

# Things You'll Use Every Day

Anyone going into the practice of pharmacy will recognize that the profession involves a lot of memorization. Memorizing basic conversions will be your first step toward mastering pharmaceutical calculations. By the end of this lesson, you will be ready to use these facts to solve problems that arise in daily practice.

## Measurement Systems

The four kinds of measurement systems used in the world of pharmacy are metric, apothecaries', avoirdupois, and common.

### Metric System

In pharmacy, you will be dealing with metric measurements of length and height, volume, and weight. These measurements will be in meters (m), liters (L), and grams (g), respectively. Table 1-1 provides the prefixes that represent multiples or fractions of these measurements that you will need to know.

### Apothecaries' System

The apothecaries' system was used by the forerunners of today's pharmacists and pharmacy technicians (Box 1-1). In this system, the troy (apothecary) pound was divided into 12 ounces, each ounce into 8 drams (originally *drachms*), each dram into 3 scruples, and each scruple into 20 grains. Thus, 1 troy pound is 5,760 grains.

For the measurement of fluid in this system, 1 gallon was divided into 4 quarts, each quart into 2 pints, each pint into 16 fluid ounces, each fluid ounce into 8 fluidrams, and each fluidram into 60 minims. You may recognize some of the volume components if you cook.

See Table 1-2 for some relationships involving measures of this system.

**Table 1-1. Metric Measurements**

Abbreviation and Meaning	Example
kilo (k): one thousand	kilogram (kg); drug dosing commonly needs the patient's weight in kg
deci (d): one-tenth	deciliter (dL); some drug concentrations are reported as g/dL
centi (c): one-hundredth	centimeter (cm); patient's height often has to be converted from inches to cm
milli (m): one-thousandth	milliliter (mL); most injectable drug amounts are in mL
micro (mc or $\mu$ ): one-millionth	microgram (mcg or $\mu$ g); some drugs have low serum concentrations, e.g., mcg/L (mcg is preferred)
nano (n): one-billionth	nanogram (ng); some drugs have very low serum concentrations, e.g., ng/L
pico (p): one-trillionth	picogram (pg); a few drugs have barely detectable concentrations, e.g., pg/L

## Avoirdupois System

The avoirdupois system is Roman in origin, has a French name, and was adopted by the English as a standard of weight in commerce. It remains in use in the United States. An avoirdupois (pronounced "ah-vvor-doo-pwuh") pound is divided into 16 avoirdupois ounces. One avoirdupois ounce is made of 437.5 grains.

The number of ounces and the number of grains in an avoirdupois pound and the troy (apothecaries') pound are different: 7,000 grains (16 ounces) per pound in the avoirdupois system versus 5,760 grains (12 ounces) per pound in the apothecaries' system. However, the common measure between the two systems is the grain; a grain in the avoirdupois system has the same weight as a grain in the apothecaries' system.

### Box 1-1. Some Origins of Terms

In medieval times, the merchants came to the people, rather than the people coming to the merchants. Merchants would thus travel the countryside, spending a day or more at each regional fair and returning periodically to port cities or to craftsmen to restock their wares. Some cities were large enough to have "great fairs," which drew merchants and traders from many countries. One such city was Troyes, in the Champagne region of France, home to a great fair in the 8th and 9th centuries. It is likely that the apothecary troy pound came from the name of this city, where a standard weight of coinage for metals, jewels, and medicines was determined and was eventually adopted all over Europe. Troy weight is still used in the jewelry industry. In England, a troy pound of silver became a measure of currency and eventually gave its name to the pound sterling.

The story about the connection between the scruple as a measure of weight and a scruple as a moral principle that keeps people from doing wrong is interesting. It seems that the medieval apothecaries' apprentices were supposed to use weights to measure out the correct amount of medication for a prescription. Because the amount in a scruple was so small, however (about 1.3 grams, around the weight of a quarter teaspoon of salt), some of the apprentices would just take a pinch of the ground substance for each scruple and add it to the drug mixture they were concocting, rather than go through the laborious process of using the scruple weight and balance to ensure they had the right amount. If the apothecary (who was both physician and pharmacist in medieval times) didn't see the scruple weight laid out, he would ask the apprentice, "Have you no scruples?" This phrase first became associated with carelessness or an unconcern for accuracy. In time, it changed to mean a lack of principles or moral integrity; individuals with these attributes came to be described as "unscrupulous."

**Table 1-2. Relationships of Measures in Apothecaries' System**

Fluid Measures			
1 fluidram (fʒ)	=	60 minims	
1 fluid ounce (fʒ)	=	8 fluidrams	= 480 minims
16 fluid ounces	=	1 pint	
32 fluid ounces	=	1 quart	= 2 pints
4 quarts	=	1 gallon	= 8 pints
Solid Measures			
20 grains (gr)	=	1 scruple (ʒ)	
60 grains	=	3 scruples	= 1 dram (ʒ)
480 grains	=	8 drams	= 1 ounce (ʒ)
5,760 grains	=	12 ounces	= 1 pound

Thus, the measure to remember is 437.5 grains = 1 ounce (oz), and 16 ounces = 1 pound (lb). This is also the grain definition used in the grain–ounce conversion in pharmacy practice.

A grain weight originated from the weight of a dried grain of wheat (France) or barleycorn (England) pulled from the middle of the ear of wheat or barleycorn.

The reason the standard English measurement system has a French name is that at the time of adoption, French was the language spoken by the English court. Avoirdupois has been roughly translated into "heavy goods," "goods of weight," and "to have weight."

## Common or Household System

This system combines bits of both the apothecaries' and the avoirdupois systems and also throws in a couple of new measures. This system is commonly used in the United States. Although it is being replaced by the metric system, the change is occurring at a pace so painfully slow that our children's children may still be learning both metric and common systems of measurement, at least when they cook. The basics of this system are outlined in Table 1-3.

## Converting between Measurement Systems

The most basic calculations you will do in pharmacy will consist of converting between the metric system and the other measurement systems. You will need to memorize these conversions (Table 1-4).

