

BIO EOC Review: Scientific Method and Chemistry of Life

1. Smithers thinks that a special juice will increase the productivity of workers. He creates two groups of 50 workers each and assigns each group the same task (in this case, they're supposed to staple a set of papers). Group A is given the special juice to drink while they work. Group B is not given the special juice. After an hour, Smithers counts how many stacks of papers each group has made. Group A made 1,587 stacks, Group B made 2,113 stacks.

- a. Identify the control group. _____
- b. What is the independent variable? _____
- c. What is the dependent variable? _____
- d. What should Smithers's conclusion be? _____
- e. How could this experiment be improved? _____

2. A type of feed claims to boost the growth rate of cows. The feed is tested on two twin newborn cows. Bessie receives the experimental feed, and Bertha receives regular corn feed. Their weights are recorded below.

- a. Both cows ended at the same weight, but did the experimental feed change the way they gained weight at all? Explain.

Month	April	May	June	July	Aug
Bessie	150 lbs	210 lbs	260 lbs	320 lbs	400 lbs
Bertha	150 lbs	250 lbs	290 lbs	340 lbs	400 lbs

- b. Describe your conclusions about the experimental feed.
- c. Why is it important that the experiment used twin cows?

3. Write theory, hypothesis or law next to each of the following below.

- a. A _____ is an idea that can be tested through experimentation.
- b. A _____ is a description of a process in nature.
- c. A _____ is a well-tested explanation based on many experiments that support the same idea.
- d. _____ Gravity pulls objects with mass toward the center of the earth.
- e. _____ Heart rate will increase if a person watches a scary movie.
- f. _____ Organisms change over time due to changes in their environment.

4. To ensure that a scientific work is free of bias and meets standards set by the scientific community, a research group's work is peer reviewed by:

- a. anonymous scientific experts
- b. the general public
- c. the researchers friends
- d. lawmakers

5. Which of the following statements is an inference and NOT an observation?

- a. The insect has three legs on the left side.
- b. The insect has a pattern on its back.
- c. The insect's pattern shows that it is poisonous.

D. phospholipids

18. Bleach has a pH of 12.5 and lemon juice a pH of 2.5. Which is an acid and which is a base?

Cells and Photosynthesis and Cellular Respiration

19. Cell theory was first proposed in 1838. Evidence obtained through additional scientific investigations resulted in the current cell theory. Which statement describes a component of the original cell theory that was removed because of the new scientific knowledge?

- A. All living things are made of cells.
- B. All cells come from other preexisting cells.
- C. Cells form through spontaneous generation.
- D. Cells are the basic structural and functional units of life.

20. Name two differences between the light microscope and an electron microscope.

- a.
- b.

