The Pharmacy Professionals

Pharmacy Technician Lab Manual

Name_____

Pharmacy Technician

Lab Manuals are to be completed and turned in prior to externship placement

Drug Class Definitions

A.C.E. Inhibitors - Angiotensin Converting Enzyme Inhibitors block the conversion of angiotensin I to angiotensin II. Avoiding Angiotensin II may avoid increased blood pressure and vasoconstriction. They usually have the suffix "**PRIL**"

A.2.R.B. - Angiotensin 2 Receptor Blockers block Angiotensin 2 enzymes from specific receptor sites. Avoiding Angiotensin 2 activity helps prohibit vasoconstriction. They usually have the suffix "**ARTAN**"

Anti-Biotics - Anti-Biotics inhibit the reproduction of new Bacteria cells. There are several varieties and Drug Class Definitions of Anti-Biotics.

Anti-Convulsants - Anti-Convulsants suppress the rapid firing of neurons in the nervous system (brain). Also known as **Anti-epileptic** drugs and **Anti-Seizure drugs**.

Anti-Diabetics / Sulfonylureas - lower glucose levels in the blood. They are **only**used to treat Type II Diabetes.

Benzodiazepines - Also know as "Benzos". Benzos are used as anti-anxiety agents, muscle relaxants, sedatives, and hypnotics. They usually have the suffix "**PAM**".

Generic Drug **Suffix** Chart

Suffix	Drug Class
STATIN	**CHOLESTEROL (HMG CoA Reductase Inhibitor)**
RAZOLE	**PROTON PUMP INHIBITOR**
ARTAN	**A2RB (Angiotensin 2 receptor blocker)**
PAM	**BENZODIAZEPINES (BENZOS)**
OLOL	**BETA BLOCKER**
PRIL	**ACE INHIBITOR (Angiotensin Converting Enzyme)**
AZOSIN	**ALPHA BLOCKER**
ITIDINE	**H2 ANTAGONIST**
CILLIN	**PENICILLIN ANTI-BIOTICS**
FLOXACIN	**FLUOROQUINOLONE ANTIBIOTICS**
CYCLINE	**TETRACYCLINE ANTIBIOTICS**
ROMYCIN	**MACROLIDE ANTIBIOTICS**
LAX	**LAXATIVE**
VIR	**ANTI-VIRAL**

Beta Blockers (B1) - Also known as Beta-adrenergic blocking agents. Block adrenaline receptors, which are part of the central nervous system and mediate a "Fight or flight" response, which would cause actions in the heart. They usually have the suffix "**OLOL**".

Calcium Channel Blockers - Calcium channel blockers work by blocking calcium channels in cardiac muscle and blood vessels, thereby slowing down activity in the heart.

Diuretics - Diuretics are primarily used to treat hypertension. They promote evacuation of water from the body, which decreases the load on the cardiovascular system.

HMG-CoA Reductase Inhibitors - Also known as **Statins**, They inhibit the body'scholesterol production and usually have the suffix "**STATIN**".

NSAID - Non Steroidal Anti-Inflammatory Drugs are commonly used as pain killers and Fever Reducers. They are non-narcotic and can be sold OTC.

Opioid - Opioids provide an analgesic effect by decreasing the perception of pain and increase pain tolerance.

Proton Pump Inhibitors - Inhibit the action of the gastric proton pump, thereby reducing gastric acid production. They usually have the suffix "**PRAZOLE**".

S.S.R.I - Selective Seratonin Re-Uptake Inhibitors increase the body's Seratonin level by inhibiting its re-uptake into the Presynaptic cell. Commonly indicated as an Anti-Depressant.

SCH. II

BRAND	GENERIC	FUNCTION
Percocet®	Oxycodone + APAP	Pain Relief
Oxycontin®	Oxycodone	Pain Relief
Concerta®	Methylphenidate	ADHD
Adderall®	Amphetamine + Dextroamphetamine	ADHD
Vyvanse®	Lisdexamfetamine	ADHD
Duragesic®	Fentanyl Patch	Pain Relief
Methadose®	Methadone	Opoid Recovery

SCH. III

BRAND	GENERIC	FUNCTION
Vicodin®	APAP + Hydrocodone	Pain Relief
Tylenol 3®	Codeine + APAP	Pain Relief
Suboxone®	Buprenorphine	Opoid Recovery
Tussionex®	Hydrocodone + Chlorpheniramine	Cough suppressant + Antihistamine

SCH. IV

BRAND	GENERIC	FUNCTION
Xanax®	Alprazolam	Benzodiazepine
Ambiem®	Zolpidem	Sleep Aid
Klonopin®	Clonazepam	Benzodiazepine
Ativan®	Lorazepam	Benzodiazepine
Darvocet®	Propoxyphene + APAP	Pain Relief
Valium®	Diazepam	Benzodiazepine
Restoril®	Temazepam	Sleep Aid
Adipex®	Phentermine	Appetite Supressant
Lunesta®	Eszopiclone	Sleep Aid
Soma®	Carisoprodol	Muscle relaxer

Prescription order expiration dates

A prescription order must be dated, and it has an appropriate expiration date based on the type of drug ordered. If it's not filled in time, the script expires.

DEA Sch II	**No Expiration**
DEA Sch III thru V	**6 Months**
Legend Drugs	**12 Months**

Refills

If refills are allowed by the prescriber, it will be noted on the prescription. However, there are boundaries and limitations. These are the guidelines:

DEA Schedule II	**NO REFILLS ALLOWED**
DEA Schedule III thru V	**up to 5, but only 5 times***
Legend Drugs	**up to 12 Months worth**

*If a patient has a Sch 3-5 prescription with 5 refills of 100, but can only afford 50 at a time, they will only get 250 total. (not 500) **Period. Each time a refill is redeemed, that refill is then voided. So, if you are authorized a refill of 100, but only get 50, you then forfeit the other 50.**

Generic Substitutions

Generic drug substitutions **may not be used** unless the **prescriber** has authorized it.**Generic substitutions** may only be used if the prescriber has requested or authorized them.

DEA Controlled Drug Prescriptions

→ **Must contain at least :**

- Date of prescription issue
- Patient's name and address
- Practitioner's name, address, and phone number
- Drug name
- Drug strength
- Dosage form and instructions
- Exact quantity prescribed
- Complete directions for use
- Number of refills authorized
- Have a valid DEA Number

Schedule II drug prescriptions also:

→ Must be manually signed by the practitioner. No exceptions.

→ May not be Faxed or Called in, except for a valid emergency.

→ May not have any refills.

Pediatric Dosage Calculations

Pediatric Dosage Calculation methods should be memorized to prepare for the pharmacy technician exam. However, in the field most prescribers will use a ratio to body weight formula for more accuracy. Pharmacy technicians will be better equipped to package the correct dosage with this more straight-forward method.

Pharmacokinetics basically means "Drugs in motion", and that refers to how the patients body will processes a drug. This topic is in the math section because it's required for calculating typical metabolism and elimination times.

Try not to confuse it with**pharmacology**. The difference is pharmacology is the study of how a chemical will react with or affect apatient.
Whereas, **pharmacokinetics** is more like (for lack of better terminology) the logistics of the drug while it's in the body.

The basic components of **pharmacokinetics** are (in order):

i **Absorb**
ii **Distribute**
iii **Metabolize**
iv **Eliminate**

(Hint: Memorize A.D.M.E.)
The components listed above may look standard, but keep in mind that there are several factors that may affect each in different patients. Examples include: age, food or alcohol consumption, interactions with other meds, and many more. Such factors can make a drugs journey through the body in one patient different from another. Certainly, in whatever pharmacy technician program you are enrolled in, this subject will be covered in way more detail. However, on this page we will just be covering the basics.

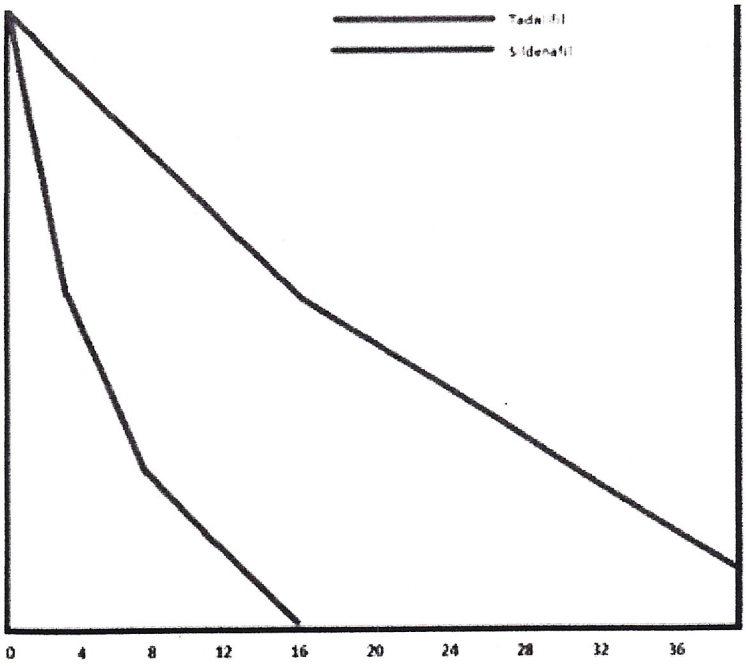
First Order Kinetics (Half-Life)

A majority of drugs are processed by the body and eliminated through **first order kinetics**. The concept is mostly used to gauge the speed at which the drug is broken down by the body.

The term **Half-Life** is used because in first order kinetics a constant fraction of the drug in the body is eliminated during a unit of time. The rate of elimination is proportional to the amount of drug in the body.

The body will process and eliminate "half" of the blood concentration of the drug every "half-life" period. The more drug present in the bloodstream, the more that is processed and eliminated. To put it another way, for every "half-life" period, the amount of drug in the system is reduced by 50%.

For example, let's (hypothetically) take a look at two



phosphodiesterase inhibitors. One has a typical "half-life" of 3.5 hours and the other has a "half-life" of 17.5 hours.

Sildenafil*		vs.	**Tadalifil***	
Hours	Blood %		Hours	Blood %
0	100%		0	100%
3.5	50%		17.5	50%
7	25%		35	25%
10.5	12.5%		52.5	12.5%

As you can see from thechart, for each **"half-life"**period (time) that expires, the body breaks down and eliminates 50% of the drug present in the system.

Now that you understand how this works, you can see why Tadalafil is called "the weekend pill" and the television ads for the drug do actually make sense.

**This example is for informational and entertainment purposes only. Please consult a medical doctor before taking any medication. The statistics on the above chart are for demonstration purposes only and may not be reliable data.*

Zero Order Kinetics

Some drugs are processed by the body and eliminated through **zero order kinetics**. This concept is also used to gauge the speed at which the drug is broken down by the body. However, it's quite a bit different than first order kinetics. With **zero order kinetics**, the available rate of elimination is a constant no matter how much the blood concentration is.

