

CLS Biology 309

Semester One Final Exam Review

Unit	Learning Standards
Unit 00: Science Skills	<input type="checkbox"/> Science Skill 1 - Scientific Method <input type="checkbox"/> Science Skill 2 - Hypothesis Writing <input type="checkbox"/> Science Skill 3 - Graphing
Unit 01: Ecology	<input type="checkbox"/> Describe the Components of an Ecosystem. <input type="checkbox"/> Analyze Energy Flow in and Ecosystem . <input type="checkbox"/> Analyze Matter Flow in an Ecosystem <input type="checkbox"/> Identify Roles and Relationships of Organisms. <input type="checkbox"/> Classify Types of Terrestrial Biomes <input type="checkbox"/> Contrast Population Growth Models <input type="checkbox"/> Analyze Limiting Factors of Population Growth <input type="checkbox"/> Evaluate Values & Importance of Biodiversity
Unit 02: Biochemistry	<input type="checkbox"/> Explain the Importance of Water <input type="checkbox"/> Contrast Organic Molecules in Living Things
Unit 03: Enzymes & Digestion	<input type="checkbox"/> Analyze the Role of Enzymatic Activity in Cells <input type="checkbox"/> Explain the Process of Human Digestion
Unit 04: Cells	<input type="checkbox"/> Explain the Role and Function of Cell Structure <input type="checkbox"/> Recognize Cell diversity
Unit 05: Cell Transport	<input type="checkbox"/> Explain the Importance of the Plasma Membrane <input type="checkbox"/> Differentiate Between the Types of Transport

This review is meant as a guide for you as you prepare for your final exam, it is not all inclusive. You should use all of your unit review guides, notes, labs, and practice worksheets to help you prepare for your final. Copies of all of the notes and answer keys to past review guides are posted online.

ES 00: Science Skill 1 - Scientific Method**LT: Determine the independent, dependent, and control variable of an experiment.**

1. A scientist wanted to test (using lab animals) if there was such a thing as a “sugar high.” In other words, do animals experience a surge of energy after ingesting a large quantity of sugar?
 - a. Describe how the experiment should be set up, and identify the control group.

2. The variable that a scientist has control over (in this case, the sugar) is called the _____ variable and is found on the ____-axis of a graph, while the _____ variable represents the “data” measured or collected and is found on the ____-axis.

3. A botanist (biologist who studies plants) wondered whether plants would grow better under a green light or under normal white light. To test this, she put 4 plants in a box and put a green light over them. After two weeks the student measured the plants’ heights (she found that the plants had an average growth of 6 inches), and then changed the green light bulb to a white light bulb. After two more weeks, she measured the plants again and found that they had only grown 4 more inches since they were measured last. She then concluded that green light causes plants to grow better than white light.
 - a. What is the independent variable?

 - b. What is the dependent variable?

 - c. What is the control variable?

4. A nutritional biologist wondered whether caffeine had an effect on behavior. To test this, he gathered 30 white rats of the same age and size. He gave 10 of the rats 20 mL of pure water to drink each day and the other 20 rats 10 mL of caffeinated water to drink each day. The two groups of rats were kept in separate cages. For 90 days, the biologist collected data concerning the quality and speed of the rats’ movements. Since the rats given caffeine seemed jittery than the other rats, he concluded that caffeine did have an effect on their behavior.
 - a. What is the independent variable?

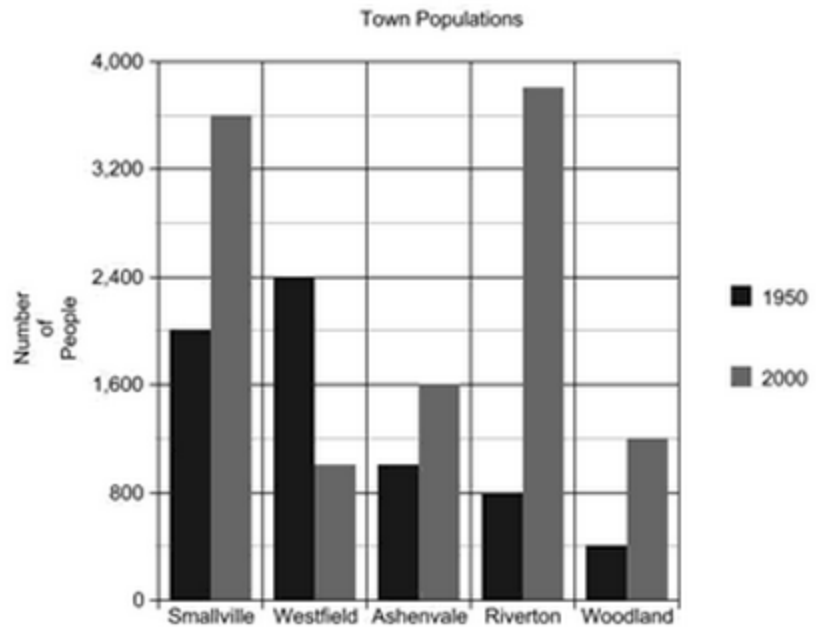
 - b. What is the dependent variable?

 - c. What is the control variable?

