

STUDY GUIDE #1

METRIC SYSTEM

1. Base units:

length - meter  
weight - gram  
volume - liter

Prefixes indicating multiples:

1000 - kilo  
100 - hecto  
10 - deka

Prefixes indicating divisions:

1/10 - deci  
1/100 - centi  
1/1000 - milli  
1/1,000,000 - micro

2. Commonly used units:

| <u>Weight</u> |                     | <u>Volume</u>      |                     |
|---------------|---------------------|--------------------|---------------------|
| <u>Unit</u>   | <u>Abbreviation</u> | <u>Unit</u>        | <u>Abbreviation</u> |
| kilogram      | kg                  | liter              | L                   |
| gram          | g                   | milliliter         | mL                  |
| milligram     | mg                  | or                 |                     |
| microgram     | mcg                 | **cubic centimeter | cc                  |

3. Equivalents within the system (MEMORIZE):

Weight

1 kg = 1000 g  
1 g = 1000 mg  
1 mg = 1000 mcg

Volume

1 L = 1000 mL or \*\*cc (1 cc = 1 mL)

\*\* (The cc abbreviation should not be used. Use only mL, but recognize cc if still given on labels or orders.)

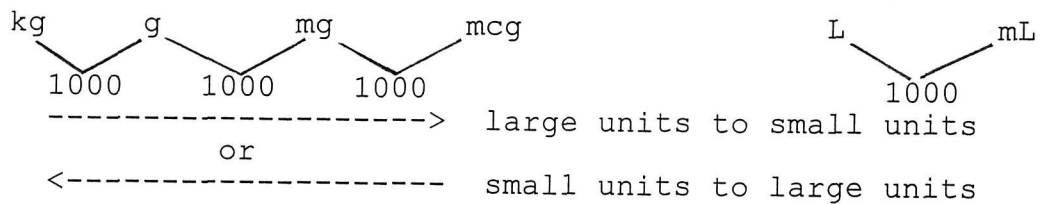
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4. CONVERSIONS WITHIN THE METRIC SYSTEM:

The metric system is a decimal system. To convert g (large) to mg (small), multiply by 1000 or move the decimal point 3 places to the right (for 1000 times smaller.) The units are smaller so the number of them is larger.

To convert mg (small) to g (large), divide by 1000 or move the decimal point 3 places to the left (for 1000 times greater). The units are larger so the number of them is smaller.

The diagram below is a way to remember the direction to move the decimal point. The decimal moves the same direction the arrow points when going from one unit to another. The 1000 tells you that you are multiplying or dividing by 1000.



EXAMPLES:

a. 1500 mg = ? g

Solution: Since mg to g is small units to large units, divide by 1000 or move the decimal point 3 places to the left (1500), so

$$1500 \text{ mg} = 1.5 \text{ g}$$

b. 3.4 mg = ? mcg

Solution: Since mg to mcg is large units to small units, multiply by 1000 or move the decimal point 3 places to the right (3.400) so

$$3.4 \text{ mg} = 3400 \text{ mcg}$$

c. 10,000 mcg = ? g

Solution: Since mcg to g is small units to large units, by a factor of 1000 x 1000, divide by 1,000,000, or move the decimal point 6 places to the left (0.010000) so

$$10,000 \text{ mcg} = 0.01 \text{ g}$$

STUDY GUIDE #2

APOTHECARY SYSTEM

1. Base units:

Weight - grain

Volume - minim

2. Common units:

| <u>Weight</u> |                     | <u>Volume</u> |                     |
|---------------|---------------------|---------------|---------------------|
| <u>Unit</u>   | <u>Abbreviation</u> | <u>Unit</u>   | <u>Abbreviation</u> |
| grain         | gr                  | minim         | m, min              |
| dram          | dr or ℥             | dram          | ℥, f ℥              |
| ounce         | oz or ℥             | ounce         | ℥, f ℥              |
|               |                     | pint          | pt                  |
|               |                     | quart         | qt                  |
|               |                     | gallon        | gal                 |

Amounts are written as Arabic numerals and fractions or Roman numerals. The symbol precedes the number.

