

## Midterm Biology Assessment Study Guide

### Biochemistry

1. Compare and contrast atoms and elements.
2. Name the components of an atom and give the charge of each component.
3. Calculate the number of protons, neutrons and electrons in a neutral oxygen-16 atom.
4. Draw a Bohr model for an atom of oxygen-16.

Use each of the terms below only once to complete the sentences.

**acids    bases    neutral    pH    greater    less**

5. The concentration of hydrogen ions in a solution is called \_\_\_\_\_.
6. Pure water is \_\_\_\_\_ and has a pH of 7.0.
7. Bases have pH values \_\_\_\_\_ than 7.0.
8. Acids have pH values \_\_\_\_\_ than 7.0.
9. Organic molecules always contain which three elements?
10. Fill in the chart for the 4 types of organic molecules.

	Carbohydrates	Proteins	Lipids	Nucleic Acids
Building Block (monomer)				
Example				
Use/Function/Importance				

11. Draw a water molecule. Label the following: Oxygen, hydrogen, positive end, negative end.
12. Why is water a polar molecule?
13. What makes water a good solvent?

Match the correct term with each description.

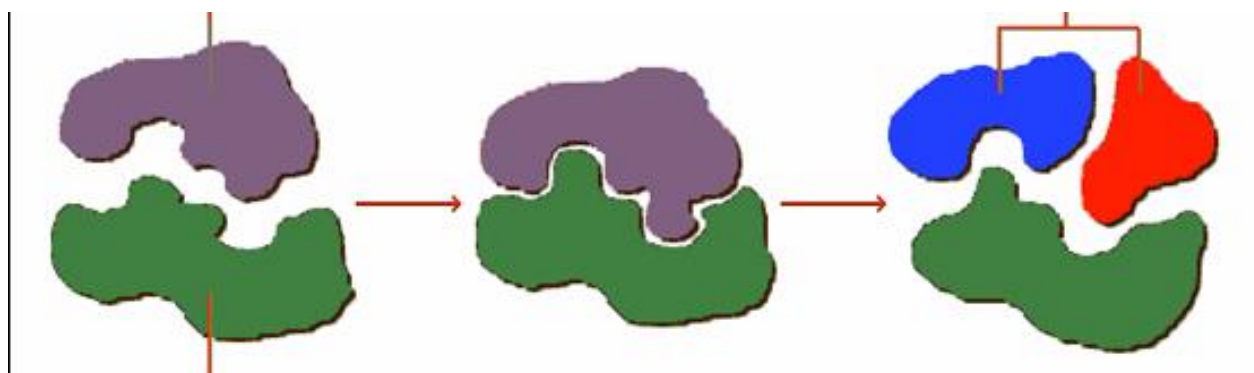
14. \_\_\_\_\_ minimum amount of energy required for reactants to form products
15. \_\_\_\_\_ substance that lowers energy needed to start a chemical reaction
16. \_\_\_\_\_ protein that is a biological catalyst
17. \_\_\_\_\_ molecule that binds to an enzyme
- a. enzyme  
b. substrate  
c. activation energy  
d. catalyst

18. List the products and reactants in the following chemical reaction.



Reactants	Products

19. Circle the correct choice to make the statement true: An enzyme (**speeds up/slow down**) a chemical reaction by (**reducing/increasing**) activation energy.
20. Label the picture using the following terms:  
**enzyme, substrate, product, active site, enzyme-substrate complex**



21. An enzyme's job is to reduce the activation energy required in a chemical reaction. This energy reduction increases the speed of the reaction. Describe the amount of enzyme before a reaction compared to the amount of enzyme after the chemical reaction.
22. Recall the term denature. How does denaturing an enzyme change its ability to work? What are some factors that could denature an enzyme?

