Chapter 10

1. What is taxa?
   Categories in which organisms are placed based on similarities

2. List the 3 domains of life.
   Eukarya, bacteria, & archaea

3. What is binomial nomenclature?
   Universal nomenclature
   First term is capitalized (can be abbreviated with just the capital letter and a period)
   Second term is lower case
   Both terms are *italicized* (if typed) or <u>underlined</u> (if written)

4. Write the taxonomic hierarchy from largest group to smallest group.
   Domain
   Kingdom
   Phylum
   Class
   Order
   Family
   Genus
   Species

5. Classify prokaryotic and eukaryotic species.
   Prokaryotic → a population of cells with similar characteristics
   Eukaryotic → a groups of related organisms that breed among themselves

6. Classify the following kingdoms:
   a. Animalia multicellular, no cell walls, chemoheterotrophic
   b. Plantae multicellular, cellulose cell walls, usually photoautotrophic
   c. Fungi unicellular or multicellular, chitin cell walls, chemoheterotrophic, develop spores or hyphal fragments, absorb pre-digested food
   d. Protista a catchall kingdom for eukaryotic organisms that don't fit other kingdoms (includes algae & protozoans)

7. What is the difference between classification and identification?
   Classification is placing a known organism in a group of related species. Identification is identifying an unknown organism by matching its characteristics with those of other known species.
8. Explain the slide agglutination test.
   Known antiserums (solution of specific antibodies) are mixed with the unknown bacteria
   If agglutination (clumping) occurs, then the antiserum had antibodies that reacted with the bacteria (indicates a positive test)

9. What is phage typing?
   A test (similar to serological testing) that determines which phages a bacterium is susceptible to (can provide another basis for identifying)

10. What methods can genetics be used to identify organisms?
    - DNA base composition
    - DNA fingerprinting
    - rRNA sequencing
    - Polymerase chain reaction (PCR)

Chapter 11

1. What are the two prokaryotic domains?
   Archaea & bacteria

2. List 5 groups in the domain bacteria. Which are gram -? Gram +?
   Proteobacteria (gram -)
   Cyanobacteria (gram -)
   Chlamydias (gram -)
   Spirochetes (gram -)
   Gram + bacteria (gram +)

3. What is the largest taxonomic group?
   Proteobacteria

4. What species does proteobacteria include?
   E. coli, *Vibrio cholerae*, *Thiomargarita namibiensis*, & *Rhizobium* species

5. Explain the symbiotic relationship between *Rhizobium* species and legume root nodules.
   Rhizobium species lives in the root nodules of legumes, where they convert atmospheric nitrogen gas into a form that the legumes can use (nitrogen fixation)

6. Men and women with *Neisseria gonorrhoeae* can be asymptomatic.
   a. True
   b. False

7. What can happen if a gonorrheal infection is left untreated? How is it treated?
   Pelvic inflammatory disease and infertility
   Treated with antibiotics

8. What species does cyanobacteria include?
   Plantlike, oxygen-generating photosynthesis
   Includes anabaena (have specialized cells that fix nitrogen)

9. What is trachoma? What group does it originate from?
   Infection of the eye that causes blindness, comes from *Chlamydia trachomatis*

10. What happens if nongonococcal urethritis is left untreated? How is it treated?
    Pelvic inflammatory disease and infertility
    Treated with antibiotics

11. What species do spirochetes include? What illnesses do they cause?
    Treponema pallidum (syphilis), *Borrelia* species (Lyme disease)

12. What species does gram-positive bacteria include?
    Actinomycetes, Streptomycetes, Staphylococcus, Streptococcus, Bacillus anthracis, MRSA

Chapter 12

1. What are the two fungal forms?
   Macroscopic (mushrooms, puffballs, etc.)
   Microscopic (molds or fleshy fungi, yeasts)

2. What morphologies can exist?
   Molds & yeasts

3. Yeasts are multicellular
   a. True
   b. False

4. How can yeast cells reproduce?
   Budding → asymmetrical asexual reproduction
   Fission → symmetrical asexual reproduction
5. What is dimorphism?
   Having alternate forms (depending on growth conditions)

