AP BIOLOGY SUMMER ASSIGNMENT

Dear potential AP student,

Thank you for considering AP Biology as one of your Advanced Placement courses for the upcoming school year! It is my hope that this summer assignment will expose you to the kind of content that you will be learning throughout the course. The concepts in AP Biology connect and build on each other, so it is very important that you lay a strong foundation this summer.

The following 90 questions serve as an overview of the concepts and terms we will be learning in AP Biology. It is my hope that you will have an idea of what to expect in AP Biology and that you will consider the amount of time the course requires on a daily basis. Remember AP Biology is more then just memorization. You will also need to apply to link the information to solve problems. This summer assignment will help you to have the basic information that we will work on making the connections in class.

You are responsible for answering every question in the summer assignment by using the AP Biology textbook as your resource.

For **each of the questions** in the summer assignment, please write your response in the blanks provided and also **write down the page numbers in the textbook** where you found the information. This will help you throughout the school year to navigate the content.

The summer assignment will be **due on the first day of school**. There will also be a test on the summer assignment questions (I will choose the questions randomly) during the first week of school. The test will assess if you have studied and learned the information over the summer.

Please keep in mind the following:

- Summer Assignment due on the first day of school
- Summer Assignment Test (20 questions based on summer assignment) during the first week of school

AP Biology is a difficult course and will require that you study the material daily. I hope that you will consider if this class is suitable for you as you complete the summer assignment. This year will be a lot of work and effect. I am looking forward to having you in my class next year.

Sincerely,
Mrs. Hoffman

Name: _____

AP BIOLOGY SUMMER ASSIGNMENT QUESTIONS

1. Explain electronegativity and how it affects the types of bonds atoms can form.

   _____

   _____

   _____

2. Define the following types of bonds:
   a. Ionic _____
   b. Nonpolar covalent _____
   c. Polar covalent _____

3. List all the unique properties of water.
   a. _____
   b. _____
   c. _____
   d. _____

4. Hydrogen bonds form between

   _____

   _____

   _

5. pH is a measure of

   _____

6. What is a buffer?

   _____

   _____

   __

7. List all the unique properties of carbon.
   a. _____

b. _____

c. _____

d. _____

8. Name the following functional groups. List the major properties of each group.
   a. $-OH^-$ _____
   b. -C=O _____
   c. -COOH _____
   d. $-NH_2$ _____
   e. -SH _____
   f. $-PO_4^-$ _____

9. What are the differences between dehydration reactions and hydrolysis?

_____

_____

_____

___

10. What is the general formula for a monosaccharide? _____
    a. What is the function of monsaccharides? _____
    b. List three examples of monosaccharides _____

11. What are polysaccharides? _____
    a. What are the functions of polysaccharides? _____
    b. What are the functions of:
       i. glycogen _____
       ii. starch _____
       iii. cellulose _____
       iv. chitin _____

12. What are the structural components of fats, phospholipids, and steroids?

_____

_____

__

    a. Fats store

_____

b. Phospholipids form

_____

c. Steroids may function as

_____

13. Proteins are polymers of _____ joined by _____

14. Describe the following levels of structures for proteins:
    a. primary

    _____

    _____

    b. secondary

    _____

    _____

    c. tertiary

    _____

    _____

    d. quaternary

    _____

    _____

15. The three parts of a nucleotide are

_____

_____

__

    a. A and G are _____
    b. C and T are _____

16. Explain the mechanism for DNA replication. When is DNA replicated during the cell cycle? Why is it copied?

_____

_____

_____

_____

_____

    a. Define these terms:
        i. leading strand

ii. lagging strand

iii. 5’ & 3’ ends

iv. Okazaki fragments

iv. origin of replication

v. RNA primer

vi. DNA polymerase

vii. helicase

viii. DNA ligase

17. Explain how DNA codes for a protein

a. Outline the steps in transcription and translation. Where does each occur?

i.

