Station A:

Use the diagram in answering Questions 1-5.

1. Give the name and functions of the structure labeled 5 on the diagram.

2. Give the name and functions of the structure labeled 2 on the diagram.

3. Give the name and functions of the structure labeled 4 on the diagram.

4. Give the name and functions of the structure labeled 6 on the diagram.

5. Give the name and functions of the structure labeled 3 on the diagram.

6. - 7. What are the major functions of the respiratory system?

8. Why does the right lung have 3 lobes and the left lung has only 2 lobes?

9. - 10. Describe the pathway of air from the nose to the alveoli using arrows to separate each step.
**Station A:**

Use the diagram in answering Questions 1-5.

1. Give the name and functions of the structure labeled 5 on the diagram.
   
   **Nasal cavity** - moistens, warms, filters, and cleans inspired air + detects odors + resonates sound

2. Give the name and functions of the structure labeled 2 on the diagram.
   
   **Trachea** - air passageway + cleans, warms, and moistens incoming air + has cartilage rings so it won’t collapse

3. Give the name and functions of the structure labeled 4 on the diagram.
   
   **Pharynx** - passage way for air food and drink

4. Give the name and functions of the structure labeled 6 on the diagram.
   
   **Bronchi** - solely a passage way

5. Give the name and functions of the structure labeled 3 on the diagram.
   
   **Larynx** - voice box for sound production + has epiglottis to cover trachea so food won’t enter lungs during swallowing

6. – 7. What are the major functions of the respiratory system?
   
   Provides oxygen to the blood stream and removes carbon dioxide
   
   Enables sound production or vocalization as expired air passes over the vocal chords.
   
   Enables protective and reflexive non-breathing air movements such as coughing and sneezing, to keep the air passages clear
   
   Control of Acid-Base balance and Control of blood pH

8. Why does the right lung have 3 lobes and the left lung has only 2 lobes?
   
   to allow room for the heart

9. - 10. Describe the pathway of air from the nose to the alveoli using arrows to separate each step.
   
   nasal cavities (or oral cavity) > pharynx > trachea > primary bronchi (right & left) > secondary bronchi > tertiary bronchi > bronchioles > alveoli (site of gas exchange)
Station B: Examine the diagram and answer the following questions.

11. What happens to the Pectoralis major muscles, Intercostal muscles and the Diaphragm during Inhalation? Is this process an active process and does it require an output of energy – why?

12. What happens to the Pectoralis major muscles, Intercostal muscles and the Diaphragm during Exhalation? Is this process an active process and does it require an output of energy – why?

13. What happens to the chest cavity during inhalation and then during Exhalation?

14. What gas is brought into the lungs during inhalation for transport into the blood and what gas is removed from the blood and exhaled?

15. What structure in the lungs acts as the exchange mechanism for the gases going into and out of the capillaries and what substance on its membrane reduces the surface tension in the fluid on its surface?
Station B: Examine the diagram and answer the following questions.

11. What happens to the Pectoralis major muscles, Intercostal muscles and the Diaphragm during Inhalation? Is this process an active process and does it require an output of energy – why?
   - the muscles contract – an active process requiring input of energy

12. What happens to the Pectoralis major muscles, Intercostal muscles and the Diaphragm during Exhalation? Is this process an active process and does it require an output of energy – why?
   - the muscles relax – passive process using recoil properties of the muscle fibers

13. What happens to the chest cavity during inhalation and then during Exhalation?
   - volume increases with inhalation and decreases with exhalation

14. What gas is brought into the lungs during inhalation for transport into the blood and what gas is removed from the blood and exhaled?
   - oxygen goes in and carbon dioxide is removed

15. What structure in the lungs acts as the exchange mechanism for the gases going into and out of the capillaries and what substance on its membrane reduces the surface tension in the fluid on its surface?
   - alveoli are the organs of exchange and surfactant reduces surface tension
Station C: Examine the data provided and answer the questions.

### Lung Capacity

<table>
<thead>
<tr>
<th>Name</th>
<th>Vital Capacity</th>
<th>Expiratory Reserve</th>
<th>Tidal volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jim</td>
<td>3500 cc</td>
<td>800 cc</td>
<td>600 cc</td>
</tr>
<tr>
<td>Sally</td>
<td>2500 cc</td>
<td>1200 cc</td>
<td>500 cc</td>
</tr>
<tr>
<td>Chuck</td>
<td>4200 cc</td>
<td>900 cc</td>
<td>550 cc</td>
</tr>
<tr>
<td>Megan</td>
<td>2000 cc</td>
<td>1200 cc</td>
<td>450 cc</td>
</tr>
</tbody>
</table>

16. Which represents the maximum amount of air that is held in lungs - vital capacity, respiratory reserve or tidal volume?

17. Which is the amount of air exchanged during a normal breath? (vital capacity, respiratory reserve or tidal volume)

18. What types of normal variations could account in differences in lung capacity among members of a 9th grade class of students?