### Length

Patient heights are often relayed to pharmacists in feet and inches, but calculation of body surface area or some nutrition calculations require the measurements to be in centimeters. Use the following conversion:

$$1 \text{ inch} = 2.54 \text{ cm}$$

**Table 1-3. Common System**

Measure		Equivalent
1 gallon (gal)	=	4 quarts
1 quart (qt)	=	2 pints
1 pint (pt)	=	2 cups
1 cup	=	8 fluid ounces
1 fluid ounce (oz)	=	2 tablespoons <sup>a</sup>
1 tablespoon <sup>a</sup> (T or Tbsp)	=	3 teaspoons <sup>a</sup> (tsp)
1 pound (lb)	=	16 ounces (oz)
1 yard (yd)	=	3 feet
1 foot (ft or')	=	12 inches (in or")

a. Some people will use the term *tablespoonful* or *teaspoonful*.

You are unlikely to need to convert between centimeters and feet or between meters and feet in the practice of pharmacy. If you do, then it is simple to use the proportional calculation of inches to centimeters to determine what you want to know.

## Volume

Pharmacists frequently work with volumes—of total product and of dose and as the denominator in a concentration.

**Table 1-4. Metric Conversions**

Measure		Metric Equivalent
Apothecary (volume):		
1 fluid ounce (f℥)	=	29.57 milliliters (mL)
1 pint (pt)	=	473 milliliters
1 teaspoon (tsp)	=	5 milliliters
Apothecary (weight):		
1 ounce (℥)	=	31.1 grams (g)
1 grain <sup>a</sup>	=	64.8 milligrams (mg)
1 pound (lb)	=	373.2 grams
Avoirdupois (weight):		
1 pound (lb) <sup>b</sup>	=	454 grams
1 ounce (oz)	=	28.35 grams

a. 1 gram = 15.432 grains.

b. 1 kilogram (kg) = 2.2 pounds.

Total volumes of liquid drugs prescribed by physicians are conveyed in ounces (e.g., 8 oz of a cough syrup) or in milliliters (e.g., 200 mL of an antibiotic suspension). If the drug is ordered in ounces, the physician is referring to the apothecaries' fluid ounce (℥, usually just called *ounce* or ℥). You will need to memorize the following relationships:

$$1 \text{ pint} = 473 \text{ mL}$$

$$1 \text{ fluid ounce } (\text{℥}) = 29.6 \text{ mL}$$

(Some practitioners round this amount to 30 mL.)

Dose volumes are most frequently represented as teaspoons, which physicians represent as ℥. Use the following conversion:

$$1 \text{ teaspoon } (\text{℥}) = 5 \text{ mL}$$

You may think that, if there are 8 fluidrams (℥) in one fluid ounce (℥), then  $29.6 \text{ mL} \div 8$  should mean that there are 3.7 mL in each fluidram. In practice, however, when a physician or pharmacist writes ℥ on a prescription, he or she always means 1 teaspoon, and you must interpret it as 5 mL.

The abbreviation for ounce, oz, is probably derived from the Italian word for ounce, *onza*. The abbreviation for pound, lb, is derived from the Latin word *libra*, meaning pound or scales.

Another volume that you should know about is the drop. The official dropper contains 20 drops/mL (of water). However, drop size varies with formulation and the type of dropper available, so you need to calibrate the dropper. Fortunately, droppers that accompany commercially available prescription and over-the-counter medications are precalibrated.

## Weight

The most important weight conversions are those between ounces and grams for solid dosage forms and those between pounds and kilograms for people. Patients will tell you their weight in pounds, but dosage recommendations will be based on kilogram weight. The conversions are

$$1 \text{ kg} = 2.2 \text{ lb}$$

$$1 \text{ ounce} = 28.35 \text{ g}$$

When compounding, do *not* round 28.4 grams to 30 grams. The two numbers vary by more than 5%, which is too inaccurate for compounding. Round only to the nearest 10th of a gram (i.e., 28.4 g). If necessary to round to the nearest whole number, use 28 grams (see Box 1-2).

The use of grains as a measure of weight has almost gone by the wayside in the medical profession (most health care practitioners think of grains as a way to obtain fiber in the diet, rather than as a unit of weight). You will occasionally encounter grains, however, so you will need to memorize the conversion:

$$1 \text{ grain} = 64.8 \text{ mg}$$

**Box 1-2. Guidelines for Rounding Weights**

The following guidelines, along with a careful consideration of relevant clinical factors, may guide you in rounding weight calculations:

- For adults and children who weigh more than 25 pounds, round to the nearest whole kilogram (e.g., 38 kg).
- For children who weigh between 6 and 25 pounds, round to the nearest 10th of a kilogram (e.g., 6.8 kg).
- For premature infants (weight is expressed in grams), round to the nearest whole gram (e.g., a 4-pound infant would be 1,818 grams).

## Review

The following are the most important measurements and symbols that you need to know:

**Length**

1 inch = 2.54 cm

**Volume**

1 pint = 473 mL = 16 fluid ounces

1 fluid ounce (℥) = 29.6 mL = approximately 2 tablespoons

1 fluidram (ʒ) = 5 mL = 1 teaspoon

1 tablespoon = 15 mL

2 cups = 1 pint

8 pints = 1 gallon

**Weight**

1 grain = 64.8 mg

1 kilogram = 2.2 lb

1 ounce = 28.4 g

**Symbol Meaning**

ʒ = 1 teaspoon or 5 mL or one fluidram

℥ = 1 ounce or 1 fluid ounce or 2 tablespoons or 30 mL

āā = of each

ḡḡ = one-half

ḡ = with

ḡ = without

Δ = change

Note: The teaspoon or the ounce symbol followed by a lowercase roman numeral (e.g., ii, iii, iv) indicates the number of either teaspoons or ounces desired (e.g., ʒii = 2 teaspoons, ℥viii = 8 oz). If the symbol itself is not followed by the lowercase roman numerals, you should assume the measure is 1 teaspoon or 1 ounce.

