**Hole’s Essentials of Human A&P 14e**

ANSWERS TO CHAPTER ASSESSMENTS

**CHAPTER 1**

**1.1 Introduction**

1. Our earliest ancestors probably became curious about the body during illnesses and injuries. At these times, they visited healers who relied on superstition and magic. Throughout early time, this curiosity led to discoveries of the healing powers of certain herbs and potions, especially to treat coughs, headaches, and other common problems. Not until about 2500 years ago did these superstitious attitudes change and the body was looked at in the new light of modern science. Experiments, accurate observations, and tried techniques rapidly expanded knowledge of the human body. Greek and Latin words were used as a basis to describe body part locations and to explain their functions.

**1.2 Anatomy and Physiology**

2. Anatomy deals with the structure (morphology) of body parts. This includes the shapes, forms, and placement of body organs/appendages. Physiology deals with the functions of body parts, what the body parts do, and how it is accomplished.

3. Generally, the body parts have evolved in a manner that allows more efficient performance of their function. An example would be the hollow chambers of the heart that are adapted to their function of pumping blood through the tubular blood vessels.

**1.3 Levels of Organization**

4. Atoms, molecules, macromolecules, organelles, cells, tissues, organs, organ systems, organism.

**1.4 Characteristics of Life**

5. 1. Movement is the ability to self-initiate position changes of either the entire organism or a part of the organism, externally from place to place and/or internally, such as in peristalsis.

2. Responsiveness refers to the ability of an organism to detect changes either within itself or the environment surrounding it and then react to these changes.

3. Growth generally refers to an increase in body size without important changes to its general shape.

4. Reproduction is the process of making a new organism, as in parents producing offspring. It also discusses the process whereby cells can produce others like themselves to take the place of damaged or destroyed cells.

5. Metabolism is the sum of all chemical reactions in a living system: Engergy production and nutrient cycling.

* Respiration refers to the process of obtaining oxygen, using the obtained oxygen in release of energy from foods, and removing waste gases that are produced in the process.
* Digestion is the chemical change of ingested foods into simpler substances that can be taken in and used by body parts. Absorption is the passage of digested substances through membranes of the intestinal lining. Assimilation refers to the changing of absorbed substances into forms that are chemically different from those that entered the body fluids.
* Circulation refers to the movement of substances from one place to another within the body using the body fluids.
* Excretion refers to the removal of wastes produced by body parts during their activities.

6. The totality of physical and chemical changes that occur within body parts.

**1.5 Maintenance of Life**

7. 1. Water, the most abundant substance in the body, is required for many metabolic processes. It provides the environment for the metabolic processes to take place and then transports substances within the body. It is also important in regulating body temperature.

2. Food is the substances that provide the body with the necessary chemical nutrients to sustain life, in addition to water. These nutrients are used in a variety of ways by the body.

3. Oxygen, which makes up about one-fifth of air, is used to release energy from food substances.

4. Heat, a form of energy, is a product of metabolic reactions. The rate at which these reactions occur is governed by the amount of heat present.

5. Pressure is a state in which a force is applied to something. Atmospheric pressure plays an important role in breathing. Hydrostatic pressure, the pressure of fluid, plays an important role in the circulatory system.

8. Homeostasis is defined as the tendency of an organism to maintain a stable internal environment. In order to survive, an organism must keep everything in balance. This allows all the body systems to work together in harmony.

9. The general physiological control system has a control center, which has a set point, which is triggered by a stimulus via receptors in our body. Once the set point is known, the effectors will give a response to the stimulus.

10. The human body temperature is controlled by a temperature-sensitive region of the brain. If the body temperature begins to drop, the brain senses this change and triggers heat-generating and heat-conserving activities. A heat-generating activity would be the shivering of the muscles. A heat-conserving activity would be vasoconstriction. If the brain senses a rise in body temperature, it triggers changes that allow increased loss of body heat. Sweating and vasodilation are examples of this change.

11. If the pressure-sensitive parts of the blood vessels sense an increase in the blood pressure, the brain will send signals to the heart causing the chambers to contract more slowly and with less force. This will decrease the pressure. If it drops too much, the brain will then send signals to the heart so it will contract more rapidly and with greater force.

**1.6 Organization of the Human Body**

12. Axial portion - This consists of the head, neck, and trunk.

Appendicular portion - This consists of the upper and lower limbs.

13. The dorsal cavity is located at the back of the organism. It is subdivided into two parts - the cranial cavity within the skull, which houses the brain; and the vertebral canal, which contains the spinal cord and is surrounded by sections of the backbone (vertebrae). The ventral cavity is the front part of the organism. It is subdivided into two parts - a thoracic cavity, which houses the lungs and heart; and an abdominopelvic cavity, which houses the stomach, liver, spleen, gallbladder, small and large intestines, urinary bladder, and the internal reproductive organs.

