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SECTION REVIEW KEY

Section 1

1. Biology is the study of every living thing. From medicine to food growth and development to air pollution, there is application in every area of life.
2. Biology improves life for humans, plants, and other animals. Society improves and becomes civilized because of what we know, what we are still learning, and how that knowledge is applied.
3. All living things are made up of cells and exhibit organization. They grow and develop, they respond to stimuli, they exhibit metabolism and homeostasis, they reproduce, they change and evolve over time, and they exhibit movement at some point in their life cycle.
4. Atoms bond together to form molecules. Molecules bond together to form organelles. Organelles organize into cells. Cells work together to form tissues. Tissues work together to form organs. Organs work together to form systems. Systems work together to form an organism.
5. Metabolism is the rate at which an organism turns nutrition or food into energy for cell function. Homeostasis is the narrow range at which most cells maintain their production and function to keep everything in the system in balance. Maintaining homeostasis requires energy from food, and so metabolism plays an important function in homeostasis.
6. Living organisms grow by increasing the size and number of their cells. Nonliving things such as rocks can add mass but not increase in size by adding more cells.
7. Most living cells are able to reproduce living cells identical to themselves, passing on the DNA or code for this process. This ensures the directions for reproduction are passed on for generations into perpetuity.

CHAPTER 1: The Science of Life

SECTION 1 VOCABULARY

1. **biology:** _____

2. **organization:** _____

3. **cell:** _____

4. **unicellular:** _____

5. **multicellular:** _____

6. **organ:** _____

7. **tissue:** _____

8. **organelle:** _____

9. **biological molecule:** _____

10. **homeostasis:** _____

11. **metabolism:** _____

12. **cell division:** _____

13. **development:** _____

14. **reproduction:** _____

15. **gene:** _____

Section 2

1. All living organisms are made up of cells, they all share a common code in DNA, and they all adapt with time and environment change.
2. Unity and diversity are represented through phylogenetic diagrams and classification of organisms.
3. The domain Bacteria contains the kingdom Eubacteria. The domain Archaea contains the kingdom Archaeobacteria. The domain Eukarya contains the kingdoms Protista, Fungi, Plantae, and Animalia.
4. Within an ecosystem, every organism is dependent on every other organism. If one disappears, it is likely the entire ecosystem will die.
5. Evolution is supported by natural selection. The strongest of the species is the most likely to live and pass on the DNA that makes it strong, causing every generation to become better adapted to its environment until the species is varied enough to give it a new name because of its diversity.
6. Natural selection, or the idea that the strongest or most well-adapted organism lives to pass on its DNA, is what drives evolution, which is the gradual change of a species until it has changed enough to warrant a new classification and its own name.

COMPREHENSION QUESTIONS

1. Biology is the study of _____ life or living organisms _____.
2. List the seven characteristics or qualities that constitute life and give an example of each.
 - a. _____ Cells and organization: Smallest unit of life organized into tissues and organ _____
 - b. _____ Responsiveness: Pupils dilating in a dark room _____
 - c. _____ Homeostasis: Sweating to maintain body temperature _____
 - d. _____ Metabolism: Converting food into energy for cell functions _____
 - e. _____ Growth and maturation (development): Cells taking in substances and cell differentiation _____
 - f. _____ Reproduction: Cell replication for growth or species reproduction _____
 - g. _____ Adaptation and change: The fastest animal catches the food and so lives to pass on favorable genes. _____
3. The smallest structural and functional unit of life is the _____ cell _____.

4. All living organisms exhibit structural and functional organization. Place the terms below in order from simplest to most complex and place an * by the term that indicates the simplest form of life.

Organisms	Tissues	Molecules	Organelles	Organs	Atoms	Cells	Systems
-----------	---------	-----------	------------	--------	-------	-------	---------

- | | |
|---------------------------|--------------------------|
| a. _____ Atoms _____ | e. _____ Tissues _____ |
| b. _____ Molecules _____ | f. _____ Organs _____ |
| c. _____ Organelles _____ | g. _____ Systems _____ |
| d. _____ Cells* _____ | h. _____ Organisms _____ |
5. In which two ways can living organisms increase in size over time?
 - a. _____ Taking in molecules and other substances to increase cell size _____
 - b. _____ Adding more cells through cell replication to increase size _____
 6. What are the two types of reproduction seen in living organisms, and how are they different?
 - a. _____ Asexual reproduction produces new identical cells or organisms. _____
 - b. _____ Sexual reproduction produces new and similar yet different cells or organisms. _____
 7. Phylogenetic diagrams (Tree of Life) are used to help biologists classify (organize) organisms according to their similarities or common characteristics. There are many different classification systems; however, the system we will be using throughout the year organizes all living things into three domains. These domains are:
 - a. _____ Archaea _____
 - b. _____ Bacteria _____
 - c. _____ Eukarya _____

