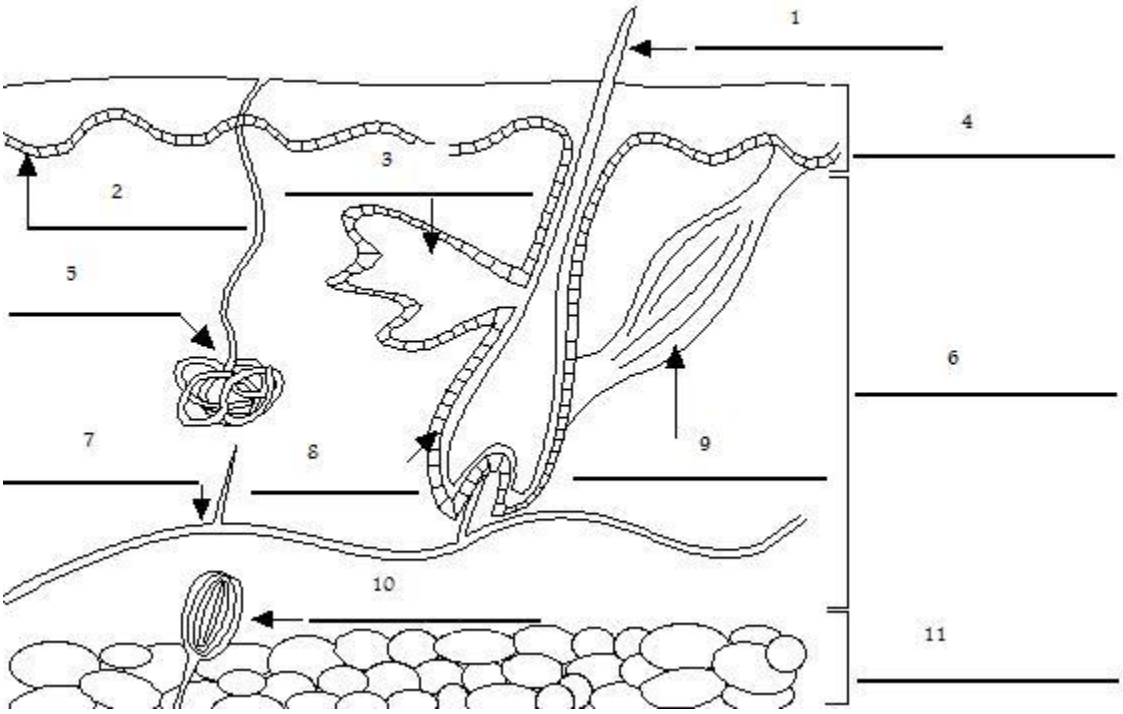
Name:_____
Grade:_____

ANATOMY AND PHYSIOLOGY ANSWERS

Integumentary System

Diagram 1 point each, fill in the corresponding blanks.



1. hair shaft
2. melanocytes
3. sebaceous gland
4. epidermis
5. sudoriferous/sweat gland
6. dermis
7. blood vessel
8. hair follicle
9. arrector pili
10. Pacinian corpuscule
11. subcutaneous layer/hypodermis

Multiple Choice 1 point each, circle the letter of the best response.

12. Vitamin D increases _____ absorption in the body.

A) calcium B) sodium C) oxygen D) water E) none of the above (or left)

13. A child put his hand on a grill and suffered burns on his hand. The skin was inflamed with blisters, but subcutaneous layer was not burned. Further study shows that deeper tissue, such as muscle or bone was not involved. What degree were his burns?

A) 1st B) 2nd C) 3rd D) 4th E) none of the above (or left)

14. Albinism is an inherited trait where a person cannot produce

A) hemoglobin B) bilirubin C) pallor D) melanin E) bronzing

15. Melanocytes synthesize melanin in _____.

A) keratinocytes
B) hemoglobin
C) neurons
D) freckles
E) melanosomes

16. _____ corpuscules sense vibration changes deep in the skin.

A) Paccinian
B) Meissner's
C) Wernicke's
D) Merkel
E) Ricket's

17. Which of the following is not a layer associated with skin?

A) Merkel layer
B) epidermis
C) dermis
D) subQ layer
E) stratum spinosum

18. Specialized dendrites of neurons that are part of the hair follicle are called _____.

A) arrector pili
B) medulla
C) cortex
D) matrix
E) hair root plexus

19. _____ cells arise from red bone marrow and migrate to the epidermis.

A) Langerhans
B) Merkel
C) stratum corneum

D) keratinocytes
E) stratum basale

20. What is the function of the hypodermis?
A) contains receptors
B) skin strength and elasticity
C) insulation
D) replace dead skin cells
E) sensation of touch

21) Which of the following is NOT a true statement? Basal cell carcinoma...
A) ...is the most common form of skin cancer.
B) ...occurs more often with increased sun exposure.
C) ...originates from melanocytes in the stratum basale.
D) ...tends to grow slowly.
E) ...is most common in Caucasians.

Free Response 6 pts each.