## Thermometry

Both the Fahrenheit and the centigrade–Celsius temperature scales are used in the clinical setting for reporting patient temperatures. Some institutions or clinics will report in Fahrenheit, others in Celsius. More commonly, the patient will report a temperature in Fahrenheit, but the dosing guide for medications will give guidelines using the Celsius scale. You must be able to move comfortably

**Table 1-5. Temperature Ranges**

Measurement method	Normal Temperature Range
Rectal	36.6°C to 38°C (97.9°F to 100.4°F)
Oral	35.5°C to 37.5°C (95.9°F to 99.5°F)
Axillary	34.7°C to 37.3°C (94.5°F to 99.1°F)
Tympanic	35.8°C to 38°C (96.4°F to 100.4°F)
Temporal	36.3°C to 37.8°C (97.1°F to 100.1°F)

Source: Adapted from Caring for Kids, <http://www.caringforkids.cps.ca/whensick/Fever.htm>.

back and forth between them. You should memorize one of the following methods for converting from Fahrenheit to Celsius and from Celsius to Fahrenheit:

$$^{\circ}\text{F} = \frac{(^{\circ}\text{C})(9)}{5} + 32 \text{ or } ^{\circ}\text{F} = (^{\circ}\text{C} \times 1.8) + 32 \text{ or } (5)(^{\circ}\text{F}) = (9)(^{\circ}\text{C}) + 160$$

$$^{\circ}\text{C} = \left( \frac{^{\circ}\text{F} - 32}{9} \right) (5) \text{ or } ^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times 0.556 \text{ or } (9)(^{\circ}\text{C}) = (5)(^{\circ}\text{F}) - 160$$

Temperatures should be rounded to the nearest 10th of a degree for both Fahrenheit and Celsius (e.g., 98.6°F or 37.0°C).

If dosing directions for a medication are based on body temperature, the site you use to determine the patient's temperature matters. For many years, temperatures were measured using a rectal, oral, or axillary (armpit) thermometer. Rectal temperatures are around 1°F (0.5°C) higher than oral. Oral temperatures are around 1°F (0.5°C) higher than axillary. Generally, for individuals age 5 years and older, you would use an oral temperature, and for children younger than age 5, you would use a rectal temperature to determine whether to give a fever-reducing agent.

Today, most clinicians will use tympanic (ear) or temporal (arterial) thermometers to check a patient's temperature. Temperatures taken with tympanic thermometers are similar to those taken with an oral thermometer. Temperatures taken with a temporal thermometer are similar to those taken with a rectal thermometer.

Remember the temperature ranges shown in Table 1-5.

You should memorize the Fahrenheit–Celsius and Celsius–Fahrenheit conversion equation that you like best, and you should memorize the conversion between oral, rectal, and axillary temperatures.

## Setting Up Calculations

### Proportional Calculations

Most of the problems you will solve here and in the next lesson are best solved using proportional calculations. Proportional calculations involve using a known ratio to determine the strength or volume of a similar ratio, where one of the values (strength or volume) is unknown. If you cook, you've probably done proportional calculations. Proportional calculations are set up like this:

$$\frac{a}{b} = \frac{x}{c}$$

where you solve for  $x$  by multiplying  $a$  times  $c$  and dividing by  $b$ .

You can use proportional calculations to determine a simple dose of a drug. Let's say you need to know the volume that will give you a dose of 400 mg, and you have a suspension that is 250 mg/5 mL. You are probably calculating the volume as follows:

$$\frac{250 \text{ mg}}{5 \text{ mL}} = \frac{400 \text{ mg}}{x \text{ mL}}$$

Then  $(400 \text{ mg})(5 \text{ mL})/(250 \text{ mg}) = 8 \text{ mL}$ .

Although you *can* get the correct answer this way, it is also possible to get the *incorrect* answer. For example, the answer will be incorrect if you don't write out the units for  $a$ ,  $b$ ,  $c$ , and  $x$ , and an incorrect answer is even more likely to occur if other variables such as  $d$  and  $e$  are involved. Because you are dealing with medications that could harm and, in some cases, even kill patients if the dose is miscalculated, you must use a method that will allow you to get the right answer every time. The following sections outline those methods.

## Dimensional Analysis and Why You Need It

Dimensional analysis is a method of checking an equation or solution to a problem by setting up the dimensions (units of measurement) in a certain way. If the two sides of an equation do not have the same dimensions, the equation is wrong. If they do have the same dimensions, then the equation is set up correctly. The method has the following steps:

1. Write out the final units you would like to arrive at on the right-hand side of the page first, leaving a space to the left. Then write an = sign.

For example, let's say you want to calculate a dose of amoxicillin, in mL:

$$= \text{_____ mL}$$

2. On the left-hand side of the equation, line up all your available data. Be sure to include a unit for every number. If you're dealing with more than one drug or drug strength, assign a drug name to all necessary units.

In the example, the variables you have are a 36-pound child, a 250 mg/5 mL concentration of amoxicillin suspension, a dosing guideline of 13 mg/kg, and your memorized conversion between pounds and kilograms:

$$36 \text{ lb} \frac{250 \text{ mg}}{5 \text{ mL}} \frac{13 \text{ mg}}{\text{kg}} \frac{1 \text{ kg}}{2.2 \text{ lb}} = \text{_____ mL}$$

3. Invert dimensions as needed so that the units cancel out. Make sure that all possible units cross out. If you have set the calculation up correctly, you will end up with the same units remaining on the left-hand side of the equation as on the right-hand side of the equation. If you have additional units left that have not canceled out, then you have missed an important dimension or included an unnecessary one. Continuing with the example:

$$36 \text{ lb} \times \frac{5 \text{ mL}}{250 \text{ mg}} \times \frac{13 \text{ mg}}{\text{kg}} \times \frac{1 \text{ kg}}{2.2 \text{ lb}} = \text{_____ mL}$$

4. Perform the calculations. You should have crossed out all units that appear in both a numerator and a denominator somewhere on the same side of the equation. You are left with mL as



the only unit not crossed out on either side of the equation, so you know that you have set the equation up correctly.

$$36 \cancel{\text{lb}} \times \frac{5 \text{ mL}}{250 \text{ mg}} \times \frac{13 \text{ mg}}{\cancel{\text{kg}}} \times \frac{1 \cancel{\text{kg}}}{2.2 \cancel{\text{lb}}} = 4.2 \text{ mL}$$

Note: Do not round to 4.3 mL. A 5 mL oral syringe, necessary for dosing a medication this way, has measurement lines in 0.2 mL increments, not 0.1 mL increments. For someone to measure a dose of amoxicillin accurately, the dose needs to be in a 0.2 mL increment.

If you use dimensional analysis, you can feel comfortable that your answer is correct, as long as you keyed in the correct numbers on your calculator. Always double-check your work. You will see dimensional analysis used in this workbook whenever more than two units of measurement (dimensions) are involved in a calculation, with a few exceptions (e.g., body surface area and creatinine clearance calculations). Dimensional analysis is vital in getting the right dose to the patient.

## Abbreviations Used on Prescriptions

Learning the abbreviations used on a prescription enables you to evaluate every dose for every patient to verify that it is the right dose for that patient. The first step in evaluating the dose is to be able to read the prescribed dose on the prescription, which will usually be communicated in a series of symbols and abbreviations. You will need to know how to interpret those notations not only to select the correct medication, but also to check the dose and to translate the directions into something the patient will understand. The most common abbreviations you will use are summarized here in the order in which you would read them on a prescription.

