MULTIPLE CHOICE

1. The listing of a drug and the amount of drug are found in which part of a prescription?
   a. Superscription
   b. Inscription
   c. Subscription
   d. Transcription (signature)

   ANS: B
   The superscription directs the pharmacist to take the drug listed and prepare the medication; the inscription lists the name and quantity of the drug being prescribed; the subscription provides directions to the pharmacist for preparing the medication; and the transcription, or signature, is the information the pharmacist writes on the label as instructions to the patient.

   REF: p. 7

2. If generic substitution is permitted on a prescription:
   a. drug from only one manufacturer must be given.
   b. drug formulation may be changed by the pharmacist.
   c. any manufactured brand of the drug listed may be given.
   d. drug strength may be changed by the pharmacist.

   ANS: C
   A generic substitution allows any brand of a drug to be given, but the pharmacist may not change a drug formulation without specific permission from the prescribing physician. A physician can indicate to the pharmacist that generic substitution is permitted in the filling of the prescription. In such a case, the pharmacist may provide any manufacturer's version of the prescribed drug, rather than a specific brand. However, the pharmacist may not change the strength of a drug without specific permission from the prescribing physician.

   REF: p. 8

3. The study of drugs, including their origin, properties, and interactions with living organisms, is known as
   a. pharmacogenetics.
   b. pharmacology.
   c. therapeutics.
   d. toxicology.

   ANS: B
   Pharmacogenetics is the study of the interrelationship of genetic differences and drug effects. Pharmacology is the study of drugs (chemicals), including their origin, properties, and interactions with living organisms. Therapeutics is the art of treating disease with drugs. Toxicology is the study of toxic substances and their pharmacologic actions, including antidotes and poison control.

   REF: p. 3

4. The brand name given to a drug by a particular manufacturer is known as the drug's
   a. chemical name.
   b. generic name.
   c. official name.
   d. trade name.

   ANS: D
   The chemical name indicates the drug's chemical structure. The generic name is assigned by the United States Adopted Name Council and is usually based loosely on the drug's chemical structure. The official name is the name given to the generic name once a drug becomes fully approved for general use and is admitted to the United States Pharmacopeia–National Formulary. The trade name is the brand, or proprietary, name given by a particular manufacturer. For example, the generic drug albuterol is currently marketed by Schering-Plough as Proventil® and by GlaxoSmithKline as Ventolin®.

   REF: p. 5

5. To find official information about drugs (according to the FDA), you need to go to the
   a. Physician's Desk Reference (PDR).
   b. Basic & Clinical Pharmacology.
   c. United States Pharmacopeia–National Formulary (USP-NF).
   d. Goodman & Gilman's The Pharmacological Basis of Therapeutics.

   ANS: C
   Because the PDR is prepared by drug manufacturers themselves, it may be lacking in objectivity. Basic & Clinical Pharmacology covers only general pharmacologic principles and drug classes. Goodman & Gilman's The Pharmacological Basis of Therapeutics covers only general pharmacologic principles and drug classes. The USP-NF is a book of standards containing information about medications, dietary supplements, and medical devices. The U.S. Food and Drug Administration (FDA) considers this book the official standard for drugs marketed in the United States.

   REF: p. 5

6. Drugs may be obtained from which of the following sources?
   a. Plants
   b. Animals
   c. Minerals
   d. Plants, animals, and minerals

   ANS: D
   Drugs may be obtained from plants (e.g., digitalis), animals (e.g., insulin), and minerals (e.g., magnesium sulfate).

   REF: p. 5

7. The branch of the U.S. government responsible for the process of approving drugs for clinical use is the
   a. USAN Council.
   b. FDA.
   c. USP-NF.
   d. PDR.

   ANS: B
   The United States Adopted Name (USAN) Council is responsible for assigning a generic name to a chemical that appears to have therapeutic use. The U.S. Food and Drug Administration (FDA) is responsible for the process of approving drugs for clinical use. The process by which a chemical moves from the status of a promising potential drug to one fully approved by the FDA for general clinical use is, on average, long, costly, and complex. Cost estimates vary, but in the 1980s it took an average of 13 to 15 years from chemical synthesis to marketing approval by the FDA, with a cost of $350 million in the United States. The USP-NF is a book of standards for medications, dietary supplements, and medical devices. The PDR is a source of drug information prepared by drug manufacturers.

   REF: p. 4

8. An orphan drug is a drug that is
   a. used for rare disease.
   b. used for common disease.
   c. inexpensive to produce.
   d. not claimed by a drug manufacturer.

