MULTIPLE CHOICE

1. By which of the following routes are drugs administered directly into the bloodstream?
   a. Enteral
   b. Transdermal
   c. Transmucosal
   d. Intravenous

   ANS: D
   Parenteral drugs are injected or infused (slowly injected) directly into a blood vessel, muscle, skin, or joint; IV, IM, subcut, and intrathecal are common routes. Enteral (oral) route requires going through the GI system, transdermal (through the dermis) route requires lipid solubility, and transmucosal (through a membrane) route requires crossing a mucous membrane, which are not directly into the bloodstream.

   DIF: Cognitive level 2: Comprehension REF: p. p0715 OBJ: 1 | 6

2. Fentanyl is used as a _____.
   a. synthetic anesthetic
   b. synthetic analgesic
   c. natural analgesic
   d. natural anesthetic

   ANS: B
   Fentanyl is a synthetically manufactured analgesic, made by chemical synthesis to mimic the natural drug opium for the *relief* of pain. Synthetic anesthetics are chemically synthesized for the lack of response to pain. Natural products are found in nature typically derived from plants, animals, or minerals; fentanyl is not a natural product and therefore would not be used as a natural analgesic.

   DIF: Cognitive level 2: Comprehension REF: p. p0425 OBJ: 5 | 7

3. To help reduce nausea, the natural drug _____ can be used.
   a. digitalis
   b. peppermint
   c. caffeine
   d. quinine

   ANS: B
   Some common beverages and foods are natural drugs. Coffee and tea contain the drug caffeine. Ginger and peppermint contain ingredients that can reduce nausea. While the other options are natural drugs, they are not used as a drug to reduce nausea.

   DIF: Cognitive level 3: Application REF: p. p0420 OBJ: 5

4. Which of the following options results in an *untrue* statement about pharmacy technicians? Pharmacy technicians who possess a good knowledge of pharmacology understand the importance of _____.
   a. drug interactions
   b. therapeutic duplication
   c. lab values
   d. excessive dose alerts

   ANS: C
   Knowledge of pharmacology facilitates selection of warning labels for drugs dispensed. Pharmacy technicians who possess a good knowledge of pharmacology understand the importance of recognizing drug interactions, therapeutic duplication, and excessive dose alerts screened by the computer. Knowing and interpreting lab values is beyond the scope of a pharmacy technician and is left to the professional judgment of the pharmacist.

   DIF: Cognitive level 2: Comprehension REF: p. p0140 OBJ: 1

5. Which of the following was passed to protect the public from ineffective and harmful drugs and later expanded to standardize new drugs getting to market?
   a. Durham-Humphrey Amendment
   b. Controlled Substance Act
   c. Pure Food and Drug Act
   d. Combat Methamphetamine Epidemic Act

   ANS: C
   In 1906, the Pure Food and Drug Act was passed to protect the public from ineffective and harmful drugs. This Act was expanded in 1938, and standards for allowing new drugs onto the market were set. The Durham-Humphrey Amendment (1951) established the distinction between legend drugs and drugs that could safely be used by the public without supervision by a health care provider. The Controlled Substance Act helps regulate controlled substances by placing them in various schedules based on abuse potential. The Combat Methamphetamine Epidemic Act regulates, among other things, retail over-the-counter sales of ephedrine, pseudoephedrine, and phenylpropanolamine products used to manufacture crystal meth.

   DIF: Cognitive level 2: Comprehension REF: p. p0440 OBJ: 3

6. Which of the following is the phase of the drug approval process that initially determines the safety and efficacy in those with the disease being studied?
   a. Phase 1
   b. Phase 2
   c. Phase 3
   d. Phase 4

   ANS: B
   In phase 1 clinical trials, the drug is administered to a small number of healthy volunteers who are enrolled in the clinical study. Phase 2 studies are controlled trials with a limited number of patients with the condition to be treated. During this phase, data are collected to determine the drug's efficacy and the drug's side effects in patients with the disease. A phase 3 clinical study is when drug safety is evaluated, and the benefit of taking the drug is compared with the risks associated with taking the drug. Phase 4 trials are studies that are conducted after the drug is marketed to the public to determine safety and effectiveness when the drug is used in "real-world" conditions.