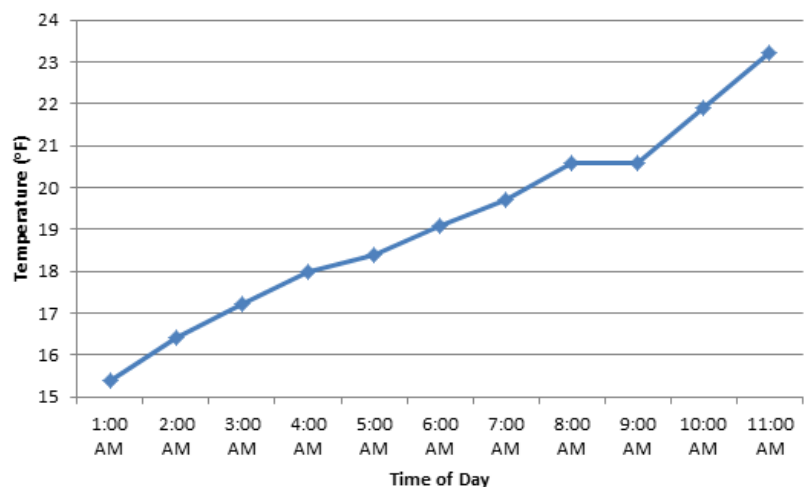
ES 00: Science Skill 3 - Graphing
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LT: Analyze a graph.

5. According to the graph, which town grew the most between 1950 and 2000?
6. Which town declined in population?
7. Which town had the smallest change in population?
8. What is the population of Woodland in 2000?



9. The graph below shows the actual temperature of Crystal Lake on January 1, 2009. As a rule, the temperature outside depends on the time of the day. Use the graph to answer the questions that follow.

Time vs. Temperature

- a. What was the temperature at 5:00am?
- b. When was the temperature 20.5 degrees Fahrenheit?
- c. What was the maximum temperature? At what time?
- d. What was the minimum temperature? At what time?
- e. Between what times was the temperature rising?

LT: Create a graph that includes a title, labels, and proper scaling.

10. What are the requirements of a well-constructed graph?

11. A type of feed claims to boost the growth rate of cows. The feed was tested on two twin newborn cows. Bessie receives the experimental feed, and Bertha receives regular corn feed. Their weights were recorded in the data table below. Graph the data; use one color to represent Bessie's growth and another color to represent Bertha's growth. Make sure to include ALL of the components of a good graph.

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

Key Outcome 1: Ecology

ES 1: Standard 1 - Describe the Components of an Ecosystem

LT: Describe the characteristics of life.

12. Briefly describe the following characteristics of life.
- a. Composed of cells
 - b. Obtain and use energy
 - c. Contain information (genetic code)
 - d. Reproduce

- e. Grow and develop
- f. Maintain a stable internal environment
- g. Respond to their environment
- h. Ability to evolve

13. Match the letter for each characteristic of life after each statement.

- | | |
|-------------------------|-----------------|
| A. Reproduction | E. Evolve |
| B. Growth & Development | F. Energy |
| C. Boundary | G. Organization |
| D. Balance | |

- _____ A teenager goes through puberty.
- _____ A cell splits into two identical cells.
- _____ The human body has many organ systems that have specific functions.
- _____ A cheetah can run at fast speeds in order to catch its prey.
- _____ A plant skeleton consists of its individual cells.
- _____ A giraffe feeds on the leaves from the tallest branches.
- _____ A Paramecium is only one cell, yet it contains all the structures required for life.
- _____ An amoeba surrounds and engulfs its prey.
- _____ Mantis lay eggs in large, foam sacs in the late summer early fall.
- _____ A seed germinates and becomes a plant.
- _____ Kidneys maintain the amount of water inside the human body.
- _____ The cone snail has a harpoon-shaped tongue and one of the most deadly venoms.
- _____ The giant squid feeds on the sperm whale.
- _____ Humans sweat to maintain body temperature.
- _____ Bats use sonar to navigate through caves.
- _____ Most bacteria divide approximately every 20 minutes.

LT: Distinguish between biotic and abiotic factors in the environment.

