MAINTENANCE AND ORGANIZATION UNIT PLAN

Key Idea: 1
Living things are both similar to and different from each other and from nonliving things.

Living things are similar in that they rely on many of the same processes to stay alive, yet are different in the ways that these processes are carried out.

Nonliving lack certain features of living organisms, such as the ability to maintain a cellular organization, carry out metabolic processes while maintaining internal stability (homeostasis), pass on hereditary information through reproduction.

In most biological respects, humans are like other living organisms. For instance, they are made up of cells like those of other animals, have much the same composition, have organ systems and physical characteristics like many other, reproduce in a similar way, carry the same kind of genetic information system, and are part of a food web.

The components of living systems, from a single cell to an ecosystem, interact to maintain balance. Different organisms have different regulatory mechanisms that function to maintain the level of organization necessary for life. Diversity is evident and important all levels of organization – from a single cell to a multicellular organism to an ecosystem.

Desired Results

Enduring Understandings

- 1.2 – Students describe and explain the structures and functions of the human body at different organization levels (e.g. systems, tissues, cells, organelles).
- 1.3 – Students explain how a one-celled organism is able to function despite lacking the levels of organization present in more complex organisms.

Essential Question

What does all life have in common?

Guiding Questions

- Life, what have cells got to do with it?
- How does life build from the bottom up?
- What are the characteristics of living things, and what life processes do they carry on?
- What are the cell parts and their functions in maintaining life?
- How do cells operate like a community?
- Why does life need an inside and an outside?
- How does life run on sugar?
- How do cells signal, sense, and react?

Knowledge and Skills

- Only cells can set up living conditions.
- Identify the characteristics of living things.
- Define the life processes of organisms.
- Describe the structure, function and composition of the cell membrane.
- Compare active and passive transport.
- Explain the chemical nature of the cell.
- Name the major organelles found in the cell and describe their functions.
- Describe the structure and function of the cell nucleus.
- Distinguish between tissues, organs, and organ systems.
- Describe the way in which cells are organized in multicellular organisms.
- Explain how chemical reactions are controlled in living things.
- Understand the need for gas exchange in living things.
- Explain how and why organisms eliminate waste.
- Describe how one-celled organisms carry out their life functions.

Assessment Evidence

- Students complete a performance task: Design an underwater "Cell City" Project will include identifying major parts and analogs to cell parts, a drawing or model of a single unit, and a proposal for developing a multi-unit city.
- Quiz on parts and functions of cell using a diagram of the cell and selected response questions.
- Comprehensive test including selected response and constructed response questions.
- Discuss and debate the advantages and disadvantages of organisms being unicellular or multicellular.

Learning Activities

- Students brainstorm characteristics of living things using live organisms, video clips, or pictures as prompts. The characteristics should include: cells, organization, using energy, ability to respond to environment, growth, reproduction, and adaptation.
- Identify and discuss life processes: nutrition, digestion, absorption, respiration, excretion, secretion, reproduction, response.
- Using live microorganisms or other visuals have students identify evidence of the occurrence of specific life processes. Continue the activity using examples of multicellular plants and animals. Compare and contrast processes of the different groups of organisms.
- Identify the cell as the unit of structure and function in all organisms.
- Have students do a microscope lab to look at the structure of cells such as: bacteria, cork, onion epidermis, Elodea, and cheek cells. Distinguish between prokaryotes and eukaryotes, identify cell parts, compare and contrast plant and animal cells.
- Using models, diagrams, and/or videos identify major cell parts and their functions.
- Review cell parts and functions through using a game of identification.
- View video on the development of an embryo (frog or other animal). Have students formulate an explanation of what must be happening t the cells of an organism as it develops.
- Define and identify tissue types in animals. Observe slides or drawings of tissue cells and identify how the cells have been modified to do their jobs.
- Have students compare the specialized cells of a multicellular organism to the specialized players on a sports team, members of a band, or some other organized group whose members have a specific job. Explore whether a group with specialized members performs better than a group with generalized members. Also explore what would happen if any members are removed.