   DIF: Cognitive level 2: Comprehension REF: p. p0450 OBJ: 4

7. Which of the following is the phase of the drug approval process that determines effectiveness of the drug in healthy volunteers?
   a. Phase 1
   b. Phase 2
   c. Phase 3
   d. Phase 4

   ANS: A
   In phase 1 clinical trials, the drug is administered to a small number of healthy volunteers who are enrolled in the clinical study. Phase 2 studies are controlled trials with a limited number of patients with the condition to be treated. During this phase, data are collected to determine the drug's efficacy and the drug's side effects in patients with the disease. A phase 3 clinical study is when drug safety is evaluated, and the benefit of taking the drug is compared with the risks associated with taking the drug. Phase 4 trials are studies that are conducted after the drug is marketed to the public to determine safety and effectiveness when the drug is used in "real-world" conditions.

   DIF: Cognitive level 2: Comprehension REF: p. p0450 OBJ: 4

8. One of the main purposes of drug therapy is to _____.
   a. analyze symptoms
   b. maintain side effects produced by drug therapy
   c. eradicate disease
   d. help cure disease

   ANS: D
   The aim of drug therapy is to diagnose, treat, *cure*, or lessen the symptoms of disease. Analyzing symptoms is part of the process and drug therapy may be changed based on the results, but it's not the main purpose of drug therapy. Maintaining side effects implies that drug therapy is to only maintain or control side effects and not diagnose, treat, cure, or lessen the symptoms of disease. While some drug therapies can help eradicate disease, it is not the main purpose since most diseases can only be cured and eliminated.

   DIF: Cognitive level 2: Comprehension REF: p. p0430 OBJ: 1

9. The streamlined generic drug approval process is a result of which of the following acts?
   a. Patent Restoration Act
   b. Pure Food, Drug, and Cosmetic Act
   c. Food and Drug Administration Reauthorization Act
   d. Drug Price Competition Act

   ANS: B
   In 1906, the Pure Food and Drug Act was passed to protect the public from ineffective and harmful drugs. This Act was expanded in 1938 and standards for allowing new drugs onto the market were set. The Drug Price Competition Act and Patent Restoration Act (1984) encouraged the creation of generic drugs by streamlining the drug approval process for drugs that were no longer patented. Food and Drug Administration Reauthorization Act is a new law that includes the reauthorization of the Prescription Drug User Fee Act (PDUFA) that provides FDA with the necessary resources to maintain a predictable and efficient review process for human drug and biologic products.

   DIF: Cognitive level 2: Comprehension REF: p. p0520 OBJ: 3

10. How does Combat Methamphetamine Epidemic Act (CMEA) of 2005 help deter the illegal manufacture of synthetic drugs?
    a. It has taken all ingredients that could be used to make illegal drugs off the market.
    b. It helps regulate controlled substances by placing them in various schedules based on abuse potential.
    c. It provides a provision to have certain products placed behind the counters out of general public reach.
    d. It has helped health care workers easily identify controlled substances by requiring identifying symbols on each of the drug labels.

    ANS: C
    The CMEA of 2005 was passed to curb the illegal manufacture and use of "crystal meth." The CMEA was signed into law on March 6, 2006, to regulate, among other things, retail over-the-counter sales of ephedrine, pseudoephedrine, and phenylpropanolamine products used to manufacture crystal meth. Purchase limits, placement of product out of direct customer access, sales logbooks, customer ID verification, employee training, and self-certification of regulated sellers are required provisions of the CMEA. Not all ingredients that could be used to make illegal drugs have been taken off the market; they are still available. The CSA helps regulate controlled substances by placing them in various schedules based on abuse potential. Canadian legislation similar to the US CSA has helped health care workers easily identify controlled substances by requiring identifying symbols on each of the drug labels.

