1. Which function of human blood includes the other three?
   A) transporting nutrients
   B) transporting oxygen
   C) **maintaining homeostasis**
   D) collecting wastes

2. Base your answer to the following question on the information below and on your knowledge of biology.

   Cells of the immune system and the endocrine system of the human body contribute to the maintenance of homeostasis. The methods and materials these two systems use as they carry out this critical function are different.

   State **two** ways cells of the immune system fight disease.

3. The two reactions illustrated in the diagrams below often occur when a foreign substance enters the body.

   ![Diagram of foreign substance and specific proteins]

   The cells labeled **A** and **B** are examples of cells known as
   A) guard cells
   B) reproductive cells
   C) **white blood cells**
   D) specialized skin cells

4. A student infected by a common cold virus ran a low-grade fever. After a few days, the student's temperature returned to normal and the student was free of cold symptoms. The fever served as
   A) an antigen in the circulatory system
   B) **an immune response to a pathogen**
   C) a biological catalyst
   D) a weakened pathogen

5. A person who is given an injection containing only antibodies would most likely develop
   A) allergies
   B) sickle-cell anemia
   C) leukemia
   D) **passive immunity**
6. In 1995, during an Ebola virus outbreak, approximately 80% of the infected individuals died. Which statement is an inference that could be made based on this information?

A) The individuals who survived were able to produce antibodies against the Ebola virus
B) The individuals who survived were not exposed to the Ebola antigens
C) Eighty percent of the population had a natural immunity to the Ebola virus.
D) Eighty percent of the population was infected with a viral antigen.

7. Base your answer to the following question on the structures in the diagram of human blood below that help to maintain homeostasis in humans.

State one way a cell such as cell X helps to maintain homeostasis.

8. SCIDS (Severe Combined Immunodeficiency Syndrome) is a disorder where a genetic mutation inhibits the production and functioning of T-cells. T-cells are special types of white blood cells that play a role in the body’s immune response. A possible symptom of SCIDS would be an increase in the

A) number of antigens produced
B) red blood cell count
C) number of infections by pathogens
D) ability to maintain homeostasis

9. A direct indication that the white blood cells of the body are functioning would be

A) an increase in the number of oxygen molecules in the lungs
B) a decrease in the number of pathogens in the body
C) a decreased secretion of hormones by certain glands
D) an increase of carbon dioxide in the cells of the body

10. A student received a flu shot in the fall. During the flu season, the student caught a cold. The most likely reason the vaccine he received did not prevent the cold was that

A) his illness was not caused by a pathogen
B) he did not get the vaccine at the right time of year
C) his body produced antibiotics in response to the vaccine
D) the vaccine he received contained only flu virus antigens
Base your answers to questions 11 and 12 on "the graph below.

11. Which statement provides the best possible reason for the decrease in number of cases of bacterial pneumonia from 1940 to 1970?

A) As a result of genetic engineering, humans became immune to the bacteria.
B) **Antibiotics were made available for the treatment of bacterial infections.**
C) The bacteria did not respond to medical treatments.
D) As a result of sexual reproduction, the bacteria evolved into a harmless form.

12. Which statement best explains a change in the incidence of disease in 1970?

A) **Children were vaccinated against measles.**
B) New drugs cured diabetes.
C) The bacteria that cause pneumonia developed a resistance to drugs.
D) New technology helped to reduce the incidence of all three diseases.

13. The purpose of introducing weakened microbes into the body of an organism is to stimulate the

A) production of living microbes that will protect the organism from future attacks
B) production of antigens that will prevent infections from occurring
C) **immune system to react and prepare the organism to fight future invasions by these microbes**
D) replication of genes that direct the synthesis of hormones that regulate the number of microbes

14. Which activity would stimulate the human immune system to provide protection against an invasion by a microbe?

A) receiving antibiotic injections after surgery
B) choosing a well-balanced diet and following it throughout life
C) **being vaccinated against chicken pox**
D) receiving hormones contained in mother’s milk while nursing
Super Vaccine Could Eliminate Flu

Every flu season, vaccine makers must bet on which strain of influenza A will pose the greatest threat to the public, and millions of Americans must decide whether to get a shot. In August, virologist Gary Nabel at the National Institutes of Health (NIH) announced progress toward a universal flu vaccine: two shots of it could provide years of protection from every known influenza A virus.

"We use a prime-boost strategy, meaning that we immunize with two vehicles that deliver the vaccine in different ways," Nabel says. In their experimental treatment, he and his colleagues injected mice, ferrets, and monkeys with viral DNA, causing their muscle cells to produce hemagglutinin, a protein found on the surface of all flu viruses. The animals' immune systems then began making antibodies that latch onto the protein and disable the virus. The researchers followed the DNA injection with a traditional seasonal flu shot, which contains dead viruses. This one-two punch protected the test subjects against influenza A viruses that had emerged in 1934 and 2007, and other experiments showed that the antibodies it generated successfully neutralized a wide variety of flu strains. Nabel's colleagues at the NIH are already testing similar approaches in humans.

Source: Rowe, A. "Super Vaccine Could Eliminate Flu."
Discover, Jan./Feb. 2011, p. 37.

15. Explain how injecting dead or weakened viruses into a person can help to fight against future infections from that virus.

16. Identify one specific difference, other than it is a two-step vaccination, between Nabel's vaccination and a traditional flu vaccine.

17. Describe how vaccinations help to prevent the spread of disease, even in people who have not received the vaccination.

18. Describe how a vaccination prevents disease in the individual who receives a vaccination.

19. Identify the component of a vaccine that makes it effective.
Base your answers to questions 20 and 21 on the information below and on your knowledge of biology.

Some viruses can enter cells by first attaching to the cell membrane. The flu virus targets and attaches to the cells of the nose and mouth. The hepatitis virus targets only specific cells of the liver.

20. Most people who get vaccinated develop immunity to the disease. Explain why the contents of the vaccine usually do not cause people to get sick.

21. State one way the immune system reacts when one of these viruses enters the body.
1. C

2. Examples: — engulf foreign substances — produce antibodies — recognize pathogens/antigens

3. C

4. B

5. D

6. A

7. Examples: — destroys foreign antigens — produces antibodies — engulfs bacteria

8. C

9. B

10. D

11. B

12. A

13. C

14. C

15. — Your body responds by making antibodies that protect you from future infections. — There are antigens on the surface of the dead virus, which then trigger the body to produce antibodies specific to that antigen. — The body makes memory cells that can fight the virus in the future.

16. — protects from every known influenza A virus, — directly injects viral DNA, — adds years of protection, — It makes muscle cells produce hemagglutinin. — It causes muscle cells to make a protein found on the surface of all flu viruses.

17. — Not as many people get sick, so the disease does not spread to as many other people. — It is less likely that the disease will spread, since fewer people are going to have the disease. — reduces the risk for exposure in the community

18. — The vaccination activates the immune system. — stimulates the production of antibodies, — stimulates the formation of memory cells — antigens, — weakened/dead pathogen, — inactive chickenpox virus

19. — The vaccine contains only dead organisms or chemicals associated with pathogens. — The contents of a vaccine are not functional pathogens/not able to reproduce and make you sick. — The vaccine contains weakened pathogens that will not make people sick.

20. — The white blood cells will make antibodies against a specific antigen on the virus. — The immune system recognizes the specific virus, and will make chemicals to fight the virus. — Antibodies will be produced. — The number of white blood cells will increase. — White blood cells will engulf the virus. — Body temperature increases.