1. What is the mechanism of action of interferon?
    - **Alert neighboring cells and protect them from becoming infected**
    - **Bind to surface receptors on those cells and activate second-messenger systems within**
    - **This induces synthesis of dozens of antiviral proteins that defend a cell by such means as breaking down viral genes or preventing viral replication**
    - **Also activate NK cells and macrophages which destroy infected cells before they can liberate a swarm of newly replicated viruses**
    - **Also confer resistance to cancer**
2. When are complement proteins produced? When do they become active?
    - **Activated in the presence of pathogens**
3. When do neutrophils become phagocytic?
    - **As they encounter bacteria**
4. What cells attack virus-infected cells and cancer cells?
    - **Lymphocytes**
5. What is the purpose of fever?
    - **Promotes interferon activity, elevates metabolic rate and accelerates tissue repair, and inhibits reproduction of bacteria and viruses**
6. What are the non-specific defense mechanisms?
    - **Guard against a broad range of pathogens and their effectiveness does not depend on prior exposure; Present from birth**
7. How are neutrophils attracted to inflamed sites?
    - **Chemical messengers released by basophils, mast cells, blood plasma, and damaged tissue**
    - **These inflammatory chemicals stimulate**
        - **Leukocyte margination - adhesion to capillary walls**
        - **Diapedesis - crawling through capillary walls**
        - **Chemotaxis - movement toward source of inflammatory chemicals**
        - **Phagocytosis - engulfing bacteria and other pathogens**
8. Which body system carries out immune responses?
    - **Lymphatic system**
9. What are the functions of helper T-cells? Suppressor T-cells? Cytotoxic T-cells? NK cells?
    - **Helper T-cells: Promote the action of cytotoxic cells as well as key in humoral immunity and nonspecific resistance. Only T cell no involved in cellular immunity only.**
    - **Suppressor (Regulatory) T-cells: limit the immune response by inhibiting multiplication and cytokine secretion by other T cells. Seem important in preventing autoimmune diseases.**
    - **Cytotoxic T-cells: Carry out attack on foreign cells. The "effectors" of cellular immunity.**
    - **NK cells: Attack and destroy bacteria, transplanted tissues, and host cells (cells of one's own body) that have either become infected with viruses or turned cancerous. Responsible for a mode of defense called immune surveillance – patrol body for pathogens and diseased host cells.**
10. What do helper T-cells do during recognition in humeral immunity?
    - **Binds to Ag-MHCP and secretes interleukins to activate the B cell, triggering clonal selection**

11. What activates an immune response?
    - **Antigens/pathogens entering the body. Region of antigen called epitope stimulates immune response**
12. What is the term for the first encounter between an immunocompetent lymphocyte and an invading antigen?
    - **Antigen Challenge**
13. What is the difference between a complete antigen and hapten?
    - **Complete antigen: any molecule that triggers an immune response**
    - **Haptens are too small to be antigenic themselves; can stimulate immune response by binding to a host macromolecule and creating a unique complex that the body recognizes as foreign**
14. Which Ig crosses the placenta?
    - **IgG**
15. Which Ig is a potent agglutinator?
    - **IgM**
16. Which Ig is primarily involved in allergic reactions?
    - **IgE**
17. Which Ig is found in body secretions?
    - **IgA**
18. Actual site of gas exchange in the lungs is the:
    - **Alveoli**
19. The movement of air in and out of the lungs is due to:
    - **Air Pressure**
    - **Inspiration**
        - **Lungs expand, increasing space inside**
        - **Less air particles per square inch in the lung (smaller concentration) than outside so air moves into the lungs by diffusion**
    - **Expiration**
        - **Lungs contract, increasing air pressure**
        - **More particles per square inch (more squashed together) than outside so air moves out of the lungs by diffusion**
20. How does the pleura and pleural fluid create a pressure gradient and reduce friction?
    - **Reduces friction by acting as lubricant that enables lungs to expand and contract with minimal friction**
    - **Creates pressure gradiant by**
21. What changes occur as the bronchial tree becomes smaller?
    - **Walls lose cartilaginous support**
22. What will a pneumothorax result in?
    - **The presence of air in the pleural cavity**
    - **Visceral and parietal pleurae separate**
    - **No negative intrapleural pressure – lungs recoil and collapse (atelectasis)+**
23. Define the respiratory membrane.
    - **Barrier between alveolar air and blood**

Brainstem Respiratory Centers

- Automatic, unconscious cycle of breathing is controlled by three pairs of respiratory centers in the reticular formation of the medulla oblongata and the pons
- Respiratory nuclei in medulla
    - Ventral respiratory group (VRG)
        - Primary generator of the respiratory rhythm
        - Inspiratory neurons in quiet breathing (eupnea) fire for about 2 seconds
        - Expiratory neurons in eupnea fire for about 3 seconds allowing inspiratory muscles to relax
        - Produces a respiratory rhythm of 12 breaths per minute
    - Dorsal respiratory group (DRG)
        - Modifies the rate and depth of breathing
        - Receives influences from external sources
    - Pons (Pontine RG)
        - Modifies rhythm of the VRG by outputs to both the VRG and DRG
        - Adapts breathing to special circumstances such as sleep, exercise, vocalization, and emotional responses