

REVIEW OF DOSAGE CALCULATION METHODS

There are three basic methods for calculating medication dosages. These are:

1. Dimensional Analysis
2. Ratio-Proportion
3. Formula Method

Each method will allow an accurate calculation of the medication dosage. Most health care professionals become comfortable with one method and use that method exclusively. It is primarily an individual decision. Let's review the steps for each method.

Dimensional Analysis

The biggest advantage to using dimensional analysis is the fact that all necessary steps can be done using one equation.. This method has also been known as Unit Conversion, Calculation by Cancellation, or Factor Label.. The idea is to set up the equation so that all unnecessary units of measure are cancelled out. This leaves only the unit of measure needed to arrive at the correct dosage. The steps for using dimensional analysis are as follows:

1. Write the doctor's order. This must be done as a fraction.

Doctor's Order: **250 mg.** This should be expressed as $\frac{250mg}{1}$.

2. Now, write down the strength and amount of medication you have available:

Dose On Hand: $\frac{5ml}{250mg}$. The *5 ml* will have to be the numerator of the fraction so that the *mg* will cancel out.

3. Now solve the problem:

$$\frac{250mg}{1} \times \frac{5ml}{250mg} = 5ml .$$

The *mg* cancels out leaving only the *ml* label, which is desired in the answer. Then the mathematical operations are performed. The answer is *5 ml*.

The formula can be extended to handle any other conversions needed. For example, if the doctor's order was in grains and the dose on hand was in *mg*, the formula would be extended to include the appropriate conversion. For example:

1. **Doctor's Order:** 2 *gr*
2. **Dose on Hand:** 30 *mg* per tablet.

The doctor's order is in grains and the dose on hand is in *mg*, therefore the appropriate conversion must be included.

3. Now solve the problem:

$$\frac{2gr}{1} \times \frac{1tab}{30mg} \times \frac{60mg}{1gr} = 4tabs$$

The answer has to have tabs as units since that is the units for the dose on hand. The other fractions were arranged so that all of the other units, *mg* and *gr*, cancelled out. After canceling out units the mathematical operations are performed to obtain the answer.

Ratio-Proportion

The ratio–proportion method is easily learned and very useful when dealing with measurements that are alike. Conversion from one unit of measurement to another requires a separate step. The idea used in ratio-proportion is to put what you have on hand on one side of the formula. For example: 500 *mg* : 3 *ml*. On the other side of the formula the doctor's order and the unknown quantity (X) are expressed. For example: 750 *mg* : X *ml*

1. **Doctor's Order:** 750 *mg*
2. **Dose On Hand:** 500 *mg*/3 *ml*
3. Now solve the problem which is how many *ml* for 750 *mg*. Make sure that the units of measure are written in the same order on both sides of the equation. The resulting equation should look like this:

$$500 \text{ mg} : 3 \text{ ml} = 750 \text{ mg} : X \text{ ml}$$

To find the value of X, multiply the numbers in the middle (the **MEANS** being 3 and 750) and then multiply the numbers on either end (the **EXTREMES** being 500 and X). The rule is that the product of the **MEANS** is equal to the product of the **EXTREMES**.

$$2250 = 500 X$$

Solve for X

$$X = 4.5 \text{ ml}$$

Formula Method

This method is really a variation on the Ratio-Proportion Method. It is useful when the units of measurement are alike. Conversion from one unit of measure to another requires an additional calculation. The basic formula is:

$$\frac{\text{Doctor's Order}}{\text{Dose on Hand}} \times \text{Quantity of Drug Available} = \text{Unknown}$$

1. **Doctor's Order:** 400 mg
2. **Dose On Hand:** 100 mg/2 ml
3. Now solve the problem. The formula should be written as:

$$\frac{400\text{mg}}{100\text{mg}} \times 2\text{ml} = X$$

Cancel out the units of measure that are alike and solve the mathematical operations. The answer is 8 ml.

Whatever method is utilized, obtaining the correct answer is the important thing.