Although abbreviations are very useful, they also can be confusing and can lead to medication errors. In 2004, the Joint Commission created a “Do Not Use” abbreviations list to reduce medication errors associated with use of medical abbreviations (Table 1-6). Avoid using these abbreviations, and encourage other practitioners to do the same.

### Drug Names

First, confirm the correct name, contact, and location information for the patient and then determine the drug name. Prescribers may abbreviate the names of some drugs (this doesn't mean that it is the correct thing to do, but you will see it done). Table 1-7 provides abbreviations used in some parts of the country. Other abbreviations may also be used in your area. You should also become familiar with the printed and Internet references for drug names. Prescribers will also use standard chemical abbreviations for electrolytes and other substances, such as KCl, NaCl, and MgSO<sub>4</sub>, which are not listed here.

### Strength

After the drug name, the prescriber may indicate the strength of the medication to be dispensed. There are only two times when this may not be done. If the drug comes in only one strength, then the prescriber will usually not note the strength. The other time the prescriber may omit the strength is if he or she writes “dose per pharmacy” on the prescription, indicating that the pharmacist may determine the correct product strength and dose for the patient.

At all other times, you should see a prescribed strength on the prescription. If it is missing and multiple strengths are available, you must contact the prescriber to determine the strength.

**Table 1-6. Abbreviations to Avoid**

<b>"Do Not Use" Abbreviation</b>	<b>Potential Problem</b>	<b>Solution</b>
U, u (unit)	Mistaken for "0" (zero), the number "4" (four), or "cc"	Write "unit."
IU (International Unit)	Mistaken for IV (intravenous) or the number 10	Write "International Unit."
Q.D., QD, q.d., qd (daily)	Mistaken for each other	Write "daily."
Q.O.D., QOD, q.o.d, qod (every other day)	Period after the "Q" mistaken for "I" and the "O" mistaken for "1"	Write "every other day."
Trailing zero (X.0 mg) <sup>a</sup>	Decimal point missed	Write "X mg."
Lack of leading zero (.X)	Decimal point missed	Write "0.X mg."
MS	Can mean morphine sulfate or magnesium sulfate	Write "morphine sulfate."
MSO <sub>4</sub> and MgSO <sub>4</sub>	Confused for one another	Write "magnesium sulfate."

Source: Adapted from the Joint Commission, [http://www.jointcommission.org/standards\\_information/npsgs.aspx](http://www.jointcommission.org/standards_information/npsgs.aspx).

Note: The table applies to all orders and all medication-related documentation that is handwritten (including free-text computer entry) or on preprinted forms.

a. *Exception:* A trailing zero may be used only where required to demonstrate the level of precision of the value being reported, such as for laboratory results, imaging studies that report size of lesions, or catheter or tube sizes. It may not be used in medication orders or other medication-related documentation.

Strengths will usually be given as a number with an abbreviation after it (Table 1-8). You will need to read the abbreviation correctly.

## Drug Form

If the drug comes in more than one form, the prescriber will need to identify the desired form (Table 1-9).

## Total Amount of Drug Product

Next, you will need to interpret the total amount of drug product to be dispensed, which may be indicated on the prescription. However, the prescriber may instead leave it up to you to determine the proper amount. More information on how to do so will be provided later. Most of the time, the total amount will be written as a standard number, with a # sign in front of it (e.g., #30 or #60, indicating 30 or 60 tablets or capsules). A few prescribers still write the quantity in Roman numerals, as shown in Table 1-10. The other symbol that a prescriber may use is the ounce symbol (℥). This symbol is included for the commonly prescribed drug amounts listed.

A final comment on prescribed amounts: for controlled substances, it is optimal for the prescriber to spell out the total number of capsules, tablets, or other total amount to be dispensed, in addition to writing the number. For example, the prescriber should write "#20 (twenty)." In fact, writing the prescription in this manner may be required by law in your state. When the number is spelled out, it is much harder for people to alter the quantity of medication prescribed. This practice helps protect you from the misfortune of filling a forged or altered prescription. (You can pass this

**Table 1-7. Drug Name Abbreviations**

Abbreviation	Meaning
3TC	Lamivudine
5-FU	Fluorouracil
APAP	Acetaminophen
ASA	Aspirin
AZT	Zidovudine (chemical name: azidothymidine)
CE	Conjugated estrogens
d4T	Stavudine
D5-1/2NS	5% dextrose and half-normal saline (0.45% sodium chloride) in water (for intravenous infusion)
D5W	5% dextrose in water (a solution for intravenous infusion)
ddC	Zalcitabine
EES	Erythromycin ethylsuccinate
EPO	Erythropoietin, epoetin
HCTZ	Hydrochlorothiazide
INH	Isoniazid
LR	Lactated Ringer's solution (for intravenous infusion)
MOM	Milk of magnesia
MPA	Medroxyprogesterone acetate
MS	Morphine sulfate (MS is on the Do Not Use Abbreviations list; it can be confused with magnesium sulfate. MS is also an abbreviation for multiple sclerosis, a disease.)
MVI	Multivitamin
NS	Normal saline (0.9% sodium chloride in water)
NTG	Nitroglycerin
PB	Phenobarbital
PCN	Penicillin
PPD	Purified protein derivative (a tuberculin skin test)
TMP/SMX	Trimethoprim + sulfamethoxazole
TPN	Total parenteral nutrition

**Table 1-8. Drug Strength Abbreviations**

Abbreviation	Meaning
%	Grams per 100 finished units: commonly, g/100 mL (g/dL) or g/100 g
g	Gram
gr	Grain (This abbreviation should not be used; write "grain" because "gr" may be confused with the abbreviation for gram, "g.")
IU	International Units (This abbreviation should not be used; write "International Units.")
mg	Milligram
mEq	Milliequivalent
u or U	Unit (This abbreviation should not be used; write "units.")