The fraction one-half is abbreviated ss, or  $\overline{ss}$  when used alone or with Roman numerals in the apothecary system.

Example: gr xv means 15 grains

gr ss means  $\frac{1}{2}$  grain

gr 1/4 means  $\frac{1}{4}$  grain

℥ i means 1 dram

3. Equivalents within the system (MEMORIZE):

| <u>Weight</u>      | <u>Volume</u>       |
|--------------------|---------------------|
| 60 grains = 1 dram | 60 minims = 1 dram  |
| 8 drams = 1 ounce  | 8 drams = 1 ounce   |
|                    | 16 ounces = 1 pint  |
|                    | 2 pints = 1 quart   |
|                    | 4 quarts = 1 gallon |

STUDY GUIDE #2 - cont.

4. CONVERSIONS WITHIN THE APOTHECARY SYSTEM

EXAMPLE:

Convert  $\mathfrak{z}28$  to  $\mathfrak{z}$  (28 drams to ounces).

RATIO/PROPORTION METHOD

Since 8 drams = 1 ounce, the known ratio is  
8 drams : 1 ounce and the unknown ratio is  
28 drams : X ounces. Set up and solve the  
proportion.

$$8 \text{ drams} : 1 \text{ ounce} = 28 \text{ drams} : X \text{ ounces}$$

$$1 \cdot 28 = 8 \cdot X$$

$$\frac{28}{8} = X$$

$$3\frac{1}{2} = X$$

$$\text{So, } \mathfrak{z}28 = \mathfrak{z}3\frac{1}{2} \text{ or } \mathfrak{z}iii\text{ss}.$$

CANCELLATION METHOD

Multiply 28 drams by the fraction  $\frac{1 \text{ ounce}}{8 \text{ drams}}$  which shows  
the known equivalence:

$$\cancel{28 \text{ drams}} \cdot \frac{1 \text{ ounce}}{\cancel{8 \text{ drams}}} = \frac{28}{8} \text{ ounces}$$

$$= 3\frac{1}{2} \text{ ounces}$$

$$= \mathfrak{z}3\frac{1}{2} \text{ or } \mathfrak{z}III\text{ss}$$

## STUDY GUIDE #3

### HOUSEHOLD SYSTEM

1. Same units for liquids and dry quantities.
2. Common units:

| <u>Units</u> | <u>Abbreviation</u>      |
|--------------|--------------------------|
| drops        | gtt                      |
| teaspoon     | tsp or t                 |
| tablespoon   | Tbs or Tbsp or tbsp or T |
| ounce        | oz                       |
| pint         | pt                       |
| quart        | qt                       |
| gallon       | gal                      |

Amounts are written in Arabic numerals and fractions.  
Abbreviations are written after the numeral.

3. Equivalentents within the system (MEMORIZE):

$$60 \text{ gtt} = 1 \text{ tsp}$$

$$3 \text{ tsp} = 1 \text{ Tbsp}$$

$$2 \text{ Tbsp} = 1 \text{ oz}$$

$$8 \text{ oz} = 1 \text{ (measuring) cup}$$

$$16 \text{ oz} = 1 \text{ pt}$$

$$2 \text{ pt} = 1 \text{ qt}$$

$$4 \text{ qt} = 1 \text{ gal}$$

STUDY GUIDE #3 - cont.

4. CONVERSIONS WITHIN THE HOUSEHOLD SYSTEM

EXAMPLE:

Convert 4 oz to tsp (4 ounces to teaspoons).