The most commonly used example is the drug Alcohol. Let's say that you go out to celebrate your birthday and your friends are treating you to your favorite adult beverage. Assuming that each of the drinks has 1 ounce of alcohol and your body can probably metabolize and eliminate about 1 ounce per hour from your system. If over thecourse of 3 hours you indulge in 7 of the drinks, your system will have a "buildup" of four of the drinks. Since your body can only metabolize 1 ounce per hour, it would take an additional 4 hours for the drug to be eliminated.

Another example frequently used to explain **zero order kinetics** is a bilge pump, pumping water from a sinking boat. If the pump is capable of removing 10 gallons of water per minute, but the boat is taking on 15 gallons per minute, it will eventually drown. All the pump can "ever" remove is 10 gallons per minute, no matter how full of water the boat becomes. Zero order kinetics works in the same manner.

Pharmacy Conversions Sheet

The following conversion factors are required:

Weight
1 Kilogram (kg) = 1000 grams (gm)
1 kilogram (kg) = 2.2 lbs
1 gram (gm) = 1000 milligrams (mg)
1 milligram (mg) = 1000 micrograms (mcg)
1 grain (gr) = 60 or 65 milligrams (mg)
1 solid ounce (oz) = 30 grams

Volume
1 Liter (L) = 1000 milliliters (ml)
1 milliliter (ml) = 1 cubic centimeter (cc)
1 teaspoonful (tsp) = 5 milliliters (ml)
1 tablespoonful (tbs) = 15 milliliters (ml)
1 fluid ounce (oz) = 30 milliliters (ml)
1 pint (pt) = 480 milliliters (ml)
2 pints (pts) = 1 quart (qt)
4 quarts (qt) = 1 gallon (gal)
1 cup (c) = 240 milliliters

Conversions
Milligrams to mcgs multiply by 1000
Grams to milligrams multiply by 1000
Mcgs to Milligrams divide by 1000
Milligrams to grams divide by 1000
Grams to Kilograms divide by 1000
Kilograms to Grams multiply by 1000
Lbs to Kilograms divide by 2.2
Kilograms to Lbs multiply by 2.2

Step 1 – Pull Supply
Step 2 – Pull what the Doctor wants
Step 3 – Make sure the tops and bottoms match
Step 4 - Cross Multiply and Divide to equal X

Example:

Order: Vistaril 15 mg IM stat
Supply: Vistaril 25 mg/mL

$$\frac{25\ \text{mg}}{1\ \text{mL}} \qquad \frac{15\ \text{mg}}{X\ \text{mL}}$$

Cross Multiply: 15mg x 1 mL
Then Divide by 25 mg to equal X mL

A personal inventory

Technicians should have these personal qualities:

- **Dependable**
  The patient, the pharmacist, and the patient's health care team will depend upon you performing your job as required. You must do what you are required to do, whether anyone is observing you or not.

- **Detail Oriented**
  Patients must receive medications exactly as they have been prescribed. Drugs, whether prescription or over-the-counter, can be dangerous if misused, and mistakes by pharmacy technicians can be life-threatening.

- **Trustworthy**
  You will be entrusted with confidential patient information, dangerous substances, and perishable products. In addition, many drugs are very expensive and you will be trusted to handle tem appropriately.

Technicians must follow these personal guidelines:

- **Health**
  You must maintain good physical and mental health. If you become physically or mentally run-down, you increase the chance of making serious mistakes.

- **Hygiene**
  Practice good hygiene. You will interact closely with others. Poor hygiene may hurt your ability to be effective. You will also be expected to perform in infection free conditions and poor hygiene can violate this requirement.

- **Appearance**
  Your uniform and personal clothing should be neat, clean, and functional. Shoes should be comfortable. Clothes should allow the freedom of movement necessary to perform your duties. Hair should be well-groomed and pulled back if long. Fingernails should be neat and trim.

Technicians must be capable and competent in the following skill areas:

- **Mathematics And Problem Solving**
  You will perform mathematical calculations in filling prescriptions and other activities.

- **Language And Terminology**
  You must learn the specific pharmaceutical terminology that will be used on your job.

- **Computer Skills**
  You will regularly use computers for entering patient information, maintaining inventory, filling prescriptions, etc.

- **Interpersonal Skills**
  You will interact with patients/customers, and supervisor, co-workers, physicians, and others. You must be able to communicate, cooperate, and work effectively.

Prescription information

Elements of the prescription

R_x is an abbreviation of the latin word recipe, meaning "take." Of course, the word recipe has a broader meaning in at it is a description of the amounts and steps volved in preparing a mixture of different ele- ents. Both of these meanings can be seen in the rrent use of the abbreviation R_x.

Prescriber information: Name, title, office address, and telephone number

Drug Enforcement Agency (DEA) registration number of prescriber *(required for all controlled substances)*

Dr. A.B. Cain
123 Main Street
Wellsville, PA 00000
TEL: (888) 555-1234
DEA Number: AB1234563

DATE Oct 10 09

Date the prescription is written.

Name and address of patient.

NAME Jane Smith

ADDRESS 6149 Any St. Wellsville PA

Other patient information such as age or weight is optional, but sometimes important, e.g., a child's weight.

Rx

Amoxil 250 mg

Sig i cap p.o. TID

#21

Inscription: Name (brand or generic), strength of medication and quantity.

Signa: This comes from the latin word signa, meaning "to write." It is abbreviated to **sig** and indicates what directions for use should be printed on the label.

Note: If a compound is prescribed, a list of ingredients and directions for mixing is included.

Refill instructions

REFILL 0

DAW: Dispense As Written and/or Generic Substitution Allowed instructions (optional).

DISPENSE AS WRITTEN ☐

A.B. Cain

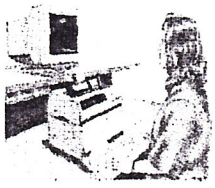
PRESCRIBER'S SIGNATURE

Signature of prescriber (not required on a verbal prescription)

Use separate box for each controlled substance prescription.
THEFT, UNAUTHORIZED POSSESSION AND/OR USE OF THIS FORM INCLUDING ALTERATIONS OR FORGERY, ARE CRIMES PUNISHABLE BY LAW

Note: prescriptions are written in ink, never pencil.

Additional Information

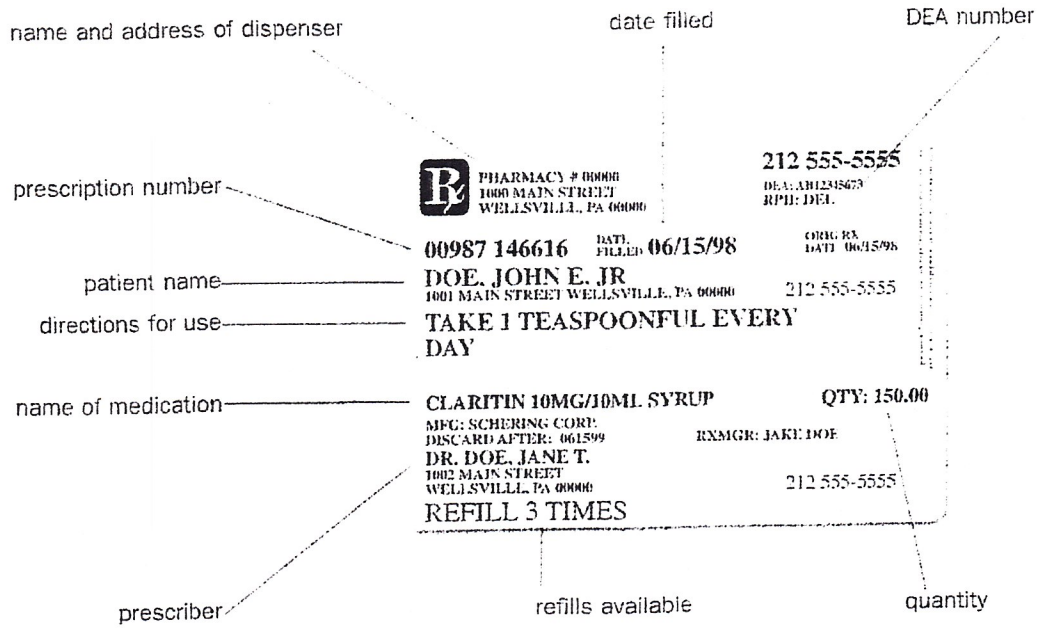


In addition to the above, the information at right must be added to the prescription in the pharmacy. This information is a product of the computerized prescription filling process. Some data are automatically assigned by the computer (e.g., prescription number), while other information is added by the pharmacist or pharmacy technician as they input the data necessary for the proper filling of the prescription (e.g., the product selected).

- Date the product is dispensed.
- Identity of the product by manufacturer and NDC (National Drug Code)—DIN (Drug Identification Number) in Canada.
- Prescription and/or transaction number.
- Insurance information for the patient.
- Price charged.
- Initials of the technician and pharmacist involved in the filling of the prescription.
- Signature of the pharmacist receiving the prescription if it is a verbal order.

LABELS

The general purpose of the prescription label is to provide information to the patient regarding the dispensed medication and how to take it. The prescription label generally contains the information indicated below.

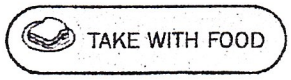


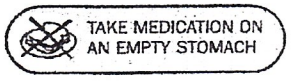
DIRECTIONS FOR USE:

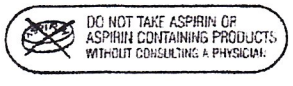
1. Directions should start with a verb (take, instill, inhale, apply, etc.) and completely, clearly, and accurately describe the administration of the medication.
2. Indicate the route of administration if it is not oral. For example, use "apply to affected area", "unwrap and insert rectally", etc.
3. Use whole words, not abbreviations. For example, use "tablets" not "tabs".
4. Use familiar words, especially in measurements. For example, use "two teaspoonfuls" instead of "10 ml".

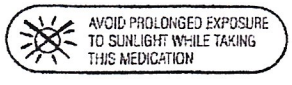
AUXILIARY LABELS:

1. Auxiliary labels are applied to the prescription container in order to provide additional information to the patient.
2. Many computerized prescription systems will automatically indicate which auxiliary labels to use.
3. Controlled substances from schedules II, III, and IV must carry an auxiliary label stating:
   Caution: Federal law prohibits the transfer of this drug to any person other than the patient for whom it was prescribed.









EXAMPLES

PRESCRIPTION TO LABEL

Dr. A.B. Cain
123 Main Street
Wellsville, PA 00000
TEL: (888) 555-1234
DEA Number: AB1234563

DATE Oct 1/98

NAME Jane Smith
ADDRESS 149 Any St. Wellsville PA

Rx
Amoxil 250 mg
Sig. ŧ cap p.o. T.I.D.
#21

REFILL 0
DISPENSE AS WRITTEN ☐ A.B. Cain
PRESCRIBER'S SIGNATURE

- Amoxil is a brand name for Amoxicillin.
- 250 mg is the strength.
- ŧ cap means "take one capsule."
- P.O. means "by mouth."
- TID means "three times a day."
- #21 means a "quantity of 21."
- there are no refills; generic substitution may be used.