14. What is the difference between an abiotic factor and abiotic factor?

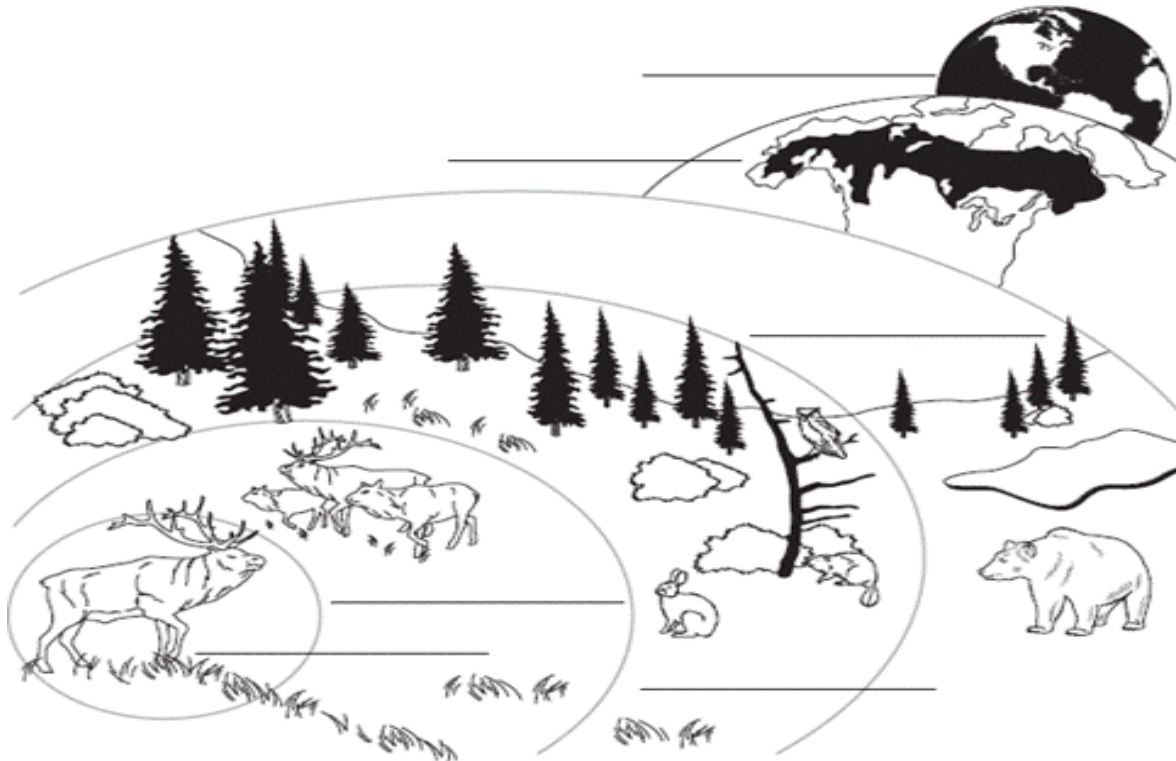
15. Look at the diagram below and list all of the biotic and abiotic factors pictured.



LT: Arrange the levels of organization within the biosphere.

16. Write the ecological levels of organization (organism to biome) in order from smallest to largest.

17. Label the following diagram using the 6 levels of organization of the biosphere.



ES 1: Standard 2 - Analyze Energy Flow in an Ecosystem.

LT: Explain how energy flows through an ecosystem.

18. As you proceed from one trophic level to the next, what happens in terms of energy transfer?

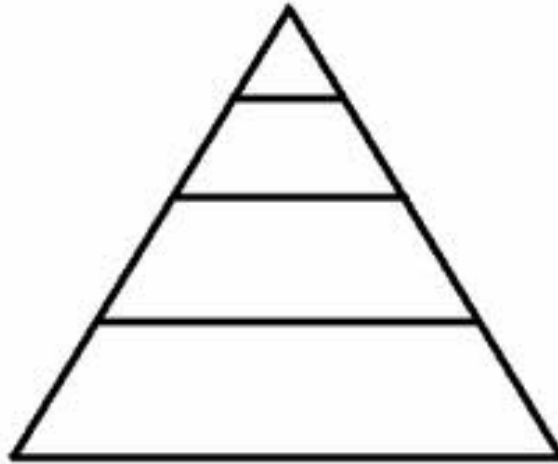
19. By what mechanism is energy transferred in an ecosystem?

20. What direction does energy flow in an ecosystem (use terms such as autotrophs, heterotrophs, producers, and consumers).

LT: Calculate the flow of energy from one trophic level to another.

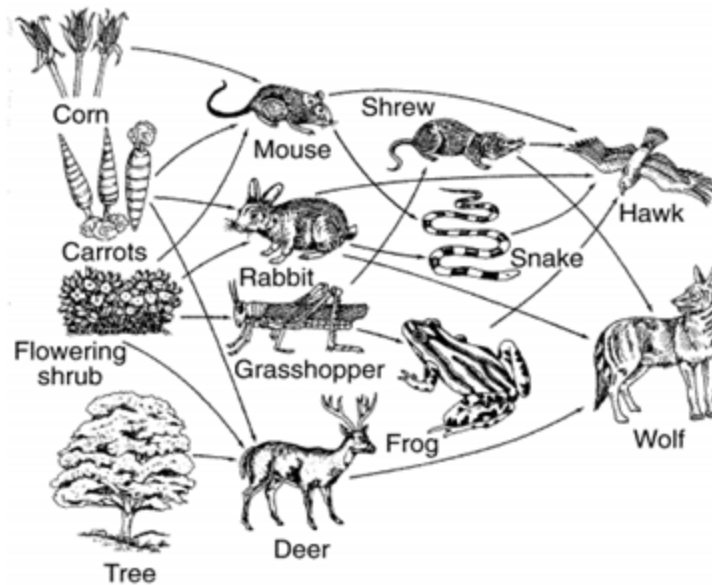
21. How much energy is passed from one trophic level to the next? Be Specific.

22. Fill in the energy pyramid below with the correct type of organisms you would expect to see at each level in any type of ecosystem.
- a. Draw an arrow to represent how energy moves through the pyramid.



23. What is the name of the rule that describes how energy moves through an ecosystem?

LT: Interpret a food chain or food web.



