

Answer Key

Respiratory

1) The conducting zone **(1)** consists of a series of interconnecting cavities and tubes both outside and within the lungs. These include the nose, pharynx, larynx, trachea, bronchi, bronchioles, and terminal bronchioles; their function is to filter, warm, and moisten air and conduct it into the lungs. (2) The respiratory zone **(1)** consists of tissues within the lungs where gas exchange occurs. These include the respiratory bronchioles, alveolar ducts, alveolar sacs, and alveoli; they are the main sites of gas exchange between air and blood. **(2 points for naming both, 2 points for functions)**

2) Bulk flow**(1)** is the major intake of gas through respiration into our system. It allows for the human body to function properly due to the adequate amount of oxygen it allows for intake. Diffusion**(1)** is the natural input of Oxygen and other gases into our system down their respective gradients. It happens faster in tighter spaces but is nowhere near as productive as Bulk flow. The tissue type that was damaged for Arnold was epithelium tissue **(1)** due to this being the main tissue seen in oxygen diffusion to cells. More specific answers are correct as well. **(2 points for naming and explaining both, 1 point for tissue name)**

3) Those two cone shaped regions are the lungs. The area that is the root of the problem is the pleural cavity because that is where the lubricating fluid is seen in movement, which allows for the reduction of friction when breathing. **(1 point for lungs, 1 point for explanation)**

4) There are three main steps in respiration. 1- Pulmonary ventilation (breathing) which is the initial inhalation and exhalation of the gases. 2- Pulmonary respiration which is the exchange of gases between the alveoli and the lungs. 3- Internal respiration which is the exchange of oxygen and carbon dioxide between the tissue cells and blood flow. **(1 points for each stages and explanation, 3 total)**

5) The external pressure at the top of the mountain is much lower, making Oxygen diffusion into our system occur at a slower pace due to the reduced gas gradient seen. It is harder to go against it now, making breathing harder. **(2 points for gradient explanation. All or none)**

6) Eupnea **(2 points)**

7) The pressure of Oxygen in the external area. The higher the pressure, the more binding that will be seen with hemoglobin. **(1 point for pressure explanation)**

8) Oxyhemoglobin (Hb-O₂) **(1 point)**

9) Respiratory bronchiole, alveolar ducts, atria, and alveoli. Need to name all 4 **(4 points. All or none)**

10) Medulla Oblongata **(1 point)**

11) The trachea **(1 point)**

12) It is mainly a protective mechanism for preventing excessive inflation of the lungs rather than a key component in the normal regulation of respiration. **(2 points for explanation)**

13) The diaphragm **(1 point)**

14) Carbonic anhydrase **(1 point)**

15) The superior, middle, and inferior nasal conchae. **(3 points)**

Digestive

1) Peristalsis **(1 point)**

2) Ingestion - The initial intake of food

Digestion - The mechanical and chemical breakdown of food

Absorption - The uptake of nutrients into the blood and lymph

Compaction - Absorbing water and consolidating the indigestible residue into feces

Defecation - The elimination of feces

(5 possible points here, 1 for each)

3) Intrinsic and extrinsic glands **(2 points. 1 for each)**

4) Intrinsic - Lingual glands, labial glands, and buccal glands. **(2 possible points, have to name all 3)**

Extrinsic - Parotid glands, submandibular glands, and sublingual gland. **(2 possible points, have to name all 3)**

5) The esophageal hiatus. The cardiac orifice. **(2 points. 1 for each)**

6) These are cells that are located in glands in the stomach. The Parietal cells are mainly found in the gastric glands with few in the pyloric glands. They secrete hydrochloric acid and intrinsic factors. The chief cells are in the lower half of the gastric glands and they secrete chymosin and lipase. **(1 point each for location, 1 point each for what it secretes. 4 points possible total here)**

7) Gastrin is secreted from the G Cells, which are a type of enteroendocrine cells. **(2 points. All or none)**

8) The duodenum, jejunum, and ileum. The ileum. **(3 points total here. 2 are for naming all three parts with 1 for ileum answer.)**

9) These are Paneth cells and they secrete lysozymes. It is a defensive protein that resists bacterial invasion of this region. **(3 points. 1 for name, 1 for secretion, 1 for secretion function.)**