8. The three domains are made up of six kingdoms. These six kingdoms and their domains are:

- | | | | |
|----|-----------------|---------|-----------------|
| a. | <u>Archaea</u> | Domain: | <u>Archaea</u> |
| b. | <u>Bacteria</u> | Domain: | <u>Bacteria</u> |
| c. | <u>Protista</u> | Domain: | <u>Eukarya</u> |
| d. | <u>Plantae</u> | Domain: | <u>Eukarya</u> |
| e. | <u>Fungi</u> | Domain: | <u>Eukarya</u> |
| f. | <u>Animalia</u> | Domain: | <u>Eukarya</u> |

9. Kingdoms are then made up of different phyla.

10. Number the terms below in order from the most general to the most specific. (See text, p. 338)

- | | | | |
|------------------|-----------------|------------------|-----------------|
| <u>5</u> Order | <u>1</u> Domain | <u>7</u> Genus | <u>4</u> Class |
| <u>8</u> Species | <u>3</u> Phylum | <u>2</u> Kingdom | <u>6</u> Family |

11. All organisms within a defined geographic area are in relationship with each other in some way or another. This relationship is termed interdependence.

12. The defined geographic area in which organisms are dependent on each other and interact is called an ecosystem.

13. The specific study of these organisms and their homes is called ecology.

14. All living organisms must reproduce in order for the species to survive. Hereditary information is passed from one organism to another in the form of genes or DNA.

15. Favorable hereditary traits that allow a species to live and reproduce more successfully are passed from one generation to another. This process is termed natural selection.

16. Natural selection occurs over time, causing new and genetically different species to emerge. This process is called evolution or change over time.

17. The steps in the process of scientific inquiry (the scientific method) are listed below. Briefly describe or explain each step on the line provided. Theory is completed for you.

- a. Theory: A well-tested and accepted explanation or model of the natural world
- b. Observation: Noticing something in the natural world that causes a question to be raised

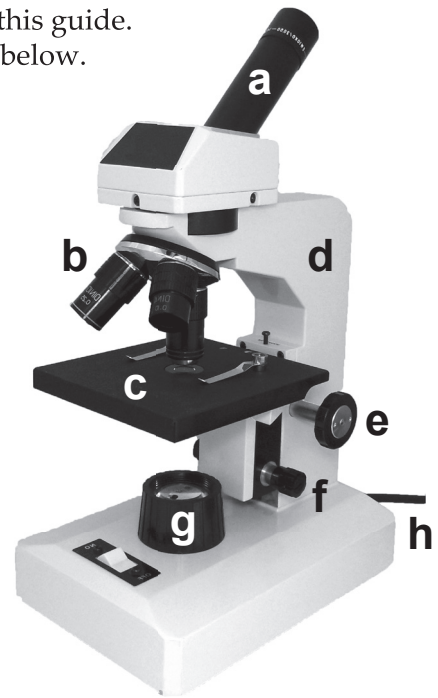
- c. Hypothesis: A proposed answer or explanation to the question raised

- d. Prediction: The expected outcome of an experiment
- e. Experiment: A test performed to support the hypothesis
- f. Results: Quantitative findings of the experiment
- g. Analysis: Objective data calculations and outcomes

- h. Conclusions: Determination if the original hypothesis and theory are supported or not

18. Study the "Parts of a Microscope" diagram in the Appendix of this guide. Then label the parts of the simple compound light microscope below.

- a. Ocular
- b. Objectives
- c. Stage
- d. Arm
- e. Coarse focus knob
- f. Fine focus knob
- g. Light source
- h. Power source



19. Review base and derived units.

- a. What is the base unit for distance? meter
- b. What is the base unit for time? second
- c. What is the derived unit for volume? cubic meter
- d. What is the base unit for mass? kilogram
- e. What is the accepted unit for temperature? Celsius
- f. What are the derived units for density? kg/m³

20. Review SI metric prefixes and fill in the abbreviation and value for each.

Prefix	Abbreviation	Value
giga	G	1,000,000,000
mega	M	1,000,000
kilo	k	1,000
hecto	h	100
deka	da	10
base unit	none	1
deci	d	1/10
centi	c	1/100
milli	m	1/1,000
micro	μ	1/1,000,000
nano	n	1/1,000,000,000
pico	p	1/1,000,000,000,000