6. Where do the majority get their nutrition?
   Dead plants & animals

7. How are hyphae classified (based on septa)?
   Porous septate hyphae → containing pores that allow flow of organelles & nutrients between compartments
   Nonporous septate hyphae → can't allow flow
   Coenocytic hyphae → continuous cytoplasmic flow (due to no or porous septa)

8. Define that following:
   a. Thallus the body/structure of a fungus (yeast- or mold-like)
   b. Hyphae branching filaments (make up fungal thallus)
   c. Mycelium mass of hyphae

9. What are fungal asexual reproduction methods?
   Fragmentation & mitosis

10. What are fungal sexual reproduction methods?
    Fusion of two opposite fertile hyphae strains

11. List the 3 most common sexual spores.
    Zygospore, ascospores, & basidiospores

12. Algae contain chloroplasts
    a. True
    b. False

13. What are plankton?
    Free-living algae

14. What do dinoflagellates do?
    Algae that can cause red tides & give off toxins that cause food poisoning with neurological symptoms

15. Protozoans have cell walls.
    a. True
    b. False

16. What is a trophozoite?
    Protozoan in motile feeding stage

17. What is a cyst?
    Protozoan in a dormant resting stage (when conditions are unfavorable)

18. How do protozoa reproduce?
    All reproduce asexually:
    - Fission
    - Budding
    - Multiple fission

    Some reproduce sexually:
    - Conjugation

19. List the 4 groups of protozoan identification.
    Flagellates, amoebas, ciliates, & apicomplexans

20. List and describe important protozoan pathogens.
    a. Pathogenic flagellates
        i. Trypanosomes → T. brucei (african trypanosomiasis) & T. cruzi (chagas disease)
        ii. Giardia intestinalis → causes giardiasis
        iii. Trichomas vaginalis → causes trichomoniasis (an STD)

b. Infective amoebas
    i. Entamoeba histolytica → amebiasis (amebic dysentery)
c. Pathogenic ciliates
    i. Balantidium coli → causes severe dysentery
d. Pathogenic apicomplexans
    i. Plasmodium → causes malaria

21. What kingdom are helminths part of?
    Animalia

22. What two phylums are helminths broken down into?
    Platyhelminthes (flatworms)
    Nematoda (roundworms)

23. Explain the difference between definitive and an intermediate host.
    Intermediate host harbors the larval/asexual stage, while definitive host harbors the sexually matrue adult (can occur in a vector, human, or other animal)

24. In what ways are arthropods vectors?
    Mechanical transmission (on their feet/body) or biological transmission (microbe multiplies inside of vector)

Chapter 14

1. What is Koch's postulates?
    Experimental steps to prove that a specific microbe causes a specific disease

2. What is an etiologic agent?
    The causative agent of infectious disease

3. Define the following:
    a. Pathogen disease-causing microbe
    b. Pathology the scientific study of disease
    c. Etiology the cause of a disease
    d. Pathogenesis the manner in which a disease develops

4. What are the 3 concerns of pathology?
    - Etiology
    - Pathogenesis
    - Structural and functional changes brought about by disease & their final effects on the body

5. Differentiate between infection and disease.
    Infection → invasion/colonization of the body by pathogens
    Disease → abnormal state where part/all of the body is not functioning normally

6. What are transients?
   Microbes that occupy the body for only short periods of time

7. What are endogenous infections?
   Occur when normal flora is introduced to a site that was previously sterile

8. List the factors that weaken host defenses.
   - Old age / extreme youth
   - Genetic defects in immunity / acquired defects in immunity (AIDS)
   - Surgery & organ transplants
   - Organic disease
   - Chemotherapy / immunosuppressive drugs
   - Physical & mental stress
   - Other infections

9. What are the 5 stages of clinical infections?
   - Incubation period
   - Prodromal stage
   - Period of illness
   - Period of decline
   - Convalescent period

10. You can be contagious in all 5 stages.
    a. True
    b. False

11. Define the following:
    a. Localized infection microbes enter the body and remain confined to a specific tissue
    b. Systemic infection infection spreads to several sites & tissue fluids usually in the bloodstream / lymph
    c. Focal infection when infectious agent breaks loose from a local infection and is carried to other specific tissues

12. What is the difference between a symptom and a sign?
    Symptom → a change in body function that is felt
    Sign → a change in a body that can be measured or observed

