

NOTE: Make sure you sign up for the computer lab for the following lessons: 2, 8, 9, 10, 11, 12, 18, 26, 31, 41, 43, 45.

TITLE OF LESSON

Biology Unit 1 Lesson 1 – Biological Components
Cells and DNA Technology: What's on the inside/outside?

TIME ESTIMATE FOR THIS LESSON

One class period

ALIGNMENT WITH STANDARDS

California – Biol CB 1

MATERIALS

course syllabus photocopied for each student
binders divided into 7 sections (vocabulary, notes, labs, readings, essays, projects, tests/quizzes, and journals)
pens, pencils and paper
copy of figure 1.5, Levels of Organization in Nature from p.6 of Starr's textbook *Biology concepts and applications*, or another such figure such as found on the Biology web site:
<http://gened.emc.maricopa.edu/Bio/BIO181/BIOBK/BioBookTOC.html>
Biology Unit 1 Introduction – Teacher Page
Fig 1.5 Starr's – Teacher Page

LESSON OBJECTIVES

- To think about and answer the Unit 1 questions
 - To look at and discuss levels of organization in life and cells
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EXPLANATION OF LESSON

The object of the first lesson is to present the course syllabus (you can create one using the **Sample Course Syllabus** – found in the *Appendix of Additional Materials* section of our site – and the **Biology Year Long Outline** – found at the top of the Science 2 page in the *Teacher Curriculum Section* of our site) for unit 1 and discuss the central questions for this unit. See questions in the *Focus and Motivate Students* section of this lesson. Then briefly discuss the overall goals for the year as presented in **Science 2 Unit 1 Introduction**. Please read the entire **Biology Unit 1 Introduction** (found in the *Teacher Pages* section of this unit) thoroughly before beginning this unit, as you will need the information to teach this class. Check out the **NOTES** section and the *Activities* section in the **Biology Unit 1 Introduction** for important details to be given to students in this lesson.

FOCUS AND MOTIVATE STUDENTS – WARM-UP ACTIVITY

- 1) Introduction – Review with students the important points from **Biology Unit 1 Introduction**. Hand out the course syllabus you designed. Tell students it is their responsibility to read the syllabus, sign it, and have a parent/guardian sign it tonight. Tell them that they must have their binders by tomorrow, as well as their signed syllabus. Tell them you will be giving a grade/points for bringing their binders and their syllabus in on time. Also, if you are giving out textbooks, now would be a good time to hand them out.
- 2) Explain – Tell students they will be keeping track of the ideas discussed in all the activities in this class by taking notes on the important ideas on a separate sheet of paper. Remind the students that asking questions is a very important aspect of learning. An even more important aspect is how we answer those questions and our reactions to those answers. In this class, the goal is to be allowed to think freely and give whatever answers we feel are correct, if we can explain or justify those answers with supporting evidence. It is key that we respect all answers although we may disagree. There will be disagreements in class, but it is important to respect other ideas whether we agree or not.



- 3) **Agenda** – Create and post an agenda for the class period in outline form. Have students copy the agenda onto a separate sheet of paper. Explain that they will be required to keep the agenda in the front of their binders. Every day they should come into class and immediately write down the agenda.
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ACTIVITIES – INDIVIDUAL AND GROUP

1. **Brainstorm** (see *Teaching Strategies* for how to conduct a brainstorm): Have students **Brainstorm** a list of what's on the outside and inside of a cell. To get them going you may want to start them off with Unit 1 questions. What's on the outside? What's on the inside? Ask such questions as, "Where do I begin and end? Is one cell me, or are all of my cells necessary? What makes up a cell? Do I stop once I get outside of my body or does my energy, which can travel as a particle or a wave, interact with everyone and everything?" This brainstorm should be done as a whole class discussion in which one designated student writes the responses on the board and the rest of the class takes notes on a sheet of paper that will go in their binders. Have them title the brainstorm, Cells: What's on the Outside/Inside?
2. **Notetaking** – Choose one student to take notes at the overhead and receive comments on the quality of the notes at the end of the following lecture/discussion (steps 3-5 below). The comments from the class at the end of the lecture/discussion should include one applaud and one critique from each student. Make sure you keep track of who has taken notes in your grade book so that students take notes at the overhead only once until each student has had a turn. Knowing that everyone will take notes in front of the class at least once per unit will encourage students to be more helpful with each other when it comes time to giving note taking praises and critiques.
3. **Inside vs. Outside** – Have the students move conceptually from the larger aspect of a person to the smallest particle that they can think of in order to examine the *What's on the outside, what's on the inside?* idea. Write **outside** and **inside** on the board. Have the students brainstorm as to what is on the outside and inside of their bodies. After you have a good list, tell students that science looks at parts of a system to study the whole. Therefore, it will be important to look at the parts of an individual cell and how they function before looking at tissues, organs and whole systems, as well as how they function together (communicate) to create our functioning body.
inside - organs, tissues, cells, bones, water, salts, etc.
outside - air, water, salts, etc.
4. **Cell Components** – Write on the board cell components: **inorganic** and **organic**. Quickly help students to define the two terms by asking who knows what each one is. Make sure they write down the definitions in their notebooks. Have the students brainstorm and make a list of **elements** and **carbon-based** components. You can also ask, "Where does one cell end and another begin? How do we know that?" Also, stimulate them to think about outer effects on our body such as physical, mental and spiritual health. This is looking at what is on the inside. Then ask, "How do these aspects change our view of ourselves in relation to us and to others? This is looking at the outside."
elements – minerals such as hydrogen, carbon, nitrogen, oxygen, sodium, magnesium, calcium, iron, iodine, potassium, sulfur, phosphorus, chlorine
carbon-based – carbohydrates, lipids, proteins, nucleic acids
5. **Discuss** – Ask students what holds molecules and, therefore, cells together? In this way, bring in the topic of bonds: covalent, ionic, hydrogen, van der Waals. Briefly discuss the role of water in cells so that students understand that the majority of a cell is composed of water.
6. **Applaud/Critique** – When you have finished the lecture/discussion, go around the room and have each student give the note taker one applaud and one critique (see notes on how to **Applaud/Critique** in the *Teaching Strategies* portion of our site). Make sure their responses are specific so that your note taker will learn to improve her note taking strategies. Remind the students they will be taking a lot of notes, not only this year but for the rest of their days as students. Should they choose to go to college, this will help prepare them. It is important to discuss that scientists keep good notes in order to catalog and refer back to when doing

