

# Fractions

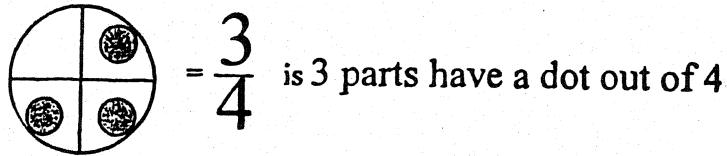
## Terms

*Numerator*: which tells how many parts you have (the number on top)

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

*Denominator*: which tells how many parts in the whole (the number on the bottom)  $\rightarrow$

Example:



*Proper fraction*: the top number is less than the bottom number.

Ex:  $\frac{1}{3}, \frac{7}{10}, \frac{9}{19}$

*Improper fraction*: the top number is equal to or is larger than the bottom number.

Ex:  $\frac{3}{2}, \frac{9}{4}, \frac{8}{8}$

*Mixed Number*: a whole number is written next to a proper fraction.

Ex:  $1\frac{3}{4}, 2\frac{2}{5}, 10\frac{1}{2}$

*Common Denominator*: is a number that can be divided evenly by all of the denominators in the problem

Ex:  $\frac{3}{4} \rightarrow 12 \rightarrow \frac{9}{12}$   
 $\frac{2}{3} \rightarrow 12 \rightarrow \frac{8}{12}$   
 $\frac{1}{2} \rightarrow 12 \rightarrow \frac{6}{12}$

The common denominator for these fractions will be 12. It also happens to be least common denominator.

## Reducing Fractions to Lowest Terms

Example:

$$\frac{48}{64} \div \frac{8}{8} = \frac{6}{8}$$

**Step 1:** Find a number that goes evenly into the numerator and the denominator of the fraction. With the fraction to the left, the number that will go in evenly is 8.

$$\frac{6}{8} \div \frac{2}{2} = \frac{3}{4}$$

**Step 2:** Check to see whether another number goes evenly into both the numerator and denominator. Stop when there are no more numbers that can go into the fraction. In the example, the fraction can be reduced further by dividing it by 2.

## Changing Mixed Numbers to Improper Fractions

Example: Change  $2\frac{3}{4}$  to an improper fraction.

Step 1: Multiply the denominator by the whole number.

$$2 \times 4 = 8$$

Step 2: Add the result to the numerator.

$$8 + 3 = 11$$

$$\frac{11}{4}$$

Step 3: Place the total over the denominator.

## Adding and Subtracting Fractions With Different Bottom Numbers

Example 1:  $\frac{3}{4} + \frac{2}{3} = \square$

$$\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$$

$$\frac{2}{3} \times \frac{4}{4} = \frac{8}{12}$$

Step 1: Need to find the common denominator for all fractions.

Example 2:  $\frac{3}{4} - \frac{3}{16} = \square$

$$\frac{3}{4} \times \frac{4}{4} = \frac{12}{16}$$

$$\frac{3}{16} \times \frac{1}{1} = \frac{3}{16}$$

$$\frac{9}{12} + \frac{8}{12} = \frac{17}{12} = 1\frac{5}{12}$$

Step 2: Then go ahead and add or subtract the fractions.

$$\frac{12}{16} - \frac{3}{16} = \frac{9}{16}$$

\*Remember to change improper fractions to a mixed number.

## Multiplying Fractions

$$\frac{3}{4} \times \frac{5}{6} = \frac{15}{24}$$

$$\frac{15}{24} \div \frac{3}{3} = \frac{5}{8}$$

Multiply the numerators across. Then multiply the denominators across. Make sure the product is in lowest terms.

## Multiplying with Mixed Numbers

Example:  $2\frac{2}{3} \times 1\frac{2}{5} = \square$

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

$$1\frac{2}{5} = \frac{7}{5}$$

Step 1: Change every mixed fraction to an improper fraction.

$$\frac{8}{3} \times \frac{7}{5} = \frac{56}{15} = 3\frac{11}{15}$$

Step 2: Then multiply across.

