

Cells: Structures and Processes

Grade Level or Special Area: Fifth Grade

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Length of Unit: Nine lessons (approximately nine to eleven days – 45 minutes each day)

I. ABSTRACT

Explore the most basic unit of life: the Cell. Discover the cell structure of animal and plant cell functions and how they affect our world.

II. OVERVIEW

A. Concept Objectives

1. Students will gain an appreciation for the complex structure of living things. (Adams 12 Curriculum Framework Grade 5, standard 1)
2. Students will understand that all living things are made up of cells. (Adams 12 Curriculum Framework Grade 5, standard 3)
3. Students will recognize that all living things are made up of one or more cells and that complex multi-cellular living things have tissues, organs, and organ systems. (Colorado Model Content Standards for Science, Standard II)

B. Content from the *Core Knowledge Sequence*

1. Fifth Grade Science: Cells: Structures and Processes, page 127
 - a. All living things are made up of cells
 - b. Structure of cells (both plant and animal)
 - i. Cell membrane: selectively allows substances in and out
 - ii. Nucleus: surrounded by nuclear membrane, contains genetic material, divides for reproduction
 - iii. Cytoplasm contains organelles, small structures that carry out the chemical activities of the cell, including mitochondria (which produce the cell's energy) and vacuoles (which store food, water, or wastes)
 - c. Plant cells, unlike animal cells, have cell walls and chloroplasts
 - d. Cells without nuclei: monerans (bacteria)
 - e. Some organisms consist of only a single cell: for example, amoeba, protozoan, some algae
 - f. Cells are shaped differently in order to perform different functions
 - g. Organization of cells into tissues, organs, and systems:
 - i. In complex organisms, groups of cells form tissues (for example, in animals, skin tissue or muscle tissue; in plants, the skin of an onion or the bark of a tree)
 - ii. Tissues with similar functions form organs (for example, in some animals, the heart, stomach, or brain; in some plants, the root or follower)
 - iii. In complex organisms, organs work together in a system (recall, for example, from earlier studies of the human body, the digestive, circulatory, and respiratory systems)

C. Skill Objectives

1. Students will be able to explain the difference between living and non-living things.
2. Students will draw, label, and define the parts of an animal cell.
3. Students will draw, label, and define the parts a plant cell.
4. Students will write definitions for vocabulary words 1-11.

5. Students will write definitions for vocabulary words 12-23.
6. Students will explain and define the parts and functions of an animal cell.
7. Students will explain and define the parts and functions a plant cell.
8. Students will compare and contrast the difference in animal and plant cells.
9. Students will be able to describe and explain the main four stages of the cell division process: mitosis.
10. Students will be able to define what a single-celled organism is.
11. Students will be able to explain the difference between the three groups of single-celled organisms.
12. Students will be able to define and give examples what a multi-celled organism.
13. Students will be able to explain the difference between the three groups of multi-celled organisms.

III. BACKGROUND KNOWLEDGE

A. For Teachers

1. *What Your 5th Grader Needs to Know*, by E. D. Hirsch, pp. 333-337
2. Mallinson, G., Mallinson, J., Smallwood, W., and Valentino, C., *Silver Burdett Science*
3. Rowan, K., *I Know How My Cells Make Me Grow*
4. *Cells*, Fichter, George
5. Animal Cell Anatomy – EnchantedLearning.com. Available URL: <http://www.enchantedlearning.com/subjects/animals/cell/>
6. Plant Cell Anatomy – EnchantedLearning.com. Available URL: <http://www.enchantedlearning.com/subjects/plants/cell/>
7. World book Online Reference Center (American English). Available URL: <http://aolsvc.worldbook.aol.com/wb/ExtMedia/id=ar102240&sc=1&em=1r002847>.
8. Cells (VHS), Bill Nye the Science Guy

B. For Students

1. Grade 2 Science: The Human Body: The Digestive and Excretory Systems

IV. RESOURCES

- A. Video: *Cells* (Lesson Four)
- B. Book: *Teacher Cell Booklet* (Lessons One – Nine, see Appendix C, pages 1-12)

V. LESSONS

Lesson One: Introduction: The Building Blocks of all Living Things (one lesson, 45 minutes)

A. Daily Objectives

1. Concept Objective(s)
 - a. Students will gain an appreciation for the complex structures of living things.
 - b. Students will understand that all living things are made up of cells.
2. Lesson Content
 - a. All living things are made up of cells.
3. Skill Objective(s)
 - a. Students will be able to explain the difference between living and non-living things.
 - b. Students will draw, label, and define the parts of an animal cell.
 - c. Students will draw, label, and define the parts a plant cell.