   ANS: A
   An orphan drug is a drug or biologic product for the diagnosis or treatment of a rare disease. Rare is defined as a disease that affects less than 200,000 persons in the United States. Alternatively, a drug may be designated as an orphan if used for a disease that affects more than 200,000 persons in the United States but for which there is no reasonable expectation of recovering the cost of drug development. Orphan drugs are often quite expensive to produce because they have a limited market in which to recoup the initial investment.

   REF: p. 6 | p. 7

9. Which of the following health care practitioners are authorized to write a prescription in the United States?
   1. Physicians
   2. Chiropractors
   3. Dentists
   4. Osteopaths
   5. Veterinarians

   a. 1 only
   b. 1, 2, and 3 only
   c. 1, 3, 4, and 5 only
   d. 1, 2, 3, 4, and 5

   ANS: C
   A prescription may be written by a physician, osteopath, dentist, and veterinarian and some other practitioners but not by chiropractors.

   REF: p. 7

10. Drugs that are available to the general public without a prescription are known as
    a. illegal drugs.
    b. generic drugs.
    c. investigational drugs.
    d. over-the-counter drugs.

    ANS: D
    Illegal drugs are not legally available to the general public, and many generic drugs require a prescription. The use of investigational drugs is very closely monitored, and they are not available to the general public. Drugs available to the general public without a prescription are referred to as over-the-counter (OTC) products.

    REF: p. 8

11. Drugs delivered by oral or nasal inhalation are intended to
    a. increase heart function.
    b. provide a local topical treatment in the respiratory tract.
    c. relax patients and relieve anxiety.
    d. improve blood flow throughout the body.

    ANS: B
    Although some inhaled drugs do increase heart rate as a side effect, most drugs intended for this purpose are given intravenously; orally or nasally inhaled drugs are intended to provide a local topical treatment in the respiratory tract. Most anxiolytics and drugs used to improve blood flow are given intravenously.

    REF: p. 9

12. The advantages of delivering drugs by oral or nasal inhalation include which of the following?
    1. Aerosol doses are smaller than doses administered systemically.
    2. Side effects are usually fewer and less severe.
    3. The onset of action is rapid.
    4. The delivery process is painless, relatively safe, and usually more convenient.

    a. 1 and 3 only
    b. 1 and 4 only
    c. 1, 2, and 3 only
    d. 1, 2, 3, and 4

    ANS: D
    The following are advantages of this method and route of delivery:
    Aerosol doses are smaller than doses used for the same purpose and given systemically.
    Side effects are usually fewer and less severe with aerosol delivery than with oral or parenteral delivery.
    The onset of action is rapid.
    Drug delivery is targeted to the respiratory system, with lower systemic bioavailability.
    The inhalation of aerosol drugs is painless, is relatively safe, and may be convenient depending on the specific delivery device used.

    REF: p. 9

13. Which of the following classes of drugs can be aerosolized?
    1. Antiasthmatic agents
    2. Adrenergic agents
    3. Antiinfective agents
    4. Mucoactive agents
    5. Corticosteroids

    a. 1 and 3 only
    b. 2, 4, and 5 only
    c. 2, 3, 4, and 5 only
    d. 1, 2, 3, 4, and 5

    ANS: D
    Antiasthmatic agents (e.g., cromolyn sodium), adrenergic agents (e.g., racemic epinephrine), and mucoactive agents (e.g., Pulmozyme®) can be aerosolized. Antiinfective agents (e.g., TOBI®) and corticosteroids (e.g., budesonide) may also be aerosolized.

    REF: p. 9

14. Which of the following drug groups are important to respiratory and critical care, although they may or may not be available in an aerosol form?
    1. Diuretics
    2. Antiarrhythmic agents
    3. Neuromuscular blocking agents
    4. Anticoagulant and thrombolytic agents

    a. 1 and 2 only
    b. 1 and 3 only
    c. 1, 2, and 3 only
    d. 1, 2, 3, and 4

    ANS: D
    The following groups of drugs are important in critical care:
    Antiinfective agents, such as antibiotics and antituberculous drugs
    Neuromuscular blocking agents, such as curariform agents and others
    Central nervous system agents, such as analgesics and sedatives/hypnotics
    Antiarrhythmic agents, such as cardiac glycosides and lidocaine
    Antihypertensive and antianginal agents, such as β-blocking agents and nitroglycerin
    Anticoagulant and thrombolytic agents, such as heparin and streptokinase
    Diuretics, such as thiazides and furosemide

    REF: p. 9

15. Place the following phases of Investigational New Drug (IND) approval in the correct order:
1. The drug is investigated as a treatment for a small number of individuals with the disease the drug is intended to treat.
2. The drug is investigated in large, multicenter studies to establish efficacy and safety.
3. The drug is investigated in small groups of healthy volunteers to establish its activity.

a. 1, 2, 3
b. 2, 3, 1
c. 1, 3, 2
d. 3, 1, 2

ANS: D
The first step of IND approval is to test the drug on healthy volunteers. Investigation by administration to ill individuals occurs only after the drug is proven safe in healthy volunteers. Multicenter studies are the third and final phase of IND approval.