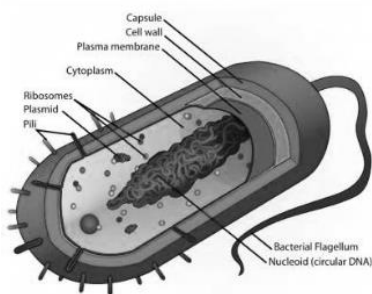


Figure 1

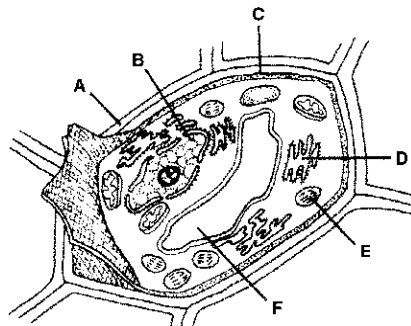


Figure 2

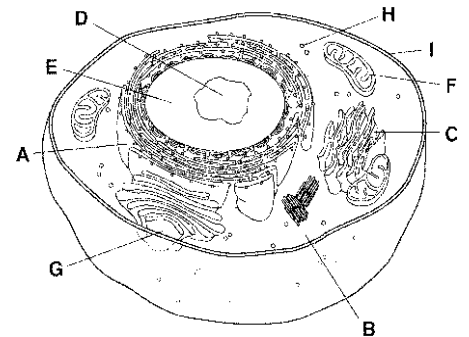


Figure 3

21. Label the cells above eukaryotic or prokaryotic, what is the difference?

22. Label the two eukaryotic cells: plant or animal.

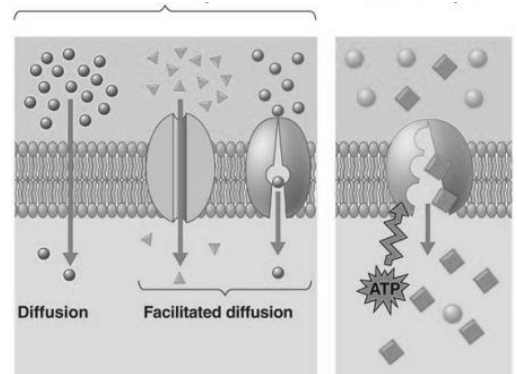
23. What are three parts the plant cell has that the animal cell does not? And what do they do?

24. What is structure F in Figure 3 and what does it do?

25. The golgi apparatus, endoplasmic reticulum and ribosomes are all part of protein synthesis. Label each above and explain their role in protein synthesis.

26. All of the above cells have a cell membrane, what is the function of the cell membrane?

27. The pictures to the right show transport across the cell membrane. Explain the 3 types of each active and passive transport.

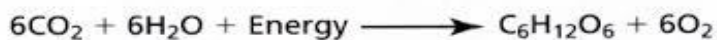


28. Why is the cell membrane called selectively permeable?

29. There are some similarities between prokaryotic and eukaryotic cells. Which of the following structures is found in both prokaryotic and eukaryotic cells?

- A. lysosome
- B. mitochondrion
- C. nucleus
- D. ribosome

30. Label the equations below photosynthesis or cellular respiration.

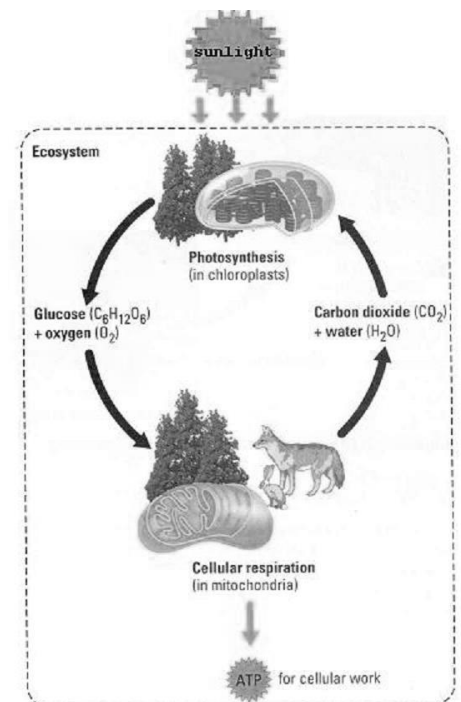


31. What are the products of photosynthesis?

32. What are the products of cellular respiration?

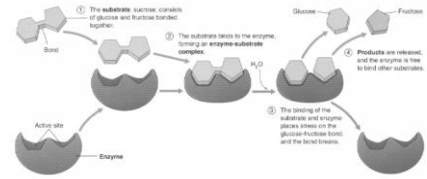
33. In which organelles do photosynthesis and cellular respiration take place?

34. Plants have both mitochondria and chloroplasts, but heterotrophs only have mitochondria, Why?



35. What is the role of ATP in a cell?

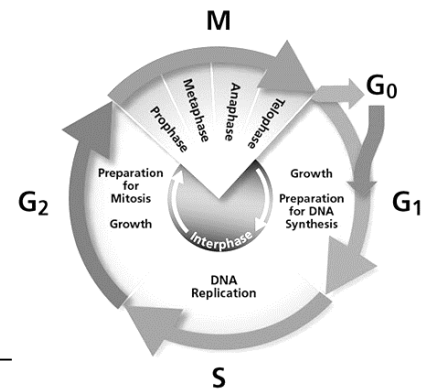
36. When you sprint your muscles go into anaerobic cellular respiration, also known as fermentation, and they start running out of energy. What does anaerobic or fermentation mean?
37. What is the purpose of the enzyme in the biochemical reaction to the below? (hint: it acts as a catalyst)



38. As food travels through the digestive system, it is exposed to a variety of pH levels. The stomach has a pH of 2 due to the presence of hydrochloride acid (HCl), and the small intestine has a pH ranging from 7 to 9. HCl converts pepsinogen into pepsin, an enzyme that digests proteins in the stomach. Which of the following most likely happens to pepsin as it enters the small intestine?
- It becomes inactive.
 - It begins to replicate.
 - Its shape changes to engulf large proteins.
 - Its activity increases to digest more proteins.