CELL UNIT MAP

Essential Question: **What does all of life have in common?**

WEEK 1	Day 1	Day 2	Day 3	Day 4	Day 5
Essential and Guiding Questions	**What does all of life have in common?**	What must you do to stay alive?	Life, what have cells got to do with it?	Life, what have cells got to do with it?	Life, what have cells got to do with it?
Learning Opportunities	1.Answer Introduce the essential question. 2.Discuss what "life" means. Identify things that make "life" work. 3.Create a KWL chart. 4. Visual identification	1. Rank list of important life processes 2. Make comparisons 3. Develop vocabulary	Day1: 1.Brainstorm to assess prior knowledge of the cell 2. Note taking on direct instruction 3. Look at slides of through microscope and hand lens. Draw pictures and make comparisons.	Day 2: 1. T-chart of similarities and difference between plants and animals. 2. Suggested lab activity – microscope use to observe cells of bacteria, cork, onion epidermis, Elodea, cheek cells. 3. Hands-on visuals, models of plant and animal cells. Fill in graphic organizer (compare and contrast).	Day 3: 1.Compare and contrast specific cells such as a neuron and an epidermis cell. 2. Lab activity – the human epidermal cell 3. Use slides, pictures of cells and organelles. 4. Design table comparing structure, description, and function of cells/organelles.
Assessments and Reflection	Journal writing Visual work	Informal Writing	Journal writing	Written comparison of plants/animals	Index card identification game
Standard 4	1.2b	1.2b	1.2a	1.2e, l.2f, 1.2I, l.3a	1.2e, l.2f, l.2I, 1.3a

UNIT MAP

Essential Question: What does all life have in common?

WEEK 2	Lesson 6	Lesson 7	Lesson 8	Lesson 9	Lesson 10
Essential and Guiding Questions	Life, what have cells got to do with it?	How do cells operate as a community?	How do cells operate as a community?	Do cells have their own chemistry?	Why does life have an inside and an outside?
Learning Opportunities	1. Using analogies to apply thinking 2. Make predictions about life activities of a single-celled organism. 3. Use visuals to provoke understanding of adaptation, structure and function.	Day l. 1. Drawing, independent work and predicting how specialized cells look and work. 2. Using visuals and working cooperatively, identify unknown samples.	Day 2. 1. Think-pair-share about body systems. 2. Use of KWL chart to brainstorm on tissue/body systems. 3. Jigsaw – developing experts on organ systems to teach teams.	See Homeostasis unit lessons …Good place to begin the Cell City Project –see attached project sheet	See Homeostasis unit lessons
Assessments and Reflection	Design analogies Make comparisons of life processes in different organisms.	Informal writing	Informal writing		
Standards	1.2e, l.2f, 1.2I, 1.3a	1.2a, 1.2e	1.2a, 1.2e		

UNIT MAP

Essential Question: What does all life have in common?

WEEK 1	Lesson 11	Lesson 12	Lesson 13		
Essential and Guiding Questions		How does life run on sugar?	What has all life have in common?		
Learning Opportunities	Cell project presentations can be ongoing.	View overhead transparency. Examine slides of stomates or leaves of live plants. Use microscopes or hand lens to examine Leaves.	Revisit essential question.		
Assessments and Reflection	Presentations	writing	Culminate unit with Formal written assessment of the essential question – and/or Cell City Project presentations		
Standards					

Lesson #: 1

Unit Topic/Essential Question: What does all life have in common?

Aim/Guiding Question: Students are introduced to the essential question: "**What does all life have in common?**

Objectives

Students will be able to:

- Distinguish between living and non-living things
- Characterize living things (organisms) based on seven broad life functions

New Terms:

organisms
organization
cell
stimulus
response
reproduction
adaptation
homeostasis

Materials/Preparations:

Pictures of living organisms, non-living objects, and once-living (dead) organisms (optional)
Video – "The Living Earth;" 25 minutes. 1991 NGSES or a similar video celebrating life on earth (optional)

Time (min)	Development	Instructional Strategies
5	Do Now: Students answer, **"What does all life have in common?"** Students respond on a separate sheet of paper. Collect papers. Results of this writing will be compared to a written response to the same question at the end of this unit. This could be an excellent portfolio piece showing students' growth and development of conceptual understanding over time. Continue to remind students, throughout the unit, that their understanding of the essential question (and all of the material convered) will be assessed in a culminating essay. By reinforcing this throughout the unit, students should be prepared to answer the big question.	Writing (motivation)
10	Students share answers with class. Discuss what "life" means. Begin a three-column, KWL chart (KWL stands for: What do you **KNOW**, What do you **WANT** to know, and What did you **LEARN**). This chart should remain	Feedback Vocabulary