13. Leukocytosis is the decrease in white blood cells
    a. True
    b. False

14. What is a reservoir? A source?
    Reservoir → primary habitat of pathogen
    Source → individual or object from which an infection is actually acquired

15. List the types of living human reservoirs.
    Carrier → individual who inconspicuously shelters a pathogen and spreads it to others (may or may not experience disease due to microbe)
    Asymptomatic → shows no symptoms
    Incubation carrier → spread the infectious agent during the incubation period
    Convalescent carrier → recuperating without symptoms
    Chronic carrier → individual who shelters the infectious agent for a long period
    Passive carrier → contaminated healthcare provider who is not infected, but picks up pathogens and transfers them to other patients

16. What is a communicable disease?
    When an infected host can transmit the infectious agent to another host & establish infection in that host

17. What are the types of transmissions?
    - Direct contact
    - Indirect contact

18. Explain the difference between prevalence and incidence.
    Prevalence → total number of existing cases with respect to the entire population
    Incidence → measures the number of new cases over a certain time period

19. What is mortality rate? Morbidity rate?
    Mortality rate → the total number of deaths in a population due to a certain disease
    Morbidity rate → number of people afflicted with a certain disease

20. Define the following terms:
    a. Endemic disease that exhibits a relatively steady frequency over a long period of time in a particular geographic locale
    b. Sporadic when occasional cases are reported at irregular intervals
    c. Epidemic when prevalence of a disease is increasing beyond what is expected
    d. Pandemic epidemic across continents

21. List emerging diseases.
- Avian influenza A (H5N1) [bird flu]
- Swine H1N1 influenza [swine flu]
- MRSA
- West Nile virus
- Bovine spongiform encephalopathy (mad cow disease)
- Escherichia coli 0157:H7
- Ebola hemorrhagic fever (ebola virus)
- Cryptosporidiosis
- AIDS

Chapter 15

1. List the portals of entry
   - Mucous membranes
   - Skin
   - Parenteral route

2. What are ways microbes can adhere to surfaces/host tissues?
   Using glycocalyx, fimbriae, or biofilms

3. What is a virulence factor?
   A characteristic or structure that contributes to the ability of a microbe to cause disease (and determines the degree of tissue damage & severity of disease)

4. How is virulence expressed?
   ID_{50} (infectious dose %)
   LD_{50} (lethal dose %)

5. List virulence factors that allow pathogens to evade or penetrate host defenses.
   - Antiphagocytic factors
   - Cell wall components
   - Exoenzymes
   - Antigenic variation
   - Invasins

6. What are examples of antiphagocytic factors?
   Glycocalyces, capsules, & m protein

7. List and define exoenzymes that aid in virulence.
   - Coagulase → produced by certain pathogens to form fibrin clots in blood to isolate & protect bacteria from host defenses
   - Kinase → breaks down blood clots that the body's defenses has formed to isolate the infection, releasing pathogens to other areas
   - Collagenase → breaks down the collagen protein in connective tissue to allow gas gangrene to spread

8. What is antigenic variation?
   The ability of some bacteria, viruses, or parasitic protozoans to change their antigens by the time the body makes antibodies to fight it

9. What are invasins?
   Surface proteins that microbes produce to penetrate host cell membrane

10. How do microbes move inside the host cell?
    Microbes use actin in the host cell's cytoskeleton

11. List ways pathogens can damage host cells.
    - Using host cell's nutrients
    - Direct damage (disrupting function, producing waste, causing rupture)
    - Producing toxins

12. Define the following terms:
    a. Toxin substance that contributes to pathogenicity
    b. Toxigenicity ability to produce a toxin
    c. Toxemia presence of toxin in host's blood
    d. Toxoid inactivated toxin used in a vaccine
    e. Antitoxin antibodies against a specific toxin

13. Toxigenicity is a virulence factor.
    a. True
    b. False

14. What group of bacteria most commonly produce exotoxins? Endotoxins?
    Exotoxins → gram + bacteria
    Endotoxins → gram - bacteria

15. What are superantigens? Explain how cytokines are involved.
    Superantigens are bacterial proteins (antigens) that provoke an intense immune response (results in excessive release of cytokines from host cells)
    Cytokines are released by T cells to regulate immune responses (too many in bloodstream can cause symptoms)

16. List the portals of exit.
- Respiratory
- Skin scales
- Gastrointestinal tract
- Blood