    DIF: Cognitive level 4: Analysis REF: p. p0525 OBJ: 3

11. Which step is *not* part of the drug development process?
    a. Clinical research
    b. Clinical studies
    c. New drug application process
    d. Marketing

    ANS: D
    There are many steps in the drug development process. The steps from the test tube to production and distribution of a new drug involve preclinical research, clinical studies, a new drug application process, and review. Marketing takes place after the drug has been approved by the FDA, not when the drug is in development.

    DIF: Cognitive level 2: Comprehension REF: p. p0445 OBJ: 4

12. The proprietary name of a drug is assigned by the _____.
    a. manufacturer
    b. CDER Labeling and Nomenclature Committee
    c. New Drug Application reviewer
    d. FDA

    ANS: A
    The proprietary name, or brand name, is assigned by the drug manufacturer according to nomenclature guidelines and must be approved (not assigned) by the CDER. The nonproprietary name must be approved (not assigned) by the FDA.

    DIF: Cognitive level 1: Recall REF: p. p0490 OBJ: 7

13. Why must a customer go to the pharmacy to purchase pseudoephedrine?
    a. Labeling confusion of the product has shown that counseling must be provided by the pharmacist.
    b. Too much of the product was shown to cause serious adverse effects and therefore the drug needs to be regulated by pharmacy staff.
    c. Placement in the pharmacy out of direct customer access helps to monitor the sale of the drug.
    d. Where the product is stocked depends on directions for use found on package labeling.

    ANS: C
    The Combat Methamphetamine Epidemic Act of 2005 (CMEA) was signed into law on March 6, 2006, to regulate, among other things, retail over-the-counter sales of ephedrine, pseudoephedrine, and phenylpropanolamine products. Purchase limits, placement of product out of direct customer access, sales logbooks, customer ID verification, employee training, and self-certification of regulated sellers are required provisions of the CMEA. Because of this law, pharmacies keep the drug BTC to monitor the sales to implement the law.

    DIF: Cognitive level 4: Analysis REF: p. p0520 OBJ: 3

14. Which of the following auxiliary labels should *always* be placed on a prescription for an oral suspension?
    a. Take with food.
    b. Store in the refrigerator.
    c. Take with lots of water.
    d. Shake well before each use.

    ANS: D
    When suspensions are dispensed, a SHAKE WELL auxiliary label should be placed on the prescription bottle. The drug itself (not dose form) will determine if the additional auxiliary labels would be placed on the prescription.

    DIF: Cognitive level 3: Application REF: p. p0660 OBJ: 5

15. Which of the following routes would have the fastest onset of action?
    a. Oral
    b. Intravenous
    c. Topical
    d. Inhalation

    ANS: B
    An advantage to parenteral administration is rapid onset of action since it is directly placed into body without needing to be absorbed and metabolized to gain access to the blood system.

    DIF: Cognitive level 3: Application REF: p. p0795 OBJ: 6

16. Why can't ear drops be placed in the eye, but eye drops can be placed in the ear?
    a. Ear drops are more viscous, thereby reducing the absorption through the eye.
    b. Ear drops do not contain the special enzymes that are necessary in eye drops.
    c. Ear drops are not sterile, and only sterile products should be used in the eye.
    d. Medication errors can happen once the patient uses the medication.

    ANS: C
    Eye drops may be placed in the ear but ear drops should not be used in the eye. Viscosity and enzymes do not determine if a product is sterile; eye drops must be manufactured in sterile conditions since it is applied to a sterile environment. Medication errors occur when the five rights of patient are not properly implemented.

    DIF: Cognitive level 4: Analysis REF: p. p0670 OBJ: 6

17. Which of the following is *not* classified as a behind-the-counter (BTC) drug?
    a. Motrin
    b. Plan B
    c. Sudafed
    d. Insulin

    ANS: A
    Examples of BTC, Schedule II drugs include iron supplements, insulin, lice treatments (e.g., pyrethrins), aspirin for pediatric use, nitroglycerin, and exempt narcotics (e.g., Tylenol with codeine 8 mg). Examples of drugs that are sold BTC in both the United States and Canada are pseudoephedrine and Plan B. Motrin is classified as an OTC product and kept where patients can easily purchase them.