ii.

iii._____

_____

iv._____

_____

v._____

_____

vi._____

_____

b. Explain the role of the following:

i. RNA polymerase _____

_____

ii. Promoter _____

_____

iii. Operator _____

_____

iv. Repressor _____

_____

v. STOP codon _____

_____

18. Energy is defined as

_____

_

19. What is entropy?

_____

_

20. How does ATP power cellular work?

_____

_____

__

21. How do enzymes control the rate of chemical reactions? _____

_____

_____

__

a. Sketch a graph showing the energy changes with an exergonic reaction with and without enzyme present

b. Explain the "induced fit" model of enzyme action

c. Explain how metabolic pathways are regulated by allosteric enzymes and cooperativity

22. List eight organelles found in the cell and their functions

a.

b.

c.

d.

e.

f.

g.

h.

23. What are the differences between diffusion (passive transport) and active transport?
    a. _____
    _____
    _____
    _____

24. What is the purpose of cellular respiration? _____
    _____
    a. Glycolysis starts with _____ and produces
    _____
    b. Krebs cycle starts with _____ and produces
    _____
    c. electron transport chain starts with _____ and produces
    _____

25. Where do the following occur:
    a. Glycolysis
    _____
    b. Kreb's cycle
    _____
    c. electron transport chain
    _____
    _____

26. Describe the two major parts of photosynthesis.
    _____
    _____
    __
    a. Where does each part occur?
    _____
    b. What enters the light reactions? _____
    c. What is produced?_____
    d. What enters the Calvin cycle? _____
    e. What is produced? _____

27. Define hypotonic, hypertonic and isotonic
    _____

28. What is chemiosmosis?

29. Where in a cell does chemiosmosis occur? (list the 2 organelles)

30. What is photophosphorylation?

31. List and explain the events of the cell cycle
    a. _____
    b. _____
    c. _____
    d. _____

32. List the phases of mitosis and explain what happens in each phase.
    a. _____
    b. _____
    c. _____
    d. _____

33. What are the differences between meiosis I and meiosis II?

_

_

_

34. Explain the difference between mitosis and meiosis. What is the goal of each process?

35. Explain how genetic variation is possible due to the following processes in meiosis:
    a. Crossing over _____
    b. Independent assortment _____

36. List some differences between viruses and bacteria

____

37. List the tools and techniques of DNA technology

__

    a. Explain the use of restriction enzymes in both RFLP analysis and recombinant DNA technology

b. How can DNA be sequenced? _____

_____

_____

_____

Amplified? _____

_____

_____

Analyzed? _____

_____

_____

_____

38. Describe the three major types of mutations

a. _____

_____

b. _____

_____

c. _____

_____

39. Describe three causes of mutations

a. _____

_____

b. _____

_____

c. _____

_____

40. What are the differences between the lytic and lysogenic cycle?

a. Lytic _____

_____

b. lysogenic_____

_____

41. List the five conditions necessary for Hardy-Weinberg equilibrium.

a. _____

_____

b. _____

_____

c. _____

_____

d. _____

_____

e. _____

_____

42. State what each term in the Hardy-Weinberg formula and equation represents

a. p^2 _____

b. 2pq _____

c. q^2 _____

d. p _____

e. q _____

43. Describe some prezygotic and postzygotic barriers to the ability to interbreed.

a. prezygotic_____

_____

_

b. postzygotic_____

_____

_

44. What is allopatric speciation? _____

_____

_____

__

What is sympatric speciation? _____

_____

_

45. What is genetic drift?

_____

_____

__

46. What is gene flow?

_____

_____

—

47. What is fitness, as defined by Darwin?

_____

_____

—

48. What is natural selection?

_____

_____

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_____

–

49. Explain the process of transpiration in plants _____

_____

_____

_____

_____

50. What are the four main types of tissues in animals? Explain the function of each.

_____

_____

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_____

–

_____

–

51. What are the three primary germ layers and what organ systems do each form in animal development?

a. _____

_____

b. _____

_____

c. _____

_____

52. What are four functions of the circulatory system?

53. How does the blood buffer system regulate blood pH? Include the names of the chemicals involved.

54. What is the difference between systemic and pulmonary circulation?

55. What are the two main types of immune system defenses in animals? Explain each.

56. List and define 5 non-specific immune responses?

    a.

    b.

    c.

    d.

    e.