**Table 1-9. Drug Form Abbreviations**

Abbreviation	Meaning
cap or caps	Capsules
crm	Cream
elix	Elixir
gtts	Drops
MDI	Metered-dose inhaler
nebs	Solution for nebulization
NPO	Nothing by mouth; not a drug form but means the patient is not to receive any medications administered orally
PO or po	By mouth, orally, or swallowed
PR	Suppository (when written after the drug name)
SL	Sublingual form
sol or soln	Solution
supp	Suppository
susp	Suspension
SVN	Small volume nebulizer
syr	Syrup (syr is also used as an abbreviation for syringe.)
tab or tabs	Tablets
ung	Ointment

**Table 1-10. Drug Dispensing Abbreviations**

Abbreviation	Meaning
disp	Dispense
mL <sup>a</sup>	Milliliter
qs	<i>Quantum sufficit</i> , meaning, add a sufficient quantity to make . . .
℥ii	2 ounces
℥iii	3 ounces
℥iv	4 ounces
℥vi	6 ounces
℥viii	8 ounces
I or i	1
IV or iv	4
V or v	5
X or x	10
C or c	100

a. A capital L is the correct abbreviation for liter; however, many practitioners use a lowercase l in abbreviations when combined (e.g., ml, µl).

suggestion on to prescribers to enable them to better safeguard the number of tablets dispensed to their patients.)

## Interpreting the Directions

The following abbreviations for the dose, route, frequency, and frequency modifiers apply to directions. Directions are often indicated on the prescription by the abbreviation *sig*, a Latin abbreviation for *signa*, which basically means directions.

The directions written on a prescription by a prescriber will contain abbreviations in the dose, the route, the frequency, and the frequency modifiers that the prescriber may specify. Figure 1-1 is a typical prescription.

### Directions: Dose

The prescriber may use the abbreviations in Table 1-11 to indicate the amount of drug product that should be used for each dose.

**FIGURE 1-1. Typical Prescription**

1104 8th Ave NW		May B. Enidok, M.D. Family Practice Seattle WA 98101	123-4567
Name:	Ida Ho	Date:	
Address:			
Rx:	gentamicin ophth sol 5mL Tgt OU qth WA x 5 days		
Refill:	0 1 2 3 prn		
substitution permitted		M.B.E., MD dispense as written	

**Table 1-11. Dose Directions**

Abbreviation	Meaning
3	Teaspoon or teaspoons
aa or āā	Of each
cc	cubic centimeter, but 1 cc = 1 mL (mL is preferred over cc)
gtt	Drop (Latin for <i>guttae</i> , meaning drops)
i	1
ii	2
ss or s̄s̄	One-half (writing out “one-half” or ½ is preferable)
t or tsp	Teaspoon or tablet (This abbreviation is confusing and dangerous and therefore should not be used.)
tblsp or T	Tablespoon
TKO or KVO	“To keep open,” “keep vein open”

### Directions: Route

*Route* refers to how the drug enters the body. Sometimes it is used to indicate a drug form (see Table 1-12).

### Directions: Frequency

The abbreviations for frequency in Table 1-13 refer to how often the patient is to take or apply the drug.

**Table 1-12. Route Directions**

Abbreviation	Meaning
ad	Right ear (“right ear” is preferred to ad)
as	Left ear (“left ear” is preferred to as)
au	Each ear (“each ear” is preferred to au)
IM	Intramuscular(ly)
IV	Intravenous(ly)
IVP	Intravenous push
IVPB	Intravenous piggyback
od	Right eye (“right eye” is preferred to od)
os	Left eye (“left eye” is preferred to os)
ou	Each eye (“each eye” is preferred to ou)
po	By mouth or orally
PR	Rectal(ly)
PV	Vaginal(ly)
SC or SQ	Subcutaneous(ly) (“subcutaneous” is preferred to SC or SQ)
SL	Sublingual(ly) (“under the tongue” is a more patient-friendly translation)
S/S	Swish and spit
top	Topical(ly) (“on the skin” is a more patient-friendly translation)

**Table 1-13. Frequency Directions**

Abbreviation	Meaning
alt	Alternating
bid	Twice a day or twice daily
biw	Twice weekly
cid	Five times a day
hs	Bedtime
q	Every
q12h	Every 12 hours
q24h	Every 24 hours or once daily
q4–6h	Every 4–6 hours
q4h	Every 4 hours
q6h	Every 6 hours
q8h	Every 8 hours
qam	Every morning or daily in the morning
qd	Daily or once daily (“daily” or “once daily” is preferred to qd)
qhs	Bedtime or daily at bedtime (“nightly” or “daily at bedtime” is preferred to qhs)
qid	Four times a day
q5min	Every 5 minutes
qOd	Every other day (“every other day” is preferred to qOd)
qpm	Every evening or daily in the evening
q week	Once weekly
tid	Three times daily
tiw	Three times weekly (“three times weekly” is preferred to tiw)

### Directions: Frequency Modifiers and Miscellaneous Abbreviations

Some of the more common abbreviations that you may encounter are provided in Table 1-14.

## Composing the Label Instructions

Once you have deciphered the information on the prescription, you will need to translate it into instructions that a patient can understand. Complete prescription sentences generally as follows:

1. Start with a command (e.g., take, place, insert, unwrap and insert, apply, or inhale).
2. Follow with a command modifier (e.g., by mouth, rectally, or sparingly).

**Table 1-14. Frequency Modifiers**

Abbreviation	Meaning
Δ	Change
ac	Before meals
ASAP	As soon as possible
ATC	Around the clock
BS, FBG	Blood sugar, fasting blood glucose
c or $\bar{c}$	With
max	Maximum
min	Minutes or minimum (depends on context)
MR	May repeat
NR	No refills
NTE	Not to exceed
OTC	Over-the-counter
pc	After meals
prn	As needed, if needed, when needed; use "as needed for" if an indication is present
s or $\bar{s}$	Without; lay individuals use the abbreviation w/o
stat	Immediately
ut dict or ud	As directed
WA	While awake
x or X	Times
x1	One time
x2	Two times
x3	Three times or up to three

- Note the dosage number and the form or unit (e.g., 2 tablets, 1 capsule, or 1 teaspoon).
- Follow with the dosing frequency (e.g., twice daily, every 4–6 hours, or after meals).
- Finish with a frequency modifier (e.g., as needed for pain, on an empty stomach, with food, for blood pressure, with a full glass of water, or for 10 days).

Some typical label instructions are shown in Table 1-15.

