the _____ bar.

Denominator: The _____ or _____ expression that is written
_____ the _____ bar.

Natural Numbers: The _____ that we use for _____.

Mixed Numbers: A _____ number consists of the _____ of a _____ number and a _____, expressed _____ the use of an _____.

Improper Fractions: An _____ is a fraction whose _____ is _____ than its _____.
such as _____.

CONVERTING A MIXED NUMBER TO AN IMPROPER FRACTION

STEPS

1. _____ the _____ of the _____ by the _____ number and _____ the _____ to this _____.

2. Place the _____ from step 1 _____ the _____ of the _____ mixed number.

Example 1: Convert the following mixed numerals to improper fractions

1. $5\frac{7}{8}$

2. $2\frac{5}{11}$

CONVERTING FROM AN IMPROPER FRACTION TO A MIXED NUMBER

STEPS

1. _____ the _____ into the _____. Record the _____ (result of the division) and the _____.
2. Write the _____ number using the following form:

Example 2: Convert the following improper fractions to mixed numerals

1. $\frac{15}{2}$

2. $\frac{24}{7}$

FACTORS AND PRIME FACTORIZATIONS

Fractions can be _____ by first _____ the natural numbers that make up the _____ and _____. To _____ a natural number means to write it as two or more _____ numbers being _____.

VOCABULARY

Prime number: A _____ number is a _____ number greater than 1 that has only _____ and _____ as _____.

Composite numbers: A _____ number is a _____ number greater than 1 that is _____ a _____.

EVERY COMPOSITE NUMBER CAN BE EXPRESSED AS THE _____ OF _____!!!

Expressing a _____ number as the _____ of _____ numbers is called the _____ of that composite number.

Example 3: Find the prime factorization of the following numbers

1. 128

2. 54

REDUCING FRACTIONS

Two fractions are called _____ if they represent the _____. Writing a fraction as an _____

with a _____ is called _____
 a _____. A fraction is _____ to its _____
 _____ when the _____ and _____ have _____
 _____ other than _____.

FUNDAMENTAL PRINCIPLE OF FRACTIONS

The _____ of a _____ if
 both the _____ and _____ are _____
 (or _____) by the _____ nonzero _____.

$$\frac{\quad}{\quad} = \frac{\quad}{\quad}$$

STEPS

1. Write the _____ of the _____
 and the _____.
2. _____ the _____ and the _____
 by the _____ (the
 product of all factors common to both).

Example 4: Reduce each fraction to its lowest terms

1. $\frac{18}{27}$

2. $\frac{100}{45}$

MULTIPLYING FRACTIONS

The _____ of two or more _____ is the _____ of their _____ divided by the _____ of their _____.

$$\frac{\quad}{\quad} \cdot \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

Example 5: Multiply and reduce each product to its lowest terms

1. $\frac{16}{11} \cdot \frac{33}{2}$

2. $\frac{5}{8} \cdot 12$

DIVIDING FRACTIONS

The _____ of two _____ is the _____ fraction _____ by the _____ of the _____ fraction.

$$\frac{\quad}{\quad} \div \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

Example 6: Divide and reduce each quotient to its lowest terms

1. $\frac{25}{32} \div \frac{3}{4}$

2. $\frac{144}{3} \div 12$

ADDING AND SUBTRACTING FRACTIONS WITH IDENTICAL DENOMINATORS

The _____ or _____ of two _____ with _____ is the sum or difference of their _____ over the _____.

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c} \quad \text{and} \quad \frac{a}{c} - \frac{b}{c} = \frac{a-b}{c}$$

Example 7: Perform the indicated operations

$$2. \frac{5}{6} + \frac{3}{6}$$

$$2. \frac{11}{13} - \frac{10}{13}$$

ADDING AND SUBTRACTING FRACTIONS WITH UNLIKE DENOMINATORS

The value of a fraction _____ change if the _____ and _____ are _____ by the _____ nonzero _____.

Example 8: Write $\frac{5}{8}$ as an equivalent fraction with a denominator of 32.

The **least common denominator** is the _____ number that the numbers in each denominator _____ into.

STEPS FOR ADDING AND SUBTRACTING FRACTIONS WITH UNLIKE DENOMINATORS

1. _____ the fractions as _____
with the _____.
2. _____ or _____ the _____, putting this
result over the _____.

USING PRIME FACTORIZATIONS TO FIND THE LCD

1. Find the _____ of each _____.
2. The _____ is obtained by using the _____ number of
times each _____ occurs in _____
factorization.

Example 9: Perform the indicated operations

1. $\frac{23}{7} + \frac{5}{14}$

2. $\frac{5}{12} - \frac{2}{15}$

Example 10: Translate from English to an algebraic expression or equation. Let x represent the variable.

1. A number decreased by one third of itself.
2. The sum of one ninth of a number and one tenth of that number gives 15.

APPLICATIONS

Shown below is a line from the sheet music for "An Irish Lullaby". The time is $\frac{2}{4}$, which means that each measure must contain notes that add up to $\frac{2}{4}$. Use vertical lines to divide "An Irish Lullaby".

The image shows musical notation for "An Irish Lullaby". At the top, five notes are shown with arrows pointing to their durations: a whole note (1), a sixteenth note ($\frac{1}{16}$), a quarter note ($\frac{1}{4}$), an eighth note ($\frac{1}{2}$), and another eighth note ($\frac{1}{8}$). Below this, a staff of music in treble clef with a key signature of one sharp (F#) is shown. The staff contains a sequence of notes: a quarter note, an eighth note, a quarter note, a half note, an eighth note, and another eighth note. The notes are connected by beams, and the staff ends with a double bar line and repeat dots.