

Introduction to Biology

1. List the 8 Characteristics of Life

1. Growth & development
2. Organization
3. Stimulus response
4. Homeostasis
5. Adaptation
6. Reproduction
7. Energy use
8. Contain DNA

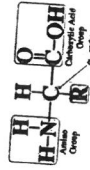
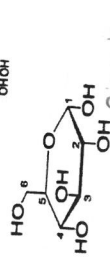
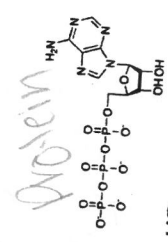
2. Which characteristic of life matches each of the following scenarios:

- a) "My jeans from last year are too short." *Growth*
- b) "Our cat gave birth to 5 kittens yesterday." *Reproduction*
- c) "Plants use photosynthesis to create sugar." *Energy use*
- d) "When I heard my parents' footsteps, I hid my cellphone and pretended to be asleep." *Stimulus response*
- e) "Single-celled organisms live in the pond behind school." *Adaptation*
- f) "Our body normally maintains a temperature of 98.6°F." *Homeostasis*
- g) "A giraffe uses its long neck to eat from the high branches of a tree." *Adaptation*

3. List the function and two organs for the following body systems:

- a. immune system - *defends the body against infection*
- b. skeletal system - *gives the body its shape, movement makes blood to absorb*
- c. digestive system - *breaks food into parts small enough*

4. Label the following macromolecules (carb, lipid, NA, protein)

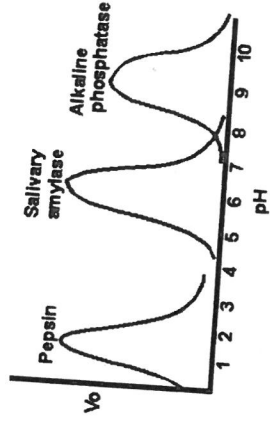


TYPE OF MOLECULE	BUILDING BLOCK/ MONOMER	TYPE OF MOLECULE	BUILDING BLOCK/ MONOMER
CARBOHYDRATES	Monosaccharides	PROTEINS	AMINO ACID
LIPIDS	Fatty acids	NUCLEIC ACIDS	NUCLEOTIDES

5. What is the function of enzymes?

helps speed up chemical reactions in our cells by helping to lower the activation energy needed to start a reaction

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Use the graph above to answer the next two questions

7. At what pH is alkaline phosphatase the most effective?
8. True or False - The activity of salivary amylase is highest at pH of 5.
9. Label the products and reactants in the chemical equation below:
 $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

10. What does the arrow in the equation above mean?

to indicate the direction of the chemical reaction

11. What is activation energy?

The minimum quantity of energy

12. Explain the difference between endothermic and exothermic reactions. Draw each.

*endo absorbs energy from surroundings
exo reaction releases the energy into surroundings*

13. Create a graph that shows a chemical reaction that is catalyzed by an enzyme. Label the reactants, products, and activation energy.



14. Directions: Write an "E" for enzyme, if the characteristic describes an enzyme, or "N" for non enzyme if it is NOT an enzyme characteristic.
- a. can be used again & again *E*
 - b. synthesize *E*
 - c. can only be used ONCE *N*
 - d. only works with one substrate *N*
 - e. speeds up reactions *E*
 - f. works with any substrate *N*

1. Labeling: In the diagram below, label the substrate, enzyme, active site, substrate-enzyme complex and product.



16. Is the enzyme in the diagram breaking apart or putting together the substrate?

Putting together

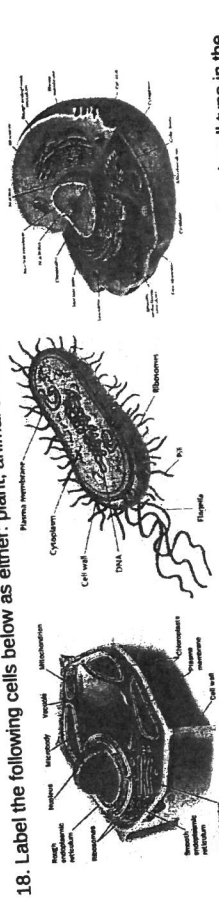
17. What are 3 factors that can change the way an enzyme works.

Temperature, pH + concentration

Cells

18. Directions: Choose which type of organelle best fits each description. Write the correct organelle in the space next to each clue.