14. A visceral organ is any organ found deep within a cavity.

15. The mediastinum is the region that separates the thoracic cavity into two compartments, which contain the right and left lungs. The remaining thoracic viscera - heart, esophagus, trachea, and thymus gland are located within the mediastinum.

16. 1. Oral cavity, which contains the teeth and the tongue.

2. Nasal cavity which is located within the nose and divided into right and left portions by a nasal septum. Several air-filled paranasal sinuses are connected to the nasal cavity.

3. Orbital cavities which contain the eyes and the associated skeletal muscles and nerves.

4. Middle ear cavities which contain the middle ear bones.

17. A parietal membrane refers to a membrane that is attached to the wall of a cavity. A visceral membrane refers to a membrane that is deeper--toward the interior--and covers internal organs.

18. 1. Integumentary system – It protects underlying tissues, helps regulate body temperature, houses a variety of sensory receptors, and synthesizes certain products.

2. Skeletal system - It provides frameworks and protective shields for softer tissues, serves as attachments for muscles, and acts together with muscles when body parts move. It also has a role in blood cell production and storage of inorganic salts.

3. Muscular system - It provides the forces that cause body movements. It also maintains posture and is the main source of body heat.

4. Nervous system - It provides the ability to detect changes that occur inside and outside the body. It interprets the sensory impulses and what to do in response to these impulses. It also plays a role in muscle contraction and gland secretions.

5. Endocrine system - It secretes hormones that alter metabolism of a target tissue.

6. Cardiovascular system - It pumps blood throughout the body. The blood serves as a fluid for

transporting gases, nutrients, hormones, and wastes.

7. Lymphatic system - It transports tissue fluid back to the bloodstream and carries certain fatty

substances away from the digestive organs. It also plays a role in immunity.

8. Digestive system - It receives various food molecules from the outside and converts them into simpler ones that can be absorbed.

9. Respiratory system - It provides for the intake and output of air and for the exchange of gases between blood and air.

10. Urinary system - It removes various wastes from the blood and assists in maintaining the body's water, electrolyte, and acid-base balances.

11. Reproductive system - It is responsible for the production of whole new organisms like itself.

19. 1. Integumentary system - It consists of the skin and various accessory organs such as the hair,

nails, sweat glands, and sebaceous glands.

2. Skeletal system - It consists of the bones, ligaments, and cartilages.

3. Muscular system - It consists of the muscles.

4. Nervous system - It consists of the brain, spinal cord, nerves, and sense organs.

5. Endocrine system - It consists of the glands that secrete hormones.

6. Cardiovascular system - It consists of the heart, arteries, veins, capillaries, and blood.

7. Lymphatic system - It consists of the lymphatic vessels, lymph fluid, lymph nodes, thymus gland, and spleen.

8. Digestive system - It consists of the mouth, tongue, teeth, salivary glands, pharynx, esophagus, stomach, liver, gallbladder, pancreas, small intestine, and large intestine.

9. Respiratory system - It consists of the nasal cavity, pharynx, larynx, trachea, bronchi, and lungs.

10. Urinary system - It consists of the kidneys, ureters, urinary, bladder, and urethra.

11. Reproductive system - The male reproductive system consists of the scrotum, testes, epididymides, vasa, deferentia, seminal vesicles, prostrate gland, bulbourethral glands, penis, anD urethra. The female reproductive system consists of the ovaries, uterine tubes, uterus, vagina, clitoris, and vulva.

**1.7 Anatomical Terminology**

20. a. Superior - The head is superior to the abdomen.

b. Inferior - The legs are inferior to the chest.

c. Anterior - The eyes are anterior to the brain.

d. Posterior - The brain is posterior to the eyes.

e. Medial - The nose is medial to the eyes.

f. Lateral - The ears are lateral to the eyes.

g. Proximal - The elbow is proximal to the wrist.

h. Distal - The fingers are distal to the wrist.

i. Superficial - The epidermis is the superficial layer of the skin.

j. Peripheral - The nerves that branch from the brain and spinal cord are peripheral nerves.

k. Deep - The dermis is the deep layer of the skin.

21. Refer to figure 1.15.

22. Refer to figure 1.17.

23. a. Acromial - point of the shoulder

b. Antebrachial - the forearm

c. Axillary - the armpit

d. Buccal - the cheek

e. Celiac - the abdomen

f. Coxal - the hip

g. Crural - the leg

h. Femoral - the thigh

i. Genital - reproductive organs

j. Gluteal - the buttocks

k. Inguinal - the depressed area of the abdominal wall near the thigh (groin)

l. Mental - the chin

m. Occipital - the lower back region of the head

n. Orbital - the eye cavity

o. Otic - the ear

p. Palmar - the palm of the hand

q. Pectoral - the chest

r. Pedal - the foot

s. Plantar - the sole of the foot

t. Popliteal - the area behind the knee

u. Sacral - the posterior region between the hipbones

v. Tarsal - the instep of the foot

w. Umbilical - the navel

x. Vertebral - the spinal column