



7th Grade Micro Life Unit

Benchmarks

Chapter 1: The Nature of Science

The Scientific World View

1A (6-8) # 1: When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, and it often takes further studies to decide. Even with similar results, scientists may wait until an investigation has been repeated many times before accepting the results as correct.

1A (6-8) #2: Scientific knowledge is subject to modifications as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way.

1A (6-8) #3: Some scientific knowledge is very old and yet is still applicable today.

Scientific Inquiry

1B (6-8) #1: Scientists differ greatly in what phenomena they study and how they go about their work. Although there is no fixed set of steps that all scientists follow, scientific investigations usually involve the collections of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence.

1B (6-8) #2: If more than one variable changes at the same time in an experiment, the outcome of the experiment may not be clearly attributable to any one of the variables. It may not always be possible to prevent outside variables from influencing the outcome of an investigation (or even to identify all of the variables), but collaboration among investigators can often lead to research designs that are able to deal with such situations.

1B (6-8) #4: New ideas in science sometimes spring from unexpected findings, and they usually lead to new investigations.

The Scientific Enterprise

1C (6-8) #1: Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.

Chapter titles and headers correlate with *Benchmarks for Science Literacy* by Project 2061. To fully understand the context and intent of the benchmarks, essays within each chapter and section of *Benchmarks* must be reviewed.

1C (6-8) #3: No matter who does science and mathematics or invents things, or when or where they do it, the knowledge and technology that result can eventually become available to everyone in the world.

1C (6-8) #4: Scientists are employed by colleges and universities, business and industry, hospitals, and many government agencies. Their places of work include offices, classrooms, laboratories, farms, factories, and natural field settings ranging from space to the ocean floor.

1C(6-8)#7: Accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society.

Chapter 5: The Living Environment

Diversity of Life

5A(6-8) # 3: Similarities among organisms are found in internal anatomical features, which can be used to infer the degree of relatedness among organisms. In classifying organisms, biologists consider details of internal and external structures to be more important than behavior or general appearance.

Cells

5C (6-8) #1: All living things are composed of cells, from just one to many millions, whose details usually are visible only through a microscope. Different body tissues and organs are made up of different kinds of cells. The cells in similar tissues and organs in other animals are similar to those in human beings but differ somewhat from cells found in plants.

5C(6-8)#3: Within cells, many of the basic functions of organisms – such as extracting energy from food and getting rid of waste – are carried out. The way in which cells function is similar in all living organisms.

5C (6-8)# 4: About two thirds of the weight of cells is accounted for by water, which gives cells many of their properties.

Chapter 6: The Human Organism

Human Identity

6A(6-8)#2: Human beings have many similarities and differences. The similarities make it possible for human beings to reproduce and to donate blood and organs to one another throughout the world. Their differences enable them to create diverse social and cultural arrangements and to solve problems in a variety of ways.

6A (6-8) #6: Technologies having to do with food production, sanitation, and disease prevention have dramatically changed how people live and work and have resulted in rapid increases in the human population.

Basic Functions

6C (6-8)#1:Organs and organ systems are composed of cells and help to provide all cells with basic needs.

6C (6-8) #4: Specialized cells and the molecules they produce identify and destroy microbes that get inside the body.

Physical Health

6E(6-8) #3: Viruses, bacteria, fungi, and parasites may infect the human body and interfere with normal body functions. A person can catch a cold many times because there are many varieties of cold viruses that cause similar symptoms.

6E (6-8) #4: White blood cells engulf invaders or produce antibodies that attack them or mark them for killing by other white cells. The antibodies produced will remain and can fight off subsequent invaders of the same kind.

Chapter 7: Human Society

Social Trade-Offs

7D (6-8)#1: There are trade-offs that each person must consider in making choices – about personal popularity, health, family relations, and education, for example – that often have life-long consequences.

7D (6-8)#2: One common aspect of all social trade-offs pits personal benefit and the rights of an individual, on one side, against the social good and the rights of society, on the other.

7D (6-8)#3: Trade-offs are not always between desirable possibilities. Sometimes social and personal trade-offs require accepting an unwanted outcome to avoid some other unwanted one.

Chapter 10: Historical Perspectives

Discovering Germs

10I(6-8)#1: Throughout history, people have created explanations for disease. Some have held that disease has spiritual causes, but the most persistent biological theory over the centuries was that illness resulted from an imbalance in the body fluids. The introduction of germ theory by Louis Pasteur and others in the 19th century led to the modern belief that many diseases are caused by microorganisms – bacteria, viruses, yeasts, and parasites.

10I(6-8)#2: Pasteur wanted to find out what causes milk and wine to spoil. He demonstrated that spoilage and fermentation occur when microorganisms enter from the air, multiply rapidly, and produce waste products. After showing that spoilage could be avoided by keeping germs out or by destroying them with heat, he investigated animal diseases and showed that microorganisms were involved. Other investigators later showed that specific kinds of germs caused specific diseases.

10I(6-8)#4: Changes in health practices have resulted from the acceptance of the germ theory of disease. Before germ theory, illness was treated by appeals to supernatural powers or by trying to adjust body fluids through induced vomiting, bleeding, or purging. The modern approach emphasizes sanitation, the safe handling of food and water, the pasteurization of milk, quarantine, and aseptic surgical techniques to keep germs out of the body; vaccinations to strengthen the body's immune system against subsequent infection by the same kind of microorganisms; and antibiotics and other chemicals and processes to destroy microorganisms.

Chapter 11: Common Themes

Models

11B(6-8) #1: Models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly, or that are too vast to be changed deliberately, or that are potentially dangerous.

11B(6-8) #3: Different models can be used to represent the same thing. What kind of a model to use and how complex it should be depends on its purpose. The usefulness of a model may be limited if it is too simple or if it is needlessly complicated. Choosing a useful model is one of the instances in which intuition and creativity come into play in science, mathematics, and engineering.

Constancy and Change

11C (6-8) #1: Physical and biological systems tend to change until they become stable and then remain that way unless their surroundings change.

Chapter 12: Habits of Mind

Values and Attitudes

12A(6-8)#1: Know why it is important in science to keep honest, clear, and accurate records.

12A(6-8)#2: Know that hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations.

12A(6-8)#3: Know that often different explanations can be given for the same evidence, and it is not always possible to tell which one is correct.

Communication Skills

12D (6-8) #1: Organize information in simple tables and graphs and identify relationships they reveal.

12D (6-8) #3: Locate information in reference books, back issues of newspapers and magazines, compact disks, and computer databases.