RATIO/PROPORTION METHOD

First, convert 4 ounces to tablespoons.  
Since 2 tablespoons = 1 ounce, the known ratio is  
2 tablespoons : 1 ounce and the unknown ratio is  
X tablespoons : 4 ounces. Set up the proportion  
and solve.

$$\begin{array}{r} 2 \text{ tablespoons} : 1 \text{ ounce} = X \text{ tablespoons} : 4 \text{ ounces} \\ 1 \cdot X = 2 \cdot 4 \\ X = 8 \end{array}$$

So, 4 oz = 8 tbsp.

Now, convert 8 tablespoons to teaspoons.  
The known ratio is 1 tablespoon : 3 teaspoons and the  
unknown ratio is 8 tablespoons : X teaspoons.

$$\begin{array}{r} 1 \text{ tablespoon} : 3 \text{ teaspoons} = 8 \text{ tablespoons} : X \\ \text{teaspoons} \\ 3 \cdot 8 = 1 \cdot X \\ 24 = X \end{array}$$

So, 4 oz = 8 tbsp = 24 tsp.

CANCELLATION METHOD

First, multiply 4 ounces by the fraction  $\frac{2 \text{ tablespoons}}{1 \text{ ounce}}$

$$\cancel{4 \text{ ounces}} \cdot \frac{2 \cancel{\text{tablespoons}}}{1 \cancel{\text{ounce}}} = 8 \text{ tablespoons}$$

Now, multiply 8 tablespoons by the fraction  $\frac{3 \text{ teaspoons}}{1 \text{ tablespoon}}$

$$8 \cancel{\text{tablespoons}} \cdot \frac{3 \cancel{\text{teaspoons}}}{1 \cancel{\text{tablespoon}}} = 24 \text{ teaspoons}$$

So, 4 oz = 8 tbsp = 24 tsp.

Both cancellations can be done in the same step:

$$4 \cancel{\text{ounces}} \cdot \frac{2 \cancel{\text{tablespoons}}}{1 \cancel{\text{ounce}}} \cdot \frac{3 \cancel{\text{teaspoons}}}{1 \cancel{\text{tablespoon}}} = 24 \text{ teaspoons}$$

If you use the cancellation method, be sure to multiply  
the given amount by a fraction with equivalent measures  
where the denominator has the same units as the given  
amount.

## DOSAGE CALCULATIONS

### ABBREVIATIONS

| <u>METRIC</u>              | <u>APOTHECARY</u> | <u>HOUSEHOLD</u>      |
|----------------------------|-------------------|-----------------------|
| mcg ( $\mu$ g) = microgram | ss = one half     | gtt = drop            |
| mg = milligram             | m = minim         | t (tsp) = teaspoon    |
| G (gm) = gram              | ʒ = dram          | T (tbs) = tablespoon  |
| kg = kilogram              | ℥ = ounce         | <u>COMMON</u>         |
| cc = cubic centimeter      | pt = pint         | u = unit              |
| ml = milliliter            | qt = quart        | mEq = milliequivalent |
| l = liter                  | lb = pound        |                       |

| <u>EQUIVALENTS</u>   |  |                        |
|----------------------|--|------------------------|
| gr 1/150 = 0.4 mg    |  | 60 gtts = 1 tsp        |
| gr i = 60 mg         |  | 1 tsp = 5 cc           |
| gr iss = 100 mg      |  | 1 Tbs = 3 tsp          |
| gr 15 = 1 gm         |  | 2 Tbs = ʒ i            |
| 1 kg = 2.2 lbs       |  | 30 ml(cc) = ʒ i        |
| 1 kg = 1000 gm       |  | 500 ml (cc) = 1 pint   |
| 1 gm = 1000 mg       |  | 1000 ml (cc) = 1 quart |
| 1 mg = 1000 mcg      |  | 1000 ml (cc) = 1 liter |
| 15(16) minims = 1 cc |  | ʒ xvi = 1 pint         |
| 1 ml = 1 cc          |  | 2 pints = 1 quart      |
| ʒ i = 4 cc           |  |                        |