24. What do the arrows in the food web above represent?
25. Write out ONE food chain from the food web above.

26. From the food web above, list the following:

- a. a producer
- b. a primary consumer
- c. a secondary consumer
- d. a tertiary consumer

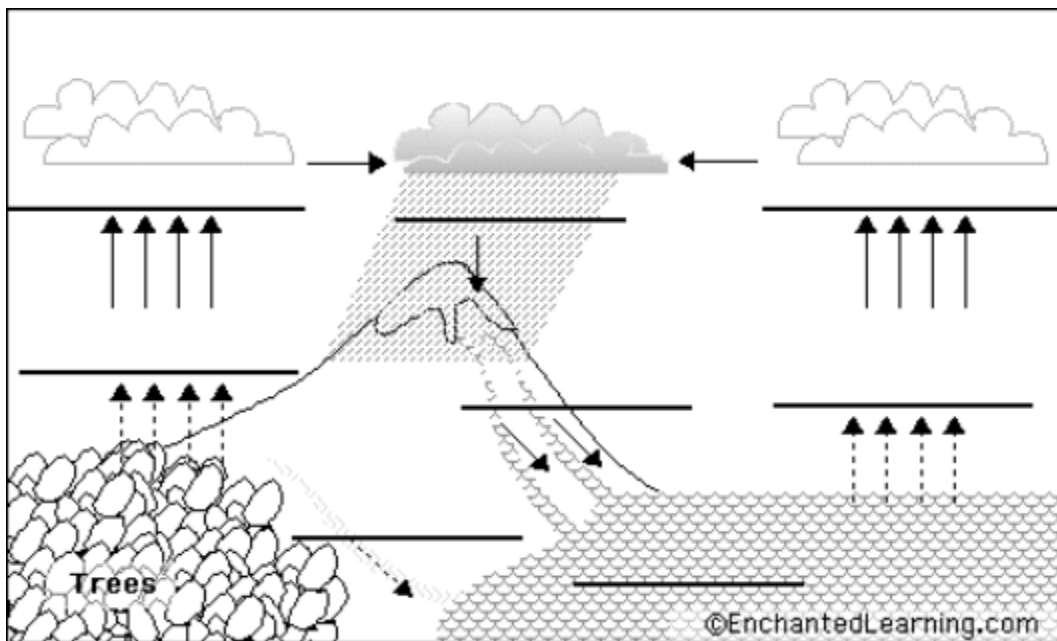
27. Using the food web above, what organisms would be directly affected if there was a decrease in the deep population?

ES 1: Standard 3- Analyze Matter Flow in an Ecosystem.

LT: Create a model describing how matter (water and carbon) cycles through the biosphere.

28. What matter cycle is represented by the diagram below?

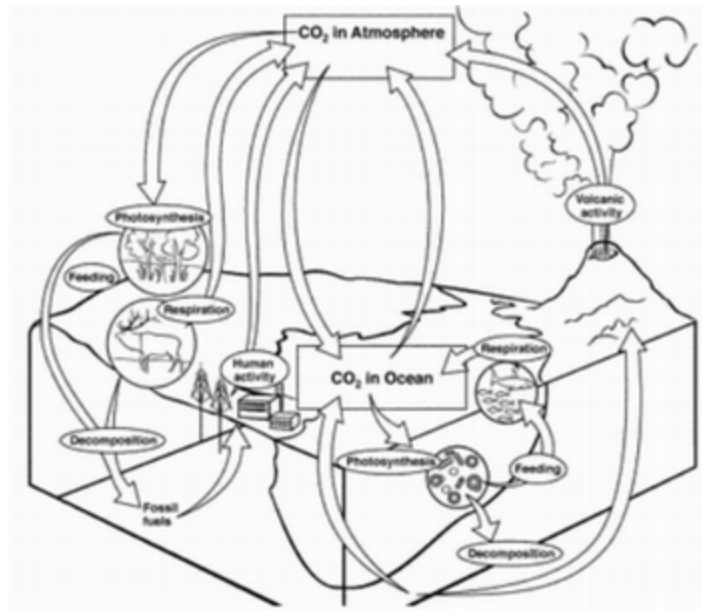
- a. Label the missing terms that complete the cycle.



29. Which part of the water cycle is missing from this diagram? Draw a simple picture to show your understanding of this part of the water cycle. (Hint: start with a tree).

30. What is the difference between transpiration and evaporation?

31. Use the illustration below to answer the next four questions.



- b. What cycle of matter is shown in the illustration?
- c. What biological process *removes* carbon dioxide from the atmosphere?
- d. What are two biological processes that *add* carbon dioxide to the atmosphere?
- e. What human activity is adding too much carbon dioxide to the atmosphere?

32. How are the carbon cycle and water cycle similar?

33. Describe how any form of matter through an ecosystem.

ES 2: Standard 1 - Identify Roles and Relationships of Organisms.

LT: Distinguish between an organism's niche and habitat.

34. What is the difference between a niche and a habitat?

35. Pick two organisms - list their habitats and their niches.

LT: Classify community members as a producer or type of consumer.

36. Fill in the chart below.

Type of Community Member	Definition	Example
Primary Producers		
Primary Consumers		
Secondary Consumers		
Decomposers		
Scavengers		

37. What is another term we can use to describe primary producers.

38. What is another term we can use to describe consumers?

LT: Identify and contrast biological relationships (predator-prey and symbiotic).

