1) Which is a characteristic of lymph nodes?
   A) They move fluids by means of a muscular pump.
   B) They produce new red blood cells.
   C) They carry blood under great pressure.
   D) They contain phagocytic cells.

2) A person with AIDS is likely to develop infectious diseases because the virus that causes AIDS
   A) damages the immune system
   B) increases the rate of antibody production
   C) destroys cancerous cells
   D) increases the rate of microbe destruction

Questions 3 through 5 refer to the following:

The diagram below represents part of the human respiratory system.

3) Compared to the blood entering \( A \), the blood leaving the vessel network at \( C \) has a lower concentration of
   A) oxygen
   B) oxygen and hemoglobin
   C) hemoglobin and carbon dioxide
   D) carbon dioxide

4) The blood vessels (\( B \)) surrounding these air sacs are known as
   A) arteries
   B) lymphatic ducts
   C) veins
   D) capillaries

5) These air sacs are known as
   A) bronchi
   B) tracheae
   C) alveoli
   D) bronchioles

6) Which response usually occurs after an individual receives a vaccination for influenza virus?
   A) Antibodies against the virus form in the blood.
   B) Antigens from the vaccine deactivate the virus.
   C) Hormones in the blood inhibit reproduction of the virus.
   D) Enzymes released from platelets hydrolyze the virus.
7) The diagram below represents part of the human respiratory system.

![Diagram of the respiratory system]

The heart chamber which most directly pumps blood to the vessel network at A is the
A) left ventricle B) left atrium C) right atrium D) right ventricle

8) The release of histamines within the body is most closely associated with
A) rejection of a transplanted organ B) blood clotting C) an allergic reaction D) active immunity

9) Humans breathe more rapidly during exercise than before it because during exercise the blood contains
A) a decreased number of red blood cells B) an increased level of oxygen C) an increased level of carbon dioxide D) a decreased amount of hemoglobin

Questions 10 through 14 refer to the following:

The diagram below represents a human heart and some major blood vessels.

![Diagram of the heart and blood vessels]

10) Deoxygenated blood from the lower part of the body returns to the heart by way of structure
A) 6 B) 5 C) 7 D) 8

11) When blood is pumped out of chamber 2, it will circulate directly to the
A) brain B) liver C) legs D) lungs

12) Which numbers indicate the atria?
A) 1 and 2 B) 2 and 4 C) 1 and 3 D) 3 and 4
13) The heart chamber indicated by number 4 is the
A) left atrium  B) left ventricle  C) right ventricle  D) right atrium

14) The blood vessel indicated by number 5 is known as the
A) aorta  B) coronary artery  C) pulmonary artery  D) superior vena cava

15) In the ventricles, deoxygenated blood is prevented from mixing with oxygenated blood by the structure labeled
A) A  B) B  C) D  D) C

16) A girl became ill with German measles and recovered. A year later, she was exposed to the disease again but did not become ill. Which is the most probable explanation for her failure to develop measles after the second exposure?
A) Her red blood cell count was elevated.
B) Specific antibodies were produced as a result of the initial illness.
C) Antibiotics taken during the initial illness were still at work.
D) The disease virus had mutated into a different strain.

17) Scientific studies have indicated that there is a higher percentage of allergies in babies fed formula containing cow's milk than in breast-fed babies. Which statement represents a valid inference made from these studies?
A) There is no relationship between drinking cow's milk and having allergies.
B) Breast feeding prevents all allergies from occurring.
C) Milk from cows causes allergic reactions in all infants.
D) Breast milk most likely contains fewer substances that trigger allergies.

18) The list below includes three ways of controlling viral diseases in humans.

- Administering a vaccine containing a dead or weakened virus that stimulates the body to form antibodies against the virus.
- Using chemotherapy (chemical agents) to kill viruses similar to the way in which sulfa drugs or antibiotics act against bacteria.
- Relying on the action of interferon, which is produced in cells and protects the body against pathogenic viruses.