Cell Reproduction

39. The picture to the right shows the cell cycle.
- What are the 4 phases of mitosis?
 - When does DNA replication occur?
 - What happens during the G1 phase?

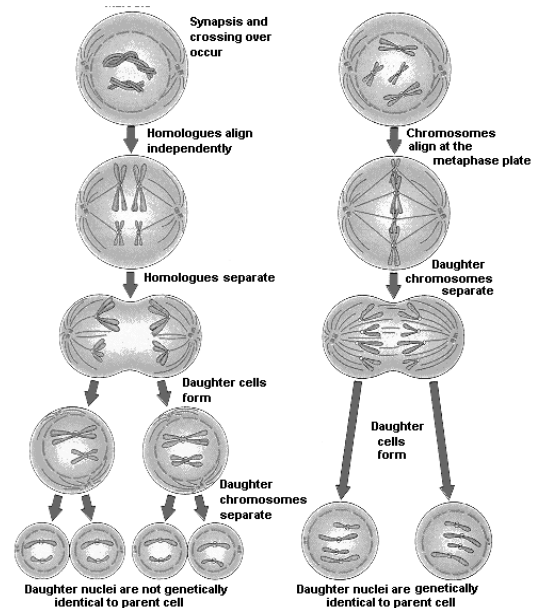


40. Is Meiosis or Mitosis used to create sperm and egg cells? _____
41. Is Meiosis or Mitosis used to grow and repair cells in an organism? _____

42. Label the pictures at the below Mitosis or Meiosis.

43. Answer mitosis or meiosis for the following:

- Starts diploid ends haploid _____
- Starts diploid ends diploid _____
- Crossing over occurs _____
- Independent assortment _____
- Sexual reproduction _____
- Asexual reproduction _____
- Creates gametes _____
- Growth, repair and development _____
- Resulting cells identical to parent _____
- Resulting cells different from parent _____



44. Explain what events are occurring in prophase, metaphase, anaphase, telophase and cytokinesis in the Mitosis.

45. How do crossing over and independent assortment help create genetic variation during Meiosis?



46. Does mitosis create genetic variation? Why or why not?

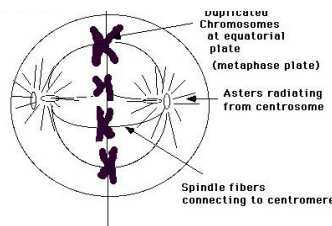
47. A cell has 64 chromosomes. If the cell divides through Mitosis, how many chromosomes will the resulting cells have? _____ If the cell divides through meiosis, how many chromosomes will the cells have? _____

48. Sometimes cells lose the ability to control their division, and the cell keeps dividing and dividing through mitosis which creates a tumor and the disease called _____.

49. Mitosis and meiosis are processes involved in cellular reproduction. Which of the following describes an event that results from mitosis but NOT meiosis?
- A. two stages of cell division
 - B. replication of cellular genetic material
 - C. daughter cells that are identical to the parent cell
 - D. four daughter cells that are produced from each parent cell

50. Which of the following phases of mitosis is represented by the diagram below?

- A. prophase
- B. metaphase
- C. anaphase
- D. telophase



51. Which row in the chart below indicates the correct process for each event indicated?

Row	Formation of Egg	Formation of Sperm	Growth of Embryo
(1)	mitosis	mitosis	meiosis
(2)	mitosis	meiosis	mitosis
(3)	meiosis	mitosis	meiosis
(4)	meiosis	meiosis	mitosis

- A. row 1
- B. row 2
- C. row 3
- D. row 4

52. Which of the following best describes meiosis?

- A. It is carried out in all tissues that require cell replacement.
- B. It occurs only in cells in the reproductive structures of organisms.
- C. It happens in all tissues except the brain and spinal cord.
- D. It is the first stage of mitosis.