Step 3: Then change the improper fraction to a mixed number in lowest terms.

## Dividing Fractions

Example:  $\frac{1}{4} \div \frac{1}{2} = \square$

The fraction that is right of the division sign will need to be turned upside down by writing the numerator in the denominator and the denominator in the numerator. Then follow the rules for multiplying fractions.

$$\frac{1}{4} \times \frac{2}{1} = \frac{2}{4} + \frac{2}{2} = \frac{1}{2}$$

Practice:

1. Change  $4\frac{1}{6}$  to an improper fraction.

2. Change  $\frac{42}{16}$  to a mixed number.

$$\begin{array}{r} 3. 5\frac{3}{5} \\ + 2\frac{2}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 4. 5\frac{1}{2} \\ + 3\frac{2}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 5. 9\frac{11}{13} \\ - 2\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 6. 10\frac{7}{8} \\ - 2\frac{3}{7} \\ \hline \end{array}$$

7.  $3\frac{1}{7} \times \frac{5}{9} = \square$

8.  $3\frac{3}{7} \times 2\frac{7}{9} = \square$

9.  $\frac{6}{11} \div 14 = \square$

10.  $3\frac{4}{5} \div 5\frac{5}{6} = \square$

Answers: 1)  $\frac{25}{6}$  2)  $2\frac{5}{8}$  3)  $8\frac{4}{15}$  4)  $9\frac{1}{6}$  5)  $7\frac{9}{26}$   
6)  $8\frac{25}{56}$  7)  $1\frac{47}{63}$  8)  $9\frac{11}{21}$  9)  $\frac{3}{77}$  10)  $\frac{114}{175}$

# DECIMALS

## Adding and Subtraction Decimals

Add:  $28.5 + 44.47 + 3075.6$

$$\begin{array}{r} 28.50 \\ 44.47 \\ + 3075.60 \\ \hline 3148.57 \end{array}$$

Step 1: Line up the decimal points.

Step 2: Then add or subtract.

Subtract:  $380.53 - 75$

$$\begin{array}{r} 380.53 \\ - 75.00 \\ \hline 305.53 \end{array}$$

## Multiplying Decimals

Multiply  $1.89 \times 5.03 = \underline{\quad}$

$$\begin{array}{r} 1.89 \\ \times 5.03 \\ \hline 567 \\ 94500 \\ \hline 9.5067 \end{array}$$

Step 1: Multiply the decimals as you would do with whole

Step 2: Then count the number of spaces of each factor being multiplied. Decimal places are the number of spaces to the right of the decimal point, There is 2 in the top factor and two in the bottom factor, so the decimal is placed 4 spaces from the right.

Step 3: Show the total number of places in your answer.

## Dividing a Decimal by a Whole Number

Example:

$$\begin{array}{r} .037 \\ 73 \overline{)2.701} \\ \underline{219} \\ 511 \\ \underline{511} \\ 0 \end{array}$$

Place the decimal point directly above its position in the problem.  
Then divide the same way as you divide whole numbers.

## Dividing a Decimal by a Decimal Number

Example:  $4.374 \div .03 = \underline{\quad}$

$$.03 \overline{)4.374} \rightarrow 3 \overline{)437.4}$$

$\rightarrow 2$  spaces

Move the decimal point of the divisor (outside the bracket) as far right as you can go. Then move the decimal point in the dividend (inside the bracket) the same number of places as the divisor.

Place the decimal point directly above its position in the problem. Then divide the same way as divide whole numbers.

$$\begin{array}{r} 145.8 \\ 3 \overline{)437.4} \\ \underline{3} \\ 13 \\ \underline{12} \\ 17 \\ \underline{15} \\ 24 \\ \underline{24} \\ 0 \end{array}$$

