Southwest Wisconsin Technical College

Dimensional Analysis in Nursing

Module 1.5

DRUG CALCULATIONS – TABLETS AND CAPSULES

Table of Contents

Noteworthy

- The key to doing routine drug calculation problems is to start your setup with **doctor's orders**.
- The *drug label* provides important equivalencies.

  Example; "250 mg tablets" can be thought of as, **1 tablet** = **250 mg**.

Pete Esser
Knox Learning Center Mathematics Instructor
Contact: pesser@swtc.edu

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Introduction

The dimensional analysis technique is used to convert from how a doctor thinks about medicine (usually *mass* – grams, milligrams, micrograms) into a measurement that makes sense for the nurse working with the patient (*quantity* of tablets or capsules).

<u>Example 1.5.1</u>

Prescription: Metoprolol 300 mg
Inventory: Metoprolol 50 mg tablets
Quantity to give patient: ___________

Begin by writing your goal to the far right of your work area. The goal reminds you of what units of measure you want to end up with. In this case, it is ***tablets***.

Goal: tablets

Step 1 – Write doctor's orders in fractional form with a denominator of 1.

Continue Step 1 by writing a multiply symbol (×) and another fraction bar with the *same units of measure* in the denominator.

Doctor's Orders

$$\frac{300\text{ mg}}{1} \times \frac{\qquad}{\text{mg}}$$

Writing **mg** in the denominator guarantees that **mg** will get cancelled-out.

Goal: tablets

Step 2 – Since the medicine label has the same units of measure (mg) as doctor's orders we can use that to convert from *mg* to *tablets* as shown. Think of "50 mg tablets" as **50 mg** = **1 tablet**. Having pre-written mg in Step 1 makes it more apparent where this information should be located.

$$\frac{300\ \cancel{\text{mg}}}{1} \times \frac{1\text{ tablet}}{50\ \cancel{\text{mg}}}$$

Showing cancellation is good form. Make this a habit!

Goal: tablets

Step 3 – We can compute the answer since *tablets* is the only unit of measure remaining and it matches our goal. Solve by multiplying the numerators together, then multiplying the denominators. Finish by dividing numerator by denominator.

$$\frac{300\ \cancel{\text{mg}}}{1} \times \frac{1\text{ tablet}}{50\ \cancel{\text{mg}}} = \frac{300\text{ tablets}}{50} = \mathbf{6\ tablets}$$

Answer!

Example 1.5.2
Prescription: Coumadin 10 mg
Inventory: Coumadin 4 mg tablets
Quantity to give patient: ___________

The goal in this problem is to determine the quantity of ***tablets***.

Goal: tablets

Step 1 – Write doctor's orders in fractional form with a denominator of 1.

Continue Step 1 by writing a multiply symbol (×) and another fraction bar with the same units of measure in the denominator.

Doctor's Orders

$$\frac{10\text{ mg}}{1} \times \frac{\quad}{\text{mg}}$$

Same units of measure (mg)

Goal: tablets

Step 2 – Since the medicine label has the same units of measure (mg) as doctor's orders, we can use that to convert from *mg* to *tablets* as shown. Think of "4 mg tablets" as **4 mg** = **1 tablet**. Having pre-written mg in Step 1 makes it easier to tell where the information should be located.

$$\frac{10\text{ mg}}{1} \times \frac{1\text{ tablet}}{4\text{ mg}}$$

Goal: tablets

Step 3 – We can compute the answer since *tablets* is the only unit of measure remaining and it matches our goal.

Solve by multiplying the numerators together, then multiplying the denominators. Finish by dividing numerator by denominator.

$$\frac{10\text{ mg}}{1} \times \frac{1\text{ tablet}}{4\text{ mg}} = \frac{10\text{ tablets}}{4} = \mathbf{2.5\text{ tablets}}$$

Answer!

Example 1.5.3

Prescription: Potassium Chloride (Extended Release Tablets) 80 mEq

Inventory: Potassium Chloride (Extended Release Tablets) 20 mEq tablets

Quantity to give patient: __________

Note: mEq is an abbreviation for "milliequivalent"*.

The goal in this problem is to compute the number of **tablets**.

Goal: tablets

Step 1 – Write doctor's orders in fractional form with a denominator of 1.

Continue Step 1 by writing a multiply symbol (×) and another fraction bar with the same units of measure in the denominator.