Therefore, the prescription is for a week's supply of Amoxicillin 250mg capsules: 21 capsules, one capsule to be taken three times daily for seven days.

The label for the above prescription.

PHARMACY # 00000
1000 MAIN STREET
WELLSVILLE, PA 00000
212 555-5555
DEA: AB1234563
RPH: DEL

6654532 DATE FILLED 10/11/98 ORIG RX DATE 10/10/98
SMITH, JANE
149 ANY STREET WELLSVILLE, PA 00000 212 555-5555
TAKE 1 CAPSULE BY MOUTH
THREE TIMES DAILY

21 AMOXICILLIN 250MG CAPSULES CPY
MFG: SMITHKLINE BEECHAM
DISCARD AFTER: 020101 RXMGR: JAKE DOE
DR. CAIN, A.B.
123 MAIN STREET
WELLSVILLE, PA 00000 888 555-1234
REFILL 0 TIMES

Dr. A.B. Cain
123 Main Street
Wellsville, PA 00000
TEL: (888) 555-1234
DEA Number: AB1234563

DATE Oct 6/98

NAME Scott Barr
ADDRESS 345 Maple St. Wellsville PA
D.O.B - 2/23/54

Rx
Prozac 20 mg
Sig. ŧ cap p.o. qd
#30

REFILL X2
DISPENSE AS WRITTEN ☑ A.B. Cain
PRESCRIBER'S SIGNATURE

- The drug is Prozac.
- 20mg is the strength.
- ŧ cap means "take one capsule."
- P.O. means "by mouth."
- qd means "each day."
- #30 means a "quantity of 30."
- there are 2 refills; dispense as written.

Therefore, the prescription is for a 30 day supply of Prozac 20mg capsules: 30 capsules, one capsule to be taken each day.

PH ARMACY # 00000
1000 MAIN STREET
WELLSVILLE, PA 00000
212 555-5555
DEA: AB1234563
RPH: DEL

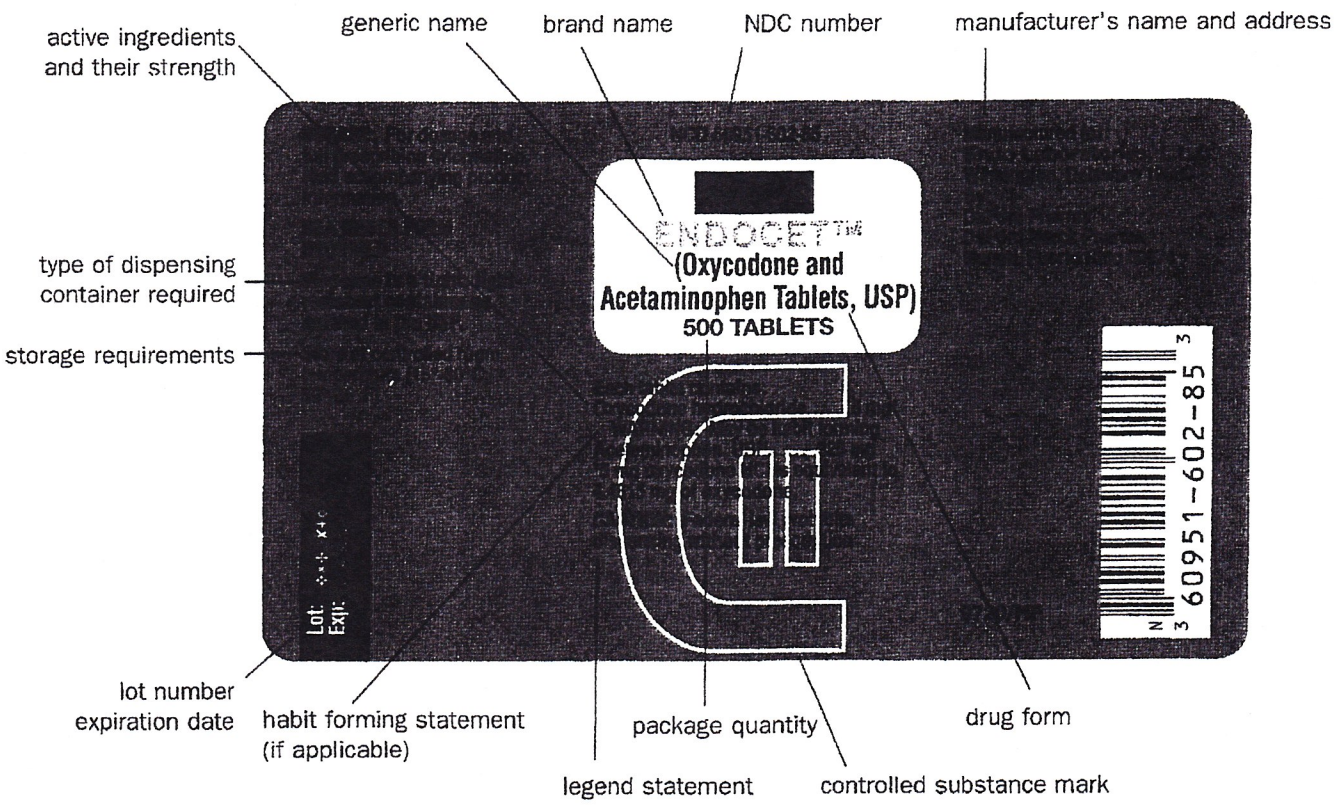
6654532 DATE FILLED 10/11/98 ORIG RX DATE 10/04/98
BARR, SCOTT
345 MAPLE STREET WELLSVILLE, PA 00000 212 555-5555
TAKE 1 CAPSULE BY MOUTH
EACH DAY

PROZAC 20MG CAPSULES CPY
MFG: DISTA PROD.
DISCARD AFTER: 020101 RXMGR: JAKE DOE
DR. CAIN, A.B.
123 MAIN STREET
WELLSVILLE, PA 00000 888 555-1234
REFILL 2 TIMES

℞ Note that "D.O.B." on this prescription means the date of birth. While this is optional, it is often important, and sometimes necessary, as with online adjudication of a claim.

MANUFACTURER STOCK LABEL

Elements of the LABEL



Labeling:

In addition to a container label, manufacturer prescription drugs must also be accompanied by labeling which includes information on the following: clinical pharmacology, indications and usage, contraindications, warnings, precautions, adverse reactions, drug abuse and dependence, dosage, and packaging. This information is designed to inform both the prescriber and the dispenser regarding the drug.

Ndc (national drug code):

This number is assigned by the manufacturer. The **first five** digits indicate the manufacturer. The **next four** indicate the medication, its strength, and dosage form. The **last two** indicate the package size.

OTC LABELS

Over-the-counter medications do not require a prescription but sometimes prescriptions are written for them for insurance or other reasons. In addition, patients often seek counseling regarding the use of over-the-counter medications. As a result, the pharmacy technician will deal with OTC medications regularly and should be familiar both with their label information and how to handle inquiries about them. **Since OTC medications are not without risks, all patients requesting information on them should be referred to the pharmacist.**

The following information should be contained on the labels of over-the counter-medications.

- product name
- name and address of manufacturer or distributor
- list of all active and other ingredients
- amount of contents
- adequate warnings
- adequate directions for use

Many over-the-counter products have labels that are difficult to read, understand, or both. At right is a label format proposed by the FDA to make it easier to read and understand the information currently contained on over-the-counter medication labels. Note that this format is not a requirement.

a proposed FDA label format for OTC medications

Active Ingredient (In Each Tablet) **Purpose**

Chlorpheniramine Maleate 4 mg.....Antihistamine

Uses: for the temporary relief of these symptoms of hay fever

► sneezing ► runny nose ► itchy,watery eyes

Warnings

Ask a Doctor Before Use If You Have:

► glaucoma
► a breathing problem such as emphysema or chronic bronchitis
► difficulty in urination due to enlargement of the prostate gland

If You Are:

► taking sedatives or tranquilizers

When Using This Product:

► marked drowsiness may occur
► alcohol, sedatives, and tranquilizers may increase the drowsiness effect
► avoid alcoholic beverages
► use caution when driving a motor vehicle or operating machinery
► excitability may occur, especially in children

If pregnant or breast-feeding, ask a health professional before use.
Keep out of reach of children. In case of overdose, get medical help right away.

Directions:

Adults and children over 12 years:	Take 1 tablet every 4 to 6 hours as needed. Do not take more than 6 tablets in 24 hours.
Children 6 to under 12 years:	Take 1/2 tablet every 4 to 6 hours as needed. Do not take more than 3 tablets in 24 hours.
Children under 6 years:	Ask a doctor.

ROUTE	DOSAGE FORM		ROUTE	DOSAGE FORM
ORAL	TABLETS		**TOPICAL**	SOLUTIONS
	CAPSULES			TINCTURES
	BULK POWDERS			OINTMENTS
	SOLUTIONS			CREAMS
	SUSPENSIONS			GELS
	ELIXERS			LOTIONS
	SYRUPS			PLASTERS
				POWDERS
(SUBLINGUAL)	TABLETS			AEROSOLS
(BUCCAL)	TROCHES/LOZENGES			TRANSDERMAL PATCHES
INTRAOCULAR	SOLUTIONS		**INTRANASAL**	SOLUTIONS
	SUSPENSIONS			SUSPENSIONS
	OINTMENTS			SPRAYS
	INSERTS			AEROSOLS
	CONTACT LENSES			INHALERS POWDERS
VAGINAL	SOLUTIONS		**INHALATION**	AEROSOLS
	OINTMENTS			POWDERS
	CREAMS			
	AEROSOL FOAMS		**RECTAL**	SOLUTIONS
	POWDERS			OINTMENTS
	SUPPOSITORIES			SUPPOSITORIES
	TABLETS			
			INTRAMUSCULAR	SOLUTIONS
SUBCUTANEOUS	SOLUTIONS			SUSPENSIONS
	SUSPENSIONS			EMULSIONS
	EMULSIONS			
	IMPLANTS		**INTRAVENOUS**	SOLUTIONS
				SUSPENSIONS
INTRADERMAL	SOLUTIONS			EMULSIONS
	SUSPENSIONS			
	EMULSIONS			

SOUNDALIKE DRUGS

It is important to recognize that a number of drugs have similar sounding or looking names, but very different properties.

Confusing such drugs can lead to terrible, sometimes fatal consequences. Therefore, it is critical to make certain that you have the name correct when involved in any aspect of the prescription process. Following is a list of drugs that can be mistaken for one another either by their sound or how they appear when written. There are many others, but this should illustrate the need for accuracy in drug names.