SECTION REVIEW KEY

Section 1

1. Animals are all heterotrophic, most are multicellular, reproduce sexually, and exhibit some type of movement.
2. Nervous tissue processes incoming sensory information and sends signals to muscles, which allows the animal to respond to the information.
3. It is thought that early protists lived in colonies, and over time, groups of cells within the colony began to carry out specialized functions until the colony developed into a loosely connected organism.
4. Notochord, pharyngeal pouches, and a post anal tail
5. Bilateral symmetry
6. The presence or absence of true tissues, the number of tissue layers, coelom type, and the presence of a notochord or dorsal nerve cord

Section 2

1. The purpose of an outer body covering on most terrestrial animals is primarily to conserve water and protect the internal organs.
2. An exoskeleton is a tough outer body covering that protects the organism and is shed and replaced as the organism grows. An endoskeleton is a bony or cartilaginous framework inside the organism that grows as the organism grows.
3. An open circulatory system is commonly seen in less complex animals and consists of a heart and vessels that pump into an open coelom where gas and nutrients are exchanged before the blood or hemolymph returns to vessels that lead to the heart. A closed circulatory system contains the blood in vessels as it travels through the organism and returns to the heart and lungs where gas exchange occurs.
4. All vertebrates and some invertebrates exhibit a high degree of cephalization. Invertebrates usually exhibit simpler response patterns and less organization than vertebrates.
5. Most invertebrates undergo direct development with a larval stage, while all vertebrates undergo direct development and begin life as nymphs.

CHAPTER 32: Introduction to Animals

VOCABULARY

Section 1

1. animal: _____

2. vertebrate: _____

3. invertebrate: _____

4. specialization: _____

5. ingestion: _____

6. zygote: _____

7. differentiation: _____

8. chordate: _____

9. notochord: _____

10. dorsal nerve cord: _____

11. pharyngeal pouch: _____

12. symmetry: _____

13. radial symmetry: _____

14. dorsal: _____

15. ventral: _____

16. anterior: _____

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Section 3

1. Fertilization, cleavage, blastula formation, and gastrulation
2. Endoderm forms most of the internal organs and the reproductive system. Mesoderm gives rise to the bones and muscles. The ectoderm becomes the skin and nervous system.
3. Protostomes undergo indirect development, spiral cleavage, and schizocoely, and the blastopore becomes the mouth. Deuterostomes undergo direct development, radial cleavage, and enterocoely, and the blastopore becomes the anus.
4. In schizocoely, the mesoderm forms at the junction of the endoderm and ectoderm. In enterocoely, the mesoderm forms at the top of the archenteron.
5. In indeterminate cleavage, if the blastula splits early enough, the cells have the ability to form two complete and identical organisms.

17. posterior: _____

18. bilateral symmetry: _____

19. cephalization: _____

20. germ layer: _____

Section 2

21. segmentation: _____

22. exoskeleton: _____

23. gill: _____

24. open circulatory system: _____

25. closed circulatory system: _____

26. hermaphrodite: _____

27. larva: _____

28. endoskeleton: _____

29. vertebra: _____

30. integument: _____

31. lung: _____

32. kidney: _____

14. Describe bilateral symmetry.

Bilaterally symmetric animals have distinctly different top, bottom, front, and back halves with mirror-imaged right and left halves.

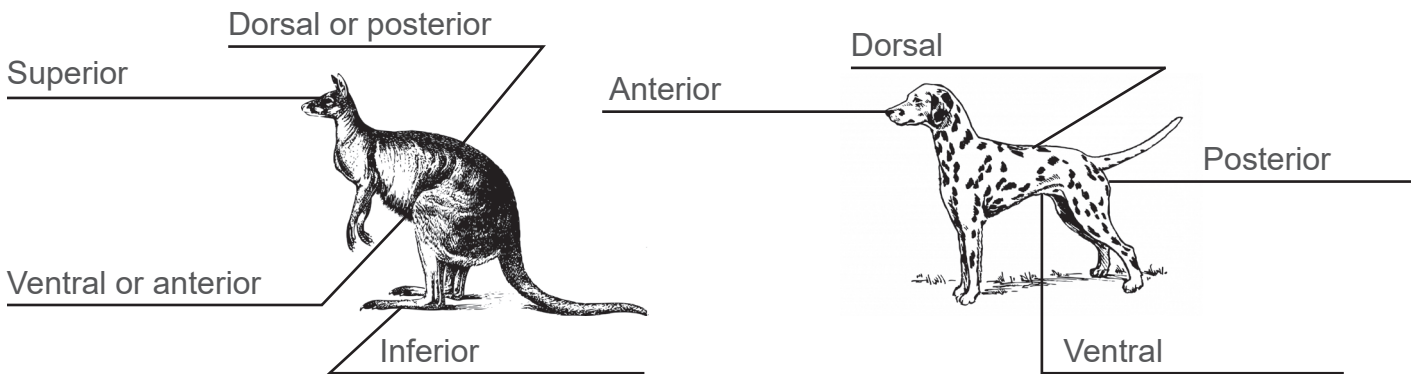
15. What is cephalization?

