

Unit 1 Study Guide: Introduction to the Human Body & its Scientific Study

1. What is science? What kinds of objects/events does science deal with? Be sure to define all relevant terms as you develop your answer.
2. What are the essential characteristics of scientific thought and scientific explanations? Be sure to be able to define the terms “mechanistic”, “parsimony”, “uniformitarianism”, and “falsifiable”. Given a question or explanation, be able to determine whether or not it falls within the “boundaries” of science.
3. Can scientific explanations be proven false? Can they be completely proven to be true? If not, does that mean we can never accept any scientific fact with certainty? Explain why or why not.
4. How does scientific evidence accumulate? Describe the “weight of evidence” standard for determining the validity of a scientific hypothesis.
5. Name the two broad categories of studies used to test hypotheses and describe the advantages and disadvantages of each. Compare and contrast laboratory/non-human animal, randomized double-blind placebo trials, cross-cultural studies, case-control studies, and cohort studies. Into which broad category does each fall? What is the general protocol for each? What are their advantages and disadvantages? Which are considered the strongest? Give examples of each as appropriate.
6. List and describe the various sources of scientific information about human health. What are the pros and cons of each? What questions should we ask about news articles or other sources of information about human health in order to make informed decisions about the information they present?
7. Outline the hierarchical structure of an individual organism, from the smallest to the largest units. Be sure to define all terms.
8. What is the surface area:volume ratio and why is it important? What two factors affect SA/V? For each factor, describe the condition(s) leading to high and low SA/V. In general, do cells need relatively large or relatively small SA/V?
9. Compare and contrast prokaryotic with eukaryotic cells by describing the groups of organisms in which each is found and their basic structural similarities and differences.
10. What advantages to eukaryotic cells gain from having extensive internal membranes?
11. What is cytoplasm? Is it uniform throughout the cell?

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12. Describe the fluid mosaic model of membrane structure. Be sure to list the major molecular components of the membrane and describe the general function of each. What are the basic functions of the plasma (cell) membrane?
13. Describe the basic structure and function of the nucleus (include a description of DNA, chromatin, and chromosomes), rough and smooth ER, ribosomes, Golgi apparatus, lysosomes, mitochondria, and cytoskeleton.
14. How is additional external support provided to cells organized into tissues? List and briefly describe the three kinds of connections that can bind cells together.
15. Name the four basic tissues that make up the human body and give a general description of their structures/functions. Name and briefly describe the major types of connective and muscle tissue.
16. Use the example of the structure of the small intestine to illustrate how organs are composed of different types of tissues working together.
17. List and briefly describe the twelve major organ systems.
18. What is materials exchange and why is it important? Describe the general pattern of materials exchange between an animal's tissues and its external environment. Use the process of materials exchange to explain why large animals (such as humans) require elaborate internal organ systems and how those systems are modified to make the exchange process efficient.
19. What is homeostasis and why is it important? In very general terms, how is homeostasis accomplished?