	visible throughout the teaching of this unit. With the class, you will add some information and delete some misinformation or unnecessary entries, as the unit progresses. • *Record all answers on the board.* Accept all answers. • *Ask students what they want to know more about?* Record this in the second column of your chart. • *Ask students to predict what they will read in the text (or see in pictures or a video) about the characteristics of living things*	development
20	• *Show pictures of living organisms and non-living objects – or list names on the board.* For example: ice, seed, light bulb, caterpillar, flower, horse, cat, hay, cell, sand, water • *Ask students to decide whether each item is living or non-living.* Divide answers into two columns on board • *Ellicit some of the characteristics that all living things seem to share.* This list should be defined and should include the following characteristics: -living things are highly organized -living things are made up of cells -living things obtain and use energy -living things grow and develop -living things reproduce -living things respond to stimuli -living things maintain a constant internal environment (homeostasis) -living things are adapted to their environments Go back to the pictures or list of items and ask students to check whether each item has any or all of the characteristics listed above. *Please note that this list varies depending on the text you are using. For example, Biology/Living Systems-Glencoe lists four major characteristics while Biology/The Study of Life-PrenticeHall lists nine characteristics.	Assessment Guided Learning Assessment/ Review

<u>Suggested Homework:</u>

Reading from text.
Why is a computer a nonliving thing? Why is a cat a living thing? Explain your answers by discussing the characteristics of living things.

References

Prentice Hall, Biology- The Study Of Life: pages 3-4
Amsco, The Living Environment: pages 104-106
Glencoe, Biology-Living Systems: pages 8-9

BSCS Biology – A Human Approach: E32-34
Holt, Biology – Visualizing Life: pages 23-25

Standards Addressed:

NYS MST Standard 4, 1.2b

Lesson #: 2

Unit Topic/Essential Question: What does all of life have in common?

Aim/Guiding Question: What must you do to stay alive?

Objectives

Students will be able to:

- Understand life processes in terms of survival
- Define nutrition (ingestion and digestion), respiration, excretion, circulation (transport), coordination, and immunity
- Explain why reproduction is a life process necessary for species survival not individual survival

New Terms:

Digestion
Respiration
Reproduction
Excretion
Circulation
Transport
Coordination
Immunity

Materials/Preparations:

Time (min)	Development	Instructional Strategies
5	Do Now: *Ask* students to make a list of the five most important things they need to stay alive. Rank the list in order of importance. When they are finished have them pair off and compare lists.	Motivation Think/Pair/Share
10	*Share* answers with the class. Follow with a class discussion on how these needs are met…what systems perform the life processes that supply these needs. *Ask* "Do all living things have the same needs?" "Do you have the same needs as an apple tree?" "How do the characteristics of an organism determine its needs?"	Feedback
15	*List and define* the eight terms listed above and explain that complex organisms like humans require multiple systems for these life processes. Some thoughts: Digestion – gives us energy and the materials to build and maintain our	Direct instruction

	bodies Respiration – releases the stored energy in glucose needed for fuel to power the metabolic processes Reproduction – an organisms ability to produce more of its kind Circulation – moves materials around, as well as in and out..maintains and defends the body Excretion – helps maintain homeostasis by removing waste materials Movement – the body's engineering marvel…the living framework powered by muscles Coordination - the network of controls that sense, monitor and coordinate thousands of processes and actions Immunity – the body's natural defenses…attacking invading pathogens and preventing them from growing inside the body	
10	Direct students to respond in their science journals to the following question. How are the systems for circulation and excretion related? How are the systems for circulation and immunity related? Share with whole class…if time permits.	Journal writing/ Informal Assessment

Suggested Homework:

Discuss the following in a paragraph:
Choose one life process and discuss how you would be affected if that system became impaired.

References:

Standards Addressed:

1.2b

Lesson #: 3

Unit Topic/Essential Question: What does all of life have in common?

Aim/Guiding Question: Life, what have cells got to do with it?

Objectives

Students will be able to:

- State the major ideas of the cell theory
- Understand why a cell is considered the basic unit of structure and function in living things

New Terms:

Cell theory

Materials/Preparations:

Reading on the historical background of the cell theory (optional)
Prepared slides (one for each group of three)
Hand lenses (one for each group of three)
Microscopes (one for each group of three)

Time (min)	Development	Instructional Strategies
5	Do Now: To find out how much students know about cells, brainstorm with the following questions: Where are cells found? How many cells are there in a single human being? What do you think might be inside a cell? *Follow* with short discussion on why a cell is considered the smallest thing that can be called living.	Assessing Prior Knowledge
10	*Direct* students to take notes during this lecture. Introduce students to the cell theory by discussing some historical background. Scientists; Robert Hooke, Anton van Leewenhoek, Matthias Schleiden, Theodor Schwann, Rudolph Virchow -A span of almost 200 years from the first microscopic viewing by Hooke in 1665 to the generalizations made by various scientists between 1838 and 1855. Their conclusions, which form the cell theory are: - All living things are made up of one or more cells or cell fragments. - Cells are the basic unit of structure and function in all living things. - All cells are produced from other cells.	Direct Instruction Note Taking
20	Group Activity – Investigating Technologies "Looking at a prepared slide" *Ask* students: What impact does technology have on research? High tech microscopes? Low tech (hand lens)? No tech (unaided eye)? Working in groups of three, give each group a prepared slide. One	Coop-group work Drawing