Acetazolamide	Acetohexamide
Alfentanil	Fentanyl, Sufentanil
Amitriptyline	Aminophylline
Atenolol	Albuterol
Azathioprine	Azaradine
Baclofen	Bactroban®, Beclovent®
Bupropion	Buspirone
Calcitonin	Calcitriol
Captopril	Capitrol®
Cefamandole	Cefmetazole
Cefonicid	Cefobid®
Cefotaxime	Ceftizoxime
Cefoxitin	Cefotaxime
Ceftizoxime	Ceftazidime
Cephalexin	Cephalothin
Chlorpropamide	Chlorpromazine
Clomiphene	Clomipramine
Clonazepam	Clofazimine
Clorazepate	Clofibrate
Clotrimazole	Co-trimoxazole
Cyclosporine	Cycloserine
Dexamethasone	Desoximetasone
Digoxin	Digitoxin
Diphenhydramine	Dimenhydrinate
Dopamine	Dobutamine
Doxazosin	Doxorubicin
Doxepin	Doxapram, Doxidan®
Dronabinol	Droperidol
Dyclonine	Dicyclomine
Encainide	Flecainide
Enflurane	Isoflurane
Etidronate	Etretinate
Flunisolide	Fluocinonide
Glyburide	Glipizide
Guanadrel	Gonadorelin
Guanethidine	Guanidine
Guanfacine	Guaifenesin, Guanidine
Halcinonide	Halcion®
Hydralazine	Hydroxyzine
Hydrochlorothiazide	Hydroflumethiazide
Hydrocortisone	Hydrocodone
Kanamycin	Garamycin®, Gentamicin
Lisinopril	Fosinopril
Magnesium Sulfate	Manganese Sulfate
Methicillin	Mezlocillin
Metolazone	Metaxalone
Metoprolol	Metaproterenol
Nifedipine	Nicardipine
Oxymorphone	Oxymetholone
Pancuronium	Pipecuronium
Pentobarbital	Phenobarbital
Phenytoin	Mephenytoin
Pramoxine	Pralidoxime
Prazosin	Prednisone
Prednisone	Prednisolone
Primidone	Prednisone
Proparacaine	Propoxyphene
Quazepam	Oxazepam
Reserpine	Risperidone
Ribavirin	Riboflavin
Ritodrine	Ranitidine
Sucralfate	Salsalate
Sulfadiazine	Sulfasalazine
Sulfamethizole	Sulfamethoxazole
Terbutaline	Tolbutamide
Terconazole	Tioconazole
Testoderm®	Estraderm®
Thyrar®	Thyrolar®
Thyrolar®	Theolair®
Timolol	Atenolol
Tolazamide	Tolbutamide
Torsemide	Furosemide
Tretinoin	Trientine
Triamterene	Trimipramine
Vincristine	Vinblastine

LOOK-ALIKE LABELS: ORAL SOLUTIONS

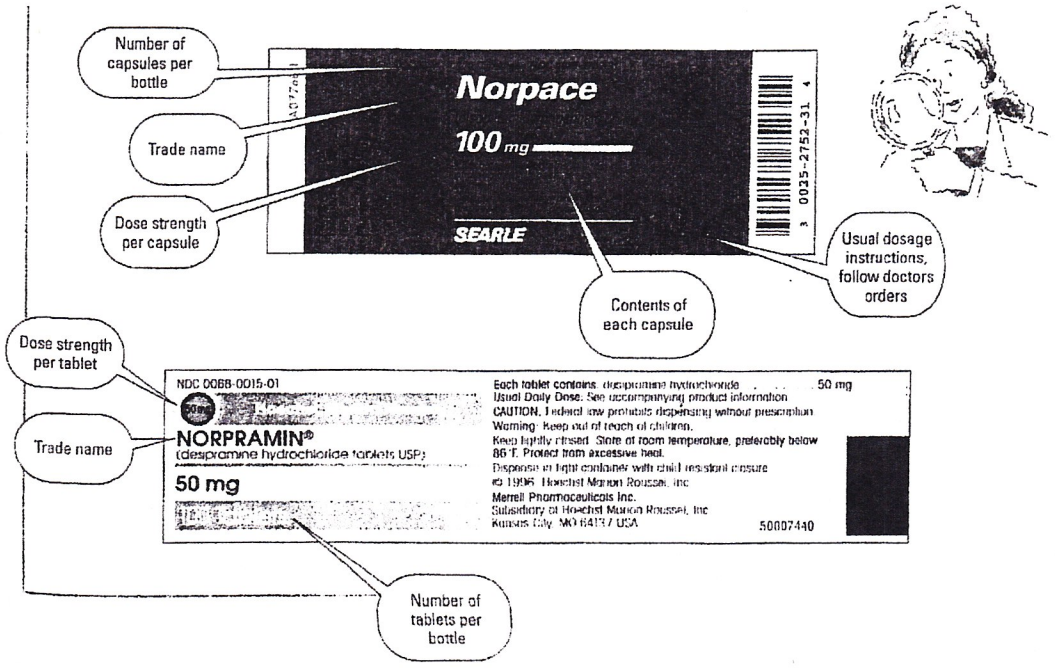
The oral solution labels below are examples of look-alikes that you are likely to encounter. Reading labels carefully can help you avoid medication errors.

LOOK-ALIKE LABELS: TABLETS AND CAPSULES

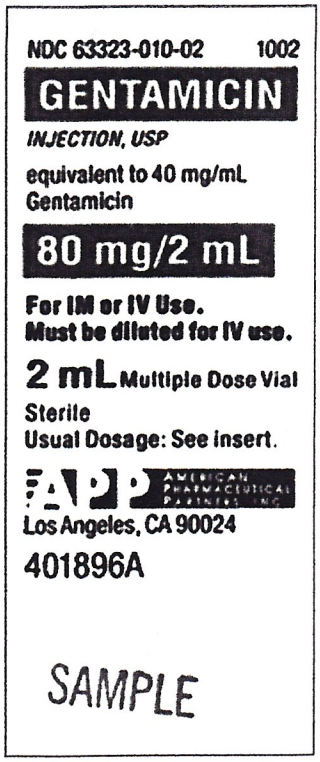
Don't let yourself be lulled by look-alike tablets. The following tablet and capsule labels are examples of **look-alike and sound-alike drugs** that you must read carefully to avoid medication errors.

Norpramin and Norpace

On first glance, these medication names may be easily confused, which could lead to a medication error that could harm the patient. Norpramin is a Tricyclic antidepressant, whereas Norpace is an antiarrhythmic. The inadvertent substitution of the antidepressant Norpramin for Norpace wouldn't control the patient's arrhythmia, which could lead to serious complications.



The recommended dosage of Nebcin (tobramycin) for adults with serious, non-life-threatening infections is 3 mg/kg/day in 3 equally divided doses q.8h. Convert all weights to kilograms.



1. What should you expect the single dosage of Nebcin to be for an adult weighing 80 kg?
   _____ ml

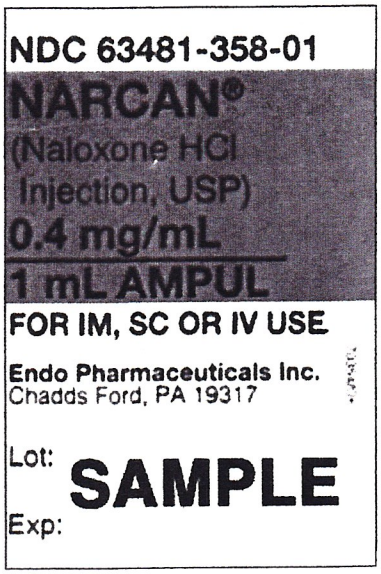
2. What should you expect the single dosage of Nebcin to be for an adult weighing 100 kg?
   _____ ml

3. What should you expect the single dosage of Nebcin to be for an adult weighing 225 lbs?
   _____ ml. What would you expect one days' dose to be? _____ml

4. What should you expect the single dosage of Nebcin to be for an adult weighing 105 lbs?
   _____ ml. What would you expect one days' dose to be? _____ml

5. What should you expect the single dosage of Nebcin to be for an adult weighing 148 lbs?
   _____ ml. What would you expect one days' dose to be? _____ml

The recommended pediatric dosage of Narcan is 0.01 mg/kg/dose. Convert the child's weight to kilograms.



1. Order: Narcan 100 mcg SC stat for a child who weighs 22 lb. Give: _____ ml.

2. Order: Narcan 100 mcg SC stat for a child who weighs 17 lb. Give: _____ ml.

3. Order: Narcan 100 mcg SC stat for a child who weighs 25 lb. Give: _____ ml.

The doctor writes a new order for strict intake and output assessment for a child. During your eight-hour shift, in addition to his IV fluids of 200 mL D5NS, he consumed the following oral fluids:

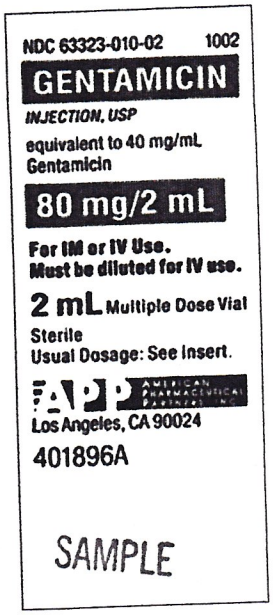
gelatin – oz. iv

water – oz. iii x 2

apple juice – pt i

What is his total fluid intake during your shift? _____ML

The recommended dosage for children is 2–2.5 mg/kg q.8h. Convert the child's weight to kilograms.



1. Order: *Gentamicin 40 mg IV q.8h* for a child who weighs 43 lb. Give: _____ ml

2. Order: *Gentamicin 80 mg IV q.8h* for a child who weighs 90 lb. Give: _____ ml

3. Order: *Gentamicin 20 mg IV q.8h* for a child who weighs 22 lb. Give: _____ ml

4. Order: *Gentamicin 35 mg IV q.8h* for a child who weighs 75 lb. Give: _____ ml

5. Order: *Gentamicin 18 mg IV q.8h* for a child who weighs 38 lb. Give: _____ ml

6. Order: *Gentamicin 22 mg IV q.8h* for a child who weighs 51 lb. Give: _____ ml

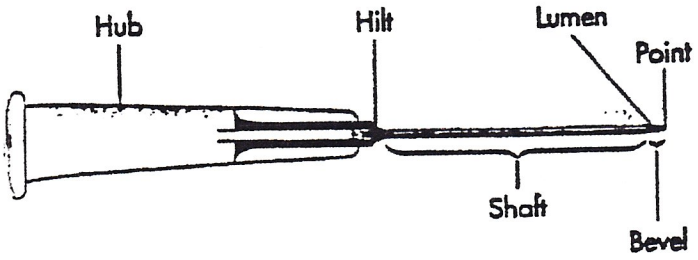
7. Order: *Gentamicin 45 mg IV q.8h* for a child who weighs 97 lb. Give: _____ ml

Identify the information requested.