Based on this information, which activity would contribute to the greatest protection against viruses?
A) developing a method to stimulate the production of interferon in cells
B) producing a vaccine that is effective against interferon
C) synthesizing a sulfa drug that prevents the destruction of bacteria by viruses
D) using interferon to treat a number of diseases caused by bacteria
Questions 19 and 20 refer to the following:

<table>
<thead>
<tr>
<th>Volunteer</th>
<th>Injected with Dead Chicken Pox Virus</th>
<th>Injected with Dead Mumps Virus</th>
<th>Injected with Distilled Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>D</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

19) None of these volunteers ever had chicken pox. After the injection, there would most likely be antibodies to chicken pox in the bloodstream of
   A) volunteers A and D, only
   B) volunteer D, only
   C) volunteer C
   D) volunteers A, B, and D

20) Volunteers A, B, and D underwent a procedure known as
   A) electrophoresis
   B) vaccination
   C) cloning
   D) chromatography

21) Whole blood type O may safely be given to people with which types of blood?
   A) O and B, only
   B) A, B, AB, and O
   C) A and B, only
   D) AB and A, only

22) Which type of vessel normally contains valves that prevent the backward flow of materials?
   A) vein
   B) artery
   C) capillary
   D) arteriole

23) Inflammation of certain membranes in the human respiratory system is known as
   A) anemia
   B) bronchitis
   C) gout
   D) meningitis

24) Under which circumstances will an antigen-antibody reaction most likely occur?
   A) A person with blood type O is given type A blood.
   B) A person with blood type A is given type O blood.
   C) A person with blood type AB is given type B blood.
   D) A person with blood type AB is given type O blood.

25) In the human heart, the muscular structure of the ventricles enables them to
   A) pump blood a greater distance than atria can
   B) carry only deoxygenated blood
   C) carry only oxygenated blood
   D) pump blood directly into the atria

26) In some individuals, the immune system attacks substances such as grass pollen that are usually harmless, resulting in
   A) an insulin imbalance
   B) an allergic reaction
   C) a mutation
   D) a form of cancer

27) Which blood type could a person with blood type O safely receive?
   A) AB
   B) A
   C) B
   D) O

28) A portion of the human respiratory tract is represented in the diagram below.

Which structure is indicated by letter A?
   A) trachea
   B) bronchiol
   C) pharynx
   D) alveolus

29) The thin-walled vessels of the circulatory system where most oxygen and carbon dioxide are exchanged are
   A) arteries
   B) alveoli
   C) capillaries
   D) veins
30) The diagram below represents what can happen when homeostasis in an organism is threatened.

Which statement provides a possible explanation for these events?
A) Cloning removes abnormal cells produced during differentiation.
B) Embryonic development of essential organs occurs during pregnancy.
C) Antibiotics break down harmful substances by the process of digestion.
D) Some specialized cells mark and other cells engulf microbes during immune reactions.

31) Which structure is involved in the breakdown of red blood cells?
A) sweat gland  B) alveolus  C) nephron  D) liver

32) A person who consumes large amounts of saturated fats may increase his or her chances of developing
A) cardiovascular disease  C) hemophilia
B) meningitis  D) viral pneumonia

33) Which activity would stimulate the human immune system to provide protection against an invasion by a microbe?
A) receiving hormones contained in mother's milk while nursing
B) choosing a well-balanced diet and following it throughout life
C) receiving antibiotic injections after surgery
D) being vaccinated against chicken pox

34) The chart below gives incomplete information about various systems of the human body which can fail, causing a specific malfunction.

<table>
<thead>
<tr>
<th>Malfunction of Human Body</th>
<th>System Affected</th>
<th>Characteristic of Malfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Endocrine</td>
<td>Not enough insulin produced by the pancreas, causing high levels of sugar in blood and urine; weakness results</td>
</tr>
<tr>
<td>Leukemia</td>
<td>B</td>
<td>Cancer of the bone marrow, causing uncontrolled production of white blood cells</td>
</tr>
<tr>
<td>Emphysema</td>
<td>Respiratory</td>
<td>C</td>
</tr>
<tr>
<td>D</td>
<td>Nervous</td>
<td>Inflammation of membranes surrounding the brain and spinal cord caused by bacterial or viral infection</td>
</tr>
</tbody>
</table>

The name of which system should be included in the table at B?
A) endocrine  B) reproductive  C) circulatory  D) digestive

35) In humans, what happens when the breathing rate increases?
A) Oxygen from body cells will diffuse more rapidly into red blood cells.
B) Increased oxygen dissolved in the blood will stimulate the cerebrum to slow the breathing rate.
C) Additional oxygen will diffuse into the blood as carbon dioxide diffuses out of the blood in the lungs.
D) Additional carbon dioxide will diffuse into the blood as oxygen diffuses out of the blood in the lungs.
36) Which sequence represents the direction of flow of carbon dioxide as it passes out of the respiratory system into the external environment?