B. *Materials*

1. Cell Unit Pre-Assessment-one per student, Appendix A pages 1-4
2. Cell Unit Pre-Assessment Key – one for teacher, Appendix B, pages 1-4
3. Pencils-two per student
4. One Teacher Cell Booklet (already made), Appendix C, pages 1-11
5. Student Cell Booklet, one per student already made, Appendix D, pages 1-11
6. Colored pencils-a set for each student
7. Animal Cell picture, one per student, Appendix E
8. Plant Cell picture, one per student, Appendix F
9. For teacher: Cell Booklet Checklist, Appendix G

C. *Key Vocabulary*

1. The *life processes* are distinguished by six characteristics. The six characteristics include:
 - a. Living things take in nutrients.
 - b. Living things need and use energy to work.
 - c. Living things reproduce.
 - d. Living things grow.
 - e. Living things respond to the world around them.
 - f. Living things get rid of waste.
2. The *cell* is the smallest living part of an organism.
3. An *organism* is a living thing.

D. *Procedures/Activities*

1. Hand out the pre-assessment to each student, Appendix A. Give them 10 minutes to complete. When the time is up, collect the pre-assessments and grade with a key later and collect data from the test to see what concepts or skills need to be taught thoroughly or if there are things that just need to be touched on.
2. Hand out student cell booklet, Appendix C. (The cell booklet will be where students keep their notes and complete activities for this unit.)
3. Introduce today's lesson by asking students: "What is the building block of all living things?" If students have trouble answering, ask guided questions. For example: "What is our skin made up of?" After getting responses from students, explain to the students: "Cells are the building blocks of all living things."
4. Ask students: "What is the difference between living and nonliving things?" Draw a two-column chart on the board; label one column *Living Things* and the other column *Nonliving Things* to record student answers. Record answers; if there is not much response ask some guiding questions. For example, "What is something people need everyday to live?" "How do animals keep from becoming extinct?" Use information from the list of six characteristics or after a brief discussion, explain to students what living things are, instruct the students to fill in information in their cell booklet on page 7. Tell the students that life processes distinguish living things from nonliving things. Scientists have discovered six life processes that all living things do:
 - a. Living things take in nutrients.
 - b. Living things need and use energy to work.
 - c. Living things reproduce.
 - d. Living things grow.
 - e. Living things respond to the world around them.
 - f. Living things get rid of waste.
5. Instruct the students to get out their colored pencils.
6. Hand out a picture of the animal cell and the plant cell, Appendices C and D.

7. Give the students time to draw and color the animal cell and plant cell on their booklet covers.
 8. At the end of the hour, have students hand in cell books for teacher to check if work is completed.
- E. *Assessment/Evaluation*
1. Pre-assessment (will be graded with key and data collected)
 2. Completion of written notes for pg. 7 in student cell booklet. (The cell booklet will be graded at the end of the unit with a cell booklet rubric. Use cell booklet checklist, Appendix F, to mark what students have completed.)
 3. Completion of the cover of the student cell booklet. (Check to see if finished and check off cell booklet checklist, Appendix F.)

Lesson Two: Cell Booklet Vocabulary (one lesson, 45 minutes)

- A. *Daily Objectives*
1. Concept Objective(s)
 - a. Students will gain an appreciation for the complex structures of living things.
 - b. Students will understand that all living things are made up of cells.
 2. Lesson Content
 - a. Structure of cells (both plant and animal)
 - i. Cell membrane: selectively allows substances in and out.
 - ii. Nucleus: surrounded by nuclear membrane, contains genetic material, and divides for reproduction.
 - iii. Cytoplasm contains organelles, small structures that carry out the chemical activities of the cell, including mitochondria (which produce the cells energy) and vacuoles (which store food, water, or wastes).
 - b. Plant cells, unlike animal cells have cell walls and chloroplasts.
 - c. Cells without nuclei: monerans (bacteria)
 3. Skill Objective(s)
 - a. Students will write definitions for vocabulary words 1-11.
- B. *Materials*
1. Student cell booklet, each should have one
 2. Pencils, two per student
 3. Vocabulary Definition Handout, Appendix H, page 1, one per student
- C. *Key Vocabulary*
1. An *organism* is a living thing.
 2. A *cell* is the smallest living part of an organism.
 3. The *nucleus* is a round body in a cell. Its job is to control the cells activities. It contains the chromosome / genes. It is the “Brain of the Cell.”
 4. *Chromosomes* are threadlike structures in the nucleus.
 5. *Genes* are units that control most of the cell’s activities.
 6. The *plasma membrane* is a thin, soft layer that surrounds the cell and helps control the movement of materials into and out of the cell.
 7. The *nuclear membrane* is the thin, soft layer that surrounds the nucleus.
 8. The *cell wall* is the thick wall outside the plasma membrane in plant cells.
 9. The *cytoplasm* is the jelly-like material outside the nucleus in an animal cell.
 10. The *organelles* are all parts of the cell that float in the cytoplasm.
 11. The *vacuole* is the clear, small areas in the cytoplasm that contain stored food for the cell.

- D. *Procedures/Activities*
1. Instruct the students to get out their Cell Booklet and pencils.
 2. Hand out the vocabulary list, words 1-11, Appendix H, page 1, one per student. Read each word aloud to the students. (Modification: Have students repeat the word after you say it.)
 3. This is where you can modify your lesson if the students need more help with comprehension. Write each word on the board and discuss each word while they write the definitions in their cell books.
 4. Explain to the students that this is the number order that the words should be in when writing them in the cell booklet. Vocabulary pages are 3, 4, 5, and 6.
 5. The first day the students will work on words 1-11 (in Lesson Three, the students will look up and write definitions for words 12 – 23).
 6. At the end of the hour have students hand in cell booklet for teacher check.
- E. *Assessment/Evaluation*
1. Completion of the vocabulary words 1-11. (Use cell booklet checklist to record when student has completed the assignment.)