10) It is made in the liver and stored in the gallbladder. **(1 point)**

11) Heartburn is misleading because this has nothing to do with the heart. It is caused by an acid reflux where the stomach acid and esophagus come into play. The burning sensation comes from that acid hitting that chest region. **(2 points. 1 for false name and 1 for reason for burn)**

12) Three major methods here include a mucous coat, which resists acid and enzyme action on itself, tight junction formed by epithelial cells, which prevent gastric juices from spreading out too far and attacking stomach tissue, and constant epithelial cell replacement, which allows for new, undamaged protection from acids every 3 to 6 days. **(4 points, depends on quality of explanation. This one will be based off of in depth of answer with a 4 being what was shown above.)**

13) Chyme **(1 point)**

14) Bolus **(1 point)**

15) It is a composition of around 98% Water with additional salivary amylase, lingual lipase, mucus, lysozymes, immunoglobulin A, and electrolytes. Do NOT need to name all of these for points, but DO need at least Water and 2 other components. **(2 points)**

Immune

1) Plasma and tissue fluid; defends against bacterial cells, viruses, and toxins; activates complement **(2 points. 1 for name and 1 for function.)**

2) 1. Antigen bearing agents enter tissues, 2. B cell becomes activated when it encounters an antigen that fits its antigen receptors, 3. Either alone or more often in conjunction with helper, 4. Some of the newly formed B cells differentiate further to become plasma cells. 5. Plasma cells synthesize and secrete antibodies whose molecular structure is similar to the activated B cell antigen receptors. **(5 points. 1 for each part.)**

3) The particular parts that actually bind to the antigen on the antibody molecule. **(1 point)**

4) Respiratory syncytial virus **(1 point)**

5) Hyper IgD syndrome (HIDS) is caused by mutations that result in a partial deficiency of mevalonate kinase. Its features are Periodic fever, elevated IgD levels, and lymphadenopathy. **(2 points. 1 for cause and 1 for symptoms.)**

6) They secrete molecules that bind to serotonin receptors on the endothelial cells which separate and create a path for the leukocytes. **(1 point)**

7) HIV enters the body and binds to dendritic cells (orange cells with projections) which carry the virus to CD4+ T cells in lymphoid tissue establishing the infection. **(1 point)**

8) Hiv rapidly infects and destroys cells in the intestinal immune system which is the site of the mucosal immunity, meaning there are a lot of memory T cells there that express CD4 and CCR5 which are co-receptors for HIV. **(2 points)**

9) Interleukins **(1 point)**

10) They make the cell undergo apoptosis. They do this by expressing a FasL designated Fas on their cell surface. Then, they produce more FasL which binds to the Fas on the target cell. **(2 points. 1 for function and 1 for how it occurs.)**

11) Adaptive immunity refers to antigen-specific immune response(1). The adaptive immune response is more complex than the innate. The antigen first must be processed and recognized. Once an antigen has been recognized, the adaptive immune system creates an army of immune cells specifically designed to attack that antigen. Adaptive immunity also includes a "memory"(1) that makes future responses against a specific antigen more efficient.

Innate immunity refers to nonspecific defense (1) mechanisms that come into play immediately or within hours of an antigen's appearance in the body. These mechanisms include physical barriers such as skin, chemicals in the blood, and immune system cells that attack foreign cells in the body (1). The innate immune response is activated by chemical properties of the antigen.

(2 points each, 4 total. Points have been labeled.)

12) Allograft reaction **(2 points. All or none)**

13) Macrophage- phagocytosis and activation of bacterial mechanisms; antigen presentation

Basophil- promotion of allergic responses and augmentation of anti-parastic immunity

Eosinophil- killing of antibody coated parasites

Dendritic Cell- antigen uptake in peripheral sites; antigen presentation

Neutrophil- phagocytosis and activation of bacterial mechanism

Mast cell- release of granules containing histamine and active agents

(1 point for every 2 described, 6 total)

14) IgG, IgA, IgM, IgD, IgE **(3 points for all 5 named. All or none)**

15) neutrophil, eosinophil, basophil, monocyte **(4 points. 1 for each named.)**