39. What are the three types of symbiotic relationships?

40. Put the letter (M,C,P) by the statement that best describes the type of symbiosis.
- A tick living on a dog.
 - The honeyguide bird leading the honey badger to the bees hive, both eat the honey.
 - A tapeworm living in a person's intestines.
 - A bird building their nest in a tree.
 - The hermit crab carrying the sea anemone on its back.
 - The bristle worm living with the hermit crab.
 - Head lice living on a human scalp.
 - The egret, an insect eating bird, graze near some herbivores mouth.
 - Orchids growing in tall tropical trees, the trees are not harmed but the orchids get sunlight.
 - Bacteria living on a human's skin.
 - The remora hitching a ride on a shark.
 - Barnacles living on a whale.
 - Bees and a flower.
 - Bacteria living in the intestines of a cow to help it break down cellulose.

ES 2: Standard 2 - Classify Types of Terrestrial Biomes.

LT: Describe biotic and abiotic factors of terrestrial biomes (desert, taiga, rainforest, deciduous forest, tundra, savanna, temperate grasslands).

41. Name the biome described by each statement below
- hot and humid, dense vegetation, lots of animal diversity
 - hot and dry, many animals here only active at night
 - cold, treeless land, permafrost
 - elephants, zebras, lions, tigers live here
 - four seasons, trees lose leaves in the fall
 - Crystal Lake is part of this biome

42. Fill in the table below.

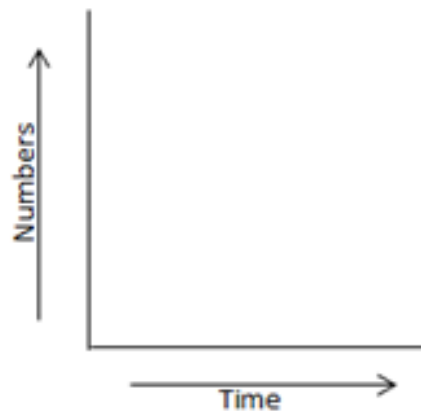
Biome	Precipitation and Temperature	Biotic Factors
Tundra		
	cold with mild summers and adequate rainfall	
		squirrels, oak trees, deer, maple trees
Rainforest		
	warm, distinct wet and dry season	
		cactus, coyotes, rattlesnakes
	cool and warm season, adequate rainfall	lush grass, prairie dogs, buffalo, deer

ES 3:Standard 1 - Contrast Population Growth Models

LT: Compare and contrast logistic and exponential growth models.

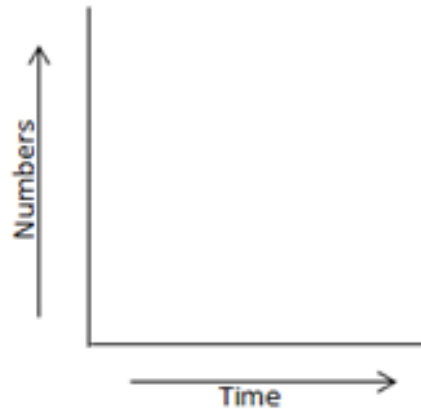
43. Under what circumstances does exponential growth occur?

44. Complete the graph below by drawing the exponential population growth curve.



45. Under what circumstances does logistic growth occur?

46. Complete the graph below by drawing the logistic population growth curve.



LT: Identify examples of populations that demonstrate different types of population growth.

47. List one example of a population that may experience exponential growth.

48. If a species is introduced to a new environment, where food sources are readily available and there are no natural predators what type of growth would you expect to see? Explain your answer.

ES 3: Standard 2 - Analyze Limiting Factors of Population Growth

LT: Identify factors that affect population growth.

49. Determine whether the following populations will increase in size, decrease, or stay the same.

- The birth rate and death rate are the same.
- The birth rate is greater than the death rate.
- The rate of immigration is equal to the rate of emigration.
- The rate of emigration is less than the rate of immigration.

LT: Predict the effects of limiting factors (ex. carrying capacity) on population growth.

50. How can limiting factors impact population growth?

51. What would you expect to happen to the population growth of a particular organism if the food supply were to disappear?

52. Can limiting factors determine how many organisms an environment can hold? Explain

53. What determines the carrying capacity of a specific environment?

54. What is the carrying capacity of an environment?

ES 4 - Standard 1 - Evaluate Values & Importance of biodiversity

LT: Examine the importance of protecting and conserving biodiversity.

55. What are the primary benefits of biodiversity on our society?

LT: Predict the impact of a specific threat to the biodiversity of an ecosystem.

56. What is an invasive species?

57. List one example of an invasive species.

LT: Describe how keystone species maintain biodiversity.

58. What is a keystone species?

59. What impact can the removal of a keystone species have on an ecosystem?

60. List at least one example of a keystone species.

61. Compare and contrast an invasive species to a keystone species.

Key Outcome 2: Cells

ES 1: Standard 1 - Explain the importance of water.

LT: Describe how the structure of water leads to its unique properties.

62. Draw a picture of a molecule of water. Be sure to include information in your sketch that shows how a water molecule is considered polar.

LT: Explain the properties of water and its importance to life.