Lesson Three: Cell Booklet Vocabulary (one lesson, 45 minutes)

- A. *Daily Objectives*
1. Concept Objective(s)
 - a. Students will gain an appreciation for the complex structures of living things.
 - b. Students will understand that all living things are made up of cells.
 2. Lesson Content
 - a. Structure of cells (both plant and animal)
 - i. Cell membrane: selectively allows substances in and out.
 - ii. Nucleus: surrounded by nuclear membrane, contains genetic material, and divides for reproduction.
 - iii. Cytoplasm contains organelles, small structures that carry out the chemical activities of the cell, including mitochondria (which produce the cell's energy) and vacuoles (which store food, water, or wastes).
 - b. Plant cells, unlike animal cells have cell walls and chloroplasts.
 - c. Cells without nuclei: monerans (bacteria)
 3. Skill Objective(s)
 - a. Students will write definitions for words 12 – 23.
- B. *Materials*
1. Student cell booklet, each should have one
 2. Pencils, two per student
 3. Vocabulary Definition Handout, Appendix H, page 2, one per student
- C. *Key Vocabulary*
1. The *mitochondria* are the part of the cell that converts food to energy.
 2. The *endoplasmic reticulum* is an organelle that transports materials through the cell.
 3. The *ribosome* is an organelle that produces protein for the cell.
 4. *Chloroplasts* are the green structures in the plant cells that contain the green chemical, chlorophyll and where food is made.
 5. *Chlorophyll* is the chemical in plants that traps energy from the sunlight to make food.
 6. A *protist* is a single-celled organism.
 7. A *protozoan* is an animal-like protist.

8. *Bacteria* are the simplest protest.
 9. *Tissue* is a team of cells in a plant or animal that does a special job.
 10. An *organ* is a group of tissues working together to carry out a body activity / function.
 11. Body *systems* are a group of organs that work together to do a major job that keeps an organism alive.
 12. *Mitosis* is the process by which a cell divides to form two cells.
- D. *Procedures/Activities*
1. Instruct the students to get out their Cell Booklet and pencils.
 2. Hand out the vocabulary list, words 12-23, Appendix H, page 2, one per student. Read each word aloud to the students. (Modification: Have students repeat the word after you say it.)
 3. If the students need more help with comprehension and understanding, write each word on the board and discuss each word while they write the definitions in their cell books.
 4. Explain to the students that this is the number order that the words should be in when writing them in the cell booklet. Vocabulary pages are 3, 4, 5, and 6.
 5. At the end of the hour have students hand in cell booklet for teacher check.
- E. *Assessment/Evaluation*
1. Completion of the vocabulary words 12-23. (Use cell booklet checklist to record when student has completed the assignment.)

Lesson Three: “The Cells” Video (one lesson, 45 minutes)

- A. *Daily Objectives*
1. Concept Objective(s)
 - a. Students will gain an appreciation for the complex structures of living things.
 - b. Student will understand that all living things are made up of cells.
 2. Lesson Content
 - a. All living things are made up of cells.
 - b. Structure of cells (both plants and animals)
 - c. Plant cells, unlike animal cells, have cell walls and chloroplasts.
 - d. Some organisms consist of only a single cell: for example, amoeba, protozoan, and some algae.
 - e. Cells are shaped differently in order to perform different functions.
 3. Skill Objective(s)
 - a. Students will compare and contrast the difference in animal and plant cells.
- B. *Materials*
1. Cells: Video
 2. Cells: Video worksheet, one per student, Appendix I
 3. Cells: Teacher Key for Video worksheet, Appendix J
 4. Pencil, two per student
 5. Red pencil, one per student
- C. *Key Vocabulary*
Review vocabulary words from Lessons Two and Three.
- D. *Procedures/Activities*
1. Make sure the video is ready to go before you start the lesson.
 2. Review the previous lessons by asking the question: “What is the building block of all living things?” Then ask questions to review vocabulary words. For example:

- a. "What is a cell?"
 - b. "Name a part of the cell and tell us what it does."
 - c. "What is considered the brain of the cell?"
 - d. "What is chlorophyll and where do you find it?"
3. Hand out the Video question worksheet to each student.
 4. Have students get out pencils.
 5. Instruct the students to fill out the blanks as they watch the video. Tell them they may write notes in the margins.
 6. Start the video. Stop the video when you see the answer to one of the questions. Discuss and have them fill out their worksheet.
 7. After watching and answering the questions grade worksheet in class.
 8. Instruct the students to get out their red pencils to fill in answers that are not correct.
 9. Discuss each question to make sure the students understand the answer.
 10. At the end of the hour, have students hand in the worksheet.
- E. *Assessment/Evaluation*
1. Look at student work to check for understanding. If there are many red words, then some concepts will need to be discussed more. Give a 21-point credit grade for this sheet.