53. How are sexual reproduction and asexual reproduction different from each other?

- A. sexual reproduction requires two parents and asexual reproduction requires only one parent
- B. asexual reproduction requires two parents and sexual reproduction requires only one parent
- C. mutation rates are lower in sexual reproduction than in asexual reproduction
- D. asexual reproduction occurs only in multicellular organisms

DNA Structure, Replication and Protein Synthesis

DNA STRUCTURE

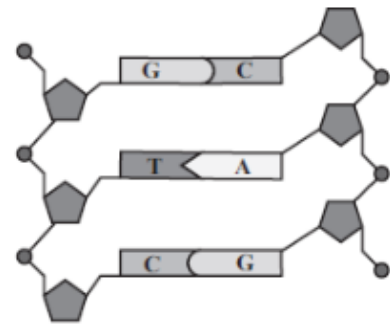
54. Label the diagram to the right with the following: nitrogen base, hydrogen bond, covalent bond, phosphate, deoxyribose/sugar.

55. Circle two nucleotides.

56. What is a nucleotide made up of?

57. Hydrogen bonds are weaker than covalent bonds. Why?

58. How does DNA store information? (think about the letters)



DNA REPLICATION

59. What is happening in the picture to the right?

60. When does DNA replication occur?

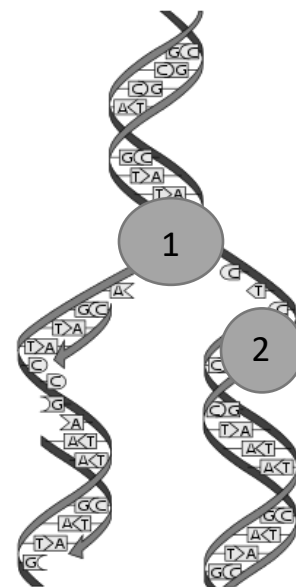
61. What is the purpose of DNA replication?

62. Two enzymes are involved in DNA replication:

- a. Enzyme 1:
 - i. Function:

- b. Enzyme 2:
 - i. Function:

63. Write the complementary strand to the DNA strands below:



ACGCTTTAACGCT

GCTATAGTATTCCCGGTAAT

64. If there is 26% adenine in a giraffe, approximately how much thymine is there? _____

65. If there is 32% guanine in a monkey, approximately how much cytosine is there? _____

PROTEIN SYNTHESIS

66. What is the purpose of protein synthesis?

67. What is the first step of protein synthesis and where does it occur?

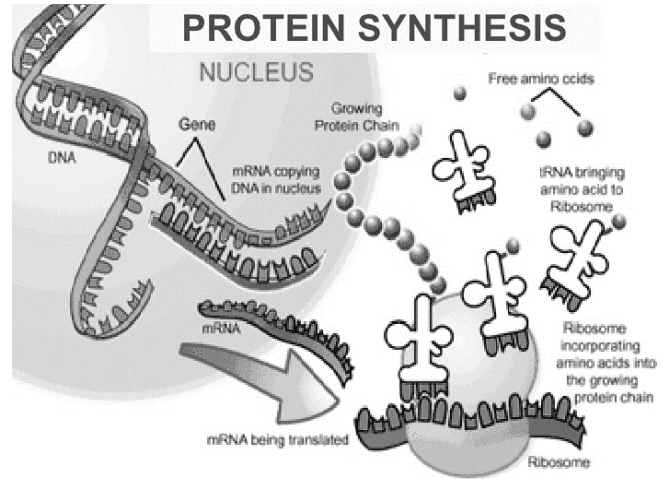
68. What is the second step of protein synthesis and where does it occur?

69. DNA is copied into mRNA during _____.

70. mRNA is used to make proteins during _____.