## Cellular Structure and Function

23. Fill in the table below for cell organelle function.

Cell Organelle	Function	Plant and/or Animal Cells
	protects and supports plant cells	
	site where photosynthesis occurs, makes ATP and sugars in photosynthesis	
	site of protein synthesis	
	supplies energy to the rest of the cell, makes ATP from sugar and $O_2$	
	directs the production of proteins and cell division, controls the cell	
	cell boundary, controls the movement of substances in and out of the cell, recognizes signals	

24. Use the terms hypertonic, hypotonic and isotonic to describe the type of solution each cell has been placed in.

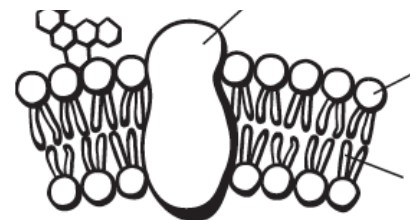


A. \_\_\_\_\_ B. \_\_\_\_\_ C. \_\_\_\_\_

25. Describe the movement of water into or out of the cell for each.

26. The movement of particles into or out of a cell is controlled by which cell structure?

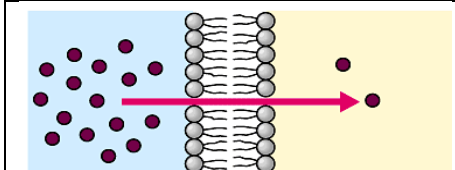
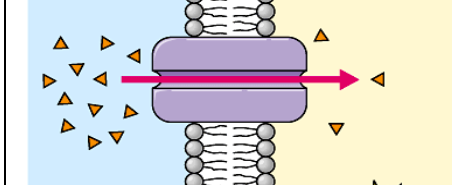
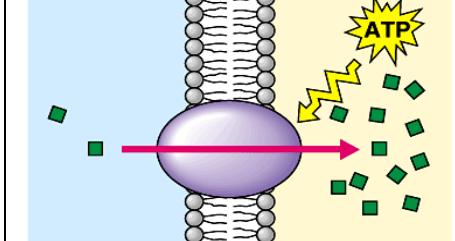
27. Label the diagram of the cell membrane with the following: **nonpolar tail**, **polar head**, **protein channel**



28. Circle a phospholipid in the diagram.

29. Which part of a phospholipid is hydrophobic? \_\_\_\_\_ hydrophilic? \_\_\_\_\_

30. Define diffusion.
31. Define osmosis.
32. Fill in the table below to review the types of transport.

	Type of Transport	Movement of Particles (Concentration gradient)	Energy Required?	Passive or Active
				
				
				

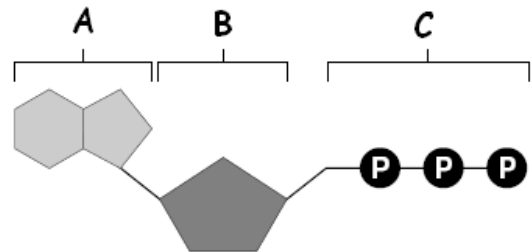
### Cellular Processes

33. LABEL THE PARTS THAT MAKE UP THIS MOLECULE: Adenine, Ribose, Phosphate Groups

A= \_\_\_\_\_

B= \_\_\_\_\_

C= \_\_\_\_\_



34. WHAT DOES ATP STAND FOR?

A \_\_\_\_\_ T \_\_\_\_\_ P \_\_\_\_\_

35. Write the equation for photosynthesis in words and as a chemical equation. Circle the reactants. Underline the products.