A) alveoli → trachea → bronchioles → bronchi → pharynx → nasal cavity
B) alveoli → bronchioles → bronchi → trachea → pharynx → nasal cavity
C) alveoli → pharynx → trachea → bronchioles → bronchi → nasal cavity
D) alveoli → bronchi → pharynx → bronchioles → trachea → nasal cavity

37) Most carbon dioxide is carried in the plasma in the form of

A) bicarbonate ions  B) hydrogen ions  C) lactic acid  D) oxyhemoglobin

38) Which condition would most likely result in a human body being unable to defend itself against pathogens and cancerous cells?

A) a parasitic infestation of ringworm on the body
B) the production of antibodies in response to an infection in the body
C) the presence in the body of the virus that causes AIDS
D) a genetic tendency toward a disorder such as diabetes

39) The absorption of fluids by various cells of the human body is part of the life function known as

A) transport  B) growth  C) respiration  D) excretion

40) In some individuals, substances such as pollen, mold, dust, or animal hair may cause an allergic response by stimulating the release of

A) histamine  B) glycogen  C) thyroxin  D) urea

41) Which phrase does not describe a way the human body responds to fight disease?

A) production of pathogens by white blood cells
B) production of antibodies by white blood cells
C) destruction of infectious agents by white blood cells
D) increased production of white blood cells

42) Certain microbes, foreign tissues, and some cancerous cells can cause immune responses in the human body because all three contain

A) cytoplasm  B) enzymes  C) fats  D) antigens

43) Smoking may damage the respiratory system because deposits from the smoke can

A) trigger the release of antigens by the alveoli
B) lower blood pressure in the mucous membranes of the bronchioles
C) interfere with ciliary action in the trachea
D) block the transmission of impulses that regulate breathing

44) In humans, circulation to and from the lungs is known as

A) lymphatic circulation  B) pulmonary circulation
C) coronary circulation  D) systemic circulation

45) Which statement most accurately describes human veins?

A) They are thin-walled vessels through which nutrients and gases diffuse to body tissues.
B) They are relatively thin-walled vessels that transport blood back to the heart from the body tissues.
C) They are thick, muscular vessels that help pump blood away from the heart to body tissues.
D) They are thick, muscular vessels that contain valves and transport blood away from the heart to body tissues.
46) Students performed an investigation to determine the effect of exercise and rest on systolic and diastolic blood pressure. The graph below represents one student's results for this experiment.

![Graph showing effect of exercise on blood pressure]

What change in blood pressure occurs during the rest period after exercise?
A) Diastolic pressure increases, only.
B) Both systolic and diastolic pressures decrease.
C) Systolic pressure increases, only.
D) Both diastolic and systolic pressures increase, then decrease.

47) Which statement correctly describes the activities of the components of human blood shown in the diagram below?

![Diagram of blood components]

A) Both A and B function in immune responses, and C transports oxygen.
B) Both B and C provide immunity, and A transports nutrients.
C) A, B, and C are able to synthesize hemoglobin.
D) A transports oxygen, B initiates clots, and C functions in immune responses.

48) Many vaccinations stimulate the immune system by exposing it to
A) enzymes
B) antibodies
C) weakened microbes
D) mutated genes

49) One similarity between cell receptors and antibodies is that both
A) are involved in digestion
B) are highly specific in their actions
C) slow the rates of chemical reactions
D) are produced by nerve cells

50) A type of "heart attack" in which a narrowing of the coronary artery causes an inadequate supply of oxygen to reach the heart muscle is known as
A) anemia
B) cerebral palsy
C) leukemia
D) angina pectoris
51) Which part of the human respiratory system is correctly paired with a description of its structure?
A) bronchiole — small branching tubule lacking cartilaginous rings
B) alveolus — microscopic sac containing rings of cartilage and ciliated membranes
C) trachea — thin, moist membrane surrounded by capillaries
D) pharynx — cavity lined with flagellated mucous membranes

52) A part of the Hepatitis B virus is synthesized in the laboratory. This viral particle can be identified by the immune system as a foreign material but the viral particle is not capable of causing disease. Immediately after this viral particle is injected into a human it
A) stimulates the production of enzymes that are able to digest the Hepatitis B virus
B) breaks down key receptor molecules so that the Hepatitis B virus can enter body cells
C) synthesizes specific hormones that provide immunity against the Hepatitis B virus
D) triggers the formation of antibodies that protect against the Hepatitis B virus

53) Which structures in the nasal cavity remove some bacteria and dust from outside air before it enters the lungs?
A) lymph nodes
B) ciliated mucous membranes
C) rings of cartilage
D) thin, moist alveoli

54) Which statement accurately describes human capillaries?
A) They contract to assist blood flow.
B) They have valves to prevent backflow of blood.
C) They have walls one cell thick.
D) They filter bacteria out of the blood.

