BIOLOGY

UNIT 1A (SECTIONS 1 & 2)

TEXTBOOK ASSIGNMENT

DUE: _____

- Enclosed is the "Unit 1a: Sections 1 and 2" Packet Assignment.
- Read the summary provided first (sections 1 and 2).
- You will have to use your TEXTBOOK to complete this assignment.
- Reference the textbook pages provided next to the questions as you go along.
- Remember what we said about missing assignments – they totally drag down your grade!
- Remember my late policy (-10% per day late; up to 4 days, including Saturdays and Sundays).
- If this assignment is not turned in, you will earn 0% (F) and a detention.

Name_____ Class_____ Date _____

Summary

1–1 What Is Science?

Science is an organized way of using evidence to learn about the natural world. Scientific thinking usually begins with observation, which is the process of gathering information about events or processes in a careful, orderly way. The information gathered from observations is called data. Quantitative data are expressed as numbers, obtained by counting or measuring. Qualitative data are descriptive and involve characteristics that can't usually be counted. Scientists use data to make inferences. An inference is a logical interpretation based on prior knowledge or experience.

After making first observations, a researcher will propose one or more hypotheses. A hypothesis is a proposed scientific explanation for a set of observations. Scientists generate hypotheses using prior knowledge, logical inference, and informed, creative imagination. Scientific hypotheses must be proposed in a way that enables them to be tested. Hypotheses are tested by performing controlled experiments. The conclusions researchers draw from experiments or data must be valid. To be valid, a conclusion must be based on logical interpretation of reliable data.

1–2 How Scientists Work

Conducting a scientific investigation involves a series of steps. The first step is asking a question. The second step involves forming a hypothesis. The third step in conducting a scientific investigation is setting up a controlled experiment. A hypothesis should be tested by an experiment in which only one variable is changed at a time. All other variables should be kept unchanged. This type of experiment is called a controlled experiment. The variable that is deliberately changed is called the manipulated variable. The variable that is observed and that changes in response to the manipulated variable is called the responding variable.

The fourth step in conducting a scientific investigation is recording and analyzing results. The fifth step is drawing a conclusion. A key assumption in science is that experimental results can be reproduced.

As evidence builds up, a particular hypothesis may become so well supported that scientists consider it a theory. In science, a theory is a well-tested explanation that unifies a broad range of observations.

1–3 Studying Life

IGNORE, FOR NOW.

Although living things vary greatly, all living things share eight characteristics:

1. Living things are made up of units called cells. Cells are the smallest units of an organism that can be considered alive.
2. Living things reproduce. In sexual reproduction, cells from two different parents unite to produce the first cell of the new organism. In asexual reproduction, a single cell divides in half to form two new organisms.
3. Living things are based on a universal genetic code. The directions for inheritance are carried by a molecule called DNA.
4. Living things grow and develop. Multicellular organisms typically go through a process called development. As cells divide, they change in shape and structure in a process called differentiation.
5. Living things obtain and use materials and energy. The combination of chemical reactions through which an organism builds up or breaks down materials as it carries out its life processes is called metabolism.

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Section 1–1 What Is Science? (pages 3–7)

Key Concept

- What is the goal of science?

What Science Is and Is Not (page 3)

1. What is the goal of science? _____

_____

_____

2. What is science? _____

_____

Thinking Like a Scientist (page 4)

3. What is observation? _____

_____

_____

4. The information gathered from observation is called _____.

5. Complete the table about types of data.

TYPES OF DATA

Type	Data Involves . . .	Example
	Numbers	
	Characteristics that cannot be easily measured or counted	

6. What is an inference? (SEE P. 4) _____

_____

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Explaining and Interpreting Evidence (page 5)

7. What is a hypothesis? _____

_____

8. In science, a hypothesis is useful only if it can be _____.
9. Is the following sentence true or false? A hypothesis should be stated in such a way that it can never be proved wrong. _____
10. What are three sources from which hypotheses may arise? (SEE P. 5)
    a. _____
    b. _____
    c. _____
11. Circle the letter of each of the following that may be an outcome of testing a hypothesis.
    a. The hypothesis is partly true but needs to be revised.
    b. The hypothesis is wrong.
    c. The hypothesis is supported.
    d. The hypothesis is of no value.