	student from each group should examine the slide with the unaided eyes. Another should use a hand lens. And, the third member should use a microscope. They should draw a composite picture of what they saw starting with the first student drawing an outline. The others will add more detail. All should get a chance to use the lens and the microscope.	Use of technology
5	*Journal writing:* When Hooke first observed cells they were dead cork cells. Leeuwenhoek observed living single-celled organisms. Why would scientists be more interested in observing living cells than observing dead cells?	Assessment

Suggested Homework:

List all of the functions you think a cell would have to carry out. Make a diagram of an imaginary cell with imaginary parts that carry out each function on your list. For example, if waste removal is on your list, than you might make a garbage truck with a roadway, or a waste basket…get the idea? Be creative!

References

Standards Addressed

1.2a

Lesson #: 4-6

Unit Topic/Essential Question: What does all life have in common?

Aim/Guiding Question: Life, what have Cells got to do with it?

Objectives

Students will be able to:

- Compare and contrast animal and plant cells
- Describe the structure and functions of the cell wall, cell membrane, and cytoplasm
- Explain the functions of a cell's organelles: nucleus, endoplasmic reticulum, ribosome, Golgi body, lysosome, mitochondrion, vesicle, vacuole
- Understand how single-celled organisms perform their life functions

New Terms:

cell wall cell membrane cytoplasm nucleus endoplasmic reticulum ribosome Golgi body lysosome vesicle micochondrion vacuole

Materials/Preparations:

"Discovering the Cell" Video, National Geographic (or "The Magic of Cells", Allied Video or something similar), models, or diagrams of major cell parts of animal and plant cells

Graphic Organizer (compare and contrast chart): Plant Cells and Animal Cells – can be a class handout sheet or used with an overhead projector for students to copy

Set of index cards (one set for every four students) with cell parts/organelles on one side and function written on the other

Human Epidermal Cells Lab (Flinn Scientific, Inc.) – see attached or http://www.flinnsci.com/homepate/bio/epiderm.html

Time (min)	Development	Instructional Strategies
	DAY 1	
5	Do Now*: Ask* students to make a list of the similarities and differences between plants and animals. Students discuss with a partner. Students share answers with class. (Students will probably not list cellular characteristics. Explain that many of the differences are at the cellular level.)	Motivation
(lab)	***Note****: To support this study, students should have a microscope lab to look at the structure of cells such as bacteria, cork, onion epidermis, Elodea, and cheek cells. They should distinguish between prokaryotes and eukaryotes, identify cell parts, and compare and contrast plant and animal cells. Students should make sketches of various cells. Extension: Using pond or aquarium water, see how many organisms and cell structures can be identified. Draw observations.*	Compare/ Contrast, Modeling, Interpret Data, Microscope skills
25	Using models, diagrams, and/or video of plant and animal cells, *ask*	Inquiry,

	students to identify what they think they see. *List* responses on board. Students meet in their groups to look at models or diagrams or read in their texts. Using the attached Graphic Organizer (or similar compare and contrast chart) students work in groups to fill in the graphic organizer. *Questions to ask*: Are there any similarities? Differences? What similarities and differences seem significant? What categories or patterns do you see in the significant similarities and differences? What conclusion might you arrive at by the significant similarities and differences? The conclusion, or interpretation, of the similarities and differences should go beyond summaries. This should be shared with the other groups as a Think-Pair-Share. Each member of one group is paired up with a member of another group. One member then reads their conclusion to the other. To extend the thinking about their conclusions, the second member should ask questions such as: "What do you mean when you say_____?" or "What more can you tell me about_____?" or "Why do you think_____?" Students can then switch roles. After a few minutes, allow students time to rewrite their conclusions. *Talk* about how Compare and Contrast is different from just listing similarities and differences. *Ask* about using Graphic Organizers. Was it helpful? How was writing your final statement before you did the Think-Pair-Share activity important?	Group work, Graphic Organizers, Compare/ Contrast Think-Pair-Share
10	*Explain* writing assignment (to be completed as homework). Write a compare and contrast essay about plant and animal cells, using your revised conclusion as the topic statement or main idea. Use the first paragraph to explain your conclusion, the second to state important similarities that support your conclusion, and the third to indicate which differences support your conclusion. Add closing comments about your main idea at the end. Time permitting, students may start draft in class.	Writing Assessment
	DAY 2	
5	**Do** Now: *Showing* slides, pictures, or transparencies, compare and contrast two types of plant or animal cells: for example, an epidermis cell and a neuron, or a leaf and root cell. *Ask* students to Compare and Contrast similarities and differences.	Motivation, Do Now, Applied Thinking (recall and transfer)
(lab)	***Note:*** *Human Epidermal Cell lab would work well here. Answers the question:* *What do your skin cells look like? (see attached lab activity)*	Hands-on learning
20	*Display* slides, pictures, or transparencies of cells and organelles. Model creating a chart that contains the following headings: Structure/organelle; Description; Function. Using text or other source, students work with partner to fill in chart (teacher should list the names of all the	Group Work, Direct Instruction