Lesson Four: The Animal Cell (one lesson, 45 minutes)

- A. *Daily Objectives*
1. Concept Objective(s)
 - a. Students will gain an appreciation for the complex structures of living things.
 - b. Students will understand that all living things are made up of cells.
 2. Lesson Content
 - a. Structure of cells (both **animal** and plant)
 - i. Cell membrane: selectively allows substances in and out
 - ii. Nucleus: surrounded by nuclear membrane, contains genetic material, divides for reproduction
 - iii. Cytoplasm contains organelles, small structures that carry out the chemical activities of the cell, including mitochondria (which produce the cell's energy) and vacuoles (which store food, water, or wastes).
 3. Skill Objective(s)
 - a. Students will draw, label, and define the parts of an animal cell.
- B. *Materials*
1. Teacher Cell Booklet for the teacher
 2. Student Cell Booklet, each student should have one
 3. Colored pencils-a set for each student
 4. Pencils – two per student
 5. Animal Cell picture, in science folder, one for each student
 6. For teacher: Cell Booklet Check List
- C. *Key Vocabulary*
1. A *nucleus* is a round body in a cell. Its job is to control the cells activities. It contains the chromosome / genes. It is the "Brain of the Cell."
 2. *Chromosomes* are threadlike structures in the nucleus.
 3. *Genes* are units that control most of the cell's activities.
 4. The *plasma membrane* is a thin, soft layer that surrounds the cell and helps control the movement of materials into and out of the cell.

5. The *nuclear membrane* is the thin, soft layer that surrounds the nucleus.
 6. The *cytoplasm* is the jelly-like material outside the nucleus in an animal cell.
 7. The *organelles* are all parts of the cell that float in the cytoplasm.
 8. The *vacuole* is the clear, small areas in the cytoplasm that contain stored food for the cell.
 9. The *mitochondria* are the part of the cell that converts food to energy.
- D. *Procedures/Activities*
1. Instruct the students to get out their cell booklet, animal cell picture, pencils, and colored pencils.
 2. Instruct the students to draw the outside shape of an animal cell on page 8, while teacher draws the shape on the board.
 3. As the teacher talks about each part of the cell, have students draw and label that part within the cell in their books as the teacher draws it on the board.
 4. Write notes on page 9:
 - a. Most animal cells have a nucleus.
 - b. All animal cells have a jell-like material outside the nucleus (cytoplasm).
 - c. All animal cells are surrounded by a cell / plasma membrane, which holds the cell together and lets substances pass in and out of the cell.
 - d. There are many kinds of animal cells.
 5. Give students time to complete animal cell picture and notes.
 6. Have students hand cell booklets in so the teacher can check off finished work on the cell checklist.
- E. *Assessment/Evaluation*
1. Check for understanding from work in the cell booklet page 8 and 9.

Lesson Five: The Plant Cell (one lesson, 45 minutes)

- A. *Daily Objectives*
1. Concept Objective(s)
 - a. Students will gain an appreciation for the complex structures of living things.
 - b. Students will understand that all living things are made up of cells.
 2. Lesson Content
 - a. Structure of cells (both animal and **plant**)
 - i. Cell membrane: selectively allows substances in and out
 - ii. Nucleus: surrounded by nuclear membrane, contains genetic material, divides for reproduction
 - iii. Cytoplasm contains organelles, small structures that carry out the chemical activities of the cell, including mitochondria (which produce the cell's energy) and vacuoles (which store food, water, or wastes).
 - b. Plant cells, unlike animal cells, have cell walls and chloroplasts.
 3. Skill Objective(s)
 - a. Students will draw, label, and define the parts of a plant cell.
- B. *Materials*
1. Teacher Cell Booklet for the teacher
 2. Student Cell Booklet, each student should have one
 3. Colored pencils-a set for each student
 4. Pencils – two per student
 5. Plant Cell picture, in science folder, one for each students
 6. For teacher: Cell Booklet Checklist

C. *Key Vocabulary*

1. A *nucleus* is a round body in a cell. Its job is to control the cells activities. It contains the chromosome / genes. It is the “Brain of the Cell.”
2. *Chromosomes* are threadlike structures in the nucleus.
3. *Genes* are units that control most of the cell’s activities.
4. The *plasma membrane* is a thin, soft layer that surrounds the cell and helps control the movement of materials into and out of the cell.
5. The *nuclear membrane* is the thin, soft layer that surrounds the nucleus.
6. The *cytoplasm* is the jelly-like material outside the nucleus in an animal cell.
7. The *organelles* are all parts of the cell that float in the cytoplasm.
8. The *vacuole* is the clear, small areas in the cytoplasm that contain stored food for the cell.
9. The *mitochondria* are the part of the cell that converts food to energy.
10. The *cell wall* is a thick wall outside the plasma membrane in plant cells.