A concentration of sensory structures such as eyes and brain at the anterior or front end of an animal

16. Which body plan typically exhibits the highest levels of cephalization, and why is it beneficial?

Bilaterally symmetric animals exhibit the most cephalization. Cephalization allows the animal's sensory structures to encounter the world before its body, so incoming information about the animal's environment can be interpreted and the body made to respond accordingly.

17. Label the surfaces of the animals below.



18. What are germ layers?

Embryonic tissues that develop from the first cells of a new organism

19. What are the three germ layers, and what main structures develop from each layer?

The ectoderm becomes the skin and nervous system. The mesoderm becomes the muscles, bones, and cardiovascular system. The endoderm becomes the visceral organs.

20. Which phylum of invertebrates has no tissues?

Porifera, more commonly known as sponges

21. Which two phyla of invertebrates develop from only two germ layers?
Cnidaria, more commonly known as jellies, and Ctenophora, which include the comb jellies
-
22. What is a coelom?
A coelom is a fluid-filled body cavity.
-
23. What is the distinguishing factor between vertebrates and invertebrates?
A bony spinal column and a spinal cord
-
24. What is segmentation?
The same or similar repeating body structures or units
-
25. What types of body support are seen in invertebrates? In vertebrates?
Invertebrates may exhibit fluid support, a simple skeleton, or an exoskeleton. Vertebrates have endoskeletons.
-
26. Describe the different types of respiration seen in invertebrates and in vertebrates.
Invertebrates may respire by simple diffusion of gasses, through gills or lungs, or across their skin or tegument. Vertebrates respire through gills or lungs.
-
27. Describe the circulatory systems seen in invertebrates and in vertebrates.
Invertebrates may have no circulatory system, a simple open circulatory system, or a more complex closed circulatory system. All vertebrates have closed circulatory systems.
-
28. What is the difference between an open and a closed circulatory system?
An open circulatory system utilizes a pump that sends blood or hemolymph into vessels and then into an open coelom where gasses diffuse into and out of the tissue cells. A closed circulatory system pumps the blood through vessels where gasses diffuse across the vessel walls into the tissue cells.
-
29. Describe digestion and excretion in invertebrates and in vertebrates.
Digestion in invertebrates ranges from diffusion and osmosis across cells, to simple one-opening systems where food enters and waste exits from the same opening, to more complex one-way gut tubes with a single opening for food and a different opening for waste. Vertebrates all have one-way gut tubes.
-
30. An organism with both male and female reproductive organs is a hermaphrodite.

44. What is the difference between determinate and indeterminate cleavage?

With determinate cleavage seen in protostomes, the path of each new developing cell is fixed early in its life so that if the blastula were to become separated, it would grow into different halves of the organism and likely die. With indeterminate cleavage seen in deuterostomes, the path of developing cells is fixed much later and the cells have the ability to change fate so that if the blastula were to become split or separated, two identical and complete organisms would ultimately form.

45. What is the difference between schizocoely and enterocoely?

Schizocoely is coelom formation in protostomes where the mesoderm begins to form at the bottom of the gastrula where the ectoderm and endoderm merge. The mesoderm will form pouches that travel upward toward the top of the gastrula, and the pouches will ultimately become the coelom. Enterocoely is coelom formation in deuterostomes where the mesoderm begins to form at the top of the archenteron and travels downward to where the endoderm and ectoderm join. The mesoderm forms pouches that will become the coelom as the organism continues to mature.

46. Fill in the phylum name.

Sponges _____	Porifera
Common jellies, coral, anemones _____	Cnidaria
Comb jellies _____	Ctenophora
Flatworms, flukes, tapeworms _____	Platyhelminthes
Roundworms and hookworms _____	Nematoda
Snails, clams, oysters, squid, octopi _____	Mollusca
Garden worms and leeches _____	Annelida
Insects, crustaceans, centipedes, spiders _____	Arthropoda
Sea stars _____	Echinodermata
Fish, amphibians, reptiles, birds, mammals _____	Chordata

47. Based on your comparison of vertebrates and invertebrates, in which of these two groups do you think there is more diversity? Why?

Invertebrates are much more diverse. Their systems range from very simple to very complex. Vertebrate organisms are very similar, and there are few differences between their systems.