	structures/organelles that should be included on the list). *Whole class assessment* of all names, descriptions, and functions of structures/organelles.	Whole class assessment
15	*Review* cell parts and functions using a game of identification. Using the index cards, have students place cards face up on a table. Give a definition of the part or function/process, and together the group decides on the correct answer. On a signal, all groups raise the chosen answer. This is not a game of speed but of accuracy.	Small Group Assessment

Suggested Homework:

Day 1: Complete Compare and Contrast Essay on plant and animal cells.

Day 2: 1. Explain the following conditions: Why do you think some cells have more mitochondria than others? Why do some cells have more ribosomes than others? 2. Which cell parts do you think are most important? Make a list, prioritize it, and explain.

	DAY 3	
5-10	Do Now: **(This activity assumes that students have had experience using analogies.)** **Students match the cell part to the object that shows the best analogy.** ***Explain.*** Cell Parts: Endoplasmic reticulum, Vacuole, Cell wall, Cell membrane Objects: Skin, Nut shell, storage warehouse, highway *Review* the above then ask students to write their own analogy for a cell part. Students' choice _____(part): _____(object) Students share out examples. Or… *Review* homework questions and answers.	Motivation Applied Thinking, Recall Assessment
15	*Ask,* how do one-celled (unicellular) organisms carry out their life functions? Give students time to think and write a brief response. Illicit responses. *Recall* the cell theory that an organism may be a single cell and still carry on life activities. *Lead* a discussion of what organelles might a single celled organisms such as the ameba and paramecium have and what is the function of each. (If you used pond water in one of the labs, recall here. What did the organisms look like? Did they move? How? What do they need to do to sustain life? How have they adapted to their environment?) Look at a text, pictures, slides, or video to observe unicellular organisms. These organisms must do everything for themselves. *Ask:* How does this differ from multicellular organisms? **Introduce the concept of specialized cells in multicellular organisms.** *Ask:* Why do you think the cells of all multicellular organisms are specialized?	Assess prior knowledge, Make predictions Recall Direct Instruction
(lab) 20	Using live microorganisms or other visuals have students identify evidence of the occurance of specific life processes. Continue this activity using examples	Observation Compare/

	of multicellular plants and animals. Have students, working in small groups, compare and contrast processes of the different groups of organisms.	Contrast, Group work Assessment

Suggested Homework:

Pretend you are an ameba being observed through a microscope. Write a persuasive essay to the person observing you that, even though you are made of only one cell, you are an organism.

References:

Standard Biology Textbook
Flinn Scientific, Inc., http://www.flinnsci.com/homepate/bio/epiderm.html

Standards Addressed

Standard 4: Key Idea ; 1.2e, 1.2f, 1.2I, 1.3a

Human Epidermal Cells

Introduction:

What do your skin cells look like? It is easy to remove some and look at them with a microscope.

Biological Concepts:

- Cell Structure
- Epidermis

Materials Needed:

Clear tape, 1.0 cm x 1.0 cm
Soap/water
Methylene blue stain, 1 %aqueous
Microscope

Procedure:

Microscope slide
Slide cover slip
Dissecting needle
Forceps

1. Wash the underside of a wrist that will be sampled for epidermal cells with soap and water.

Stick a clean piece of clear tape on the underside of the washed wrist.

Gently remove the piece of tape from the wrist being careful to avoid getting fingerprints on the tape. A forceps might help to remove the tape and avoid fingerprinting the tape.

Place the tape, sticky-side up, on a clean microscope slide.

Stain the top, sticky side of the tape with 2 or 3 drops of 1 % methylene blue solution.

Use a dissecting needle to gently place a cover slip over the sticky tape. Lower the coverslip down onto the tape and then remove the dissecting needle. This should help prevent staining your fingers. Caution: Use methylene blue carefully, It will stain most items *including skin, clothing, and table* tops.