57. What is the difference between cell mediated immunity and humoral immunity?

58. Differentiate between the primary and secondary immune response.

a. _____

b. _____

59. Which types of cells contribute to humoral immunity? Give the function for each type of cell.

a. _____

b. _____

c. _____

60. Which types of cells contribute to cell mediated immunity? Give the function of each type of cell.

a. _____

b. _____

c. _____

61. What are three of the functions of the vertebrate kidney?

_____

62. What is the difference between an endotherm and an ectotherm?

a. _____

b. _____

63. Describe the peripheral vs central nervous system and the parasympathetic vs sympathetic nervous system.
    a. _____
    _____
    b. _____
    _____

64. Describe the parts of a neuron.
    a. dendrites_____
    _
    _____
    b. axon_____
    ___ _____
    c. nodes of Ranvier_____
    _____
    d. terminal
    branches_____
    _____
    e. synaptic knobs_____
    _____

65. Explain the process of how an action potential is “fired”.
    _____
    _____
    _____
    _____

66. Describe the release of neurotransmitters at a synapse
    _____
    _
    _____
    _____
    __
    _____
    _

67. Explain how actin and myosin work to contract a muscle fiber.
    a. _____
    _____
    b. _____

68. What are the four essential nutrients?

a. _____

b. _____

c. _____

d. _____

69. What is blood plasma?

_____

What is its function?

_____

70. What are the functions of erythrocytes, leukocytes, and platelets?

a. _____

b. _____

c. _____

71. What is the difference between systolic and diastolic pressure?

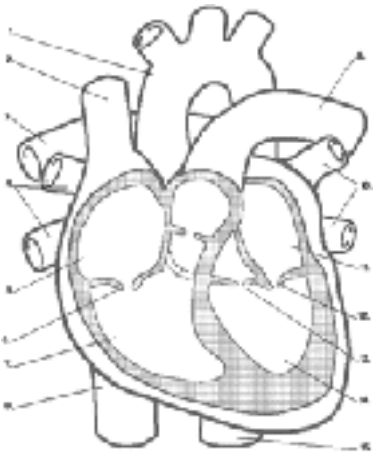
_____

72. How does aldosterone and the renin-angiotesin system work?

73. Explain the process of filtration, reabsorption, secretion, and excretion in the kidney. Include major parts.

74. How does antidiuretic hormone (ADH) work?

75. Trace the pathway of blood through the heart_ (Label the diagram)



76. What is the mechanism of steroid hormone function?

77. What is the mechanism of peptide hormone function?

78. How second messengers work?

    a. Give two examples of second messengers

79. Where is insulin produced and what is its function?

80. Where is glucagon produced and what is its function?

81. Define the following:

cleavage

blastula

gastrulation

archenteron

82. Describe three density dependent factors.

_____

_

_____

_

83. Describe three density independent factors.

_____

_

_____

_

84. What are the differences between exponential growth and logistic growth?

_____

_____

85. List and define the three types of symbiosis.

a. _____

_____

b. _____

_____

c. _____

_____

86. What is competition?

_____

_____

__

87. What is predation?

_____

_____

__

88. What is a keystone predator?

_____

_____

__

89. What is a trophic level?

a. How does energy flow through an ecosystem?

b. What is meant by biomagnification?

90. What are the major concerns (and causes) regarding human impact on the environment on the following issues:

a. Enhanced greenhouse effect

b. Reduction of the ozone layer

c. Acid precipitation

d. Introduced species