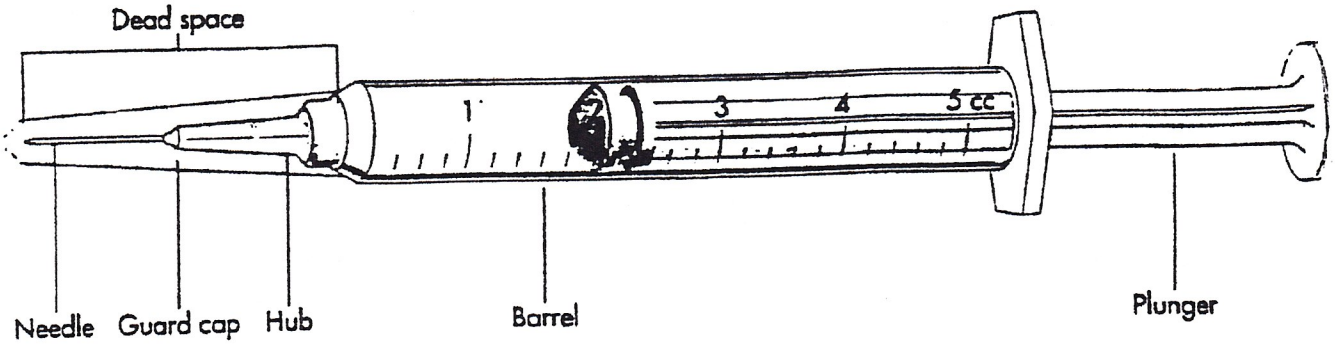
1. The brand name of the drug is _____.
2. The generic name of the drug is _____.
3. The name of the drug manufacturer is _____.
4. The dosage form of the drug is _____.
5. The National Drug Code of the drug is _____.

1. The generic name of the drug is _____.
2. The trade name of the drug is _____.
3. The dosage form of the drug is _____.
4. Prior to reconstitution the appropriate temperature for storage of this drug is _____.
5. The National Drug Code of the drug is _____.

Parts of a standard syringe and needle



Understanding the parts of a needle will help you use it correctly.

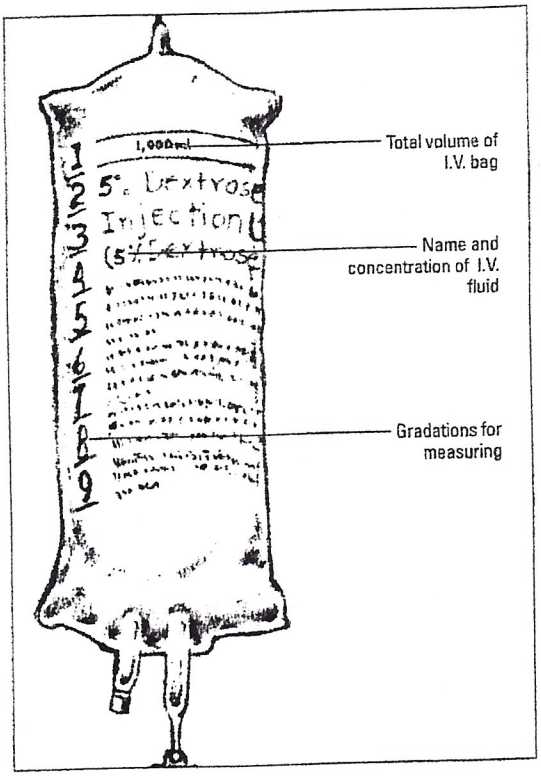


Know the parts of a standard syringe.

Common IV Component Abbreviations	
Abbreviation	Solution Component
D	Dextrose
W	Water
S	Saline
NS	Normal Saline
NaCl	Sodium Chloride
RL	Ringer's Lactate
LR	Lactated Ringer's

Read the bag

The outside of an I.V. bag is an important source of information for calculating infusion rates and times. Read it carefully.



Look for the unit label

The label of a parenteral drug that's measured in units includes the information shown below.

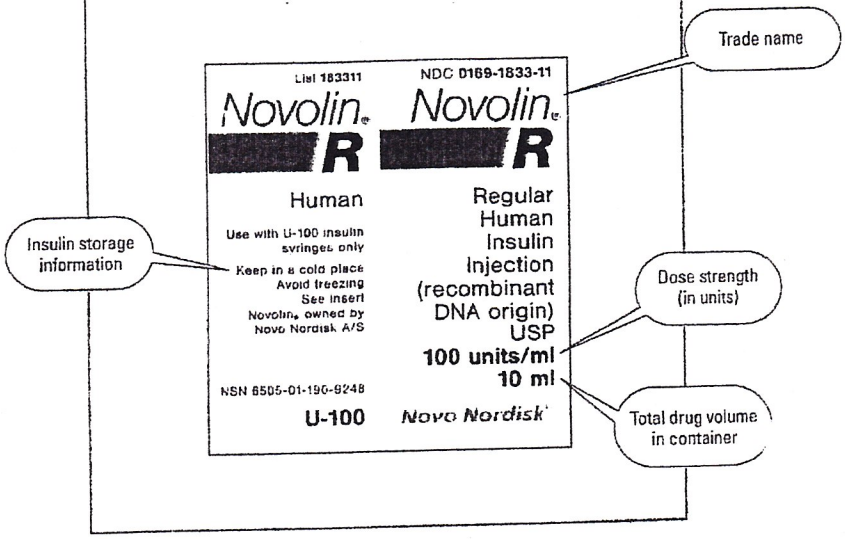


Figure 9

Figure 10

Figure 14

Refer to the label in Figure 9 and answer the following questions about this drug.

1. What is the generic name? _____.
2. What is the trade name? _____.
3. What is the dosage strength? _____.
4. What is the expiration date of the drug? _____.

Refer to the label in Figure 10 and answer the following questions about this drug.

1. What is the generic name? _____.
2. What is the trade name? _____.
3. What is the dosage strength? _____.
4. What is the expiration date? _____.

Refer to the label in Figure 14 and answer the following questions about this drug.

1. What is the dosage strength? _____.
2. If you have an order for 100mg, give _____.
3. If you have an order for 150mg, give _____.
4. If 300mg are ordered, give _____.
5. What is the generic name of this drug? _____.
6. What is the total number of tablets in this package? _____.

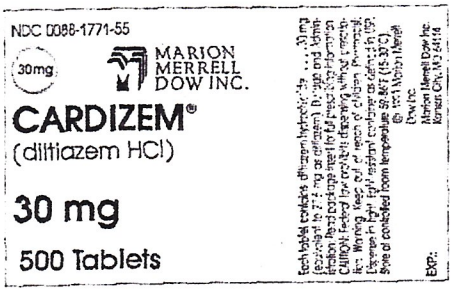


Figure 15

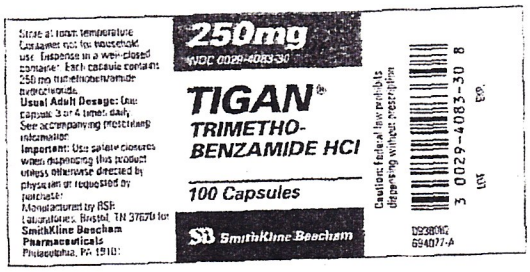


Figure 16

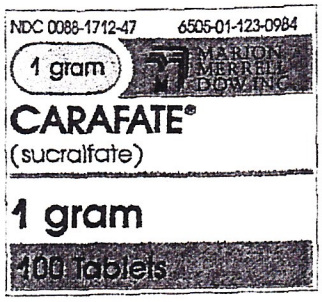


Figure 17

Refer to the label in Figure 15 and answer the following questions about this drug.

1. What is the dosage strength? _____.
2. If you have an order for 30mg, give _____.
3. If you have an order for 60mg, give _____.
4. If 120mg are ordered, give _____.
5. What is the generic name of this drug? _____.
6. What is the total number of tablets in this package? _____.

Refer to the label in Figure 16 and answer the following questions about this drug.

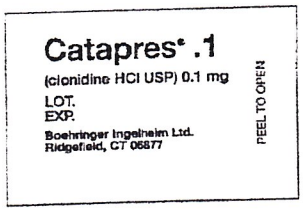
1. What is the dosage strength? _____.
2. If you have an order for 250mg, give _____.
3. If you have an order for 500mg, give _____.
4. If 1g is ordered, give _____.
5. What is the generic name of this drug? _____.
6. What is the total number of tablets in this package? _____.

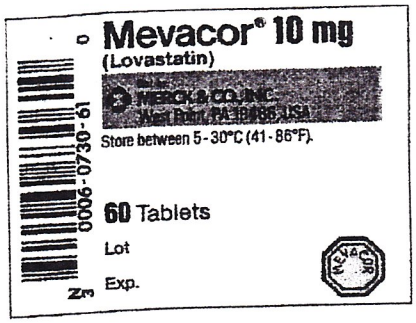
Refer to the label in Figure 17 and answer the following questions about this drug.

1. What is the dosage strength? _____.
2. If you have an order for 1000mg, give _____.
3. If you have an order for 1500mg, give _____.
4. If 3000mg are ordered, give _____.
5. What is the generic name of this drug? _____.
6. What is the total number of tablets in this package? _____.

Locate the appropriate labels for the following dosages, and indicate how many tablets or capsules are needed to give them.

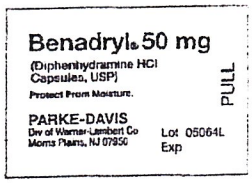
1. Achromycin V 1g _____ cap(s)
2. Catapress 100mcg _____ tab(s)
3. Tagamet 0.8g _____ tab(s)
4. Mevacor 20mg _____ tab(s)

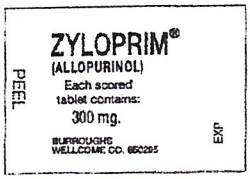


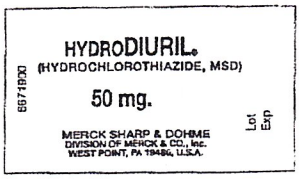


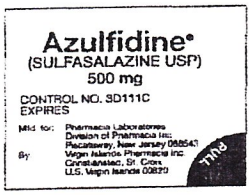
Locate the appropriate labels for the following drug orders and indicate the number of tablets/capsules which will be required to administer the dosages ordered. Assume that all tablets are scored. Notice that both generic and trade names are used for the orders and a label may be used in more than one problem.

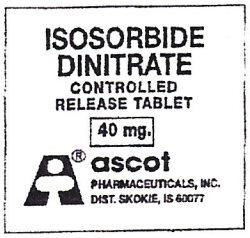
1. isosorbide dinitrate 80mg _____ tab
2. sulfasalazine 1g _____ tab
3. chlordiazepoxide HCl 50mg _____ cap
4. hydrochlorothiazide 75mg _____ tab
5. phenytoin Na 90mg _____ cap
6. diphenhydramine HCl 100mg _____ cap
7. trifluoperazine 10mg _____ tab
8. prazosin HCl 4mg _____ cap
9. Zyloprim 150mg _____ tab
10. Minipress 4mg _____ cap
11. sulfasalazine 0.5g _____ tab
12. HydroDIURIL 25mg _____ tab
13. Stelazine 7.5mg _____ tab
14. Minipress 2mg _____ cap
15. allopurinol 450mg _____ tab
16. Librium 25mg _____ cap
17. Benadryl 150mg _____ cap
18. Azulfidine 250mg _____ tab
19. Dilantin 60mg _____ cap
20. isosorbide dinitrate 20mg _____ tab

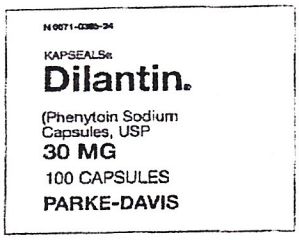






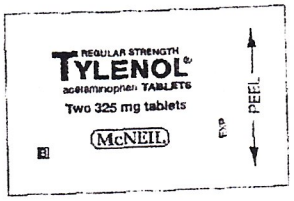


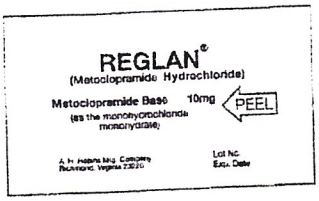


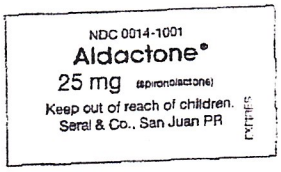


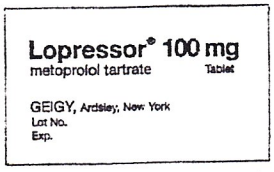
Locate the appropriate labels for the following drug orders and indicate the number of tablets/capsules which will be required to administer the dosages ordered. Assume that all tablets are scored. Notice that both generic and trade names are used for the orders, and a label may be used in more than one problem.