7. Examine the slide under a microscope. Look for cells with low power first, and then switch to high power for details.

8. Record your observations of epidermal cells by making drawings. Label your drawings with appropriate magnifications. Use your knowledge of the size of the microscopic field to estimate the size of the cells.

Discussion:

There has been concern expressed about the classic activity in which students remove cheek cells from the inside of their mouths. The procedure described in this activity eliminates the potential dangers inherent in collecting cheek cells from the mouth. The cells secured from the wrist will be easy to find. Students may have to examine numerous cells before they find a "nice" cell with nucleus, etc. Patience will yield good results. Students are likely to be amazed at how easy it is to remove cells from the surface of the skin. The simple removal technique illustrates the fact that the skin is continually shed. Microbes and other organisms are shed along with the skin thus helping in the fight against microbe invasion.

Tips:

- This activity is a perfect stimulus to provide additional information on the skin and to discuss the significance of continual shedding of the skin.
- The tape used for this activity should be as sticky as possible and it must be clear-not opaque. Clear, box-sealing tape works well.
- 9 Methylene blue (1% aqueous) or Lugol's iodine stain work well for staining basic cell structures.

Safety Precautions:

Methylene blue is a vital stain, it stains nearly everything, and it is difficult to remove. Prevention is the key when working with vital stains. Wear chemical splash goggles, chemical-resistant gloves, and a chemical-resistant apron.

Lesson # 7-8

<u>Unit Topic/Essential Question:</u> What does all like have in common?

<u>Aim/Guiding Questions:</u> How does life build from the bottom up?
How do cells operate like a community?

<u>Objectives</u>

Students will be able to:

- Define cell, tissue, organ, and organ system
- Explain how specialized cells (operating as communities) are organized in multicellular organisms
- Describe the relationship between structure and function at different organization levels

<u>New Terms:</u>

specialized cell tissue organ organ system

<u>Materials/Preparations:</u>

Diagram of the human tongue handout - can be on an overhead transparency, on chart paper, or on the board
Pictures/overhead transparencies of specialized cells, tissues, organs, organ systems labeled and unlabeled – one set of a specific tissue group for each team
Chart paper

Day 1

Time (min)	**Development**	**Instructional Strategies**
5-10	Do Now: copy the diagram of the tongue in your notebooks. Draw what you think would be revealed by a microscopic look at your tongue. During this activity, ask students to imagine what the taste buds look like and how they sense taste. Ask students to share. One or two could go to the board to work directly on the diagram. (The bumps on the surface of our tongue, called papillae, contain our taste buds. These, in turn, are formed of cluster of about fifty cells. A small community that works together as an army of specialists. They, along with nerve connections to our brain, allow us to taste.)	Motivation Do Now Predicting
15-20	Organize the class into small groups of 4-5 students and give each group a picture of animal tissue and an individual cell from that tissue group (these should not be labeled). Examples: Epithelial (skin cell), connective, adipose (fat cell), bone and cartilage, blood (red blood cell), nerve (neuron), muscle (smooth muscle cell). Students should study the pictures and make sketches with labels and captions in their notebooks. *Ask* students to guess the tissue and the organ or organ system of their sample. Circulate to listen to the group discussions and to check their progress. After five minutes, allow students to look in their texts for help or confirmation. You should have labeled copies of these pictures to post on	Cooperative Group work Reading Notetaking

	the board, circulate, or show with overhead transparencies at this point. Ask a student (one for each tissue sample) to go to the board and describe their picture. Write names of cells, tissues, organs, and organ systems on the board next to each picture.	
10	1.Why do you think the cells of all organisms (multicellular) are specialized? 2. Can a unicellular organism contain tissue? Explain.	Writing Assessment

Suggested Homework:

Read text selection.
Design a graphic organizer (concept map) on the concept of the organization of multicellular organisms.

References

Prentice Hall, Biology- The Study Of Life: 98-101

Standards Addressed:

1.2a, l.2e

Lesson # 7-8

<u>Unit Topic/Essential Question:</u> What does all like have in common?

<u>Aim/Guiding Questions:</u> How does life build from the bottom up?
How do cells operate like a community?