Science as a Way of Knowing (page 6)

12. What do scientists assume about the universe? (SEE P. 6)

_____

_____

13. What are some qualities that are desirable in a scientist? (SEE P. 6) _____

_____

_____

Science and Human Values (page 7)

14. Is the following sentence true or false? A community must use its shared values to make decisions about scientific issues. _____

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Section 1–2 How Scientists Work (pages 8–14)

Key Concepts

- How do scientists test hypotheses?
- How does a scientific theory develop?

Designing an Experiment (pages 8–10)

1. The idea that life can arise from nonliving matter is called _____.
2. What was Francesco Redi's hypothesis about the appearance of maggots?

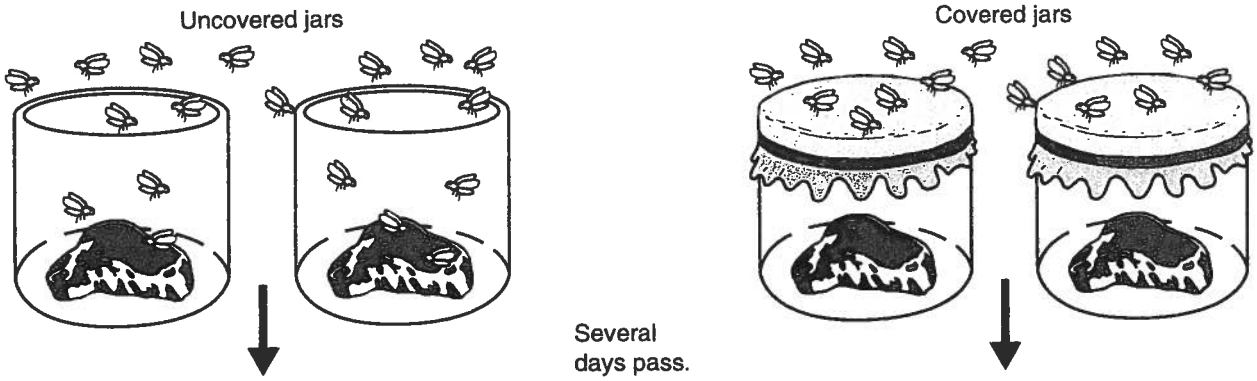
   _____
3. What are variables in an experiment? _____
4. Ideally, how many variables should an experiment test at a time? _____

   _____
5. What is a controlled experiment? _____

   _____

   _____
6. The illustration below shows the beginning of Redi's experiment. Complete the illustration by showing the outcome.

Redi's Experiment on Spontaneous Generation



Name_____ Class_____ Date_____

7. Complete the table about variables.

VARIABLES

Type of Variable	Definition
Manipulated variable	
Responding variable	

8. In Redi's experiment, what were the manipulated variable and the responding variable?

9. For what do scientists use the data from a controlled experiment? _____

10. When scientists look for explanations for specific observations, what do they assume about nature? They assume that the patterns observed in nature are consistent.

Repeating Investigations (pages 10–12)

11. Why do scientists assume that experimental results can be reproduced? (SEE P. 10)

12. What did Anton van Leeuwenhoek discover? He discovered what we now know as cells (unicellular organisms) through his perfection and use of the simple microscope.

13. What did John Needham conclude from his test of Redi's findings? (SEE P. 11)

14. What did Spallanzani do to improve upon Redi's and Needham's work? (SEE P. 11)

15. How did Pasteur settle the spontaneous generation argument? (SEE P. 12+13)

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When Experiments Are Not Possible (page 13)

16. In animal field studies, why do scientists usually try to work without making the animals aware that humans are present? (SEE P. 14)

17. When a controlled experiment is not possible, why do scientists try to identify as many relevant variables as possible? (SEE P. 14)

How a Theory Develops (pages 13–14)

18. In science, what is a theory? (SEE P. 14)

19. Is the following sentence true or false? A theory may be revised or replaced by a more useful explanation. _____