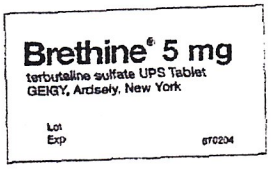
1. acetaminophen 650mg _____
2. meclizine HCl 50mg _____
3. propranolol HCl 30mg _____
4. nifedipine 10mg _____
5. Lasix 30mg _____
6. Tenormin 150mg _____
7. Procan SR 0.75g _____
8. DiaBeta 5mg _____
9. Aldactone 75mg _____
10. Reglan 15mg _____
11. metoprolol tartrate 0.15g _____
12. furosemide 10mg _____
13. dexamethasone 3mg _____
14. terbutaline 2.5mg _____
15. Synthroid 225mcg _____

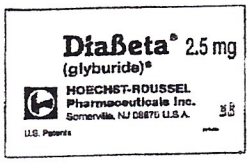


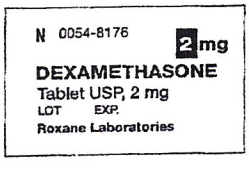


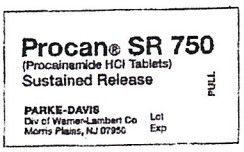


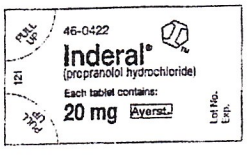


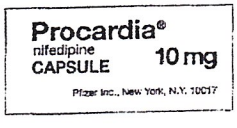


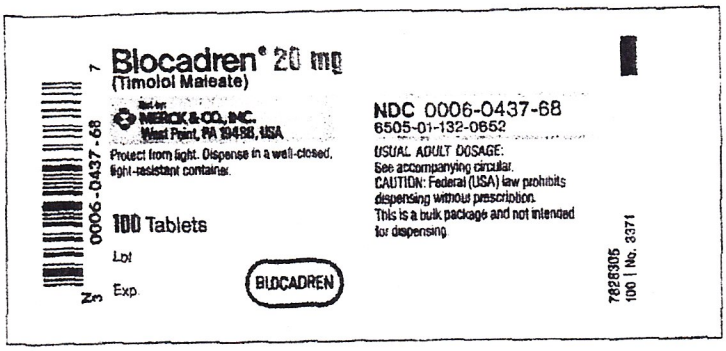






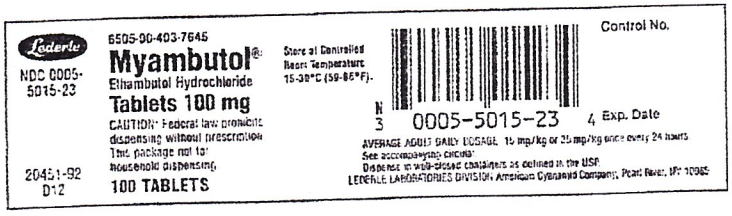


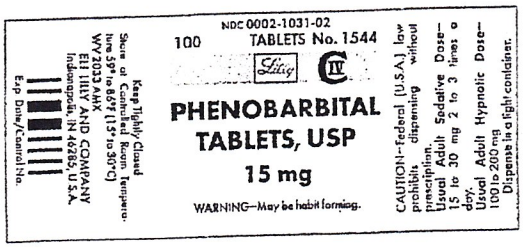


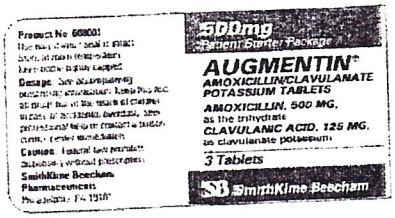


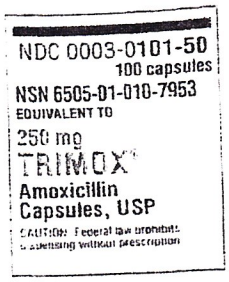
Locate the appropriate labels for the following drug orders and indicate the number of tablets/capsules or the correct milligrams which will be required to administer the dosages ordered. Assume that all tablets are scored. Notice that both generic and trade names are used for the orders, and a label may be used in more than one problem.

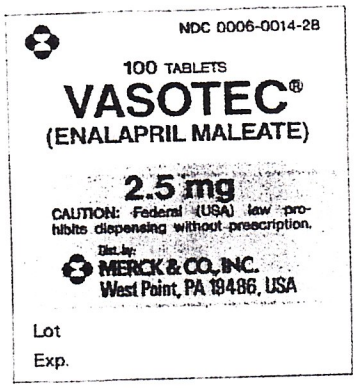
1. captopril 250mcg _____ tab
2. timolol maleate 40mg _____ tab
3. ethambutol HCl 50mg _____ tab
4. phenobarbitol 45mg _____ tab
5. lithium carbonate 0.3g _____ cap
6. Eskalith 2 caps _____ mg
7. Capoten 0.5 tab _____ mg
8. Phenobarbital 2 tabs _____ mg
9. Myambutol 2 tabs _____ mg
10. Blocadren 1.5 tabs _____ mg

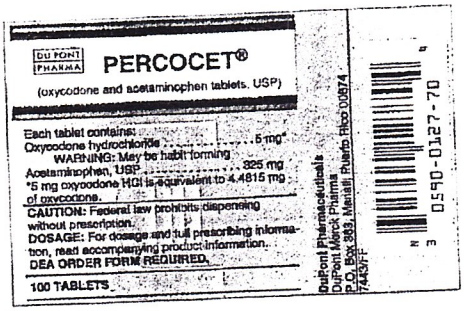


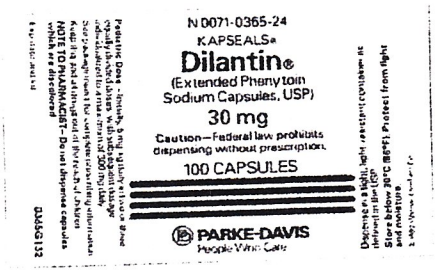


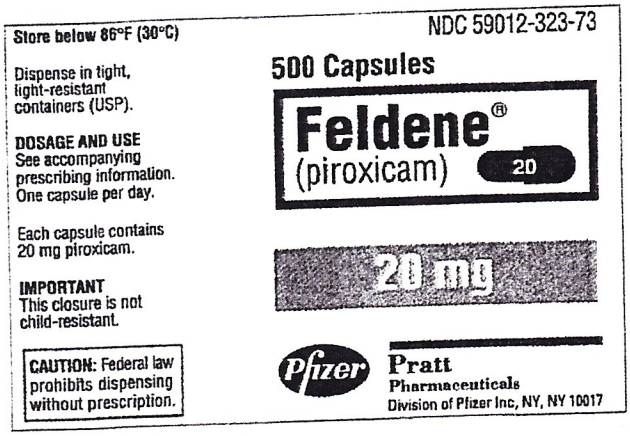












Locate the appropriate labels for the following drug orders and indicate the number of tablets/capsules which will be required to administer the dosages ordered. Assume that all tablets are scored. Notice that both generic and trade names are used for the orders, and a label may be used in more than one problem.

1. Feldene 40mg _____ cap
2. enalapril maleate 1.25mg _____ tab
3. metronidazole 0.5g _____ tab
4. spironolactone 150mg _____ tab
5. Percocet 2tab _____ mg
6. amoxicillin/clavulanic acid 500mg _____ tab
7. Dilantin 60mg _____ cap
8. amoxicillin 0.25mcg _____ cap
9. Dilantin 0.3g _____ cap
10. Augmentin 1g _____ tab
11. piroxicam 20mg _____ tab
12. oxycodone/APAP 1 tab _____ mg
13. Trimox 750mg _____ cap
14. Aldactone 250mg _____ cap
15. Flagyl 1000mg _____ cap
16. Vasotec 2500mcg _____ tab

Oral liquids are supplied in solution form and contain a specific amount of drug in a given amount of solution. In solving dosage problems when the drug is supplied in solid form, you calculated the number of tablets or capsules that contained the prescribed dosage. The supply container label indicates the amount of medication per one tablet or one capsule. For medications supplied in liquid form, you must calculate the volume of the liquid that contains the prescribed dosage of the drug. The supply dosage noted on the label may indicate the amount of drug per one milliliter or per multiple milliliters of solution, such as 10 mg per 2 ml, 125 mg per 5 ml, or 1.2 g per 30 ml.

EXAMPLES:

Solid: 250 mg in **1 tablet** Liquid: 250 mg in **5 ml**

Solid: 100 mg in **1 capsule** Liquid: 100 mg in **10 ml**

Figure 18

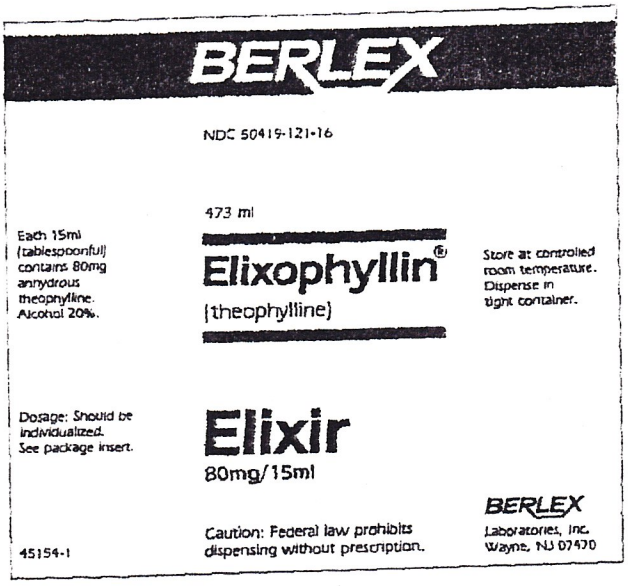


Figure 19

Refer to the label in Figure 18 and calculate the following dosages.

