

Cheat Card for Fractions

Converting Fractions

1. Mixed to Improper:

1. Multiply the whole number by the denominator (bottom number)
2. Add the numerator (top number)
3. This number becomes the new numerator
4. The denominator stays the same.

Example: $3\frac{2}{5}$ $3 \times 5 = 15$ $15 + 2 = 17$ $\frac{17}{5}$

2. Improper to Mixed:

1. Divide numerator (top number) by denominator (bottom #)
2. The number of full times the denominator fits into the numerator is your whole number.
3. The remainder goes into a fraction as over the original denominator.

Example: $\frac{17}{5}$ $5 \overline{)17}$ $3\frac{2}{5}$

$\begin{array}{r} 3 \\ 5 \overline{)17} \\ \underline{-15} \\ 2 \end{array}$

Prime Numbers

- Prime numbers are only divisible by itself and 1
(can only be divided by itself or 1)

Example: 2, 3, 5, 7, 11, 13, 17, 19, 23, ~~25~~ 29

Prime Factorization

- Tree!
- Start by dividing the number by the first prime number (2)
- When you can't divide by a prime number, you move on to the next prime number possible.

Example:

$$\begin{array}{cc} 72 & \\ / \quad \backslash & \\ 2 & 36 \\ & / \quad \backslash \\ & 2 & 18 \\ & & / \quad \backslash \\ & & 2 & 9 \\ & & & / \quad \backslash \\ & & & 3 & 3 \end{array}$$

- Write as each prime number multiplied by the next.
- Simplify with exponents.

Example: $2 \times 2 \times 2 \times 3 \times 3$
 $2^3 \times 3^2$

Writing Fractions in Lowest Terms

1. Divide the numerator (top number) and denominator (bottom #) by common factors.

Example: $\frac{24 \div 2}{36 \div 2} = \frac{12 \div 3}{18 \div 3} = \frac{4 \div 2}{6 \div 2} = \frac{2}{3}$

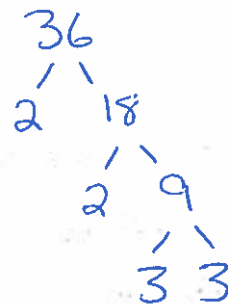
2. Find lowest terms using Prime Factorization

1. Do a prime factorization tree for both numbers in the fraction.

2. Write the product of each tree into a fraction

3. Divide like terms

Example: $\frac{24}{36}$



$$\frac{24}{36} = \frac{\overset{1}{2} \times \overset{1}{2} \times \overset{1}{2} \times \overset{1}{3}}{\underset{1}{2} \times \underset{1}{2} \times \underset{1}{3} \times \underset{1}{3}} = \frac{2}{3}$$

Multiplying Fractions

1. Proper Fractions:

1. Multiply the numerators (top #)

2. Multiply the denominators (bottom #)

3. Write in lowest terms

Example: $\frac{2}{3} \times \frac{3}{5} = \frac{2 \times 3}{3 \times 5} = \frac{6 \div 3}{15 \div 3} = \frac{2}{5}$ ← lowest terms

2. Improper Fractions:

1. Multiply the numerators (top #)

2. Multiply the denominators (bottom #)

3. Use long division to write as a mixed number.

4. Write Fraction in lowest terms.

Example: $\frac{6}{4} \times \frac{5}{2} = \frac{30}{8}$

$$\begin{array}{r} 3 \\ 8 \overline{)30} \\ \underline{-24} \\ 6 \end{array}$$
$$3 \frac{6}{8 \div 2} = 3 \frac{3}{4}$$

3. Mixed Fractions:

1. Write each mixed number as an improper fraction

2. Multiply the numerators (top #)

3. Multiply the denominators (bottom #)

4. Use long division to write as a mixed number

5. Write fraction in lowest terms.

Example: $2\frac{1}{5} \times 2\frac{2}{3} = \frac{11}{5} \times \frac{8}{3} = \frac{88}{15}$

$$\begin{array}{r} 5 \\ 15 \overline{)88} \\ \underline{-75} \\ 13 \end{array}$$
$$5 \frac{13}{15 \div 5} = 5 \frac{1}{3}$$

Dividing Fractions

1. Dividing Proper or Improper Fractions:

1. Change the division sign to multiplication.

2. Leave the first term the same.

3. Find the reciprocal of (flip) the second term.

Example: $\frac{3}{5} \div \frac{1}{3} = \frac{3}{5} \times \frac{3}{1} = \frac{9}{5}$

4. Simplify by writing the fraction in lowest terms or by writing as a mixed number.

Example: $\frac{9}{5} \begin{array}{r} 1 \\ 5 \overline{)9} \\ \underline{-5} \\ 4 \end{array} = 1\frac{4}{5}$

2. Dividing Mixed Numbers:

1. Change the mixed number to an improper fraction.

2. Change the division sign to multiplication.

3. Leave the first term the same.

4. Find the reciprocal of (flip) the second term.

5. Simplify by writing the fraction in lowest terms or by writing as a mixed number.

Example: $3\frac{5}{9} \div 2\frac{2}{5} = \frac{32}{9} \div \frac{12}{5}$

$$= \frac{32}{9} \times \frac{5}{12} = \frac{160}{108} = \frac{80}{54} = \frac{40}{27}$$

$$\begin{array}{r} 1 \\ 27 \overline{)40} \\ \underline{-27} \\ 13 \end{array} = 1\frac{13}{27}$$

Adding/Subtracting Fractions

1. Adding/Subtracting Like Fractions:

1. Add or subtract the numerators (top numbers)

2. Leave the bottom numbers the same

3. Simplify by writing in lowest terms or as a mixed number.

Example: $\frac{2}{8} + \frac{4}{8} = \frac{6}{8} = \frac{3}{4}$

$$\frac{4}{5} - \frac{1}{5} = \frac{3}{5}$$

← already in lowest terms.