22. Identify and BRIEFLY describe the three stages of the hair growth cycle. Descriptions should only be one sentence long.

1. Growth/Anagen:
   - cells of hair matrix divide.
   - 2-6 years
2. Regression/Catagen: cells of hair matrix stop dividing, hair follicle shrinks 2-3 weeks.
   - hair follicle shrinks
   - 2-3 weeks
3. Rest/Telogen: old hair root is pushed out. 3 months.
   - hair is pushed out of follicle
   - 3 months

23. Arrange the following in order from most numerous to least numerous and state each cell's function:

melanocytes, Merkel cells, keratinocytes, Langerhans cells

1. keratinocytes - produce keratin

2. melanocytes - produce melanin

3. Langerhans cells - activate immune system

4. Merkel cells - sense light touch

Immune System (33 points)

Multiple Choice 1 point each, circle the letter of the best response.

1) Innate immunity...

A) is based on recognition of antigens that are specific to different pathogens.
B) is found only in vertebrate animals.
C) depends on a newly infected animal′s previous exposure to the same pathogen.
D) is activated immediately upon infection.
E) utilizes highly specific antigen receptors on B cells.

2) A systemic inflammatory response that is often life-threatening is

A) aches and dull pain.
B) increased white blood cell count.
C) mild fever.
D) septic shock.
E) high blood pressure.

3) Which of the following is not part of the lymphatic system?

A) liver
B) thymus
C) spleen
D) tonsils
E) lymph nodes

4) A patient who can produce antibodies against some bacterial pathogens, but not against viral infections, probably has a disorder in his…

A) plasma cells.
B) macrophages.
C) T cells.
D) natural killer cells.
E) B cells.

5) The cells and signaling molecules that initiate inflammatory responses are

A) the phagocytes and the chemokines.
B) the dendritic cells and the interferons.
C) the lymphocytes and the interferons.
D) the mast cells and the histamines.
E) the phagocytes and the lysozymes.

6) A patient complaining of watery, itchy eyes and sneezing after being given a flower bouquet as a birthday gift should first be treated with

A) diphenhydramine
B) a vaccine
C) monoclonal antibodies
D) complement
E) sterile pollen

7) The primary function of humoral immunity is

A) to defend against fungi and protozoa.
B) to protect the body against cells that become cancerous.
C) to defend against bacteria and viruses that have already infected cells.
D) to reject transplanted tissues.
E) to protect the body against extracellular pathogens.

8) Red and white pulp in the _____ help to _____.

A) spleen; purify blood
B) thymus; mature T cells
C) spleen; mature T cells
D) bone marrow; purify blood
E) bone marrow; differentiate blood cells

9) Which is not an autoimmune disorder?

A) asthma
B) Addison′s disease
C) Graves disease
D) system lupus erythematosus
E) Type I diabetes

10) Antivirals work by _____.

A) destroying the virus
B) boosting antiviral bacteria
C) boosting the immune system
D) destroying nutrients for the virus
E) inhibiting viral replication

Fill-ins 1 point per blank.

11) Helper T-cells are also known as ____CD4 T-cells_____ T-cells, named after a protein in their plasma membrane. In similar fashion, cytotoxic T-cells are also known as _____CD8 T-cells_____ T-cells.

12) Pieces of an antigen that trigger an immune response are known as _____epitopes_____.

13) ____Toll-like receptors_____ are located in the membranes of macrophages and bind molecule fragments characteristic of a set of pathogens (ex. double-stranded RNA).

14) Immune cells responsible for defending against multicellular invaders are known as ____eosinophils_____.

15) The ____complement system___ consists of a set of small proteins that destroy pathogens in an enzyme cascade.

16) _____Lupus_____ is a disease where the immune system attacks histone proteins.

17) _____SCID_____ is a rare disease where a baby is born with very few or no T-lymphocytes.

18) HIV attacks _____helper T_____ cells.

19) _____Granzymes_____ are protein-shredding enzymes released by cytotoxic T-cells that induce apoptosis.

20) _____type 1 diabetes_____ is a disease where beta cells in the pancreas are targeted by cytotoxic T-cells.

Free Response

21) Identify 3 ways antibodies combat antigens. Give a short description for each. (6 points)

-Neutralization (neutralizes some toxins and prevents binding to body cells)
-Opsonization (mark antigens for phagocysosis)
-Activate complement system (self explanatory)
-Agglutination (link them together, also enhances phagocytosis)