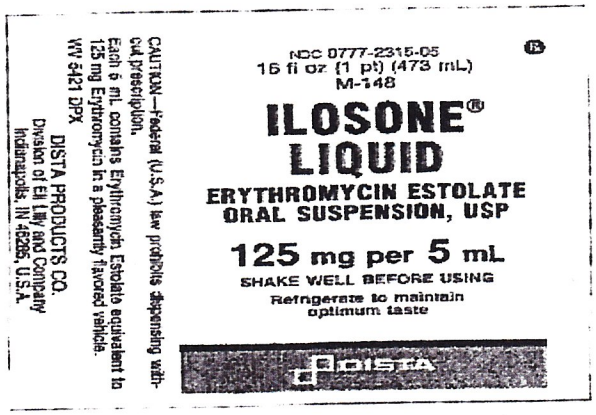
1. The order is for cloxacillin Na soln. 125mg. Give _____.
2. The order is for Tegopen soln. 0.25mg. Give _____.

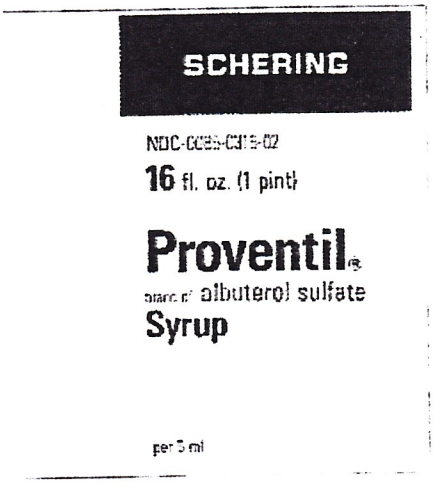
Refer to the label in Figure 19 and calculate the following dosages.

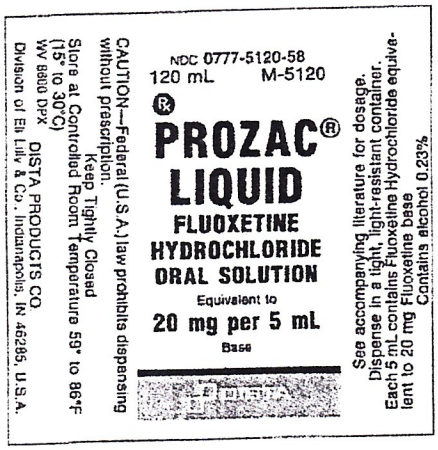
1. The order is for theophylline soln. 160 mg. Give _____.
2. The order is for Elixophyllin soln. 40mg. Give _____.
3. Theophyllin soln. 80 mg has been ordered. Give _____.

Locate the appropriate labels for the following drug orders and indicate the correct volume which will be required to administer the dosages ordered. Notice that both generic and trade names are used for the orders, and a label may be used in more than one problem.

1. The order is for fluoxetine HCl soln. 40mg. Give _____.
2. The order is for erythromycin estolate susp. 125mg. Give _____.
3. The order is for albuterol sulfate syrup 1mg. Give _____.
4. The order is for Ilosone susp. 0.25g. Give _____.
5. The order is for cefaclor susp. 374mg. Give _____.
6. The order is for Prozac soln. 0.3g. Give _____.
7. The order is for Proventil syrup 4mg. Give _____.
8. The order is for Ceclor susp. 0.187g. Give _____.

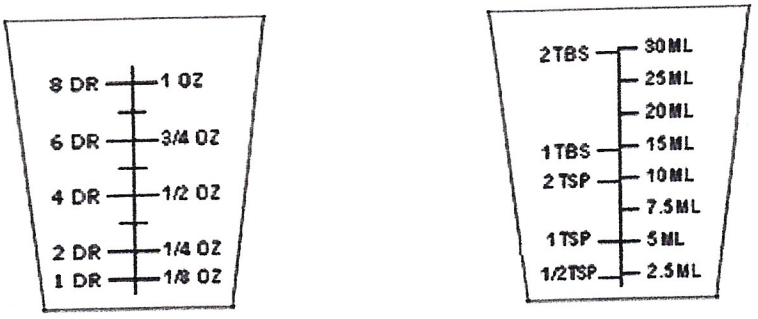






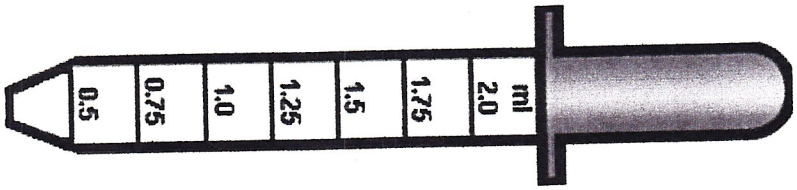
EQUIPMENT USED IN DOSAGE MEASUREMENT

Oral administration



MEDICINE CUP

The 30 milliliter or 1 ounce medicine cup is used to measure most liquids for oral administration. Approximate equivalents of the metric, apothecary and household systems of measurement are indicated.



CALIBRATED DROPPER

The calibrated dropper is used to administer small quantities when giving medicine to children, the elderly, and when adding small amounts of liquid to water or juice. Eye and ear medications are also administered from a medicine dropper. The amount of the drop varies according to the diameter of the hole at the tip of the dropper.

APPROXIMATE EQUIVALENTS

1 g = gr. xv

gr. i = 60 mg or gr. i = 65 mg (in select instances)

1 t = 5 mL

1 T = 3 t = 15 mL = oz. ss

i = 30 mL = 6t

1 L = qt i = oz. 32 = pt ii = 4 cups

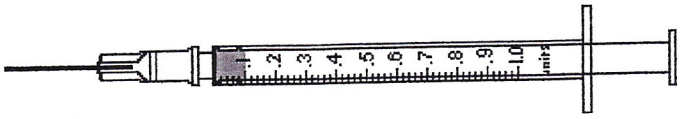
pt i = 500 mL = oz. 16 = 2 cups

1 cup = 250 mL = oz. viii

1 kg = 2.2 lb

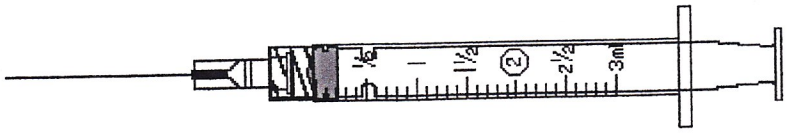
1 in = 2.5 cm

PARENTERAL ADMINISTRATION

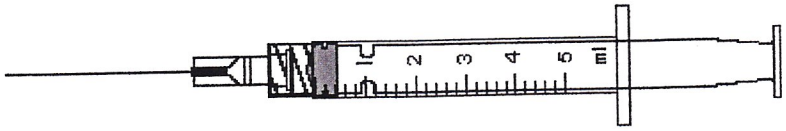


1 ML OR 1 CC SYRINGE

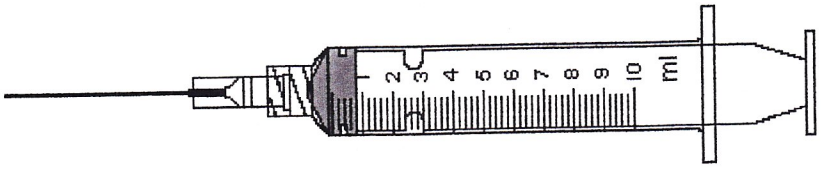
The 1 ml syringe is also referred to as the tuberculin or TB syringe.



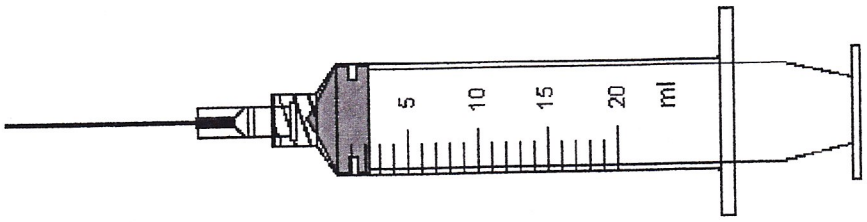
3 CC OR 3 ML SYRINGE



5 cc or 5 ml syringe

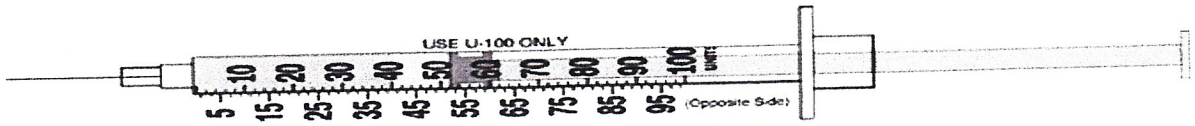


10 CC OR 10 ML SYRINGE



20 CC OR 20 ML SYRINGE

INSULIN SYRINGE



This syringe is to be used for the measurement and administration of U-100 insulin **ONLY.**

Syringe calibrations

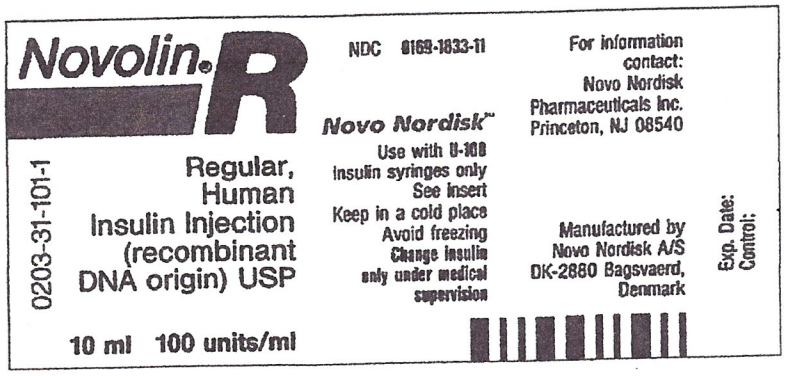
SYRINGE	CALIBRATION	PREFERABLE MEASUREMENT
1 ml	Hundredths (0.01) of a milliliter	AMOUNTS LESS THAN 0.5 ML *
3 ml	1 Tenth (0.1) of a milliliter	*
5 ml	2 Tenths (0.2) of a milliliter	*
10ml	2 Tenths (0.2) of a milliliter	*
20 ml	1 Tenth (0.1) of a milliliter	*
30ml	1 Tenth (0.1) of a milliliter	*
60ml	1 Tenth (0.1) of a milliliter	*

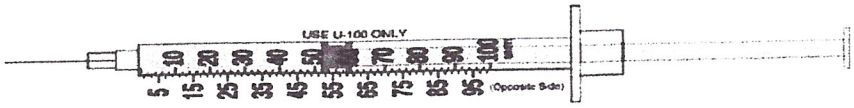
***RULE OF THUMB**: The capacity of the syringe should be the next size larger than the volume to be measured.

INSULIN

Sliding Scale:

The doctor will specify the amount of insulin in units, which 'slide' up or down based on a specific blood sugar level range. Sliding scales are individualized for each patient.