## Other Abbreviations You Will See in Practice

### Indications

Indications outline why the patient is receiving the drug or warn of a reason to alter intake of the drug if an adverse event occurs (e.g., hold pain medication if respiratory rate is less than 12). Indications



**Table 1-15. Label Instructions**

What Is Written on a Prescription	What You Would Type on a Label
Tylenol #3 disp. 30 i po q4–6h prn pain	Tylenol #3 #30 Take 1 tablet by mouth every 4–6 hours as needed for pain.
APAP 5 gr supp #10 i PR prn temp>101	Acetaminophen 325 mg Supp. #10 Unwrap and insert rectally 1 suppository as needed when temperature is higher than 101°F.
Cheracol 3iv 3ii po q4h prn cough	Cheracol 4 oz Take 2 teaspoons by mouth every 4 hours as needed for cough.
Gentamicin ophth soln 5 ml i gtt ou q4h WA × 5 days	Gentamicin 0.3% 5 mL Place 1 drop in each eye every 4 hours while awake for 5 days.
Ampicillin 250 mg #40 i po ac & hs	Ampicillin 250 mg #40 Take 1 capsule by mouth four times a day, before meals and at bedtime.

are useful to the pharmacist but are often not provided by the practitioner. Abbreviations for some common indications are noted in Table 1-16.

## Abbreviations of Prescriber

The final thing you should see on a prescription is the signature of the prescriber, followed by his or her degree. Because authority to prescribe varies from state to state, any of the professionals in Table 1-17 may be able to write prescriptions in your state.

**Table 1-16. Indications**

Abbreviation	Meaning
BP	Blood pressure
CHF	Congestive heart failure
COPD	Chronic obstructive pulmonary disease, including emphysema and bronchitis
CP	Chest pain
HTN, HBP	Hypertension, high blood pressure
HR	Heart rate
MI	Myocardial infarction: a heart attack
N/V	Nausea or vomiting or both
temp	Temperature
RR	Respiratory rate
SOB	Shortness of breath
sz	Seizures
UTI	Urinary tract infection

**Table 1-17. Abbreviations of Prescribers**

Abbreviation	Meaning
ARNP	Advanced registered nurse practitioner
CNM	Certified nurse midwife
DDS	Doctor of dental surgery (a dentist)
DPM	Doctor of podiatric medicine
DO	Doctor of osteopathy
DVM	Doctor of veterinary medicine
MD	Medical doctor
ND	Doctor of naturopathy
OD	Doctor of optometry
PA	Physician's assistant
PharmD or RPh	Pharmacist with collaborative authority to prescribe

### Other Health Care Professionals

In addition to the prescriber's initials, you will also see other health care practitioners' qualifications given after their notes in the chart. Table 1-18 outlines degrees of other health care professionals who are not prescribers.

Some of these people (e.g., MSWs, RNs, RPhs, and RRTs) may write an order for a medication but only if told to do so by a physician or other prescriber. In this case, they will sign the prescription using the abbreviations v.o., for voice order, or t.o., for telephone order, to indicate how the order was communicated to them and then sign the prescriber's name and degree, followed by a slash and then their name and degree:

v.o. W. Harrison, MD/T. O'Sullivan, RPh

### Laboratory Values

You may need to convert between laboratory value measurement systems (you will see more on this in Chapter 2 of this book and in your therapeutics courses). For now, you need to be able to recognize the units before you can begin to convert. Table 1-19 includes those units and a few abbreviations from frequently ordered laboratory tests.

**Table 1-18. Abbreviations of Other Health Care Professionals**

Abbreviation	Meaning
BSN	Bachelor of science in nursing
CNA or NAC	Certified nursing assistant (also called a <i>nurse's aide</i> )
CPhT	Certified pharmacy technician
DC	Doctor of chiropractic
HCP	Health care professional (not a degree but used often)
LMT	Licensed massage therapist
LPN	Licensed practical nurse
MHA	Master's of health care administration
MPH	Master's of public health
MSW	Master's of social work
MT or MLT	Medical technologist or medical laboratory technologist
OT	Occupational therapist
PharmD	Doctor of pharmacy <sup>a</sup>
PhD	Doctor of philosophy
PT	Physical therapist
RD	Registered dietitian
RN	Registered nurse
RPh	Registered pharmacist <sup>a</sup>
RT or RRT	Respiratory therapist or registered respiratory therapist

a. Pharmacists can sometimes prescribe medications under prescriptive authorities established with a prescriber. These stipulate the conditions under which independent prescribing can occur.

**Table 1-19. Laboratory Value Abbreviations**

<b>Abbreviation</b>	<b>Meaning</b>
<i>Units</i>	
dL or dl	Deciliter (100 mL)
mcg or $\mu\text{g}$	Microgram (1/1,000 of a mg); mcg is preferred to $\mu\text{g}$
mcL or $\mu\text{L}$ or $\mu\text{l}$	Microliter (1/1,000 of a mL)
ng	Nanogram (1/1,000 of a mcg)
pg	Picogram (1/1,000 of a ng)
<i>Substances</i>	
Ca	Calcium
Cl	Chloride
K	Potassium
Na	Sodium
$\text{PO}_4$	Phosphate
<i>Laboratory Testing Terms</i>	
alb	Albumin (a serum protein)
BUN	Blood urea nitrogen (used to calculate whether a patient is dehydrated)
CBC	Complete blood count (counts all cells in the blood)
Cr or SCr	Serum creatinine (used for calculating kidney function)
C/S	Culture and sensitivities (used to determine type of bacteria)
glu	Serum glucose (blood sugar)
Hb	Hemoglobin (used to calculate a dose of IV iron)
Hct	Hematocrit (used to calculate a dose of IV iron)

# Practice

1

1 gr aspirin = \_\_\_\_\_ mg

If a physician told you to recommend a product that would give a patient “a grain per day of aspirin,” which product would you dispense?

- (a) Bayer Children’s Aspirin, 81 mg chewable tabs
- (b) Halfprin, 165 mg enteric-coated tablets
- (c) Ecotrin, 325 mg enteric-coated tablets
- (d) Generic enteric-coated aspirin, 650 mg

2

1/200 gr nitroglycerin SL = \_\_\_\_\_ mg

You receive a prescription for the above. Which product will you dispense?

- (a) Nitrostat 0.3 mg tablet (nitroglycerin)
- (b) Nitrostat 0.4 mg tablet (nitroglycerin)
- (c) Nitrostat 0.6 mg tablet (nitroglycerin)
- (d) Nitrobid 2.5 mg capsules (nitroglycerin)

3

5 gr ferrous gluconate = \_\_\_\_\_ mg

A patient tells you her physician wanted her to take one of these every day. Which product would you recommend?