Doctor's Orders

$$\frac{80\ \text{mEq}}{1} \times \frac{\qquad}{\text{mEq}}$$

Same units of measure (mEq)

Goal: tablets

Step 2 –The units of measure (mEq) in the doctor's orders match the units of measure on the available drug. Think of "20 mEq tablets" as **20 mEq = 1 tablet**. Pre-labeling *mEq* in the denominator helps you get the right information in the right spot

$$\frac{80\ \cancel{\text{mEq}}}{1} \times \frac{1\ \text{tablet}}{20\ \cancel{\text{mEq}}}$$

Goal: tablets

Step 3 – The only unit of measure not cancelled is *tablets*. Since this matches the goal, multiply the numerators together, then multiply the denominators. Finish by dividing numerator by denominator.

$$\frac{80\ \cancel{\text{mEq}}}{1} \times \frac{1\ \text{tablet}}{20\ \cancel{\text{mEq}}} = \frac{80\ \text{tablets}}{20} = \mathbf{4\ tablets}$$

Answer!

* Milliequivalents measure the drug's ability to react with electrons. Drugs such as potassium chloride (KCl), calcium gluconate, sodium bicarbonate, and sometimes even sodium chloride can be measured in milliequivalents.
Source: http://www.cwladis.com/math104/lecture2.php

Practice Problems

Directions – For each problem, use dimensional analysis to determine the quantity of medicine required for the patient. Write your goal in the provided box. Your answers should include the appropriate units of measure.

1.) Prescription: Aspirin 4.5 g
Inventory: Aspirin 3 g tablets
Quantity to give patient: __________

Goal: ______

2.) Prescription: Thioridazine Hydrochloride 25 mg
Inventory: Thioridazine Hydrochloride 10 mg tablets
Quantity to give patient: __________

Goal: ______

3.) Prescription: Calcort 15 mg
Inventory: Calcort 6 mg tablets
Quantity to give patient: __________

Goal: ______

4.) Prescription: Clinoril 250 mg
Inventory: Clinoril 500 mg tablets
Quantity to give patient: __________

Goal: ______

5.) Prescription: Potassium penicillin 600,000 units
Inventory: Potassium penicillin 400,000 units tablets
Quantity to give patient: __________

Goal: ______

6.) Prescription: potassium chloride 16 mEq
Inventory: potassium chloride 8 mEq tablets
Quantity to give patient: __________

Goal: ______

Solutions to Practice Problems

1.) Prescription: Aspirin 4.5 g
Inventory: Aspirin 3 g tablets
Quantity to give patient: ___________

$$\frac{4.5\ \cancel{g}}{1} \times \frac{1\ \text{tablet}}{3\ \cancel{g}} = \frac{4.5\ \text{tablets}}{3} = \mathbf{1.5\ tablets}$$

Goal: tablets

2.) Prescription: Thioridazine Hydrochloride 25 mg
Inventory: Thioridazine Hydrochloride 10 mg tablets
Quantity to give patient: ___________

$$\frac{25\ \cancel{mg}}{1} \times \frac{1\ \text{tablet}}{10\ \cancel{mg}} = \frac{25\ \text{tablets}}{10} = \mathbf{2.5\ tablets}$$

Goal: tablets

3.) Prescription: Calcort 15 mg
Inventory: Calcort 6 mg tablets
Quantity to give patient: ___________

$$\frac{15\ \cancel{mg}}{1} \times \frac{1\ \text{tablet}}{6\ \cancel{mg}} = \frac{15\ \text{tablets}}{6} = \mathbf{2.5\ tablets}$$

Goal: tablets

4.) Prescription: Clinoril 250 mg
Inventory: Clinoril 500 mg tablets
Quantity to give patient: ___________

$$\frac{250\ \cancel{mg}}{1} \times \frac{1\ \text{tablet}}{500\ \cancel{mg}} = \frac{250\ \text{tablets}}{500} = \mathbf{0.5\ tablet\ \ or\ \ \frac{1}{2}\ tablet}$$

Goal: tablets

5.) Prescription: Potassium penicillin 600,000 units
Inventory: Potassium penicillin 400,000 units tablets
Quantity to give patient: ___________

$$\frac{600{,}000\ \cancel{units}}{1} \times \frac{1\ \text{tablet}}{400{,}000\ \cancel{units}} = \frac{600{,}000\ \text{tablets}}{400{,}000} = \mathbf{1.5\ tablets}$$

Goal: tablets

6.) Prescription: potassium chloride 16 mEq
Inventory: potassium chloride 8 mEq tablets
Quantity to give patient: ___________

$$\frac{16\ \cancel{\text{mEq}}}{1} \times \frac{1\ \text{tablet}}{8\ \cancel{\text{mEq}}} = \frac{16\ \text{tablets}}{8} = \mathbf{2\ tablets}$$

Goal: tablets