19. What effect would smoking have on the lung capacity of an individual over a long period of time? Why?

20. What are the effects of exercise and conditioning have on lung capacity over a long period of time? Why?
Station C: Examine the data provided and answer the questions.

**Lung Capacity**

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16. Which represents the maximum amount of air that is held in lungs - vital capacity, respiratory reserve or tidal volume?
   - **vital capacity**

17. Which is the amount of air exchanged during a normal breath? (vital capacity, respiratory reserve or tidal volume)
   - **tidal volume**

18. What types of normal variations could account in differences in lung capacity among members of a 9th grade class of students?
   - **size, sex, weight**

19. What effect would smoking have on the lung capacity of an individual over a long period of time? Why?
   - **decreases – destroys tissue**

20. What are the effects of exercise and conditioning have on lung capacity over a long period of time? Why?
   - **increases strength, endurance (strengthens muscles used in respiration)**
Station D:

26. How many teeth does this adult have?

27. Many individuals have their “wisdom teeth” pulled. Which letter represents these teeth?

28. What are the glands labeled “G” and what is their function?

29. Give the letter from the diagram for the canine teeth. How are they modified in carnivores?

30. Give the name and function of structure “F”
26. How many teeth does this adult have?
   32 teeth

27. Many individuals have their “wisdom teeth” pulled. Which letter represents these teeth?
   E (wisdom teeth)

28. What are the glands labeled “G” and what is their function?
   Salivary gland produces saliva as lubricant, antiseptic, and begins starch digestion

29. Give the letter from the diagram for the canine teeth. How are they modified in carnivores?
   B – canine are long and pointed in carnivores

30. Give the name and function of structure “F”
   tongue – manipulates food into ball for swallowing and helps with speech
Station F:

Examine the Data on Digestion of a Meal and answer the following questions.

A person ate dinner at 6 PM on Monday and the progress of the food through the digestive system was recorded.

31. How many hours was the food from this meal in the digestive system?

32. How many hours was the food in the stomach?  
   What percent of the total time was spent in the stomach?

33. Where does most of the digestion of food take place?  
   What percent of the total time was spent in this part of the digestive system?

34. In what two parts of the digestive system does the food spend the least amount of time?  About how many minutes are spent in these two regions combined?

35. In what region of the digestive system is digestion aided by bacteria for additional extraction and absorption of nutrients, salts, and water?  
   What percent of the total time is spent in this region?
Station F:

Examine the Data on Digestion of a Meal and answer the following questions.

A person ate dinner at 6 PM on Monday and the progress of the food through the digestive system was recorded.

31. How many hours was the food from this meal in the digestive system?
   20 hours

32. How many hours was the food in the stomach?
   What percent of the total time was spent in the stomach?
   about 4 hours

33. Where does most of the digestion of food take place?
   What percent of the total time was spent in this part of the digestive system?
   small intestine – about 58% (50 – 60 %)

34. In what two parts of the digestive system does the food spend the least amount of time? About how many minutes are spent in these two regions combined?
   Mouth and esophagus – about 15 min or ¼ hour

35. In what region of the digestive system is digestion aided by bacteria for additional extraction and absorption of nutrients, salts, and water?
   What percent of the total time is spent in this region?
   Large Intestine – about 14 % (10-15%)
Station G:

36. What three areas of the alimentary canal are involved in mechanical digestion?

37. What process involving muscle contraction allows the food to be moved through the digestive system?

38. What two organs do most of the chemical digestion of food?

39. Where does most of the absorption of nutrients take place?

40. Where does most of the water absorption of water and formation of feces take place?
36. What three areas of the alimentary canal are involved in mechanical digestion? 
   **mouth, stomach, and small intestine**
37. What process involving muscle contraction allows the food to be moved through the digestive system? 
   **peristalsis**
38. What two organs do most of the chemical digestion of food? 
   **stomach and small intestine**
39. Where does most of the absorption of nutrients take place? 
   **small intestine**
40. Where does most of the water absorption of water and formation of feces take place? 
   **large intestine**
41. Where are the precursor cells which form the immune cells produced?

42. What do the cells of the immune system defend against?

43. The lymph tissue assists in immunity – where are these lymph tissues found?

44. Which cells are the chief phagocytes in the blood and become macrophages when in organs?

45. Which cells make and secrete antibodies?

46. Which cells recognize foreign antigens and secrete antibodies to guide the attack?

47. Which cells kills cells with the guidance of antibodies?

48. Which cells destroy worms?

49. Which cells trigger the inflammatory response?

50. Which cells are attacked by the HIV virus?
14

Station H: Immune Cells

41. Where are the precursor cells which form the immune cells produced?
   bone marrow

42. What do the cells of the immune system defend against?
   infectious agents, malfunctioning cells or abnormal body cells and foreign cells or particles

