

## Multiplying Whole Numbers

1. Write the problem vertically
2. Multiply the ones digit of the bottom number by each of the digits in the top number, right to left
3. Bring down a zero and then multiply the tens digit of the bottom number by each digit in the top number, right to left
4. Bring down two zeros and repeat with the hundreds digit of the bottom number
5. Add up all of the products

ex:  $3,481 \times 142$

$$\begin{array}{r} \phantom{0}^1 \phantom{0}^3 \\ 3,481 \\ \times \phantom{0}142 \\ \hline 6962 \\ + 139240 \\ + 348100 \\ \hline \boxed{494,302} \end{array}$$

## Dividing Whole Numbers

1. Write out the long division problem with the first number (dividend) underneath the division symbol and the second number (divisor) to the left of the division symbol
2. Divide the divisor into the smallest part of the dividend it can go into and write the number of times it can go in on top of the division symbol
3. Multiply the number on top by the divisor and write the product under the number you divided into in step 2
4. Subtract your product from the number above it
5. Bring down the next digit of the dividend
6. Repeat steps 2-5 until there is nothing left to bring down.
7. If your last subtraction answer is not zero, write the remainder on top

ex:  $6,425 \div 21$

$$\begin{array}{r} \boxed{305 \text{ R } 20} \\ 21 \overline{) 6425} \\ \underline{-63} \phantom{0} \phantom{0} \phantom{0} \\ 12 \phantom{0} \phantom{0} \phantom{0} \\ \underline{-10} \phantom{0} \phantom{0} \phantom{0} \\ 25 \phantom{0} \phantom{0} \phantom{0} \\ \underline{-21} \phantom{0} \phantom{0} \phantom{0} \\ 20 \end{array}$$

# Rounding with Whole Numbers & Decimals

|               |           |          |      |      |   |        |            |             |
|---------------|-----------|----------|------|------|---|--------|------------|-------------|
| —             | —         | —        | —    | —    | ● | —      | —          | —           |
| ten-thousands | thousands | hundreds | tens | ones |   | tenths | hundredths | thousandths |

1. Keep all digits to the left of the place you are rounding the same
2. If the digit to the right of the rounding digit is less than 5, keep the rounding digit the same. If it's 5 or greater, increase the rounding digit by 1.
3. Change all places to the right of the digit you are rounding to 0. (Trailing zeros after the decimal are unnecessary)

ex: round 52.943 to the nearest tenth

52.943  
 less than 5, so the 9 stays the same

52.900  
 don't need trailing zeros after the decimal

52.9

## Word Form & Expanded Form

1. Word Form: write the whole number in word form, translate the decimal to "and", & write the decimal as if it were a whole number, followed by the name of the place of the last digit
2. Expanded Form: write the value of each non-zero digit separately, with addition signs between them

ex: 209.315

two hundred nine and three hundred fifteen thousandths

$200 + 9 + 0.3 + 0.01 + 0.005$

## Comparing & Ordering Decimals

1. Compare the whole number portions of the numbers. If they are different write  $>$  for greater than or  $<$  for less than.
2. If the whole numbers are the same, compare each digit to the right of the decimal point, one at a time until you find digits that are different. (If necessary, add zeros at the end of a decimal.)

ex: 13.702 ○ 13.74

$13 = 13$

$13.7 = 13.7$

$13.70 < 13.74$

So,  $13.702 < 13.74$

# Adding & Subtracting Decimals

1. Write the problem vertically, lining up the decimal points
2. Add zeros, if necessary
3. Add or subtract the numbers as if they were whole numbers
4. Bring the decimal point straight down

ex:  $12.8 - 1.52$

$$\begin{array}{r} 12.\overset{7}{8}\overset{1}{0} \\ - 1.52 \\ \hline 11.\overset{1}{2}8 \end{array}$$

# Multiplying Decimals

1. Write the problem vertically with the numbers lined up to the right (decimals do NOT need to be lined up)
2. Ignore the decimal points and multiply the numbers as if they were whole numbers
3. Count the total number of decimal places in the two factors and put a decimal point in the product so that it has that same number of decimal places

ex:  $3.24 \times 0.8$

$$\begin{array}{r} \overset{1}{3}.\overset{3}{2}4 \rightarrow 2 \text{ decimal places} \\ \times 0.8 \rightarrow 1 \text{ decimal place} \\ \hline 2592 \end{array}$$

3 decimal places

$\downarrow$

2.592

# Dividing Decimals

1. Write the dividend under the division symbol and the divisor in front of the division symbol
2. Move the decimal in the divisor after the number and then move the decimal in the dividend the same number of places and bring it up
3. Ignore the decimal point and divide as if whole numbers
4. If there is a remainder, add a zero to the end of the dividend, bring it down, and then continue dividing until there is no remainder

ex:  $32.3 \div 0.5$

$$\begin{array}{r} \overline{)64.6} \\ 0.5 \overline{)32.3} \uparrow 0 \\ \underline{-30} \phantom{0} \\ 23 \phantom{0} \\ \underline{-20} \phantom{0} \\ 30 \phantom{0} \\ \underline{-30} \\ 0 \end{array}$$