71. Chains of amino acids make _____.

72. Label the following: DNA, tRNA, ribosome or mRNA



A _____ B _____ C _____ D _____

73. Match the letters above to the following:

- _____ contains the base uracil and acts as a messenger
- _____ brings the amino acid to the ribosome to match the mRNA
- _____ site of translation
- _____ contains the based thymine and holds the code for making the proteins

74. Complete the following:

DNA: T A C G G G C T A G C A
 mRNA:
 Protein:

DNA: T A C C G C A A A C T T
 mRNA:
 Protein:

75. How many codons are there in the following segment of DNA? _____ → TCGCCACTGACTGCC

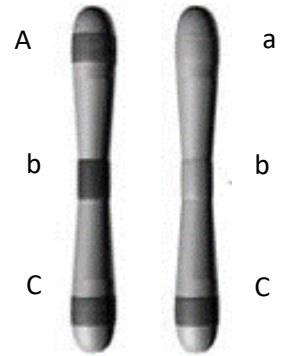
76. Differentiate between substitution, insertion and deletion mutation.

77. Do mutations always affect how an organism looks and acts? Explain.

Genetics Review

78. To the right are a pair of chromosomes. One came from the mother and one came from the father so they are a homologous pair.

- What are chromosomes made of?
- How many genes are on the chromosomes? _____
- What is a gene?
- How many chromosomes do each of the cells in the human body contain?
- In which part of the cell would you look to find the chromosomes?



79. The two chromosomes above are from a plant. The key for the genes above is as follows:

“A” codes for leaf shape, where A= round and a = triangular.

“B” codes for leaf color, where B = green and b = blue-green.

“C” codes for leaf hairiness where C= hairy and c = not hairy.

- Which of the above traits are dominant?
- Which of the above traits are recessive?
- Which traits do you tend to see more of in a population dominant or recessive?
- Label the following homozygous or heterozygous:
 - Aa= _____ bb = _____ CC = _____
- What will be the phenotype of the plant?
 - Aa= _____ bb= _____ CC= _____
- What are the possible genotypes of the following?
 - Triangular leaves: _____ Green leaves: _____
 - _____

80. Match the following words to the correct description:

Codominance, sex-linked, multiple alleles, polygenic, and incomplete dominance

- _____ traits that are controlled by more than one gene such as hair color AaBBCC
- _____ traits that have more than one allele such as blood type I^A, I^B and i
- _____ traits that are linked to the X chromosome and are more common in males, such as color blindness.
- _____ traits where there are only dominant alleles, with three different phenotypes, for example RR=red, WW=white and RW= pink, so you see a little of both.
- _____ traits with only dominant alleles and both alleles are expressed at the same time; a black chicken and white chicken mate to create a black and white chicken.

81. A homozygous tall plant is crossed with a heterozygous tall plant. Do a Punnett square and describe the possible phenotypes and genotypes of the offspring.

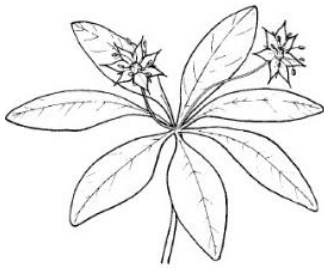
Classification and Evolution

Match the following kingdoms to the correct description below:

Animalia, Plantae, Eubacteria, Archae, Fungi, Protista

82. _____ An organism is a eukaryotic, unicellular, heterotroph without a cell wall.
 83. _____ An organism is an autotrophic, prokaryote that lives in a hot spring.
 84. _____ An organism is heterotrophic and multicellular and does not have a cell wall.
 85. _____ An organism is a eukaryotic, heterotroph with a cell wall that contains chitin.
 86. _____ An organism is unicellular with a cell wall, but no nucleus, and lives in an intestine.
 87. _____ An organism is eukaryotic, unicellular, autotrophic, and has a cell wall that contains cellulose.