- (a) Ferrous sulfate 324 mg tablets
- (b) Ferrous fumarate 324 mg tablets
- (c) Ferrous gluconate 240 mg tablets
- (d) Ferrous gluconate 325 mg tablets

4

A patient has been receiving penicillin 1,000,000 units IV q6h while in hospital. He is now to be sent home. You need to convert his medication to an oral form. The bottle of penicillin tells you that 250 mg = 400,000 units.

What dosage regimen will you recommend for this patient?

- (a) Penicillin VK 250 mg po qid
- (b) Penicillin VK 500 mg po qid
- (c) Penicillin VK 500 mg po bid

5

Convert the following patient weights to their metric equivalent. (See rules for rounding patient weights.)

- (a) 120 lb = \_\_\_\_\_ kg
- (b) 150 lb = \_\_\_\_\_ kg
- (c) 183 lb = \_\_\_\_\_ kg
- (d) 330 lb = \_\_\_\_\_ kg
- (e) 93 lb = \_\_\_\_\_ kg
- (f) 25 lb = \_\_\_\_\_ kg
- (g) 7.5 lb = \_\_\_\_\_ kg
- (h) 5 lb, 9 oz = \_\_\_\_\_ g
- (i) 3 lb, 4.5 oz = \_\_\_\_\_ g
- (j) 1 lb, 5.2 oz = \_\_\_\_\_ g

6

Calculate the metric heights of the following patients.

- (a) 5' 10" = \_\_\_\_\_ cm
- (b) 4' 6" = \_\_\_\_\_ cm
- (c) 5' 4" = \_\_\_\_\_ cm
- (d) 6' 4" = \_\_\_\_\_ cm
- (e) 36" = \_\_\_\_\_ cm

7

Convert the following amounts.

- (a) 1 mg/L = \_\_\_\_\_ mcg/mL
- (b) 1.6 ng/mL = \_\_\_\_\_ mg/L
- (c) 100 mg/dL = \_\_\_\_\_ mg/mL
- (d) 60 mg/dL = \_\_\_\_\_ g/L
- (e) 2 ng/mL = \_\_\_\_\_ mcg/L
- (f) 20 mg/dL = \_\_\_\_\_ mg/L
- (g) 20 pg/mL = \_\_\_\_\_ ng/L
- (h) 50 mcg/mL = \_\_\_\_\_ mg/dL

8

Answer the following questions about temperatures.

- (a) Normal oral body temperature is 98.6°F. What is this temperature in °C? \_\_\_\_\_ °C
- (b) You see on a patient's chart that he has a temporal temperature of 39.6°C. What is the Fahrenheit equivalent? \_\_\_\_\_ °F

- (c) Calculate the Fahrenheit equivalent of a tympanic temperature of  $36.2^{\circ}\text{C}$ . \_\_\_\_\_  $^{\circ}\text{F}$
- (d) A pediatric patient has a rectal temperature of  $102.4^{\circ}\text{F}$ . Calculate the oral equivalent of this temperature in both  $^{\circ}\text{F}$  and  $^{\circ}\text{C}$ . \_\_\_\_\_  $^{\circ}\text{F}$  \_\_\_\_\_  $^{\circ}\text{C}$
- (e) A premature infant registers an axillary temperature of  $99.6^{\circ}\text{F}$ . What would be the equivalent rectal temperature? \_\_\_\_\_  $^{\circ}\text{F}$

## 9

**Answer the following questions about symbols.**

- (a) You have a plastic amber prescription fluid vial that reads  $\mathfrak{z}\text{iv}$ .  
How many ounces is this? \_\_\_\_\_ oz  
How many mL? \_\_\_\_\_ mL
- (b) A physician has written  $\mathfrak{z}\text{ii po tid}$  on a prescription. What would you type on a label?  
Take \_\_\_\_\_ three times a day.  
What would be another way of interpreting this sig? Take \_\_\_\_\_ three times a day.
- (c) A prescription lists two inhalers and the directions are  $\text{ii puffs } \bar{\text{a}}\bar{\text{a}} \text{ qid}$ .  
This prescriber means for the patient to inhale 2 puffs \_\_\_\_\_ four times a day.
- (d) A prescriber has written HCTZ 25 mg on a prescription with the following directions:  
 $\text{i tab po qd}$ .  
You will type on the prescription label: Take \_\_\_\_\_ tablet by mouth every day.
- (e) A prescription reads:  $\text{i po bid}$ . Take  $\bar{\text{c}}$  food. You will type:  
Take 1 tablet twice daily \_\_\_\_\_ food.

## 10


**Consider the following sigs (shorthand directions found on the prescription that the patient brings in from the prescriber), and write out the directions that you would place on the prescription label for the patient:**

- (a) Septra DS #20:  $\text{i po bid} \times 10 \text{ days}$   
Your label directions: \_\_\_\_\_
- (b) Kaolin-pectin 8 oz:  $\mathfrak{z}\text{i}-\text{ii po q}$  loose stool  
Your label directions: \_\_\_\_\_
- (c) Nitroglycerin 0.4 mg #100:  $\text{i SL prn CP. MR q5min} \times 2$   
Your label directions: \_\_\_\_\_  
\_\_\_\_\_
- (d) Ventolin Syrup 4 oz:  $\mathfrak{z}\text{i po tid prn SOB, wheezing}$   
Your label directions: \_\_\_\_\_
- (e) Amoxicillin 125 mg/5 mL 100 mL:  $\text{2.5 mL po tid} \times 10 \text{ days}$   
Your label directions: \_\_\_\_\_

## Bonus


The following prescriptions were written in haste by a prescriber. Can you decipher them?

- (a) What drug do you think this is? \_\_\_\_\_

<b>Family Medical Center</b> 222 W Elm St. Anywhere WA 98000 206-111-1111		 ALLERGIES: <input type="checkbox"/> NKDA
Doe Jamie		
<small>Keep Medicines Out of Reach of Children Please Label and Use Safety Caps</small>		
<b>R</b> <i>amoxicillin 200mg</i> <i>PO</i> <i>q 8h TID</i>		
REFILL 0 1 2 3	PRN	DATE
PRINT PHYSICIAN'S NAME HERE		PHYSICIAN NO.
PHYSICIAN SIGNATURE (Substitution Permitted)		PHYSICIAN SIGNATURE (Dispense as Written)
M. D.		M. D.