63. List the different properties of water.

64. Define and list one application or example of water's cohesive property.

65. Define adhesion and list one application of water's adhesive property.

66. What does it mean to be a universal solvent?

67. What happens to water molecules when they freeze? Why is it important that water is less dense when frozen?

ES 1: Standard 2 - Contrast Organic Molecules in Living Things

LT: Describe characteristics and functions of carbohydrates, lipids, and proteins.

68. Fill in the table below.

Organic Molecule	Elements present	Monomers	Functions/Examples
Carbohydrates			
Lipids			
Proteins			
Nucleic Acids			

LT: Compare and contrast the classes of organic compounds.

69. Which monosaccharide did we study most as the primary energy source for all living things.

70. List the three polysaccharides that we studied and their functions.

71. What is the difference (chemically) between a saturated and an unsaturated fat? Give examples of each.

72. What determines the structure and function of each individual protein?

73. What is the relationship between monomers and polymers?

74. Determine if each of the following terms describes a monomer (M) or polymer (P).

- | | | | |
|----------|------------------------|-----------|----------------------|
| _____ 1. | Cellulose | _____ 7. | Enzyme |
| _____ 2. | Unsaturated fatty acid | _____ 8. | Saturated fatty acid |
| _____ 3. | Starch | _____ 9. | Glucose |
| _____ 4. | Glycerol | _____ 10. | Polypeptide |
| _____ 5. | Fructose | _____ 11. | Amino acid |
| _____ 6. | Lipid | _____ 12. | Glycogen |

75. Determine whether each of the following statements describes a carbohydrate, lipid, or protein.

- Consists of three fatty acids bonded to a glycerol molecule.
- Contain peptide bonds.
- Commonly called fats and oils.
- Made of amino acids
- Used for long-term energy storage, insulation, and protective coating.
- Includes enzymes which speed up reactions.
- Primary source of energy for your body.
- Made up of long chains of amino acids.

ES 1: Standard 3 - Analyze the Role of Enzymatic Activity in Cells

LT: Describe the relationship between an enzyme, substrate, and active site.

76. What type of molecule are enzymes?

77. What is the function of enzymes in living things?

78. Draw a diagram of an enzyme reacting with its substrate. Label the enzyme, active site, and substrate.

LT: Predict the effect of factors on enzymatic activity

79. What is activation energy? How does it relate to enzymes?
80. List the factors that can affect enzymatic activity. Be sure to explain *how* each factor affects the enzyme's activity.
81. Explain the difference between a competitive and noncompetitive inhibitor.

LT: Explain the importance of enzymes to metabolism.

82. What is metabolism?
83. How does metabolism relate to enzymes and digestion?
84. What two reactions are associated with the building and breakdown of organic molecules?

ES 1: Standard 4 - Explain the Process of Human Digestion
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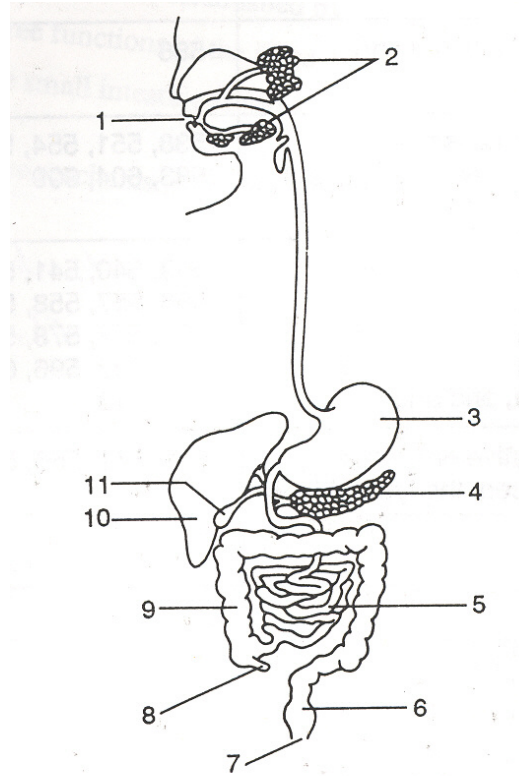
LT: Identify and describe the structure and function of the human digestive system.

85. What term refers to the muscle contractions that push food through the digestive system?
86. Name the digestive organ described by each statement below.
- a. contains villi
 - b. most of the absorption of nutrients occurs here
 - c. absorption of water
 - d. site that begins chemical digestion of proteins
 - e. passageway for air and food, back of oral cavity
 - f. makes bile

- g. produces enzymes to digest carbs, fats, & proteins
- h. stores bile

- i. food tube that connects the mouth to stomach

87. Label the diagram below.



88. List each of the organs found in the human digestive system with their functions.

89. Which organs (in order) does food pass through on its journey through the digestive system?

90. List the accessory organs of the digestive system.

ES 2: Standard 1 - Explain the Role and Function of Cell Structure

LT: Describe the structure and function of organelles in a typical cell.