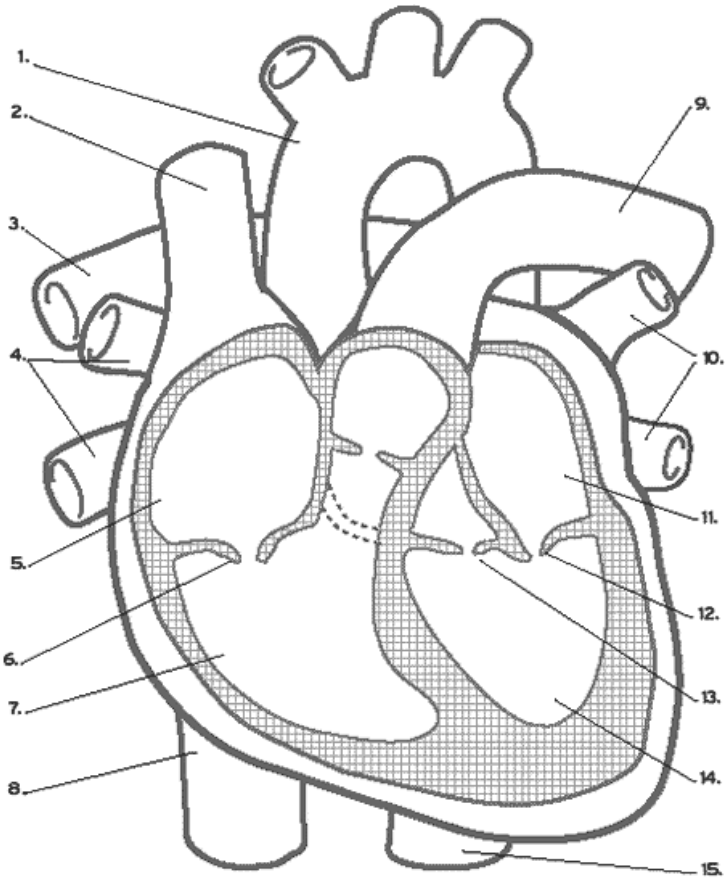
22) Describe the process of antigen presentation of exogenous (outside of body cell) antigens. Be sure to identify key cells and molecules. (6 points)

1. Ingest antigen (**phagocyte**)
2. Digest antigen
3. Synthesize **MHC II** molecules, package them into vesicles
4. Fuse vesicles of antigen and MHC II
5. Bind peptide fragments to MHC II
6. Insert antigen-MHC II complex into membrane

2 points each for steps 1 and 3. (phagocyte, MHC II). Other steps worth 0.5 points each.

Cardiovascular System (33 points)

Diagram 1 point each, fill in the corresponding blanks.



1) aortic arch

2) superior vena cava

3) right pulmonary artery

4) right pulmonary veins

5) right atrium

6) tricuspid valve

7) right ventricle

8) inferior vena cava

9) left pulmonary artery

10) left pulmonary veins

11) left atrium

12) mitral valve

13) aortic valve

14) left ventricle

15) descending aorta

Fill ins 1 point per blank.

16) The protein in red blood cells that binds oxygen is __hemoglobin____.

17) Name 2 protein solutes of blood plasma.

_____ _____

fibrinogens, albumins, globulins

18) _____hemolytic disease of the newborn (HDN)_____ is the disorder where an Rh^- mother is pregnant with an Rh^+ fetus.

19) The outermost layer of the heart wall is called the ____epicardium_____.

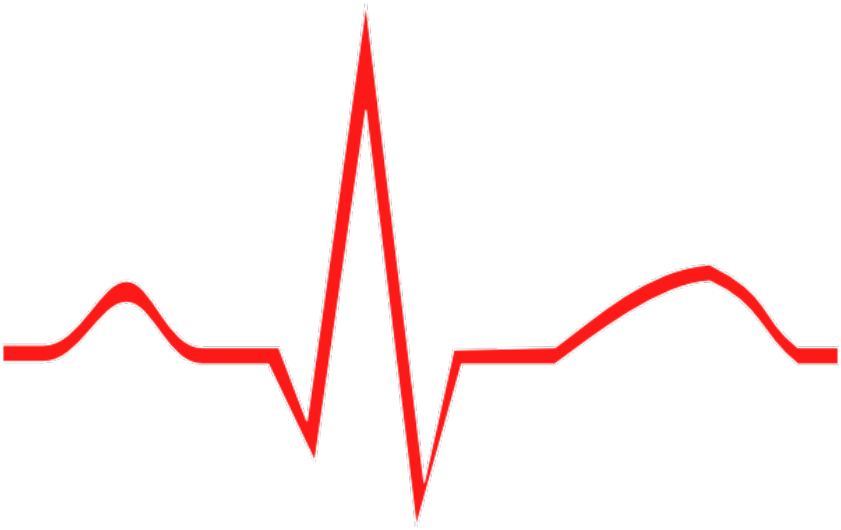
20) The pacemaker is also called the ___atrioventricular_____ node.

21) The cardiovascular condition involving consistently high blood pressure is called __hypertension__.

22) ____veins_____ are blood vessels that return blood to the heart.

Free Response

23) An electrocardiogram (ECG) records electrical changes during cardiac cycles. Label the three phases and briefly describe what is happening during each. (6 points)



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P wave QRS complex T wave

atrial depolarization

rapid ventricular depolarization

ventricular repolarization

24) Blood pressure is usually given as two numbers. For example, 135/90. What does each number measure? Briefly explain what these two terms mean. (4 points)

systolic blood pressure / diastolic blood pressure

1. systolic = when heart pumps blood through arteries, raising pressure

2. diastolic = pressure when heart rests in between beats