    DIF: Cognitive level 4: Analysis REF: p. p0520 OBJ: 7

18. Chemical properties of the drug influence _____ of the drug in the body.
    a. absorption
    b. distribution
    c. metabolism and elimination
    d. all of the above

    ANS: D
    Chemical properties of the drug influence absorption, distribution, metabolism, and elimination of the drug in the body. This is also known as pharmacokinetics which helps determine drug formulation.

    DIF: Cognitive level 1: Recall REF: p. p0545 OBJ: 4

19. Which of the following could be an implication if postmarketing (phase 4) were taken out of the drug approval process?
    a. Additional safety information could be collected while on the market.
    b. Safety and efficacy would be determined when the drug is used in real-world conditions.
    c. Not all adverse reactions would be known, and the drug could be on the market longer than necessary.
    d. Long-term side effects could be identified when used in the mass population.

    ANS: C
    Additional safety information is collected in the postmarketing phase. Phase 4 trials are studies that are conducted after the drug is marketed to the public to determine safety and effectiveness when the drug is used in real-world conditions. If phase 4 trials were not implemented, we could not catch other adverse events that may happen in a larger population; events that may not have happened in phases 1 to 3 trials due to a smaller population.

    DIF: Cognitive level 4: Analysis REF: p. p0450 OBJ: 4

20. Which of the following drugs would belong to the proton pump inhibitor class?
    a. Amlodipine
    b. Pantoprazole
    c. Ranitidine
    d. Alprazolam

    ANS: B
    The ending of the official name of many drugs indicates the pharmacological class to which a drug belongs. From Table 1-2, the common ending for drugs in the proton pump inhibitor class is *–prazole; the common drug ending for H2 receptor antagonist is –tidine; the common drug ending for calcium channel blockers is –dipine; and the common drug ending for benzodiazepines is –zepam or – zolam.*

    DIF: Cognitive level 3: Application REF: p. p0480 OBJ: 7

21. The Human Genome Project
    a. has enabled scientists to develop new genetically modified drugs.
    b. mapped how all drugs are related to one another.
    c. helped scientists find a common relation between each drug and the diseases they are used to treat.
    d. has accurately described approximately 600 medicinal plants.

    ANS: A
    The Human Genome Project, a study of human genes, has provided data useful in understanding diseases that are caused by genetic defects or linked to heredity. The study of genes has also enabled scientists to develop new genetically modified drugs, such as human insulin. It has not mapped all drugs and their relation to one another, nor has it found a common relation between each drug and the diseases they treat or accurately described approximately 600 medicinal plants.

    DIF: Cognitive level 2: Comprehension REF: p. p0155 OBJ: 2

TRUE/FALSE

1. Drugs come only from natural origins.

    ANS: F
    Drugs may come from natural or synthetic origins.

    DIF: Cognitive level 1: Recall REF: p. p0415 OBJ: 2

2. Erythropoietin is an example of a biopharmaceutical.

    ANS: T
    Erythropoietin and human insulin are examples of biopharmaceuticals.

    DIF: Cognitive level 1: Recall REF: p. p0425 OBJ: 2

3. Generic drugs are always less expensive than the corresponding brand name drug.

    ANS: T
    Generic drugs are always less expensive than brand name drugs.

    DIF: Cognitive level 1: Recall REF: p. p0505 OBJ: 3

4. “Rx only” must be printed on the label of all legend drugs.

    ANS: T
    “Rx only” must be printed on the label of all prescription drugs.

    DIF: Cognitive level 1: Recall REF: p. p0520 OBJ: 3

5. Binders and fillers are inactive ingredients but have no influence on the rate of drug absorption.

    ANS: F
    Binders and fillers are inactive ingredients but may influence rate of drug absorption.

    DIF: Cognitive level 1: Recall REF: p. p0560 OBJ: 6