D. *Procedures/Activities*

1. Instruct the students to get out their cell booklet, plant cell picture, pencils, and colored pencils.
2. Instruct the students to draw the outside shape of a plant cell on page 10, while teacher draws the shape on the board.
3. As the teacher talks about each part of the cell, have students draw and label that part within the cell in their books as the teacher draws it them on the board.
4. Write notes on page 11:
 - a. Plant cells have a thick wall outside the plant membrane.
 - b. The plasma membrane is very thin and is a living part of the cell.
 - c. The cell wall is thick and is a nonliving part of the cell.
 - d. Plant cells make their own food in the chloroplasts.
 - e. Plant cells contain vacuoles that are much larger than those that are in animal cells.
5. Give students time to complete plant cell picture and notes.
6. Homework: Have students do pages 12 and 13. This will help to check for understanding.

E. *Assessment/Evaluation*

1. Check for understanding from work in the cell booklet page 10, 11, 12, and 13. Use checklist to mark off finished work.

Lesson Six: CULMINATING ACTIVITY (one lesson, 30 minutes)

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Students will gain an appreciation for the complex structures of living things.
 - b. Students will understand that all living things are made up of cells.
2. Lesson Content
 - a. All living things are made up of cells.
3. Skill Objective(s)
 - a. Students will be able to explain the difference between living and non-living things.
 - b. Students will explain and define the parts and functions of an animal cell.
 - c. Students will explain and define the parts and functions a plant cell.

B. *Materials*

1. Cell Project packet made up before lesson, Appendix K, pages 1-5

- C. *Key Vocabulary*
Use Appendix H, pages 1-2 for definitions to help with project.
- D. *Procedures/Activities*
 - 1. Have a student hand out the cell project packet.
 - 2. Discuss the packet. Go through page by page and discuss what is required. Answer any questions. Make sure all students understand what they are required to complete for this project.
- E. *Assessment/Evaluation*
 - 1. At the end of the unit, schedule two days for presentations and one day for test.

Lesson Seven: The Four Main Stages of Mitosis (one lesson, 45 minutes)

- A. *Daily Objectives*
 - 1. Concept Objective(s)
 - a. Students will gain an appreciation for the complex structures of living things.
 - b. Students will understand that all living things are made up of cells.
 - 2. Lesson Content
 - a. All living things are made up of cells.
 - b. Structure of cells (both plant and animal)
 - i. Cell membrane: selectively allows substances in and out
 - ii. Nucleus: surrounded by nuclear membrane, contains genetic material, divides for reproduction
 - iii. Cytoplasm contains organelles, small structures that carry out the chemical activities of the cell, including mitochondria (which produce the cell's energy) and vacuoles (which store food, water, or wastes).
 - 3. Skill Objective(s)
 - a. Students will be able to describe and explain the four main stages of the cell division process: mitosis.
- B. *Materials*
 - 1. Teacher Cell Booklet for the teacher
 - 2. Student Cell Booklet, each student should have one
 - 3. Colored pencils-a set for each student
 - 4. Pencils – two per student
 - 5. The Stages of Mitosis handout, Appendix L, one per student
 - 6. For teacher: Cell Booklet Checklist
- C. *Key Vocabulary*
 - 1. *Mitosis* is the process by which a cell divides to form two cells.
- D. *Procedures/Activities*
 - 1. Have a student pass out “The Stages of Mitosis” handout.
 - 2. Instruct the students to get out their cell booklets, pencils and colored pencils.
 - 3. Instruct the students turn to page 14 and 15 in their cell booklet.
 - 4. As the teacher talks about each stage of mitosis, draw it on the board and have students draw the stage in their books.
 - 5. Write notes under each picture on pages 14 and 15.
 - a. Stage 1: Nuclear membrane breaks; chromosomes get thicker and become attached.
 - b. Stage 2: Chromosomes line up in the center of the cell; fibers appear to become connected to the chromosomes.
 - c. Stage 3: Pairs of identical chromosomes separate, pairs go to the opposite ends of the cell.

- d. Stage 4: Nuclear membrane forms around each group of chromosomes creating **two** separate new identical cells.
Give students time to finish pictures and notes.
- 7. Homework: Have students do pages 14 and 15.
- E. *Assessment/Evaluation*
 - 1. Check for understanding from work in the cell booklet page 14 and 15. Use checklist to mark off finished work.

Lesson Eight: Single-Celled Organisms (one lesson, 45 minutes)