Practice:

$$\begin{array}{r} 1. 18.1 \\ \times .04 \\ \hline \end{array}$$

$$\begin{array}{r} 2. .97 \\ \times 5.6 \\ \hline \end{array}$$

$$3. 123 + 2.6 + 9.04 = \square$$

$$4. 83.0097 + 124.9 + 9.043 = \square$$

$$5. .07 - .002 =$$

$$6. 96 - .3992 =$$

$$7. 4 \overline{)27.36}$$

$$8. 0.2601 \div 9$$

$$9. 7.055 \div 0.83$$

$$10. 2 \overline{)03} \overline{)4.466}$$

Answers: 1) 0.724 2) 5.432 3) 134.64 4) 216.9527 5) 0.068  
6) 95.6008 7) 6.84 8) 0.0289 9) 8.5 10) 2.2

## PERCENTS

Percents are used to describe a part of something. Percents are used to figure out sales or the amount of interest someone will pay on a loan. When converting a percent to its fraction form, it will always have a denominator of 100.

### Changing Decimals to Percents or Percents to Decimals

The important key is where to move the decimal point. If changing from decimal to percent, you would need to move the decimal point two places to the right and add the percent sign.

$$\text{Example: } 0.35 = 35\%$$

$$0.8 = 80\%$$

To change from percent to decimal, need to move the decimal point two places to the left and drop the percent sign.

$$\text{Example: } 30\% = .3$$

$$0.9\% = .009$$

### Converting Fraction to Percent Form

Divide the bottom number of the fraction into the top number and move the point two places to the right.

$$\text{Example: } \frac{3}{4} \quad \begin{array}{r} .75 \\ 4 \overline{)3.00} \\ \underline{28} \\ 20 \\ \underline{20} \\ 0 \end{array} = .75 = 75\%$$

-or-

Multiply the fraction by 100%

$$\text{Example: } \frac{3}{4} \quad \begin{array}{r} 25 \\ \frac{3}{4} \times \frac{100\%}{1} = \frac{75\%}{1} = 75\% \end{array}$$

### Percent to Fraction

Example: 85%

$$\frac{85}{100} + \frac{5}{5} = \frac{17}{20}$$

Write the percent as a fraction with 100 as the denominator. Then reduce the fraction to lowest terms.

### Percent of a Number

1) What is 25% of \$6,500.

$$n = 25\% \times \$6,500$$

$$n = .25 \times 6500$$

$$n = \$1,625$$

2) Change the percent to a fraction

$$\text{-or-} \quad n = \frac{1}{4} (6,500)$$

$$n = \frac{6,500}{4}$$

$$n = \$1,625$$

### Finding What Percent One Number Is of Another

There are key words to remember that will help you solve the problem it is asking you.

The word 'of' in the sentence means to multiply.

The word 'is' means it is equal to.

Example: 9 is what percent of 45

$$\begin{array}{l} \downarrow \qquad \qquad \downarrow \\ 9 = a \qquad \qquad (x) 45 \end{array} \quad \begin{array}{l} \text{The variable 'a' is being multiplied by 45.} \\ \text{Need to divide by 45.} \end{array}$$
$$\frac{9}{45} = \frac{a}{45}$$
$$\frac{9}{45} = a$$
$$\frac{9}{45} + \frac{9}{9} = a$$
$$\frac{1}{5} = a$$
$$0.20 = a$$
$$20\% = a$$

Therefore, 20% of 45 is 9.

### Finding a Number When a Percent of It is Given

Example: 20% of what number is 16?

$$\downarrow$$
$$.2 \cdot a = 16$$
$$\frac{20}{100} a = 16 \quad \text{Change the percent to fraction form.}$$
$$\frac{1}{5} a = \frac{16}{1}$$
$$5 \times \frac{1}{5} a = \frac{16}{1} \times 5 \quad \text{Need to multiply both sides of the equation by 5.}$$
$$a = 16 \times 5$$
$$a = 80$$

Practice:

Write the following in percent form.

1. 0.12      2.  $\frac{6}{8}$       3.  $\frac{2}{5}$       4. 0.233      5. 1.15

6. What is 11% of \$3,000?

7. 60 is what percent of 12,000?

8. 28 is 40 % of what number?

Answers: 1) 12% 2) 75% 3) 40% 4) 23.3% 5) 115% 6) \$330 7) 0.5% 8) 70
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