91. Name the organelle being described by each statement below.

- a. very large in plants, water storage centers
- b. breaks down and digests excess or worn out cell parts
- c. only in animal cells, may aid in cell division
- d. makes proteins
- e. makes ribosomes
- f. site of photosynthesis
- g. powerhouse of the cell
- h. process, packages, and exports proteins out of the cell
- i. jellylike interior inside the cell
- j. control center of the cell

92. List the different organelles found in plant and animal cells. Briefly explain their role/function.

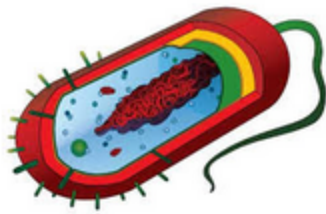
ES: 2 Standard 2 - Recognize Cell Diversity

LT: Differentiate between prokaryotic and eukaryotic cells.

93. Compare and contrast prokaryotic and eukaryotic cells.

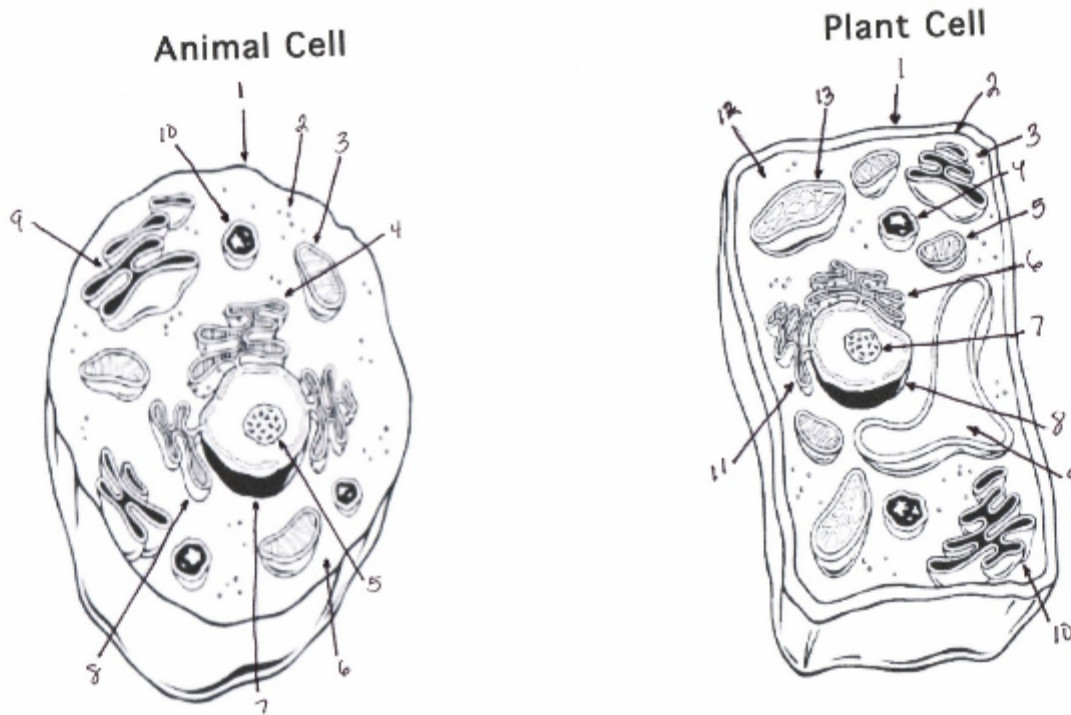
Prokaryotes	Both	Eukaryotes

94. Identify the drawings below as either prokaryotic or eukaryotic.



LT: Compare structural differences between a plant and animal cell.

95. Label the different organelles found in the plant and animal cell below.

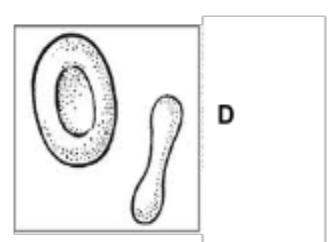
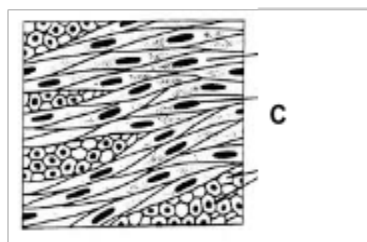
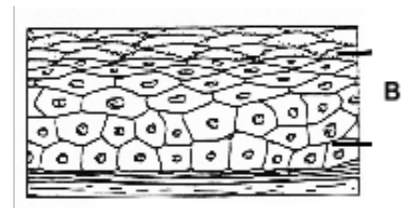
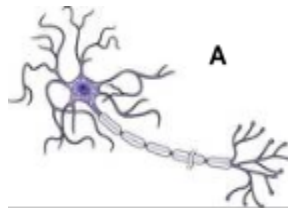


LT: Recognize the relationship between a cell's structure and function.

96. Why do different cells have different shapes?

97. Match the cells pictured below to the correct description.

- a. These cells fit through thin blood vessels.
- b. These cells contract and stretch with the movement of muscles.
- c. These cells send signals from one cell to another.



- d. These cells form a protective layer on the surface of some organisms.

ES 3: Standard 1 - Explain the Importance of the Plasma Membrane

LT: Describe the structure and function of the plasma membrane.

98. What does the term semi-permeable (selectively permeable) mean?
99. Which part of the membrane's structure gives the cell the greatest and most specific control over molecules entering and leaving the cell?
100. What structures are found in the plasma membrane? What are their functions.
101. What does the label "Fluid Mosaic Model" tell you about the plasma membrane?