- A. *Daily Objectives*
 - 1. Concept Objective(s)
 - a. Students will understand that all living things are made up of cells.
 - 2. Lesson Content
 - a. Cells without nuclei: monerans (bacteria)
 - b. Some organisms consist of only a single cell: for example, amoeba, protozoans, some algae.
 - c. Cells are shaped differently in order to perform different functions.
 - 3. Skill Objective(s)
 - a. Students will be able to explain the difference between the three groups of single-celled organisms.
 - b. Students will be able to define what a single-celled organism is.
- B. *Materials*
 - 1. Teacher Cell Booklet for the teacher
 - 2. Student Cell Booklet, each student should have one
 - 3. Pencils – two per student
 - 4. For teacher: Cell Booklet Checklist
 - 5. Optional: find pictures of different single-celled organisms to show students
- C. *Key Vocabulary*
 - 1. A *protist* is a single-celled organism, microscopic, most live in water / moist places. There are three groups: animal-like protists, plant-like protists, and bacteria.
 - 2. *Heterotrophs* are organisms that feed on other organisms.
- D. *Procedures/Activities*
 - 1. Instruct the students to get out their cell booklets and pencils.
 - 2. Using the teacher cell booklet, discuss information about single-celled organisms and write notes, as the students write them in their cell booklet on pages 16-17.
 - 3. Instruct the students to label page 16: Single-Celled Organisms.
 - 4. Write on the board the definition of protist: A Protist is a single-celled organism. They are microscopic, most live in water or moist places.
 - 5. Tell them that there are three groups of protists, which include: animal-like protists, plant-like protists, and bacteria.
 - 6. All protists are heterotrophs, which feed on other organisms.
 - 7. Then discuss the three groups to understand the differences in each.
 - 8. Animal-Like Protist: Protozoan are animal-like protist; protozoan do not have chlorophyll; protozoans do not make their own food; protozoan are classified by the way they move and search for food. Examples: amoebas, paramecium, and euglena.
 - 9. Plant-Like Protist: Plant-like protists have chloroplasts and cell walls; plant-like protists are found in the soil, floating in fresh water or in salt water. Examples: diatoms, red algae, and green algae.

10. **Bacteria:** Bacteria are the simplest protists; bacteria has a cell wall; bacteria do not have a nucleus; most bacteria do not have chlorophyll; bacteria can not make their own food; bacteria are the smallest of all protists; bacteria can be found everywhere: water, soil, and air; bacteria is classified by their shape; and some bacteria cause substances to decay.
 11. There are three shapes of bacteria: round, rod-shaped, and spiral-shaped. Examples are: water mold, slime molds, and downy molds.
- E. *Assessment/Evaluation*
1. Have students hand in cell booklet for teacher check.

Lesson Nine: Multi-Celled Organisms (one lesson, 45 minutes)

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Students will recognize that all living things are made up of one or more cells and that complex multi cellular living things have tissues, organs, and organ systems.
2. Lesson Content
 - a. Organization of cells into tissues, organs, and systems:
 - i. In complex organisms, groups of cells form tissues (for example, in animals, skin tissue or muscle tissue; in plants, the skin of an onion or the bark of a tree)
 - ii. Tissues with similar functions form organs (for example, in some animals, the heart, stomach, or brain; in some plants, the root or follower)
 - iii. In complex organisms, organs work together in a system (recall, for example, from earlier studies of the human body, the digestive, circulatory, and respiratory systems)
3. Skill Objective(s)
 - a. Students will be able to define and give examples of a multi-celled organism.
 - b. Students will be able to explain the difference between the three groups of multi-celled organisms.

B. *Materials*

1. Teacher Cell Booklet for the teacher
2. Student Cell Booklet, each student should have one
3. Pencils – two per student
4. For teacher: Cell Booklet Checklist
5. Optional: find pictures of different multi-celled organisms to show students

C. *Key Vocabulary*

1. *Multi-celled organisms* are made up of many cells.
2. The *tissue* is a team of cells in a plant or animal that does a special job.
3. An *organ* is a group of tissues working together to carry out a body activity.
4. A *system* is a group of organs that work together to do a major job that keeps an organism alive.

D. *Procedures/Activities*

1. Instruct the students to get out their cell booklets and pencils.
2. Using the teacher cell booklet pages 18-19, explain that plants and animals are made up of many cells that do different jobs, which are defined as multi-celled organisms. Write this on the board under the label Multi-Celled Organisms.
3. Instruct the students to label page 18 Multi-Celled Organisms and write the definition.

4. Write on the board that the multi-celled organisms are divided into three groups: Tissue, Organs, and Systems. Then discuss the three groups to understand the differences in each.
 5. Tissue: Tissues are a team of cells in a plant or animal that join together to form organs that do a special job. The different kinds of tissues are: Skin Tissue, which covers and protects; Muscle Tissue are cells that get longer / shorter; and Nervous Tissue are cells that carry messages from the brain to other parts of the body.
 6. Organs: Organs are a group of different kinds of tissues working together to carry out a body function. Kinds of organs are eyes, ears, stomach, heart, lungs, pancreas, tongue, liver, mouth, small / large intestines.
 7. Systems: Systems are groups of organs that work together to do a major job. Kinds of systems are digestive, circulatory, nervous, respiratory, muscular skeletal.
- E. *Assessment/Evaluation*
1. Have students hand in cell booklet for teacher check. Make sure to give back the book so that students will have it to study for the test.

VI. CULMINATING ACTIVITY

- A. Cell Project: see Lesson Six
 1. It will take two days to present the projects at the end of the unit. Schedule them accordingly and use the rubric to grade them.
- B. The Cell Unit Post Test, one per student
 1. Give the Pre-Test for a Post-Test. Change the title on the test to Post-test and copy, Appendix A, pages 1-4.