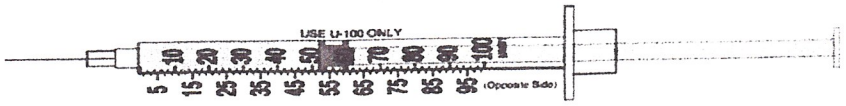


1. Order: Novolin R Regular U-100 insulin SC ac per sliding scale and blood sugar (BS) level. The patient's blood sugar at 1730 hours is 238. **Calculate the dosage. Indicate the amount of insulin to be given by drawing an arrow on the syringe.**

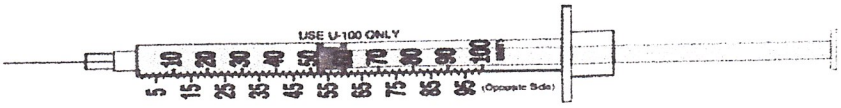
Sliding Scale	Insulin Dosage
BS: 0–150	0 U
BS: 151–250	8 U
BS: 251–350	13 U
BS: 351–400	18 U
BS: > 400	Call M.D.

Calculate the dosage and indicate the amount of insulin to be given by drawing an arrow on the syringe. Use the sliding scale below to answer the following:

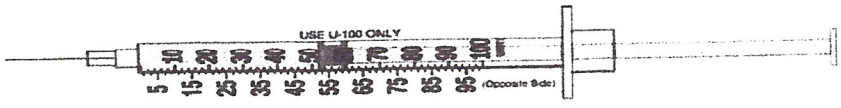
Sliding Scale	Insulin Dosage
BS: 0–150	0 U
BS: 151–250	8 U
BS: 251–350	13 U
BS: 351–400	18 U
BS: > 400	Call M.D.



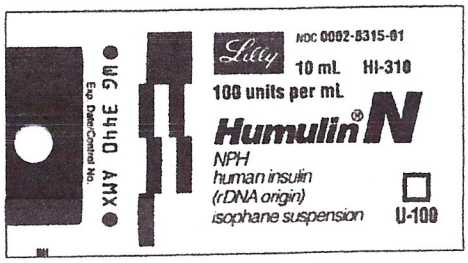
2. Order: Novolin R Regular U-100 insulin SC ac per sliding scale and blood sugar (BS) level. The patient's blood sugar at 0730 hours is 153.

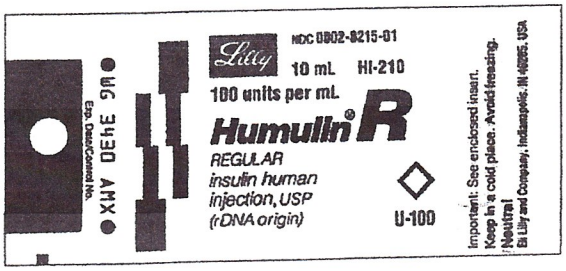


4. Order: Novolin R Regular U-100 insulin SC ac per sliding scale and blood sugar (BS) level. The patient's blood sugar at 2245 hours is 352.



5. Order: Novolin R Regular U-100 insulin SC ac per sliding scale and blood sugar (BS) level. The patient's blood sugar at 1800 hours is 401.





1. Order: Humulin R Regular U-100 insulin 15 U c̄ Humulin N NPH U-100 insulin 45 U SC at 0730. You will give a total of _____ U insulin.

2. Order: Humulin R Regular U-100 insulin 20 U c̄ Humulin N NPH U-100 insulin 40 U SC at 0830. You will give a total of _____ U insulin.

3. Order: Humulin R Regular U-100 insulin 12 U c̄ Humulin N NPH U-100 insulin 39 U SC at 0700. You will give a total of _____ U insulin.

4. Order: Humulin R Regular U-100 insulin 21 U c̄ Humulin N NPH U-100 insulin 47 U SC 0545. You will give a total of _____ U insulin.

5. Order: Humulin R Regular U-100 insulin 18 U c̄ Humulin N NPH U-100 insulin 41 U SC at 0730. You will give a total of _____ U insulin.

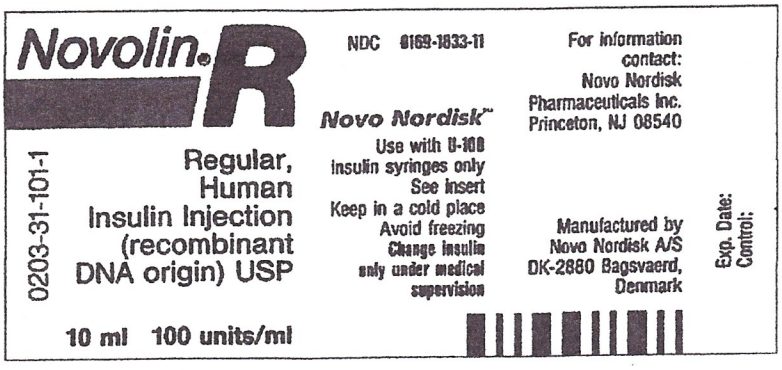
6. Order: Humulin R Regular U-100 insulin 9 U c̄ Humulin N NPH U-100 insulin 36 U SC at 0730. You will give a total of _____ U insulin.

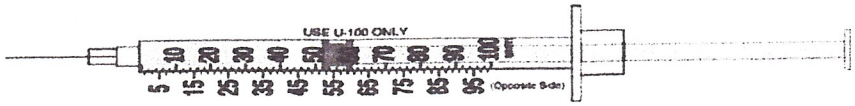
7. Order: Humulin R Regular U-100 insulin 14 U c̄ Humulin N NPH U-100 insulin 35 U SC at 0730. You will give a total of _____ U insulin.

INSULIN

Sliding Scale:

The doctor will specify the amount of insulin in units, which 'slide' up or down based on a specific blood sugar level range. Sliding scales are individualized for each patient.

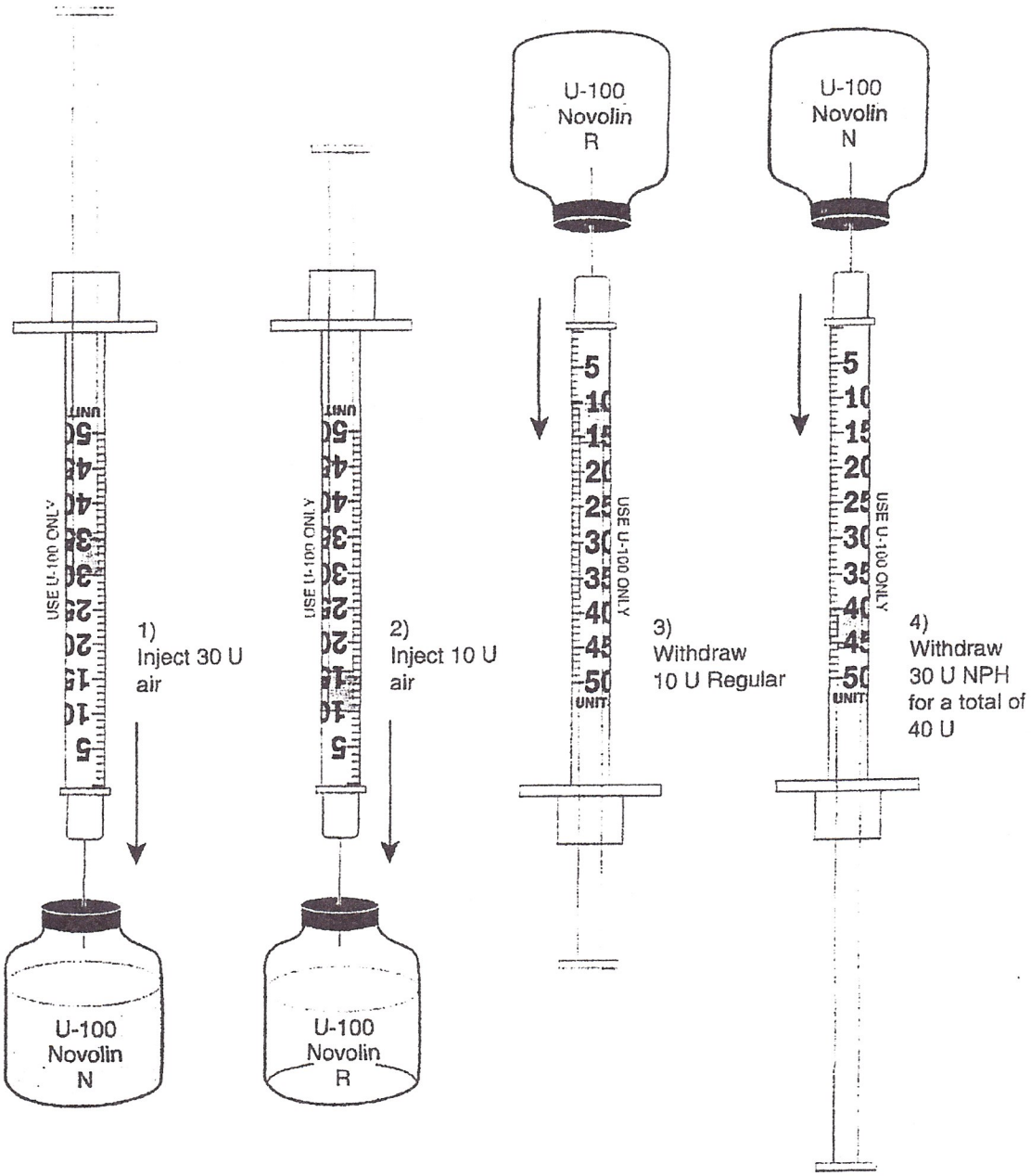


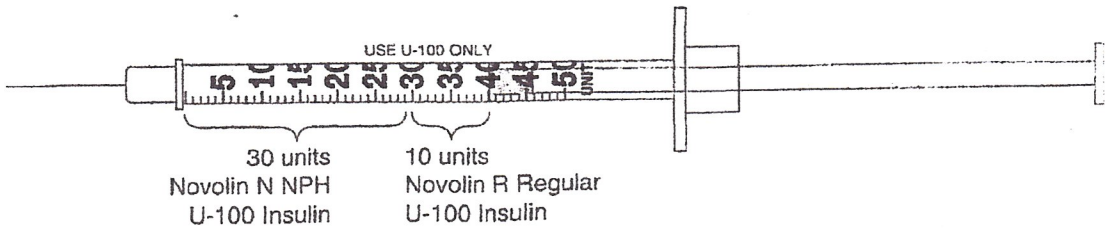


1. Order: Novolin R Regular U-100 insulin SC ac per sliding scale and blood sugar (BS) level. The patient's blood sugar at 1730 hours is 238. **Calculate the dosage. Indicate the amount of insulin to be given by drawing an arrow on the syringe.**

Sliding Scale	Insulin Dosage
BS: 0–150	0 U
BS: 151–250	8 U
BS: 251–350	13 U
BS: 351–400	18 U
BS: > 400	Call M.D.

Procedure for drawing up combination Insulin dosage: 10 U Regular U-100 Insulin with 30 U NPH U-100 Insulin. ***Draw up clear insulin first, then draw up cloudy insulin. Regular insulin is clear. NPH is cloudy.***





Total insulin dosage = 40 units