ES 3: Standard 2 - Differentiate Between the Types of Transport

LT: Compare and contrast different types of passive transport.

102. With regards to diffusion, molecules move from an area of _____ concentration to an area of _____ concentration until _____ is reached.
103. What is the differences between simple diffusion and facilitated diffusion?
104. What is the difference between diffusion and osmosis?
105. How are diffusion and osmosis similar?

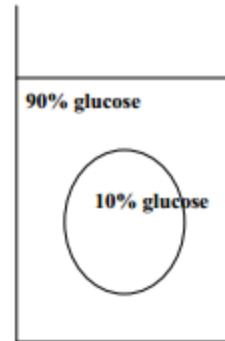
LT: Explain how materials diffuse across a semi-permeable membrane.

106. How do materials diffusion across the plasma membrane?

LT: Predict the effect of osmotic solutions on plant and animal cells.

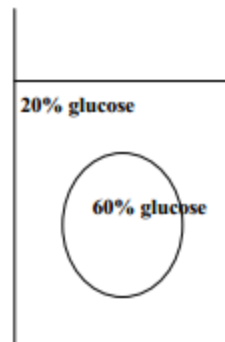
Use the diagram to the right to answer the next four questions.

- 107. What is the percent of water inside the cell?
- 108. What is the percent of water outside the cell?
- 109. Will osmosis occur?
 - a. If so, in what direction will osmosis occur?
 - b. Will the cell shrink or swell?
- 110. What type of osmotic solution is the cell in?



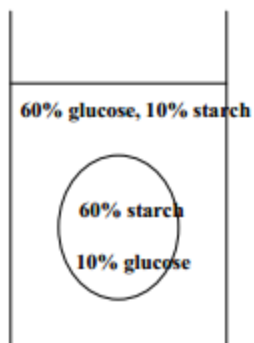
Use the diagram to the right to answer the next four questions.

- 111. What is the percent of water inside the cell?
- 112. What is the percent of water outside the cell?
- 113. Will osmosis occur?
 - a. If so, in what direction will osmosis occur?
 - b. Will the cell shrink or swell?
- 114. What type of osmotic solution is the cell in?



Use the diagram to the right to answer the next four questions.

- 115. What is the percent of water inside the cell?
- 116. What is the percent of water outside the cell?
- 117. Will osmosis occur?
 - a. If so, in what direction will osmosis occur?
 - b. Will the cell shrink or swell?
- 118. What type of osmotic solution is the cell in?

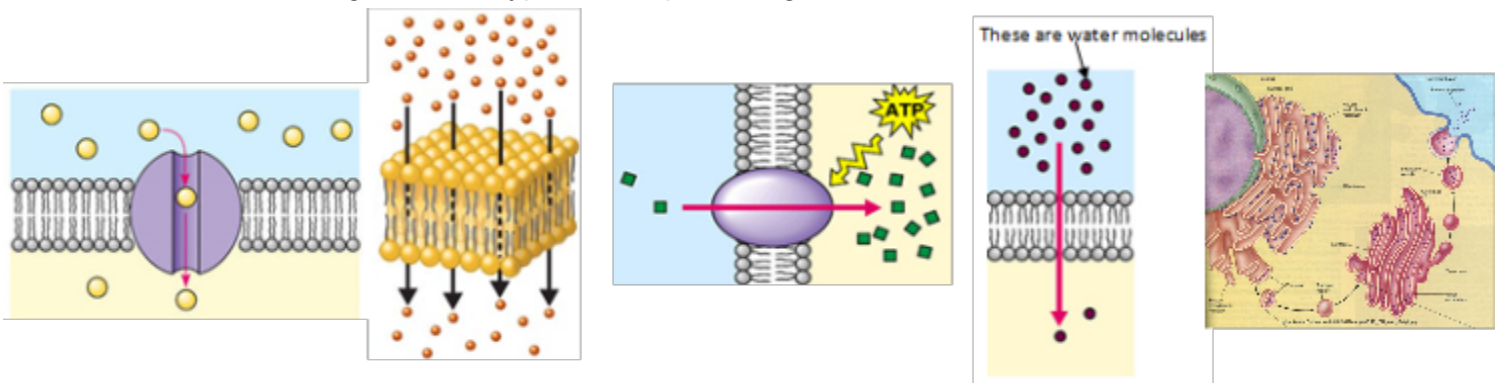


LT: Identify examples of passive and active transport.

119. List the different forms of passive transport.

120. List the different forms of active transport.

121. Label each image with the type of transport being shown.



LT: Contrast active and passive transport.

122. How are active transport and facilitated diffusion similar? How are they different?

123. Circle the processes that require energy (need energy to occur).

- a. diffusion
- b. osmosis
- c. endocytosis
- d. exocytosis
- e. facilitated diffusion
- f. active transport

124. State whether the solution would be hypertonic, hypotonic, or isotonic in each description below.

- a. concentration of water is the same inside of cell as outside
- b. net movement of water out of the cell
- c. no net movement of water
- d. concentration of water is greater inside of cell

- e. concentration of water is lower outside of cell
- f. plasmolysis may occur
- g. cytolysis may occur
- h. ideal solution type for animal cells
- i. the cell swells and may burst
- j. beneficial for plant cells but not animal cells
- k. distilled water