experiments. Without this data a scientist is not able to publish his findings. Record keeping is an aspect necessary in this class, as well. Have the note taker place her notes in the class binder.

7. Assign Groups – Place the students in groups of three to five, depending on the size of your class. Tell them these will be their groups for the rest of the quarter. Make sure you have listed the Group Roles and their definitions (found in the *Group Roles* section below) either on the board or on a poster. Tell the all group members choose a role. If there are not enough people, then someone will need to take on two roles for today. Give them two minutes to do this.
 8. Group Roles – At the end of two minutes call time. Have students write their name at the top of a separate sheet of paper. Then have them list their group member's names and their group role next to their name.
 9. **Group Definition** – Write the headings from the following list (Figure 1.5) on the board. Have the students copy the headings onto their paper. In their groups, have them decide what the definition for each heading is. Give them 10 minutes. At the end of 10 minutes call time. Have each group present their definitions.
 10. Sample Figure – Put a copy of **Figure 1.5** in Starr's *Biology, Concepts and Applications* describing the levels of organization in nature on the overhead. Have the students add any definitions or ideas from this list that they didn't come up with to their sheets.
 11. Prefixes, Suffixes and Root Words – Figure 1.5 contains the following key terms: subatomic particle, atom, molecule, organelle, cell, tissue, organ, organ system, multicelled organism, populations, community, ecosystem and biosphere. Write these words on the board. Have students copy them onto their papers. Have the students look at the list of words. In each of their groups, ask them to identify the prefix, root and suffix of each word. They should underline the prefixes, circle the suffixes and **highlight** the roots. Tell them if they think they can figure out what the word means based on its prefix, suffix or root word, they should write it down too. Give them five minutes.
 12. Present – At the end of five minutes, call time. Randomly choose students to come to the board and mark the prefixes, roots, and suffixes the word contains. For example, subatomic. If they know the definition, have them write it next to the word. Explain that understanding these terms will help them understand new words they encounter while studying biology. When they find a new word, they should first look for the root, prefix and suffix in order to see if they can figure out what the word means before going to a dictionary. Make sure they're marking the words correctly. If they are not, ask the class to help them out. All students should be checking their list against the one on the board and making corrections accordingly. Tell them tonight that their job will be to look up the dictionary definitions.
 13. Group Work – Direct their attention back to Figure 1.5 (posted on an overhead or on the chalkboard). Ask the groups to describe how a cell fits into the schematic in figure 1.5. They should make a list of their ideas about the levels of organization, as well as ways in which scientists study or explore these levels of organization. They should also be thinking about if a cell is a simple or a complicated structure and if it is highly developed or not. Then answer why they think so. In fact, it may be both, depending on how they view the cell.
 14. Present and Discuss – After the groups have made their lists, have them join the whole class for a discussion. Each group will present their ideas and the others will listen for things they did not think of and add them to their list. In this way, the students will have to listen in order to ensure they all have the same information since they will be responsible for getting it from each other. Choose one student to be responsible for writing the ideas on the board during the presentations so that those who are not good listeners have two opportunities to get the information.
 15. Questions – Ask the class to think of other pertinent questions they may have about cells to add to this unit. List their questions on the board. Then tell them that they will attempt to answer these questions this quarter.
 16. Homework Review – Collect all notes from today's activities. Remind students of their homework.
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HOMEWORK

- 1) Read Starr's textbook *Biology Concepts and Applications*, chapter 1 pp. 3-16, chapters 2 and 3 pp. 20-49. If you are using another text make sure they read about the following topics: DNA, energy and life; energy and life's organization; life's diversity, evolutionary view of diversity, biological observation such as observation, hypotheses, theories and tests; atoms and bonds; properties of water; buffers; organic compounds such as carbohydrates, lipids, proteins, and nucleic acids.
 - 2) Highlight the key points in your text or if students are not allowed to write in their books, have them write the main points of the chapter in the Notes section of their binders.
 - 3) Make a list of new vocabulary words found in the reading, have them determine the prefix, root and suffix and label as in class today, define them, and add them to their binder. Tell them to make sure they have dated and titled their vocabulary and notes.
 - 4) Define the vocabulary from today's lesson.
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GROUP ROLES

Recorder – the Recorder will record all responses from the brainstorming and the discussions

Facilitator – the Facilitator will keep group members focused on the activity

Illustrator – the Illustrator will draw a scheme or illustration of the data discussed

Manager – the Manager is responsible for getting materials the group needs

DOCUMENTATION FOR PORTFOLIO

None

NOTE: Tell students they will be keeping a portfolio of all of their formal/graded essays, labs, projects, and tests this year. These will be demonstrations of their mastery of the concepts and skills taught in Biology and will determine whether or not they have learned all that is required of them in this course. This will be a showcase of their best work and will never leave the room. However, it will move with them next year to their next science class and may be used to determine whether or not they will be promoted to the next grade level in this subject area. For right now, they should have nothing in their biology portfolio, although some students may have a portfolio from their Physical Science class.