88. Dichotomous key – identify the two flowers below by their scientific name



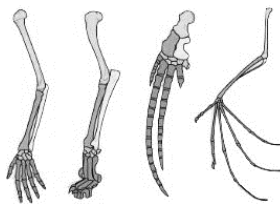
Key to White Wildflowers

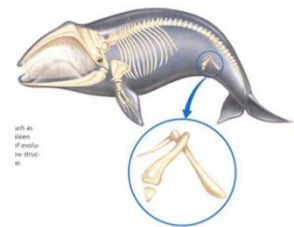
1a. Five petals	Go to 2
1b. Seven petals.....	Starflower (<i>Trientalis borealis</i>)
2a. Petals single pieces	Go to 3
2b. Petals deeply divided	Chickweed (<i>Stellaria media</i>)
3a. Wide round petals	Common strawberry (<i>Fragaria virginiana</i>)
3b. Narrow elongated petals	Bowman's root (<i>Galleria trifoliata</i>)



89. Define evolution.

90. Label the following pictures homologous structure or vestigial structure.



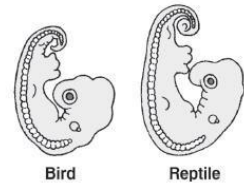


91. Genes can change in a population due to genetic drift (migration)= GD, gene flow (random events)=GF, or natural selection (survival of the fittest)=NS. Label the descriptions below with the correct term.

- a. _____ More fish have darker skin because they blend in with the more muddy water due to erosion runoff
- b. _____ a drought causes a deer population to move to a new territory and join another deer population
- c. _____ an airplane goes down and only brown hair and brown eyed people are survivors on this island
- d. _____ two islands are close enough that occasionally birds will fly to the opposite island and mate
- e. _____ a mutation causes a flower to be brighter red; this attracts more bees to pollinate it
- f. _____ the largest, strongest male grizzly is walking along and BAM he is hit by lightning
- g. _____ wolves closer to the arctic circle have lighter and often more white wolves; whereas near the southwest desert they tend to be red or dark brown

92. The diagram illustrates an embryonic stage of two organisms, and represents comparative embryology. Which of the following can be determined by observing the embryos shown in the diagram?

Embryos



- A. The organisms share a common ancestry.
- B. The organisms belong to the same genus.
- C. The organisms are native to the same geographic areas.
- D. The organisms will grow into anatomically similar adults.

Plant and Human Anatomy Review

93. Label the following in the picture to the right:

- a. Roots, Stems, Leaves
- b. Xylem, Phloem, Meristem
- c. Ground tissue, dermal tissue, vascular tissue

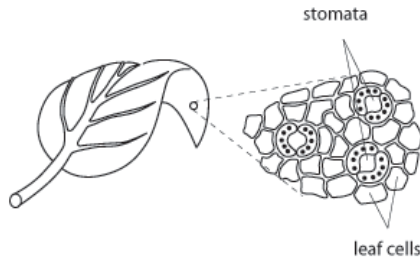
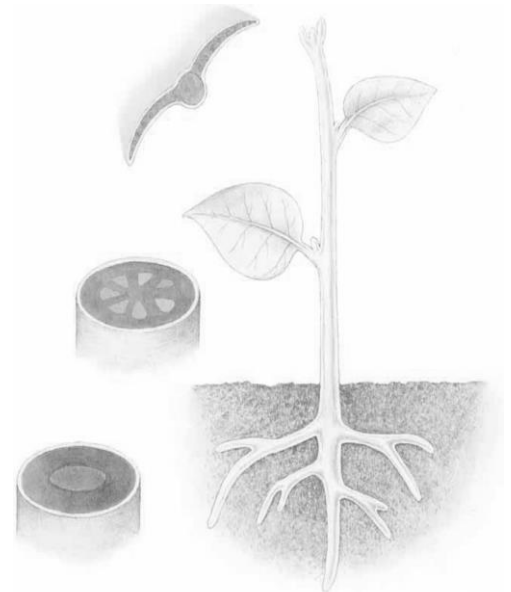
94. Which part of the plant moves sugars? _____

