Chapter 1 Mader Study Guide Colin Quinn  
Bio 241

1.1 The Characteristics of Life  
1. What is the relationship between atoms, cells, molecules, organisms, organs, organ systems, and tissues? Make a flowchart to express this relationship.

Atoms and molecules make up cells, cells make up tissues, tissues make up organs, organs make up organ systems, and organ systems make up organisms. They are like the stepping stones to a living organism.

2. Define the following:

a. population: all of the organisms of the same group/species that live in a similar area.

b. community: a group of species with a similar characteristic

c. ecosystem: the connection between many living organisms to sustain particular types of life.

d. biosphere: the surface, atmosphere, and hydrosphere of the earth with living organisms.

3. What is homeostasis? What is one example of homeostasis that you can consider is going on in your body today?

Homeostasis is an organisms equilibrium that it works best under. Things like temperature and weight often have a homeostasis for each organism.

4. What are some of the characteristics of life?

GO SHARE, growth, organization, response to stimuli, homeostasis, adaptations, reproduction, and energy transformations.

5. Which of the following are considered to be not alive? Defend your answer. What characteristics of living things do they not have?

a. bacteria: yes, they follow most of the GO SHARE meanings.

b. viruses no, they are parasites and need a host to ‘live’

c. plants yes, they follow all of GO SHARE

d. fungi yes, they follow all of GO SHARE

e. prions no, they are similar to viruses and need a host to live.

1.2 Classification of living things

1. What are the three domains of life?

Bacteria, archaea, eukarya

2. What properties do bacteria and archaea share? In what ways are they different?

Prokaryotic cells, adaptations to extreme environments, absorb food, unique chemical characteristics.

3. What are some distinguishing cellular features that are different between bacteria and animal cells?

Bacteria cells don’t have nuclei, mitochondria, or chloroplasts.

4. What are the kingdoms of eukarya?

Animalia, Plantae, Fungi, and Protista

1.3 Science as a Process

1. What is entailed in the following terms of the scientific method: observation, hypothesis formulation, hypothesis testing, data collection, data analysis, reforming hypotheses, and reporting?

Controls, variables, and things like that.

2. What is standard error?

The amount of error that is accounted for.

3. How is something determined to be statistically accurate?

By using standard deviation and other statistics to determine where outliers are.

4. Is it possible for a person to have good data collection, good analysis, but poor interpretation? Give an example of this from the news, articles, or otherwise?

Yes, things can be applied to the wrong situations or implications.

5. What is the role of ethics in scientific reporting? Give an example of an unethical situation being exploited in the news involving a scientist or medical professional.

Statistics can often be manipulated to show what the researcher wants to show, this is often seen lately with things like COVID, which definitely goes in both positive and negative ways.

6. Biology has been around for a long time as a science…yet…there are constantly updates in the biological field that can seem to contradict previous information. Why do you think this is?

We are always learning new things and creating new technology that can further our understanding of many things, and this can some times contradict previous information.

7. What are some elements of a good scientific study?

Dependent and independent variables, acknowledgement of potential bias,

8. Read BIOLOGY TODAY-Science “Discovering the Cause of Ulcers” on page 14 of the text.. A. Explain how Marshall’s approach was similar to and different from the scientific method. B. If Marshall had an animal model to test, what could he have done?

9. Many medical scientific studies present associative information but rarely causal information. Why is this the case? Elaborate.

10. Can anecdotal data (defined by Merriam Webster as “evidence in the form of stories that people tell about what has happened to them” be considered a reliable data source for scientific research? (Consider blogs…) Why or why not? What might the purpose of anecdotal evidence be to the scietntific field?