- I turn food into chemical energy for the cell. *respiration*
- I am the liquid material of the cell, in which the organelles are suspended.
- I store and protect a cell's DNA.
- I photosynthesize.
- I am very large in plant cells, and much smaller in animal cells and am used for storage.
- I am located on the rough endoplasmic reticulum and also scattered through the cytoplasm.
- We are protein factories. There are many of us.
- You would find me in the cell of a maple tree or tulip, but not in the cell of a rabbit or goldfish. (3 answers)
- I break down old and worn out cell parts.
- I sort and deliver proteins.
- I am a rigid layer that provides support, protection, and shape to a plant cell.
- I am a flexible layer that provides a barrier between the cell and its environment.



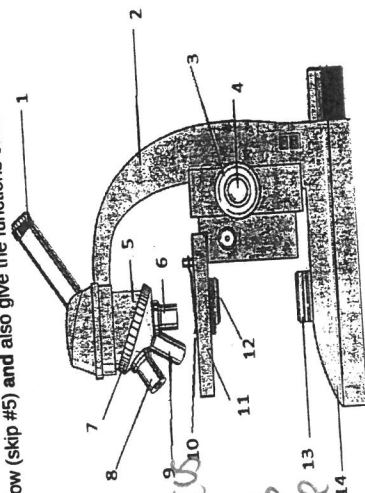
19. Directions: Choose which type of cell best fits each description. Write the letter of each cell type in the blank provided at the left of the description.

- P = Prokaryotic Cells E = Eukaryotic Cells B = Both Prokaryotic and Eukaryotic Cells
- Have a nucleus *E*
 - Type of cells that make up *E* humans/animals.
 - Contain DNA *E*
 - Bacteria cells *P*
 - Multicellular organisms *E*

20. Plants vs. Animals



21. Label the microscope below (skip #5) and also give the functions of numbers 1, 10, 11, and 12.



1. eye piece

2. arm

3. coarse focus

4. fine focus

5. nose piece

6. stage

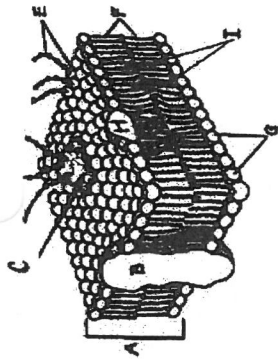
Cellular Transport

21. Explain selectively permeable

22. Define equilibrium

it's keeping everything equal

5/2/22



23. Identify the following from the diagram to the left.

- A= Phospholipid bilayer
B= Channel protein
F= fatty acid
G= Phospholipid head

24. How many layers of phospholipids make up the cell membrane?

2 layers

25. Explain how the cell membrane helps a cell maintain homeostasis.

regulating the material that may enter or leave cell

26. Sketch a phospholipid. Label it using the following terms: head, tail, hydrophobic, hydrophilic

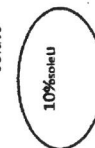
27.

	DIFFUSION	OSMOSIS	FACILITATED DIFFUSION	ACTIVE TRANSPORT
WHAT MOVES?	molecules	water	materials	materials
AGAINST/DOWN CONCENTRATION GRADIENT?	Down	against	Down	against
REQUIRE ENERGY?	no	no	no	yes
REQUIRE PROTEINS?	no	no	yes	yes

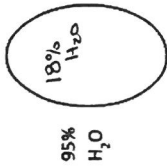
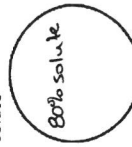
28. Directions:

- A. Calculate and write in the amount of water in each cell and environment below.
B. Draw an arrow to show the net movement of water.
C. Label the type of solution hypertonic, hypotonic, or isotonic.

15% solute



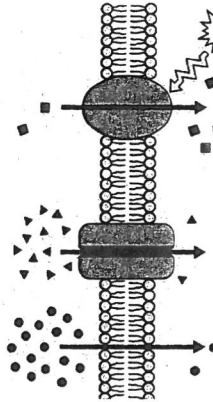
10% solute



15% solute



re 8.14 Review: A comparison of passive and active transport

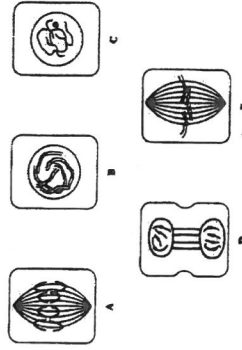


29. Label the above three types of transport.

Cell Division

30. Mitosis is the division of daughter cells.

31. Determine the correct order for the following illustrations of the stages of mitosis. Label each phase.



32. Chromosomes that are the same size, shape and contain the same genetic material are called homologous chromosomes.

33. Which phase of the cell cycle lasts the longest? inter
34. In which phase of the cell cycle does the nucleus divide? mitosis
35. In which phase of the cell cycle does growth occur? inter
36. In which phase of the cell cycle does DNA replication take place? S phase
37. In which phase of the cell cycle does the cytoplasm divide? M phase