REF: p. 6

16. In today's market, companies spend approximately how much money per new drug on research, development, and preclinical and postclinical trials?
a. $2 million
b. $10 million
c. $800 million
d. $1 billion

ANS: D
In a study done in 2003 by DiMasi and associates, it was calculated that companies spend over $800 million on research and development and on preclinical and postclinical trials of a new drug in the current market. In a recent study by Adams and Brantner that replicated DiMasi's calculations, they estimated companies now spend over $1 billion to bring a new drug to market.

REF: p. 6

17. Toxicology studies and studies on the effects of a new drug on such organs as the liver and kidneys occur during which step of the drug approval process in the United States?
a. Animal studies
b. Investigational New Drug approval
c. Chemical identification
d. New Drug Application

ANS: A
Chemical identification is the process of recognizing that a chemical may have the potential for useful physiologic effects. No testing has occurred before this step. Once an active chemical is isolated and identified, a series of animal studies examines its general effect on animals and effects on specific organs such as the liver or kidneys. Toxicology studies to examine mutagenicity, teratogenicity, effect on reproductive fertility, and carcinogenicity are also performed. Investigational New Drug (IND) approval is a three-phase process that involves administering the drug to human subjects. It is imperative that safety be established before this step is taken. New Drug Application occurs only after a successful IND process, when the U.S. Food and Drug Administration (FDA) approves the drug for general clinical use.

REF: p. 6

18. Regarding the therapeutic potential of a drug, the code AA symbolizes
a. an important therapeutic gain over other drugs.
b. an important therapeutic gain, indicated for AIDS patients; "fast-track" drug.
c. modest therapeutic gain.
d. little or no therapeutic gain.

ANS: B
The U.S. Food and Drug Administration (FDA) has a classification system to help identify the significance of new products. Codes A, AA, C, and D are used to describe therapeutic potential. Code A is given to a drug that shows significant therapeutic gain over other drugs. Code AA is given to a drug that shows significant therapeutic gain for patients with AIDS; this agent is then fast-tracked. Code B is given to a drug that shows moderate therapeutic gain. Code C is given to a drug that shows little or no therapeutic gain over other drugs, although the drug may have important options.

Choice A: This statement describes code A.
Choice B: This statement describes code AA: Important therapeutic gain, indicated for a patient with acquired immunodeficiency syndrome (AIDS); fast-track.
Choice C: This statement describes code B.
Choice D: This statement describes code C.

REF: p. 6

19. Which of the following may be used when writing or preparing drug orders?
    1. Latin
    2. English
    3. Metric measures
    4. Apothecary measures

    a. 1 only
    b. 1 and 2 only
    c. 1 and 3 only
    d. 1, 2, 3, and 4

    ANS: D
    Latin, English, and metric and apothecary measures may all be used for drug orders.

    REF: p. 7

20. If a drug is ordered with the Latin abbreviation *qid,* it should be administered
    a. every hour.
    b. four times daily.
    c. every other day.
    d. every 4 hours.

    ANS: B
    The abbreviation for *every hour* is *qh*, for *four times daily* is *qid,* for *every other day* is *qod*, and for *every 4 hours* is *q4h*.

    REF: p. 8

21. If a drug is ordered with the Latin abbreviation *ac,* it should be administered
    a. before a meal.
    b. every other hour.
    c. twice daily.
    d. at bedtime.

    ANS: A
    The abbreviation for *ante cenam (before a meal) is ac*, for *every other hour* is *alt hor,* for *twice daily* is *bid,* and for *at bedtime* is *hs*.

    REF: p. 8

22. If a physician desires a drug to be administered *as needed,* he or she should use which of the following abbreviations?
    a. pr
    b. prn
    c. npo
    d. po

    ANS: B
    The abbreviation *pr* means *rectally, prn* means *as needed, npo* means *nothing by mouth*, and *po* means *by mouth*.