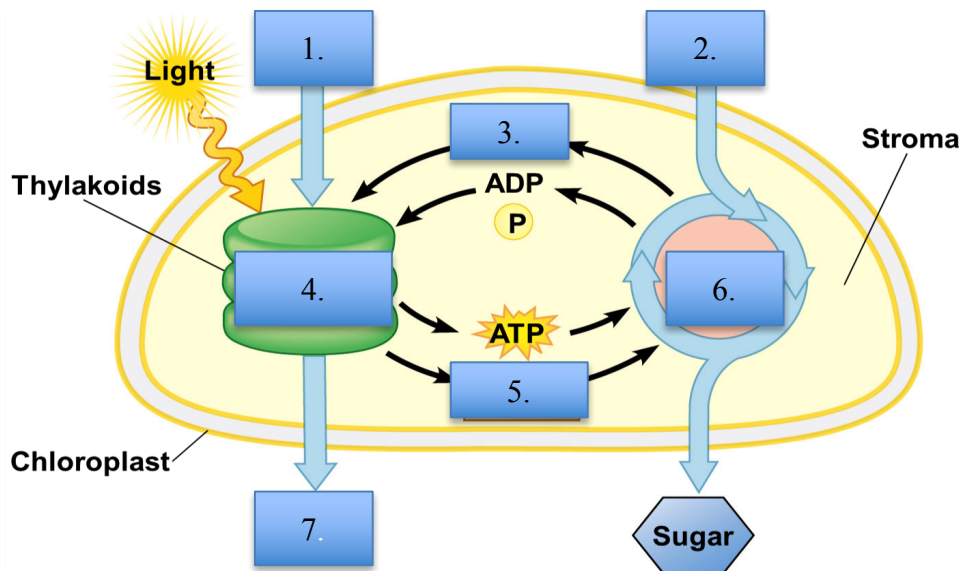
36. In which organelle does photosynthesis take place?

37. What is the goal of photosynthesis?

38. What type of cells undergo photosynthesis?

39. Below is a picture of a chloroplast. Use the following words to label the numbered boxes in this diagram.

Water	Carbon dioxide	NADPH
ATP	Oxygen	Light Dependent Reactions
NADP+	ADP	Calvin Cycle/Light Independent Reactions



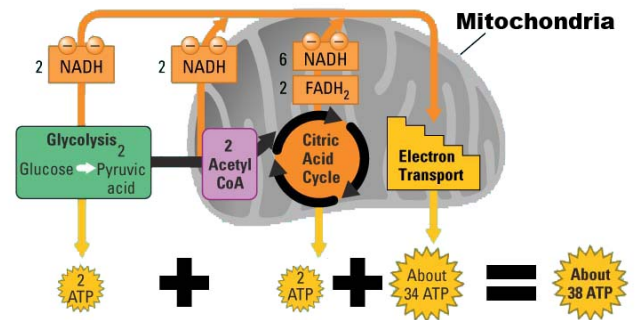
40. Write the equation for cellular respiration in words and as a chemical equation. Circle the reactants. Underline the products.

41. In which organelle does cellular respiration take place?

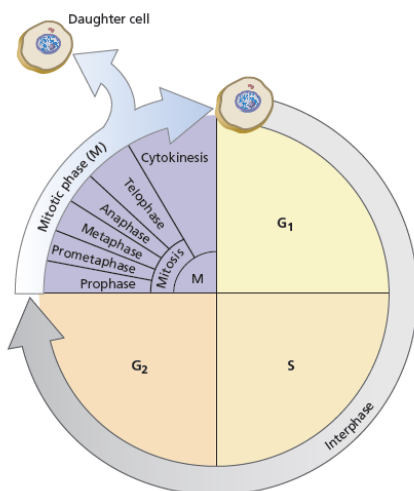
42. What is the goal of cellular respiration?

43. Which types of cells undergo cellular respiration?

44. Use the diagram to sequence the stages of cellular respiration. How many molecules of ATP are made during each stage?

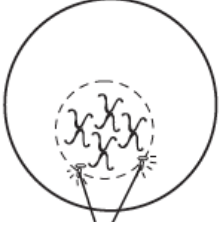
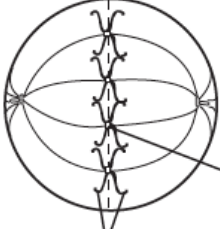
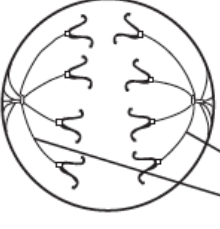
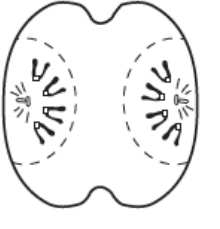


45. Use the diagram below to sequence the steps of the cell cycle. Briefly describe what happens during each stage.



Stage	What happens?
G <sub>1</sub>	
S	
G <sub>2</sub>	
Mitosis	
Cytokinesis	

46. Let's talk mitosis. Fill in the chart. Use the choices below the chart to match the correct "what happens" with each phase.