- (b) What directions would you type on the label? \_\_\_\_\_

- (c) What drug do you think this is? \_\_\_\_\_

<b>Family Medical Center</b> 222 W Elm St. Anywhere WA 98000 206-111-1111		 ALLERGIES: <input type="checkbox"/> NKDA
Doe Jane		
<small>Keep Medicines Out of Reach of Children Please Label and Use Safety Caps</small>		
<b>R</b> <i>ATG - Q.Y</i> <i>SO #1</i> <i>ISL x 1m Cl</i>		
REFILL 0 1 2 3	PRN	DATE
PRINT PHYSICIAN'S NAME HERE		PHYSICIAN NO.
PHYSICIAN SIGNATURE (Substitution Permitted)		PHYSICIAN SIGNATURE (Dispense as Written)
M. D.		M. D.

- (d) What directions would you type on the label? \_\_\_\_\_



# Answers

**1**

1 gr aspirin = **65 mg**

Which product would you dispense?

- (a) Bayer Children's Aspirin, 81 mg chewable tabs (Note: A 65 mg dose is not available, so you would use the closest dosage form available.)

**2**

1/200 gr nitroglycerin SL = **0.325 mg**

Which product would you dispense?

- (a) Nitrostat 0.3 mg tablet (nitroglycerin).

**3**

5 gr ferrous gluconate = **325 mg**

Which product would you recommend?

- (d) Ferrous gluconate 325 mg tablets (Note: The first two choices are the wrong salt and the third is the wrong strength.)

**4**

What dosage regimen will you recommend for this patient?

- (b) Penicillin VK 500 mg po qid (Note: 500 mg is the closest dosage form available.)

**5**

Convert the following patient weights to their metric equivalent:

- (a) 120 lb = **55 kg**  
(b) 150 lb = **68 kg**  
(c) 183 lb = **83 kg**  
(d) 330 lb = **150 kg**  
(e) 93 lb = **42 kg**  
(f) 25 lb = **11.4 kg**  
(g) 7.5 lb = **3.4 kg**  
(h) 5 lb, 9 oz = **2,528 g**  
(i) 3 lb, 4.5 oz = **1,491 g**  
(j) 1 lb, 5.2 oz = **602 g**

6

Calculate the metric heights of the following patients:

- (a) 5' 10" = **178 cm**
- (b) 4' 6" = **137 cm**
- (c) 5' 4" = **163 cm**
- (d) 6' 4" = **193 cm**
- (e) 36" = **91 cm**

7

Convert the following amounts:

- (a) 1 mg/L = **1 mcg/mL**
- (b) 1.6 ng/mL = **0.0016 mg/L**
- (c) 100 mg/dL = **1 mg/mL**
- (d) 60 mg/dL = **0.6 g/L**
- (e) 2 ng/mL = **2 mcg/L**
- (f) 20 mg/dL = **200 mg/L**
- (g) 20 pg/mL = **20 ng/L**
- (h) 50 mcg/mL = **5 mg/dL**

8

Temperatures

- (a) "Normal" oral body temperature is 98.6°F. What is this temperature in °C? **37.0°C**
- (b) You see on a patient's chart that he has a temporal temperature of 39.6°C. What is the Fahrenheit equivalent? **103.3°F**
- (c) Calculate the Fahrenheit equivalent of a tympanic temperature of 36.2°C. **97.2°F**
- (d) A pediatric patient has a rectal temperature of 102.4°F. Calculate the oral equivalent of this temperature in both °F and °C. **101.4°F and 38.6°C.**
- (e) A premature infant registers an axillary temperature of 99.6°F. What would be the equivalent rectal temperature? **101.6°F**

9

Symbols

- (a) You have a plastic amber prescription fluid vial that reads  $\bar{\text{z}}\text{iv}$ .  
How many ounces is this? **4 oz**  
How many mL? **118.4 mL or 120 mL** (either is correct)

- (b) A physician has written  $\text{̄}i\text{̄}i\text{̄} \text{ po tid}$  on a prescription. What would you type on a label? Take **2 teaspoons** by mouth three times a day.

What would be another way of interpreting this sig? Take **10 mL by mouth** three times daily.

- (c) A prescription lists two inhalers and the directions are  $i\text{̄}i\text{̄} \text{ puffs } \bar{a}\bar{a}\text{̄} \text{ qid}$ .

This prescriber means for the patient to inhale 2 puffs **of each inhaler** four times a day.

- (d) A prescriber has written for HCTZ 25 mg with the following directions:  $i\text{̄} \text{ tab po qd}$ . You will type on the prescription label: Take  $\frac{1}{2}$  tablet by mouth every day.

- (e) A prescription reads:  $i\text{̄} \text{ po bid}$ . Take  $\bar{c}$  food. You will type: Take 1 tablet **twice daily** with food.

**10** Consider the following sigs (shorthand directions found on the prescription that the patient brings in from the prescriber) and write out the directions you would place on the prescription label for the patient:

- (a) Septra DS #20:  $i\text{̄} \text{ po bid } \times 10 \text{ days}$

Your label directions: **Take 1 tablet twice daily for 10 days.**

- (b) Kaolin-pectin 8 oz:  $\bar{3}i\text{̄}-i\text{̄}i\text{̄} \text{ po q loose stool}$

Your label directions: **Take 2–4 tablespoons after each loose stool.**

- (c) Nitroglycerin 0.4 mg #100:  $i\text{̄} \text{ SL prn CP. MR } q5\text{min } \times 2$

Your label directions: **Dissolve under the tongue 1 tablet as needed for chest pain. May repeat every 5 minutes if pain persists, to a maximum of two additional doses.**

- (d) Ventolin Syrup 4 oz:  $3i\text{̄} \text{ po tid prn SOB, wheezing}$

Your label directions: **Take 1 teaspoon up to three times a day as needed for shortness of breath or wheezing.**

- (e) Amoxicillin 125 mg/5 mL 100 mL:  $2.5 \text{ mL po tid } \times 10 \text{ days}$

Your label directions: **Take  $\frac{1}{2}$  teaspoon (2.5 mL) three times a day for 10 days.**

## Bonus Answers

- (a) Amoxicillin 250 mg/5 mL susp, 150 mL

- (b) Take 1 teaspoon three times a day for 10 days. (Note: Adding “for 10 days” shows that the prescriber intended that the patient take the drug for a full 10 days.)

- (c) Nitroglycerin 0.4 mg SL tabs, #24 (Note: This product is available in a bottle of 24 tablets, which is what you will dispense.)

- (d) Dissolve under the tongue 1 tablet as needed for chest pain.