38. If the SOMATIC cell of a grasshopper contains 24 chromosomes, how many chromosomes does the GAMETE of a female grasshopper contain? 12

39. Be able to determine sex of individual on karyotype. Determine if trisomy exists on karyotype.

40. Draw Metaphase I and II.



41. Draw Anaphase I and II.



42. What is the difference between diploid and haploid cells?

diploid are somatic and haploid are sex cells

43. Mitosis produces _____ daughter cells that are genetically _____ to the parent cell, while Meiosis produces _____ daughter cells that are genetically _____ when compared to the parent cell.

DNA STRUCTURE AND REPLICATION

44. Where is DNA found in a eukaryotic cell? And prokaryotic?

45. What sugar is found in DNA? RNA?

46. Sketch and label a nucleotide.



47. What nitrogenous base differs in DNA and RNA?

Thymine in DNA, Uracil in RNA

48. What is the name of DNA's shape?

double helix

49. If a DNA molecule is 22% guanine, what percentages are the other bases?

50. What is the process of copying DNA called?

DNA replication

51. In which organelle is DNA copied?

mitochondria + chloroplasts

52. Write out the full name for DNA.

deoxyribose nucleic acid

PROTEIN SYNTHESIS

53. What happens during translation? Where does this take place in a cell?

where mRNA is read and translated in the cytoplasm by ribosomes

54. What happens during transcription? Where does this take place in a cell?

in the nucleus

55. Where would you find a codon? An anticodon?

codon in mRNA, anticodon in tRNA

56. What is Central Dogma?

DNA → RNA → Protein

57. If an original DNA strand reads GGCAATTTGCGA what would its mRNA read after being transcribed?

CCGUUA AAC GCA

58. Translate the mRNA you created in number 57.

CCG UUA AAC GCA

59. What is the difference between a point mutation and a frameshift mutation?

point mutation changes one amino acid, frameshift changes the reading frame

60. Are all mutations harmful?

no

61. What type of mutation is seen here? Strand 1 ATC CAT TAG GGG Strand 2 ATC GAT TAG GGG

GENETICS

62. Describe the genotypes given. The first one has been done for you.

a. DD- homozygous dominant

b. Dd- heterozygous dominant

c. dd- homozygous recessive

a. BB black

b. Bb black carrier

c. bb orange

d. mm- homozygous recessive
e. Mm- heterozygous dominant
f. MM homozygous dominant

63. Black fur is dominant over orange fur. What are the phenotypes of the following genotypes?

64. A pea plant that is heterozygous for green pods is crossed with a pea plant that has yellow pods.



a. What are the alleles? Gg

b. What are the genotypes of each parent? Gg x gg

c. Complete a Punnett square to predict the offspring from this cross.

d. What are the predicted genotype and phenotype ratios of the offspring?

e. If this cross produced 50 pea plants, how many of the 50 would we expect to be yellow?

65. In another cross, two brown seeded plants were crossed. About 25% of their offspring were white. What must the genotypes of the parent plants have been? Show a Punnett square as evidence.



66. In Kentucky, there is a creature known as a wildcat. Wildcats can be blue, red, or purple.
- What type of non-Mendelian genetics is this an example of?
 - Cross two purple wildcats and give the genotype and phenotype ratios of their offspring.

67. Long horn cattle can have coats that are brown, black, or brown and black.
- What type of non-Mendelian genetics is this an example of?
 - Cross a brown and black bull and a black cow and give the genotype and phenotype ratios of their offspring.

68. There are four different blood types in humans. Give the genotype of each individual described below.

- heterozygous type A-
- heterozygous type B-
- homozygous type A-
- homozygous type B-
- type AB-
- type O-

69. Circle the person above who is considered a Universal Donor and put a star by the Universal Recipient.

70. A father with type AB blood and a mother with type B blood have a child with type A blood.

- What must the genotypes of the parents be? Show a Punnett square as evidence.
- What are all of the possible blood types their offspring could have?



female  male 

71. Draw a pedigree for the family described below. Write in the names & genotypes for each family member. Tongue rolling is dominant over no tongue rolling. Both Mr. and Mrs. Bridges can roll their tongues. Of their three children, Sarah and Oliver can roll their tongues but Darian cannot. Sarah marries Stephen who cannot roll his tongue. Oliver marries Gina who also rolls her tongue, and they have one son, Josh, who can roll his tongue. Darian marries Molly, who can roll her tongue and they have one daughter, Natalie, who cannot roll her tongue.