2. Finding Lowest Common Multiple:

1. List Method

- List the first few multiples of each denominator
- Find the lowest number they have in common.

Example: $\frac{1}{4}, \frac{2}{6}$

$$4, 8, \textcircled{12}, 16, 20, 24, 28, 32$$

$$6, \textcircled{12}, 18, 24, 30$$

2. Dividing Prime Number Method

- Start by trying to divide by the first prime numbers
- Continue dividing by prime numbers until all quotients are 1.
- Multiply all prime numbers used to get Lowest Common Multiple.

Example 9, 15

$$\begin{array}{r|rr} 3 & 9 & 15 \\ \hline 3 & 3 & 5 \\ \hline 5 & 1 & 5 \\ \hline & 1 & 1 \end{array}$$

$$3 \times 3 \times 5 = 45$$

45 = Lowest Common Multiple.

3. Adding/Subtracting Unlike Fractions:

1. Find the Lowest Common Multiple
2. Rewrite the fractions with the least common Multiple as the denominator.
3. Add/Subtract the numerators (top numbers).
4. Simplify by writing in lowest terms or by writing as a mixed number.

Example: $\frac{1}{3} + \frac{1}{4} + \frac{1}{10}$

$$\begin{array}{r|rrr} \text{LCM} = & 2 & 3 & 4 & 10 \\ \hline & 2 & 3 & 2 & 5 \\ \hline & 3 & 3 & 1 & 5 \\ \hline & 5 & 1 & 1 & 5 \\ \hline & & 1 & 1 & 1 \end{array}$$

$$2 \times 2 \times 3 \times 5 = \underline{60}$$

$$\frac{1}{3} \times \frac{20}{20} + \frac{1}{4} \times \frac{15}{15} + \frac{1}{10} \times \frac{6}{6}$$

$$\frac{20}{60} + \frac{15}{60} + \frac{6}{60} = \frac{41}{60} \leftarrow \text{lowest terms.}$$

4. Adding/Subtracting Mixed Numbers:

1. Change the Mixed number to an improper fraction.
2. Find the lowest common multiple of the denominators (bottom numbers)
3. Rewrite the fractions with the least common multiple as the denominators (bottom numbers).
4. Add or subtract the numerators (top numbers).
5. Simplify by writing in lowest terms or by writing as a mixed number.

Example: $8\frac{5}{8} - 3\frac{11}{12} =$ ~~$11\frac{5}{8}$~~ $\frac{69}{8} - \frac{47}{12}$

LCM = 8, 16, 24, 32, 40

12, 24, 36, 48

$$\frac{69 \times 3}{8 \times 3} - \frac{47 \times 2}{12 \times 2} = \frac{207}{24} - \frac{94}{24} = \frac{113}{24} \quad \leftarrow \text{improper}$$

$$\begin{array}{r} 4 \\ 24 \overline{) 113} \\ \underline{-96} \\ 17 \end{array} \quad 4\frac{17}{24}$$

Estimating Fraction Equations

1. Round the mixed numbers/fractions to a whole number.
2. Estimate the answer
3. Use estimate to check if your exact answer is reasonable.

* If the numerator (top number) of the fraction is at least half of the denominator (bottom number), you round the whole number up.

* If the numerator (top number) of the fraction is less than half of the denominator (bottom number), you round down (leave the whole number as it is).

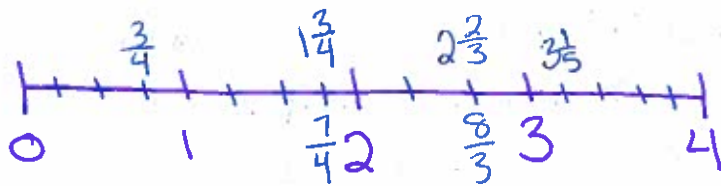
Example: $8\overset{\text{①-less}}{3} - 2\overset{\text{⑤-more}}{6} =$

$$8 - 3 = 5$$

$5\overset{\text{⑤-less}}{12} + 2\overset{\text{⑤-more}}{8} =$

$$5 + 3 = 8$$

Locating Fractions on a Number Line



$$\frac{3}{4}$$

$$\frac{7}{4}$$

$$\frac{8}{3}$$

$$3\frac{1}{5}$$

$$4\frac{1}{7}$$

$$\begin{array}{r} 4\frac{1}{7} \\ -4 \\ \hline \frac{1}{7} \end{array}$$

$$3\frac{2}{8}$$

$$\begin{array}{r} 3\frac{2}{8} \\ -6 \\ \hline \frac{2}{8} \end{array}$$

$$1\frac{3}{4}$$

$$2\frac{2}{3}$$

Greater than, Less than, Equal

Greater $>$ Less than $<$ Equal $=$

* Alligator wants to eat the bigger one *

$$2 \nless 3$$

$$\frac{2}{3} < \frac{3}{4}$$

LCM:

3, 6, 9, 12, 15, 21, 24

4, 8, 12, 16, 20, 24

$$\frac{2}{3} \times 4$$

$$\frac{3}{4} \times 3$$

$$= \frac{8}{12} < \frac{9}{12} \leftarrow \text{Greater than}$$

1. Find lowest common multiple
2. Rewrite fractions with lowest common multiple as the denominator
3. Compare fractions