43. The lymph tissue assists in immunity – where are these lymph tissues found?
   spleen, thymus, tonsils, lymph nodes, GALT, MALT, SALT

44. Which cells are the chief phagocytes in the blood and become macrophages when in organs?
   monocytes – dendrite cells are also phagocytes in tissues that are in contact with external environment

45. Which cells make and secrete antibodies?
   plasma cells or plasma B cells

46. Which cells recognize foreign antigens and secrete antibodies to guide the attack?
   B cells

47. Which cells kills cancer cells, cells infected esp with viruses and other damaged cells?
   NK cells or cytotoxic T cells

48. Which cells destroy parasitic worms?
   eosinophils

49. Which cells trigger the inflammatory response and release histamine?
   basophils and Mast cells

50. Which cells are attacked by the HIV virus?
   helper T cells also macrophages and dendrite cells
Station I: Inflammation Process

51. What is the body’s first line of defense? What helps with is defense?

52. What is the body’s second line of defense?

53. What is the body’s third line of defense?

54. Which line of defense is most involved in the inflammation process?

55. Is the response associated with the inflammation process - specific or nonspecific? Why?

56. What is the role of complement proteins?

57. What is the collective name for the types of immune cells with destroy invading organisms?

58. What is the major mechanism used to destroy invading organisms?

59. What make up the pus that is formed during the inflammation process?

60. What chemicals are released which cause redness, swelling, and pain?
51. What is the body’s first line of defense? What helps with is defense?
   prevent entry – intact skin and mucosae and their secretions
52. What is the body’s second line of defense?
   fight infection and keep it local - phagocytic white blood cells, antimicrobial proteins, and other cells
53. What is the body’s third line of defense? (Specific or innate response)
   combat major infections - Lymphocytes and Antibodies – work on specific invaders – produce memory cells to protect against another infection
54. Which line of defense is most involved in the inflammation process?
   Second line of defense
55. Is the response associated with the inflammation process - specific or nonspecific? Why?
   Non-specific – it is designed to be immediate and fight all invaders
56. What is the collective name for the types of immune cells with destroy invading organisms?
   phagocytes – mainly neutrophils
57. What is the role of complement proteins?
   activate other proteins in a domino fashion resulting in a cascade of reactions which attract phagocytes
58. What is the major mechanism used to destroy invading organisms?
   phagocytosis
59. What make up the pus that is formed during the inflammation process?
   Dead neutrophils make up a large proportion of pus
60. What chemicals are released which cause redness, swelling, and pain?
   histamine – this is why antihistamines are used to reduce inflammation
Station J. Immune Responses

The third line of defense is very specific and involves two processes.

Use the diagram of these two processes in answering Questions 91-100.

61. Which is the third line of defense – the adaptive response – specific or nonspecific?

62. Which is the third line of defense – the adaptive response – immediate or is there a lag time between exposure and maximum response?

63. What is the name of the response which defends against extracellular pathogens by binding to antigens?

64. What is the name of the response process which defends against intracellular pathogens and cancer by binding to and lysing these cells?

65. Antigen-presenting cells stimulate what type of cells? What letter is it on the diagram?

66. Which type of cells stimulate B cells, cytotoxic T cells and memory T cells? What letter is it on the diagram?

67. Free antigens directly activate what type of cells? What letter is it on the diagram?

68. What cells secrete antibodies and are derived from B cells? What letter is it on the diagram?

69. Which cells binding to and lyse infected cells or cancer cells? What letter is it on the diagram?

70. Which cells provide memory for the two response mechanisms to help with future infections?
Station J. Immune Responses

The third line of defense is very specific and involves two processes.

Use the diagram of these two processes in answering Questions 91-100.

61. Which is the third line of defense – the adaptive response – specific or nonspecific?  
   specific

62. Which is the third line of defense – the adaptive response – immediate or is there a lag time between exposure and maximum response?  
   lag time between exposure and maximum response

63. What is the name of the response which defends against extracellular pathogens by binding to antigens?  
   Humoral (antibody-mediated) immune response

64. What is the name of the response process which defends against intracellular pathogens and cancer by binding to and lysing these cells?  
   Cell-mediated immune response

65. Antigen-presenting cells stimulate what type of cells? What letter is it on the diagram?  
   Helper T cells – C on the diagram

66. Which type of cells stimulate B cells, cytotoxic T cells and memory T cells? What letter is it on the diagram?  
   Helper T cells – C on the diagram

67. Free antigens directly activate what type of cells? What letter is it on the diagram?  
   B cells – A on the diagram

68. What cells secrete antibodies and are derived from B cells? What letter is it on the diagram?  
   Plasma cells – B on the diagram

69. Which cells bind to and lyse infected cells or cancer cells? What letter is it on the diagram?  
   Active cytotoxic T cells – H on the diagram

70. Which cells provide memory for the two response mechanisms to help with future infections? What letters is it on the diagram?  
   Memory B cells and Memory T cells – E & F on the diagram