    REF: p. 8

23. Which of the following is a major step in the process of marketing a drug in the United States?
1. Isolation of the chemical
2. Identification of the chemical
3. Investigational new drug approval
4. New drug application

a. 1 only
b. 1 and 2 only
c. 1 and 3 only
d. 1, 2, 3, and 4

ANS: D
BOX 1-1 Major Steps in the Process of Marketing a Drug in the United States

Isolation and Identification of the Chemical

Animal studies

General effects

- Special effects on organ systems
- Toxicology studies

Investigational New Drug (IND) Approval

Phase 1 studies: Small number, healthy subjects

Phase 2 studies: Small number, subjects with disease

Phase 3 studies: Large, multicenter studies

New Drug Application (NDA)

Reporting system for first 6 months

REF: p. 6

24. Your patient has an order for 2 puffs of albuterol MDI *q3h,* and it was last given at 0700. When should it be administered next?
a. 0900
b. 1000
c. 1100
d. 1200

ANS: B
q3h means every 3 hours. If first given at 0700, 1000 would be 3 hours later.

REF: p. 8

25. If drug A is ordered with the Latin abbreviation *q4h* and drug B is ordered with the Latin abbreviation *qid,* which drug would be given more frequently in a 24-hour period?
a. Drug A
b. Drug B
c. Both would be given the same amount.
d. More information is needed to answer the question.

ANS: A
The abbreviation *q4h* means every 4 hours, which would be 6 times in a day. The abbreviation *qid* means four times a day.

REF: p. 8

26. The study of toxic substances and their pharmacologic actions, including antidotes and poison control is known as
a. toxicology.
b. therapeutics.
c. pharmacognosy.
d. pharmacology.

ANS: A
Toxicology is the study of toxic substances and their pharmacologic actions, including antidotes and poison control. Therapeutics is the art of treating disease with drugs. Pharmacognosy is the identification of sources of drugs, from plants and animals. Pharmacology is the study of drugs (chemicals), including their origin, properties, and interactions with living organisms.

REF: p. 3

27. The study of the interrelationship of genetic differences and drug effects is known as
    a. toxicity.
    b. pharmacy.
    c. pharmacognosy.
    d. pharmacogenetics.

    ANS: D
    Pharmacogenetics Study of the interrelationship of genetic differences and drug effects. Toxicology is the study of toxic substances and their pharmacologic actions, including antidotes and poison control. Pharmacology is the study of drugs (chemicals), including their origin, properties, and interactions with living organisms.
    Pharmacognosy is the identification of sources of drugs, from plants and animals.

    REF: p. 3

28. The preparation and dispensing of drugs is known as
    a. toxicity.
    b. pharmacy.
    c. pharmacognosy.
    d. pharmacogenetics.

    ANS: B
    Toxicology is the study of toxic substances and their pharmacologic actions, including antidotes and poison control. Therapeutics is the art of treating disease with drugs. Pharmacognosy is the identification of sources of drugs, from plants and animals.
    Pharmacology is the study of drugs (chemicals), including their origin, properties, and interactions with living organisms.

    REF: p. 3

29. The identification of sources of drugs from plants and animals
    a. Toxicity
    b. Therapeutics
    c. Pharmacognosy
    d. Pharmacology

    ANS: C
    Toxicology is the study of toxic substances and their pharmacologic actions, including antidotes and poison control. Therapeutics is the art of treating disease with drugs. Pharmacognosy is the identification of sources of drugs, from plants and animals.
    Pharmacology is the study of drugs (chemicals), including their origin, properties, and interactions with living organisms.

    REF: p. 3

30. The art of treating disease with drugs is referred to as
    a. toxicity.
    b. therapeutics.
    c. pharmacognosy.
    d. pharmacology.

    ANS: B
    Toxicology is the study of toxic substances and their pharmacologic actions, including antidotes and poison control. Therapeutics is the art of treating disease with drugs. Pharmacognosy is the identification of sources of drugs, from plants and animals.
    Pharmacology is the study of drugs (chemicals), including their origin, properties, and interactions with living organisms.

    REF: p. 3

31. What must physicians include on prescriptions when prescribing narcotics or controlled substances?
    a. DEA registration number
    b. Generic and trade name of the medication
    c. Patient’s social security number
    d. All of the above

    ANS: A
    Since the passage of the Controlled Substances Act in 1971, all physicians are required to include their DEA registration number when prescribing narcotics or controlled substances.

    REF: p. 7

32. Once a drug is released for general clinical use, how long must a detailed reporting system remain in place to track any problems that arise with the drug’s use?
    a. For 6 months
    b. For 1 year
    c. For 5 years
    d. For 10 years

    ANS: A
    The detailed reporting system monitoring a drug released for general clinical use remains in place for only 6 months.

    REF: p. 6