VII. HANDOUTS/WORKSHEETS

- | | | |
|----|---------------------|--|
| A. | Appendix A: | Pre-Assessment Cells Test |
| B. | Appendix B: | Teacher Key to Pre-Assessment Cells Test |
| C. | Appendix C: | Teacher Cell Book |
| D. | Appendix D: | Student Cell Book Template |
| E. | Appendix E: | Animal Cell Parts and Functions |
| F. | Appendix F: | Plant Cell Parts and Functions |
| G. | Appendix G: | Cell Booklet Checklist |
| H. | Appendix H, page 1: | Cell Unit Vocabulary List 1-11 |
| I. | Appendix H, page 2: | Cell Unit Vocabulary List 12-23 |
| J. | Appendix I: | Cells Video Worksheet |
| K. | Appendix J: | Cell Video Worksheet Key |
| L. | Appendix K: | Cell Project |
| M. | Appendix L: | The Four Main Stages of Mitosis |

VIII. BIBLIOGRAPHY

- A. *Animal Cell Anatomy* – EnchantedLearning.com. Available URL: <http://www.enchantedlearning.com/subjects/animals/cell/>
- B. Hirsch, Jr. E.D. *What Your Fifth Grader Needs to Know*. New York: Dell Publishing, 1991. ISBN 0-385-31464-7
- C. Mallinson, G., Mallinson, J., Smallwood, W., and Valentino, C. *Silver Burdett Science*. Silver Burdett Co., 1985. 0-382-13108-8.
- D. Pictures taken from: *10,000 Graphics Pack Vol. 3 and PrintArtist: Grand Suite*, Sierra On-line, Inc., 1999.

- E. *Plant Cell Anatomy* – EnchantedLearning.com. Available URL:
<http://www.enchantedlearning.com/subjects/plants/cell/>
- F. Rowan, K. *I Know How My Cells Make Me Grow*. Candlewick Press, 1999. 0-7636-0502-6
- G. Video: *Cells*, Bill Nye the Science Guy. 1995. (available at:
http://dep.disney.go.com/educational/store/detail?product_id=68A96VL00)
- H. *World book Online Reference Center* (American English). Available URL:
<http://aolsvc.worldbook.aol.com/wb/ExtMedia/id=ar102240&sc=1&em=1r002847>.

Pre-Assessment Cells Test

True or False:

- _____ 1. Cells have many different shapes.
- _____ 2. Mitosis is a jelly-like structure in the cell.
- _____ 3. One of the things living cells can do is reproduce.
- _____ 4. Cells need food to give us energy.
- _____ 5. Mitochondria are the powerhouse of the cell.
- _____ 6. Animal cells have a cell wall.
- _____ 7. Microscopes helped us to discover more about cells.
- _____ 8. Vacuoles tell the cell what to do.

Fill in the blank with one of the following words:

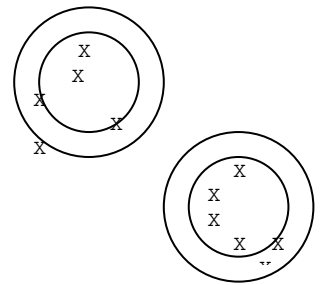
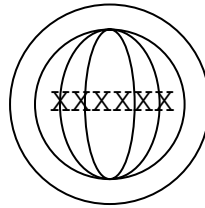
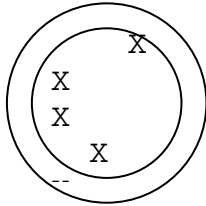
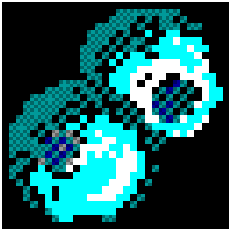
Ribosome Vacuoles Mitochondria Nucleus
Endoplasmic Reticulum

- 9. Protein is made by the _____.
- 10. The _____ is the control center of the cell.
- 11. Food and waste are stored in the _____.
- 12. The _____ is the cell's transportation system.
- 13. Most of a cell's energy is created in the _____.

Appendix A, page 2

Fill in the blanks:

14. The pictures below show the stages of the process of cell division called _____.
15. Write the numbers 1, 2, 3, 4 under each picture in order to show the steps of the cell process.



16. A single-celled organism is called a _____.
17. Bacteria are classified according to these *three* shapes:
- a. _____
 - b. _____
 - c. _____

Put the letter of the word that matches the correct definition:

