

Fractions

Vocabulary for Fractions

Fraction – a number that represents a portion of a whole or a ratio.

Numerator - the number above the line.

Denominator – number below the line.

Proper fractions – the numerator is smaller than the denominator.

Improper fractions – the numerator is larger than the denominator.

Mixed numbers – a whole number paired with a proper fraction; a simplified improper fraction.

Reciprocal fraction – the fraction you multiply your given fraction by to get one (ie flip the given fraction over to get the reciprocal $\frac{x}{y} \rightarrow \frac{y}{x}$)

Least Common Denominator – the least common multiple for a set of fraction or the smallest positive multiple of both denominators (ie. The least common denominator of $\{\frac{7}{12}, \frac{5}{14}\}$ is 28 because the least common multiple is 28)

Reducing

- Find a common factor of the numerator and denominator
- Divide both the numerator and the denominator by the common factor.

$$\text{a. } \frac{10}{25} \rightarrow 5$$

$$\text{b. } \frac{10 \div 5}{25 \div 5} = \frac{2}{5}$$

Addition

- Make sure the denominators are the same.
- If the denominators are different find the least common denominator that will make them the same.
- Add the top numbers together.
- Reduce if necessary.

$$\text{b. } \frac{2}{5} + \frac{1}{3} \rightarrow 5 \times 3 = 15 \rightarrow \frac{2 \times 3}{5 \times 3} + \frac{1 \times 5}{3 \times 5} = \frac{6}{15} + \frac{5}{15}$$

$$\text{c. } \frac{6}{15} + \frac{5}{15} = \frac{11}{15}$$

Subtraction

- Same as addition.
- Same as addition.
- Subtract the second numerator (the top number) from the first numerator.
- Reduce if necessary.

$$\text{b. } \frac{7}{10} - \frac{1}{5} \rightarrow 5 \times 2 = 10 \rightarrow \frac{7}{10} - \frac{5 \times 2}{2 \times 5} = \frac{7}{10} - \frac{5}{10}$$

$$\text{c. } \frac{7}{10} - \frac{5}{10} = \frac{2}{10}$$

$$\text{d. } \frac{2}{10} = \frac{1}{5}$$

Multiplication

- Place fractions next to each other separated by a multiplication sign
- Multiply straight across; the top numerators together and the denominators together
- Reduce if necessary

$$\text{a. } \frac{5}{9} \times \frac{2}{3}$$

$$\text{b. } \frac{5}{9} \times \frac{2}{3} = \frac{5 \times 2}{9 \times 3} = \frac{10}{27}$$

Division

- Place fractions next to each other separated by a division sign
- Find the reciprocal of the second fraction.
- Change the division sign to a multiplication sign
- Multiply straight across; numerators together and denominators together
- Reduce if necessary

$$\text{a. } \frac{9}{20} \div \frac{1}{2}$$

$$\text{b. } \frac{9}{20} \div \frac{1}{2} \rightarrow \text{flip } \frac{2}{1}$$

$$\frac{9}{20} \times \frac{2}{1} \rightarrow \frac{9 \times 2}{20 \times 1} = \frac{18}{20}$$

$$\text{c. } \frac{9}{20} \times \frac{2}{1} = \frac{9 \times 2}{20 \times 1} = \frac{18}{20}$$

$$\text{d. } \frac{18}{20} = \frac{9}{10}$$

Converting Improper Fractions to Mixed Numbers

- Divide the numerator by the denominator using long division
- The quotient becomes the whole number in front of the fraction and the remainder becomes the numerator for the fraction

$$\text{a. } \frac{23}{5} \rightarrow 5 \overline{)23} \rightarrow \begin{array}{r} 4 \\ 5 \overline{)23} \\ \underline{-20} \\ 3 \end{array} \rightarrow r = 3$$

$$\text{b. } 4 \frac{3}{5}$$

Converting Mixed Numbers to Improper Fractions

- Multiply the denominator with the whole number
- Add the result to the numerator and place on top of the fraction as the new numerator
- The denominator does not change

$$\text{a. } 3 \frac{1}{4} \rightarrow 3 \times 4 = 12$$

$$\text{b. } 12 + 1 = 13 \rightarrow \frac{13}{4}$$

$$\text{c. } \frac{13}{4}$$

Decimals & Percentages

Common Factor to Decimal conversions

$$\frac{1}{10} = 0.10$$

$$\frac{1}{8} = 0.125$$

$$\frac{2}{10} = \frac{1}{5} = 0.20$$

$$\frac{2}{8} = \frac{1}{4} = 0.25$$

$$\frac{1}{5} = 0.20$$

$$\frac{1}{4} = 0.25$$

$$\frac{3}{10} = 0.30$$

$$\frac{3}{8} = 0.375$$

$$\frac{2}{5} = 0.40$$

$$\frac{1}{3} = 0.3\bar{3}$$

$$\frac{4}{10} = \frac{2}{5} = 0.40$$

$$\frac{5}{10} = \frac{1}{2} = 0.50$$

$$\frac{4}{8} = \frac{1}{2} = 0.5$$

$$\frac{2}{4} = \frac{1}{2} = 0.5$$

$$\frac{1}{2} = 0.5$$

$$\frac{6}{10} = \frac{3}{5} = 0.60$$

$$\frac{5}{8} = 0.625$$

$$\frac{3}{5} = 0.60$$

$$\frac{2}{3} = 0.6\bar{6}$$

$$\frac{7}{10} = 0.70$$

$$\frac{6}{8} = \frac{3}{4} = 0.75$$

$$\frac{3}{4} = 0.75$$

$$\frac{8}{10} = \frac{4}{5} = 0.80$$

$$\frac{7}{8} = 0.875$$

$$\frac{9}{10} = 0.90$$

$$\frac{10}{10} = \frac{1}{1} = 1$$

$$\frac{1}{1} = 1$$

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

Fractions to Decimals

- Divide the numerator by the denominator

$$\text{a. } \frac{2}{5} = 2 \div 5 = 5 \overline{) 2.0} = 0.4$$

$$\text{b. } \frac{3}{8} = 3 \div 8 = 0.125$$

Decimals

Bar Notation - a bar can be placed over the last number in a decimal to indicate that the number repeats to infinite

Percentages

- A fraction with a denominator of 100
- The word Per-cent means Per-hundred

Decimals to Percentages

- Multiply the decimal by 100 or move the decimal to the right 2 spaces and add at percent sign %

$$\checkmark 0.4 \rightarrow 0.4 \times 100 = 40\%$$

$$\checkmark 0.125 \rightarrow 0.125 \times 100 = 12.5\%$$

Percentages to Decimals

- Divide by 100 or move the decimal over two spaces to the left and remove the percent sign %.

$$\checkmark 65\% = 65 \div 100 = 0.65$$

$$\checkmark 2.5\% = 2.5 \div 100 = 0.025$$

$$\frac{1}{3} = 0.333333333333 \rightarrow 0.3\bar{3}$$