					Picture two separate cells here.
Phase					
What happens?					

**What Happens Choices:**

- The nuclear envelope breaks down, chromatin coils up into chromosomes, and the nucleolus disappears.
- Sister chromatids are split and move to opposite sides of the cell
- Duplicated chromosomes line up in the middle of the cell
- A nuclear membrane re-forms around the chromosomes. The cell begins to form a cleavage furrow.
- The cytoplasm splits, creating two new cells.

47. Mitosis vs meiosis comparison. Complete the chart.

Characteristics	Mitosis	Meiosis
A. Purpose		
B. Type of reproduction		
C. Types of cells that undergo the process (areas of the body)		
D. Types of cells produced by the process		
E. Behavior of homologous chromosomes during prophase		
F. Behavior of homologous chromosomes during metaphase		
G. Number of nuclear divisions		
H. Replication of DNA		
I. Cytokinesis		
J. Number of daughter cells produced at the end of the process		
K. Mother cell's genetic makeup compared to the daughter cells' genetic makeup		

## Heredity

48. Define the following terms:
- a. gene
  - b. allele
  - c. dominant
  - d. recessive
  - e. genotype
  - f. phenotype
49. Circle the genotypes that would result in a dominant genetic disorder. RR Rr rr
50. Circle the genotypes that would result in a recessive genetic disorder RR Rr rr
51. A white mouse whose parents are both white produces only brown offspring when mated with a brown mouse. The white mouse is most probably \_\_\_\_.
- g. homozygous recessive
  - h. heterozygous
  - i. homozygous dominant
  - j. haploid
52. In mink, brown fur color is dominant to silver-blue fur color. If a homozygous brown mink is mated with a silver-blue mink and 8 offspring are produced, how many would be expected to be silver-blue?
- k. 0
  - l. 3
  - m. 6
  - n. 8
53. If two heterozygous individuals are crossed, what percent of their offspring are also expected to be heterozygous?
- o. 0
  - p. 50
  - q. 75
  - r. 100



54. Complete the dihybrid cross using the following information.

In peas:			
R = round	T = tall	Y = yellow peas	P = purple flowers
r = wrinkled	t = short	y = green peas	p = white flowers

Cross: Heterozygous Tall, Heterozygous Round x Heterozygous Tall, Heterozygous Round

Parental Genotypes: \_\_\_\_\_ x \_\_\_\_\_

Possible Gametes: \_\_\_\_\_

How many out of 16 will be:


\_\_\_\_\_ Tall & Round

\_\_\_\_\_ Tall & Wrinkled

\_\_\_\_\_ Short & Round

\_\_\_\_\_ Short & Wrinkled

How many will be tall, wrinkled and true breeding?

55. Two healthy parents produce a child with the genetic disorder of cystic fibrosis, which is the result of a recessive gene. What would be the best explanation for this inheritance?
- This is not the result of a genetic disorder
  - Both parents carried the recessive gene for cystic fibrosis
  - Cystic fibrosis is a chromosomal mutation that occurred during development and is not related to the parental genotypes.
  - Cystic fibrosis is caused by a mutation in the 21<sup>st</sup> pair of chromosomes.
56. A man heterozygous for blood type A marries a woman heterozygous for blood type B. The chance that their first child will have type O blood is \_\_\_\_\_. (hint-do a Punnett square to figure this out!) What other blood types could this couple produce?

57. Describe how recessive sex-linked disorders are passed from parents to offspring.
58. A colorblind male  $X^nY$  marries a woman that is a carrier for color blindness. What chance does the couple have of having a colorblind daughter?
59. Recall the terms Codominance and Incomplete dominance. Give an example of each.
60. Differentiate autosome and sex chromosome. How many of each are in a normal human karyotype?
61. What can cause a chromosome number abnormality?
62. Determine the number of autosomes and sex chromosomes in each karyotype. Circle any abnormalities you notice within any of the karyotypes.