<u>Objectives</u>

Students will be able to:

- Define cell, tissue, organ, and organ system
- Explain how specialized cells (operating as communities) are organized in multicellular organisms
- Describe the relationship between structure and function at different organization levels

<u>New Terms:</u>

tissue organ organ system

<u>Materials/Preparations:</u>

Pictures of organ/organ systems – enough to give one specific system to a member ("expert") of each team

Day 2

Time (min)	Development	Instructional Strategies
5	*Ask:* Which of your body systems is the most important? Why? Students think independently then share with a partner or small group. .	Do Now, Motivation Think-pair-share
10	*Ask* for responses to the Do Now and start a **K-W-L** chart. You should stop filling in the **K** column when all of the organ systems are listed. Questions which may arise: How are the systems connected? How do they function separately yet are interdependent at every level? Continue filling in the **W** column until there are no more questions.	Group share Brainstorming
15-20	Group students in teams of 4-5. Give each member of the group a picture and reading on a specific organ/organ system (this member will be the expert on this organ system). After a few minutes of working independently, each "expert" member meets with the other "experts" on that system to discuss their understanding of the topic. After five minutes, all "experts" return to their original group to teach the other members about their specific topic.	Jigsaw Cooperative Learning
5-10	Students write in journals/notebooks about the learning experience. "What I learned about today…."	Writing Assessment

Suggested Homework:

Why do you think scientists use the term system to describe you sketetal, muscular, skin, digestive, respiratory, excretory, nervous, endocrine, and reproductive systems?

Name three activities that require different parts of your body to act together? Describe each.

Standards Addressed:

1.2a, l.2e

Lesson#: 9

Unit Topic/Essential Question: What does all like have in common?

Aim/Guiding Question: Do cells have their own chemistry?

Objectives

Students will be able to:

- Distinguish between atoms and molecules
- Define element, compound, mixture
- Distinguish between organic and inorganic compounds
- Name the major organic and inorganic compounds in the living things

New Terms:

atoms	molecules	element	compound	mixture
organic	inorganic	amino acid	nucleic acid	nutrient
protein	starch	simple sugar	DNA	synthesis
carbohydrate				

Materials/Preparations:

Selected readings, from a handout or text, on compounds important to living things: Organic/inorganic compounds, proteins/amino acids, carbohydrates/simple sugars, lipids, nucleic acids/DNA

Time (min)	Development	Instructional Strategies
5	Do Now: Agree or disagree with the following statement. Life runs on energy. It keeps on going and going and going. Explain. Students share ideas. Illicit some responses.	Motivation Do Now Activate Prior Knowledge
10	*Ask: What is the source of all energy on Earth?* Discuss the sunlight to heat energy stream. Introduce the concept of using the energy of sunlight to make energy rich molecules that can bond together simple molecules into more complex , long chain molecules. Life then is an ordered collection of molecules joined by bonds made to capture energy. Discuss and give notes on: **Atoms** making energy – colliding, bonding covalently, storing and releasing energy: carbon, hydrogen, oxygen, nitrogen, phosphorus **Transferring energy** – breaking high energy bonds: proteins, constructing and moving activities. A bird flapping its wing represents bond energy being transferred. Everything that happens in a living cell is a result of bond-breaking, bond-making, and bond-transfer. Diagram at least one covalent bond (H2O).	Direct Instruction Vocabulary development
5	*Ask:* What elements do the symbols C, H, O, and N represent? List as many things as you can that contain each element. Share with partner.	Vocabulary Development
20	In small groups of 4-5 students should read specific material on organic compounds. Each member should have a selection to read on one of the	Jigsaw

	following: Organic/inorganic compounds, proteins/amino acids, carbohydrates/simple sugars, lipids, nucleic acids/DNA. Each member is responsible for reading, taking notes, and teaching to other members of the group. Other members take bulleted notes from each presenter. One member of each group shares all the notes at the end.	Informal Assessment

Suggested Homework:

Design a concept map using the following terms (add words to link the concepts)
Atoms, elements, molecules, compounds, organic compounds, inorganic compounds, carbohydrates, lipids, proteins, carbon

References

Prentice Hall, Biology- The Study Of Life: 33-45, 57-67

Standards Addressed:

1.2h, 5.1c

Lesson#: 10

Unit Topic/Essential Question: **What does all like have in common?**

Aim/Guiding Question: **How is life like a balancing act?**

Objectives

Students will be able to:

New Terms:

Materials/Preparations:

Time (min)	Development	Instructional Strategies
	SEE HOMEOSTASIS UNIT – LESSONS 2 AND 3	

Suggested Homework:

References

Standards Addressed:

1.2c

Lesson#: 11

Unit Topic/Essential Question: What does all life have in common?

Aim/Guiding Question:Why does life need an inside and an outside?