# Adding & Subtracting Fractions

1. Rename the fractions to equivalent fractions with common denominators
2. Add or subtract the numerators and keep the denominator the same
3. If mixed numbers, add or subtract the whole numbers
4. If possible, simplify the answer & change improper fractions to mixed numbers

ex:  $4\frac{4}{9} + \frac{2}{3}$

$$\begin{array}{r} 4\frac{4}{9} \times \frac{1}{1} = \frac{4}{9} \\ + \quad \frac{2}{3} \times \frac{3}{3} = \frac{6}{9} \\ \hline \end{array}$$

$$4\frac{10}{9} = \boxed{5\frac{1}{9}}$$

# Multiplying Fractions

1. Turn a whole number into a fraction by giving it a denominator of 1
2. Cross-simplify the fractions if possible
3. Multiply the 2 numerators and the 2 denominators
4. If possible, simplify the answer & change improper fractions to mixed numbers

ex:  $6 \times \frac{2}{3}$

$$\begin{array}{c} 2\cancel{6} \\ \cancel{1} \times \frac{2}{\cancel{3}} = \frac{4}{1} \end{array}$$

$$= \boxed{4}$$

# Dividing Fractions

1. Turn a whole number into a fraction by giving it a denominator of 1
2. Keep the 1<sup>st</sup> fraction the same, change the division symbol to multiplication, and flip the 2<sup>nd</sup> fraction to its reciprocal
3. Multiply the 2 fractions
4. If possible, simplify the answer & change improper fractions to mixed numbers

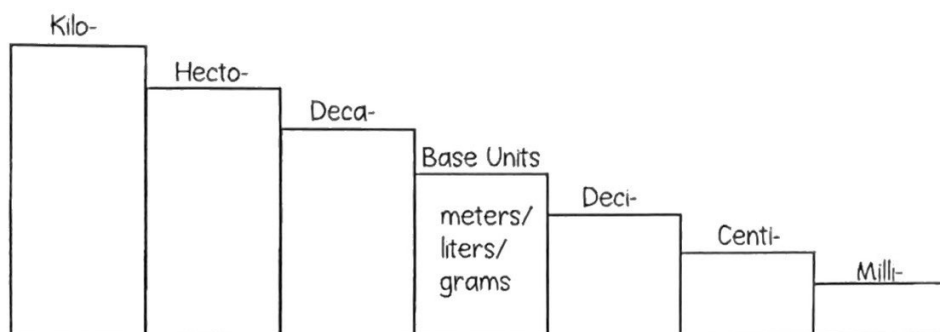
ex:  $12 \div \frac{1}{2}$

$$\frac{12}{1} \div \frac{1}{2}$$

↓

$$\frac{12}{1} \times \frac{2}{1} = \frac{24}{1} = \boxed{24}$$

# The Metric System



ex:  $23 \text{ m} = \underline{\hspace{2cm}} \text{ cm}$

going from base unit step to centi- step, so need to move the decimal 2 places right

$$23 \overset{00}{\curvearrowright} = \boxed{2,300 \text{ cm}}$$

Determine the direction and count the number of steps it takes to get from the starting unit to the unit you are converting to and move the decimal point the same number of places in that direction.

# The Customary System

| Length                                         | Weight                         | Capacity                                                   |
|------------------------------------------------|--------------------------------|------------------------------------------------------------|
| 1 ft = 12 in<br>1 yd = 3 ft<br>1 mi = 5,280 ft | 1 lb = 16 oz<br>1 T = 2,000 lb | 1 c = 8 fl oz<br>1 pt = 2 c<br>1 qt = 2 pt<br>1 gal = 4 qt |

ex:  $18 \text{ c} = \underline{\hspace{2cm}} \text{ pt}$

cups are smaller units of measure than pints, so need to divide

$$18 \div 2 = \boxed{9 \text{ pints}}$$

To convert from a larger unit to a smaller unit, multiply. To convert from a smaller unit to a larger unit, divide.

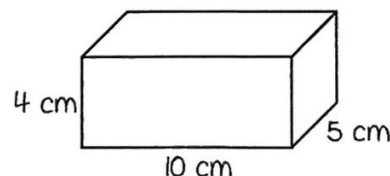
# Volume

Volume is the number of cubic units inside a figure.

Volume of Rectangular Prism = length x width x height

Volume of Irregular Figure: count cubic units

ex: find the volume



$$V = 4 \times 10 \times 5 = \boxed{200 \text{ cm}^3}$$