95. Which part of the plant moves water? _____

96. Is this vascular or non-vascular? How do you know?

97. Below is a picture of stomata on the underside of the leaf.

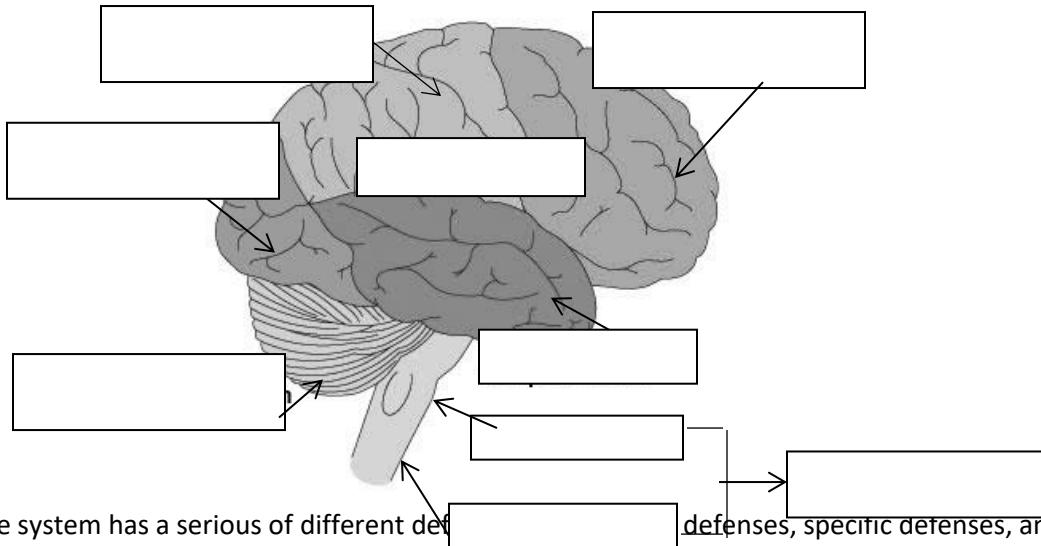
- a. These openings play a role in photosynthesis allowing some gases to exit and others to enter the leaf. Draw arrows and indicate which gas is entering and which gas is exiting.



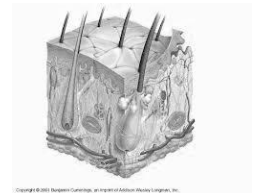
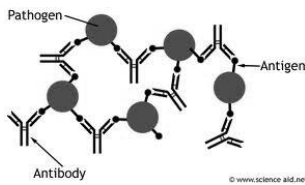
- b. The stomata also play a role in transpiration. What is transpiration and how are stomata involved?

Human Anatomy:

1. Label the following pictures using these words: *parietal lobe, frontal lobe, occipital lobe, temporal lobe, cerebellum, medulla, pons, cerebrum, brain stem.*



2. The immune system has a series of different defenses, specific defenses, antibiotics and vaccinations. Label the pictures below with the correct DEFENSE:



3. What is the difference between a non-specific and specific defense?
4. Although vaccines cannot be used to treat a person who is sick, they can help to prevent infections. Vaccinations tell the body to create "memory cells", which will function later to create antibodies against certain pathogens. When a person is vaccinated, what are they injected with?
 - A. antibodies to a disease bacterium
 - B. live, inactive viruses
 - C. weakened viruses or antigens from the virus
 - D. blood from a person who has had the disease
5. Many species of bacteria have become resistant to antibiotics because antibiotics have been so widely used. Now, bacteria that used to be killed by antibiotics are more difficult to treat. What is the best way to proceed in dealing with this public health problem?
 - A. Antibiotics should no longer be used.
 - B. Antibiotics should be made available to anyone without a prescription.
 - C. Antibiotics should only be prescribed to people with bacterial infections.
 - D. Anti-viral medications should now be used instead of antibiotics.
6. What causes high blood pressure?

7. What are some ways you can help to maintain a healthy blood pressure?

8. The rate at which blood flows through the human body changes in response to many factors. Which statement describes one of these factors and its effect on blood flow?

- A. A high viscosity of blood causes an increased resistance in the blood vessels and leads to slow blood flow.
- B. A low blood pH decreases the rate of diffusion through the blood vessels and leads to slow blood flow.
- C. The changing of the shape of red blood cells to a crescent shape decreases resistance and lead to a faster blood flow.
- D. The narrowing of blood vessels increases pressure and leads to a faster blood flow.

9. Label the following parts and FUNCTIONS: ovaries, fallopian tube, uterus, cervix, vagina, testes, epididymis, seminal vesicle, prostate, vas deferens, and urethra.