55) Which structure is best illustrated by the diagram below?
A) a heart ventricle
B) an artery
C) a lymph vessel
D) a capillary
56) In which heart diagram do the arrows correctly represent the path of blood flow?

A)  

B)  

C)  

D)  

57) People with a blood antigen genotype of ii can receive only type O blood because their blood contains

A) anti-A antibodies and B antigens  
B) A and B antigens and no anti-A or anti-B antibodies  
C) anti-B antibodies and A antigens  
D) anti-A and anti-B antibodies and no A or B antigens

58) Blood can be tested to determine the presence of the virus associated with the development of AIDS. This blood test is used directly for

A) treatment  
B) cure  
C) prevention  
D) diagnosis

59) Which adaptation found within the human respiratory system filters, warms, and moistens the air before it enters the lungs?

A) involuntary smooth muscle  
B) clusters of alveoli  
C) ciliated mucous membranes  
D) rings of cartilage

60) For each statement, select the human system that is best described by the statement.

This system includes the pharynx, trachea, and alveoli.

A) nervous  
B) excretory  
C) endocrine  
D) respiratory

61) Many bacteria that enter the circulatory system are engulfed and destroyed by

A) platelets  
B) plasma  
C) phagocytic red blood cells  
D) phagocytic white blood cells

62) Which statement best describes the human respiratory system?

A) The external body surface is kept moist to allow for gas exchange.  
B) It is composed of a network of moist passageways that permit air to flow from the external environment to the lungs.  
C) Each cell of the human body is in direct contact with the external environment, and gas exchange occurs by diffusion.  
D) Gases diffuse across membranes on both the external and internal surfaces of the body.

63) What will most likely happen when food is in the trachea?

A) The food will interfere with the passage of air to the alveoli.  
B) The food will undergo emulsification and deamination.  
C) The food will be completely digested as a result of enzyme action.  
D) The food will be moved down to the stomach by peristalsis.
64) In humans, which of the following is produced within certain bones?
   A) striated muscle cells  
   B) red blood cells  
   C) urea  
   D) bile

65) Which substances produced in the body are directly responsible for the rejection of a transplanted organ?
   A) antigens  
   B) antibodies  
   C) histamines  
   D) excretions

66) Which human organ is correctly paired with its functional subunits?
   A) lung — alveoli  
   B) liver — ureters  
   C) kidney — neurons  
   D) brain — nephrons

67) Allergic reactions are most closely associated with
   A) the action of circulating hormones  
   B) immune responses to usually harmless substances  
   C) a low blood sugar level  
   D) the shape of red blood cells

68) Which condition results from brain cell damage due to blocked or burst blood vessels and is characterized by impaired speech or motor patterns?
   A) diabetes  
   B) meningitis  
   C) polio  
   D) stroke

69) Which blood component is correctly paired with a process in which it is directly involved?
   A) platelets — oxygen transport  
   B) white blood cells — clotting  
   C) red blood cells — bacteria destruction  
   D) lymphocytes — antibody production

70) Which activity is not a response of human white blood cells to pathogens?
   A) engulfing and destroying bacteria  
   B) identifying invaders for destruction  
   C) removing carbon dioxide  
   D) producing antibodies

Questions 71 and 72 refer to the following:

The schematic diagram below shows the blood flow throughout the human body.

71) Which chambers of the heart contain blood which has the highest concentration of oxygen?
   A) 1 and 3  
   B) 2 and 4  
   C) 1 and 2  
   D) 3 and 4

72) Which blood vessels contain blood with the lowest concentration of oxygen?
   A) D and B  
   B) A and D  
   C) B and C  
   D) C and A

73) The exchange of air between the human body and the environment is a result of the rhythmic contractions of the rib cage muscles and the
   A) trachea  
   B) heart  
   C) lung  
   D) diaphragm

74) A patient has just received an organ transplant. Which treatment would be most effective in preventing the rejection of the organ by the patient's body?
   A) Give the patient blood transfusions.  
   B) Treat the patient with antibiotics to fight off a possible viral infection.  
   C) Restrict the patient's salt intake.  
   D) Treat the patient with medications that decrease the immune response.
75) Microbes that enter the body, causing disease, are known as
   A) antibodies    B) hosts    C) pathogens    D) enzymes

76) The accumulation of specific antibodies in the plasma, due to the introduction of an antigen, is characteristic of
   A) a coronary thrombosis    C) an immune response
   B) angina pectoris    D) cerebral palsy

77) What is a major difference between red blood cells and white blood cells?
   A) Red blood cells can move, but white blood cells cannot.
   B) Red blood cells engulf foreign bacteria, but white blood cells do not.
   C) Red blood cells contain nuclei, but white blood cells do not.
   D) Red blood cells contain hemoglobin, but white blood cells do not.

