

The recommended SI system. Each step represents a unit one thousand times greater than the unit below it. I have included the next prefix higher than the ones we discussed in class and the next prefix lower. They are in red. You will only be responsible for the ones in black which we discussed in class.

$$\begin{array}{r}
 1\ 000\ 000\ 000\ 000\ 000 = 10^{15} \text{ Peta (P)} \\
 1\ 000\ 000\ 000\ 000 = 10^{12} \text{ Tera (T)} \\
 1\ 000\ 000\ 000 = 10^9 \text{ Giga (G)} \\
 1\ 000\ 000 = 10^6 \text{ Mega (M)} \\
 1\ 000 = 10^3 \text{ kilo (k)} \\
 \text{UNIT} \\
 .001 = 10^{-3} \text{ milli (m)} \\
 .000\ 001 = 10^{-6} \text{ micro } (\mu) \\
 .000\ 000\ 001 = 10^{-9} \text{ nano (n)} \\
 .000\ 000\ 000\ 001 = 10^{-12} \text{ pico (p)}^* \\
 .000\ 000\ 000\ 000\ 001 = 10^{-15} \text{ femto (f)}
 \end{array}$$

\*

When given a number of large units and you are looking for the equivalent number of small units, multiply the number of large units by 1000 multiplied by itself the number of steps between units.

$$\begin{array}{l}
 427 \text{ km} = ? \text{ mm} \\
 \text{Since there are two steps between kilo and milli} \\
 427 \times 1,000 \times 1,000 = 427,000,000 \text{ mm}
 \end{array}$$

When given a number of small units and you are looking for the equivalent large unit, divide the number of small units by 1 000 multiplied by itself the number of steps between units.

$$\begin{array}{l}
 5,420,000,000,000 \text{ mm} = ? \text{ Mm} \\
 \text{Since there are three steps between milli and Mega} \\
 \frac{5,420,000,000,000}{1\ 000 \times 1\ 000 \times 1\ 000} = 5,420 \text{ Mm}
 \end{array}$$

Here are the minor steps between kilo and milli. Each step represents a unit ten times greater than the unit below it.

$$\begin{array}{r}
 1\ 000 = 10^3 \text{ kilo (k)} \\
 100 = 10^2 \text{ hecto (h)} \\
 10 = 10^1 \text{ deka (da or dk)} \\
 \text{UNIT} \\
 .1 = 10^{-1} \text{ deci (d)} \\
 .01 = 10^{-2} \text{ centi (c)} \\
 .001 = 10^{-3} \text{ milli (m)}
 \end{array}$$

Converting using the small steps is the same as above except you multiply or divide by 10 instead of 1000

\* as I was typing out this sheet I realized that I think I made a mistake in the lecture. I think I went from nano to femto but I should have gone from nano to pico then to femto. The chart above is correct.

Name \_\_\_\_\_  
Date \_\_\_\_\_

Please try the following conversions: (you must show some calculations or justification for obtaining the correct answer. Answers only are considered wrong)

1. The official height of a balance beam is listed in the FIG rule book is 1,250 mm. How high is it in meters?

2. The official size of the floor exercise area is 12 meters by 12 meters. What would be the length of the floor exercise area in centimeters?

3. On average, the distance to the moon is 384 megameters. How far is the moon in micrometers?

4. Although the speed of sound changes slightly depending on such things as temperature and air density, it will usually travel about  $343,000,000 \mu\text{m}$  in one second. How many kilometers would it travel in one second?

5. The distance light travels in a year is  $9.4607 \times 10^{15}$  meters or about  $5.8786 \times 10^{12}$  miles. What is the distance in tarameters?