Objectives

Students will be able to:

New Terms:

Materials/Preparations:

Time (min)	Development	Instructional Strategies
	SEE HOMEOSTASIS UNIT – LESSONS 5, 6, 7	

Suggested Homework:

References

Standards Addressed:

1.2g,

Lesson#: 12

Unit Topic/Essential Question: What does all life have in common?

Aim/Guiding Question: How does life run on sugar?

Objectives

Students will be able to:

- Explain how plants store energy through photosynthesis
- Describe how respiration releases energy for both plants and animals
- Compare photosynthesis and respiration

New Terms:

photosynthesis	chlorophyll
ATP	chloroplasts

Materials/Preparations:

Overhead transparency of photosynthesis
Slides of stomates or leaves from live geranium plants
Microscopes or hand lenses

Time (min)	Development	Instructional Strategies
5	Do Now: Review questions: Why do plants need energy? Where do plants get their energy? How do you get your energy? What is respiration? Whole group sharing of answers.	Do Now Review – Activating Prior knowledge
10	Draw a simple diagram on board or use overhead transparency showing photosynthesis. Label important terms: sunlight, carbon dioxide, water, oxygen, and glucose (flowing to materials, information, and energy). Discuss photosynthesis and respiration. Each year, plants, marine algae, and certain bacteria convert 100 billion tons of atmospheric carbon dioxide and hydrogens extracted from water into sugar. The waste product of this conversion is oxygen. Plants, algae, bacteria, and animals all burn sugar – the transform the energy in sugar's chemical bonds into chemical energy – adenosine triphosphate, ATP. This process, called respiration, sugar's carbon and oxygen become waste (CO_2) and its hydrogens are linked to oxygen and released as water. Answer all questions.	Notetaking Direct Instruction
5	*Demonstration: At the beginning of class place a freshly picked leaf in water.* *After 30 minutes observe the surface of the leaf while it is still in the water.*	Demonstration

	ASK: what formed on the leaf? Why? (The leaf should still be releasing oxygen as a waste product of photosynthesis.)	
20	Write the work **Chlorophyll** on the board. Ask students where it is found and what is its use. Discuss the connection between chlorophyll and **chloroplasts.** Organize small groups of students. Using microscopes or hand lenses, observe slides of stomates. (If slides and microscopes are not available, use hand lenses and geranium plants.) Look at the undersides of the leaves. Look for chloroplasts. Record/sketch their shape. Write chemical reaction for photosynthesis. Explain how chlorophyll absorbs light and becomes energized and capable of transferring energy to split the water molecule (it takes energy to break bonds) and uses energy to make ATP – the molecule that is used by cells to store energy. *Review* – Respiration reverses this process by combing oxygen with glucose and releasing energy in the form of ATP. Write the chemical reaction for respiration.	Prior knowledge Direct Instruction Group work, Hands-on activity Review Reteach as needed
5	Ask student to write a brief summary of today's lesson	Assessment

Suggested Homework:

Make a T- Chart comparing photosynthesis and respiration.

References

Standards Addressed:

5.1a, 5.1b, 5.1d

Lesson#: 13

Unit Topic/Essential Question: What does all life have in common?

Aim/Guiding Question: What does all life have in common?

Objectives:

Students will be able to:

- Understand the big unifying idea that life, with all of its diversity, is unified on many levels
- Explain, in detail, that living things are both similar and different from each other

New Terms:

none

Materials/Preparations:

none

Time (min)	Development	Instructional Strategies
	Students should respond, in persuasive essay form, to the ESSENTIAL QUESTION: **What does all life have in common?** **Suggested Checklist for essay criteria:** • Argues convincingly that life is unified – includes at least four examples of the following characteristics: Living things are organized Living things are made up of cells Living things maintain a constant internal environment (homeostasis) Living things obtain and use energy Living things respond to stimuli Living things grow and develop Living things reproduce Living things are adapted to their environments • Uses specific details and examples • Maintains a focus on the topic • Writing indicates an understanding of the Essentional Question • Understands and uses scientific vocabulary and terms to make connections • Concluding statement supports development of the main idea Depending on your students'ability and exposure to persuasive essay form, you should develop your own scoring point grid (rubric). This writing could be started in class as a first draft and handed in for teacher comments. The in-class final writing could be considered an exam. Or, it could be used as a test when first given.	Writing Assessment (final)

	Results of this writing should be compared to the original response to the essential question when this unit was first started. This would be an excellent portfolio piece showing students' growth and development of conceptual understanding. Again, students would be aware, from the beginning of the unit, that all material studied would be leading up to an understanding of the essential question. By reinforcing this throughout the unit, students are prepared to answer the big question.	

Suggested Homework:

References

Standards Addressed