78) People with AIDS are unable to fight multiple infections because the virus that causes AIDS
   A) produces antibodies in their blood
   B) attacks muscle tissue
   C) weakens their immune systems
   D) kills pathogens

Questions 79 through 81 refer to the following:

The diagram below represents the human heart, and the direction of blood flow is indicated by the arrows.

79) The aorta is represented by number
   A) 1    B) 8    C) 6    D) 4

80) Deoxygenated blood returns to the heart through the structure represented by number
   A) 3    B) 8    C) 7    D) 5

81) The chamber that pumps blood to all parts of the body except the lungs is represented by number
   A) 4    B) 1    C) 3    D) 2
82) The diagram below represents a human heart.

Which type of circulation is represented by the pathway below?

\[ C \rightarrow G \rightarrow \text{organs} \rightarrow E \text{ and } H \rightarrow A \]

A) coronary circulation  
B) lymphatic circulation  
C) pulmonary circulation  
D) systemic circulation

83) Which body structures have walls one cell thick?

A) veins and arteries  
B) trachea and bronchi  
C) capillaries and alveoli  
D) lymph vessels and stomach

84) Which line in the graph below best illustrates an effect of the carbon dioxide level in the blood on breathing rate before, during, and after a period of exercise?

\[ \text{Breathing Rate (breaths/min)} \]

A) A  
B) B  
C) C  
D) D

85) In humans, excess fluid and other substances surrounding the cells are returned to the blood by

A) arteries  
B) platelets  
C) lymphocytes  
D) lymph vessels

86) Which structures in human blood contain enzyme molecules necessary for the clotting process?

A) red blood cells  
B) phagocytes  
C) lymphocytes  
D) platelets

87) Which substances may form in the human body due to invaders entering the blood?

A) nutrients  
B) vaccines  
C) red blood cells  
D) antibodies

88) Choose the disease that is most closely related to the given phrase.

a change in the structure of the lung resulting in decreased lung capacity

A) emphysema  
B) leukemia  
C) angina pectoris  
D) meningitis
89) Which statement does not identify a characteristic of antibodies?
A) They are nonspecific, acting against any foreign substance in the body.
B) They may be produced by white blood cells.
C) They may be produced in response to an antigen.
D) They are produced by the body in response to the presence of foreign substances.

90) Which respiratory structure is supported by rings of cartilage?
A) bronchiole  B) alveolus  C) trachea  D) pharynx

91) Human blood types in the ABO blood group are identified by
A) a series of enzyme-controlled synthesis reactions  C) antigen-antibody reactions
B) clotting factors in the plasma  D) microscopic examination of white blood cells

92) Which diagram correctly illustrates the flow of blood through the heart?

A)  

B)  

C)  

D)  

93) The diagram below shows a sequence of events that occurs in humans.

Stimulus → Rupture of Platelets → Release of an Enzyme → Formation of Protein Fibers → A

Which information belongs in box A?
A) decrease in body temperature  C) formation of a clot
B) formation of urea  D) increase in breathing rate

94) Which statement best describes an immune response?
A) It usually involves the recognition and destruction of pathogens.
B) It releases red blood cells that destroy parasites.
C) It always produces antibiotics.
D) It stimulates asexual reproduction and resistance in pathogens.

95) The diagrams below represent different types of cells found in the human body. Which type of cell is a component of blood tissue?

A)  

B)  

C)  

D)  


96) The diagram below represents one possible immune response that can occur in the human body.

![Diagram of immune response]

The structures that are part of the immune system are represented by

A) A, B, and C  
B) B and C, only  
C) A, only  
D) A and C, only

97) Which immune reaction is best described by the statement below.

Antibodies present in breast milk protect a nursing baby from many illnesses.

A) allergy  
B) rejection  
C) passive immunity

98) The human trachea is a passageway that remains open due to the presence of

A) bones  
B) ligaments  
C) cartilaginous rings  
D) skeletal muscles

Questions 99 and 100 refer to the following:

The diagram below illustrates the human heart.

![Diagram of heart]

99) The movement of blood between structures 5 and 6 is known as

A) systemic circulation  
B) coronary circulation  
C) lymphatic circulation  
D) pulmonary circulation

100) The blood vessel indicated by number 8 transports

A) deoxygenated blood from the body to the heart  
B) deoxygenated blood from the heart to the body  
C) oxygenated blood from the heart to the body  
D) oxygenated blood from the body to the heart