A. Organ

B. Tissue

C. System

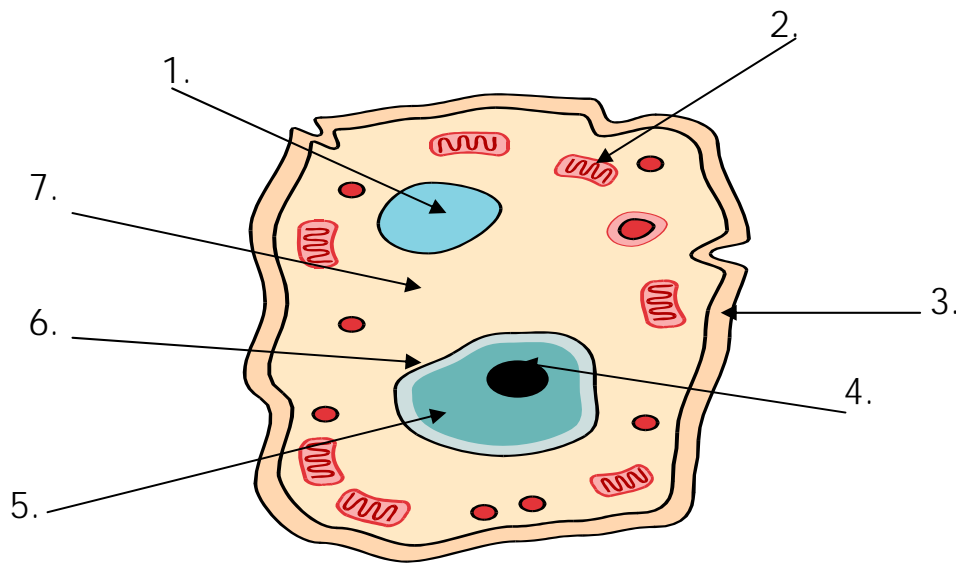
18. _____ A team of cells that does a special job.
19. _____ A team of tissues working together to carry out a body function.
20. _____ A group of organs that work together to do a major job that keeps an organism alive.

Appendix A, page 3

21. List four of the six life processes that all living things do:

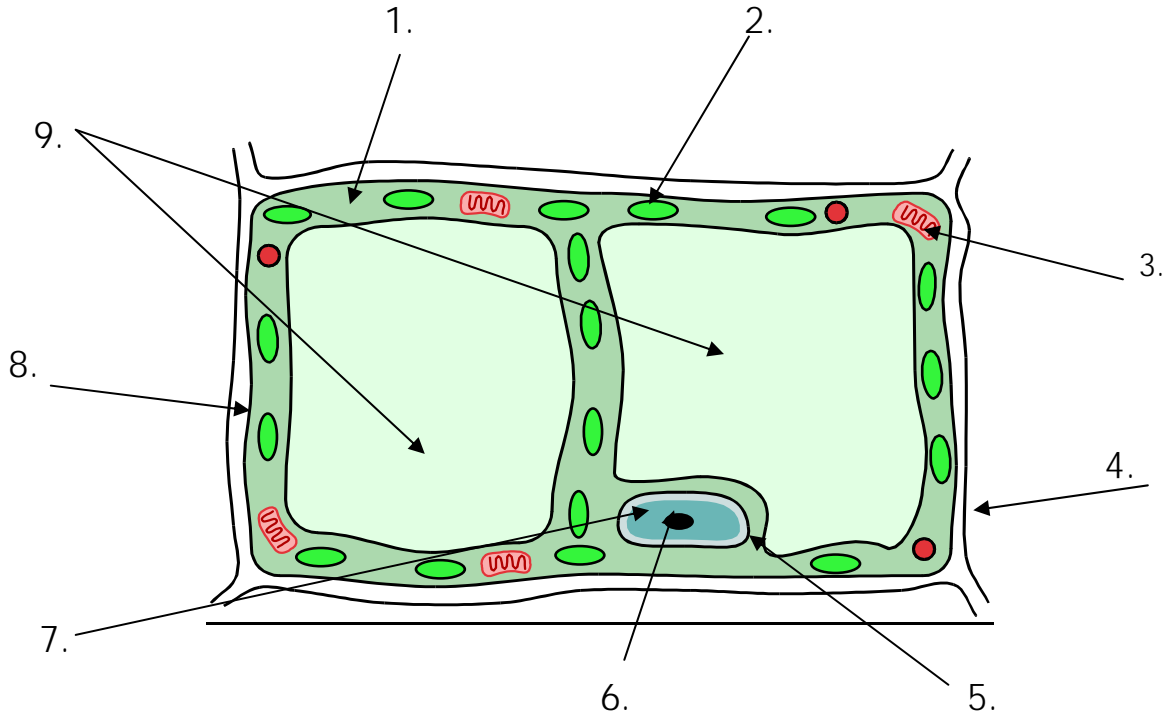
1. _____
2. _____
3. _____
4. _____

22. Label the parts of the animal cell:



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

24. Label the parts of the plant cell:



- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____
- 7. _____
- 8. _____
- 9. _____

Pre-Assessment Cells Test TEACHER KEY

True or False:

1. T
2. F
3. T
4. F
5. T
6. F
7. T
8. F

Fill in the blank with one of the following words:

9. ribosome
10. nucleus
11. vacuole
12. endoplasmic reticulum
13. mitochondria
14. mitosis
15. 3 1 2 4
16. protist
17. a. round
b. rod
c. spiral

Put the letter of the word that matches the correct definition:

18. B
19. A
20. C

21. List four of the six life processes that all living things do:

1. Living things take in nutrients.
2. Living things need and use energy to work.
3. Living things reproduce.
4. Living things grow.
5. Living things respond to the world around them.
6. Living things get rid of waste.

Appendix B, page 2

22. Label the parts of the animal cell:

1. Vacuole
2. Mitochondrion
3. Cell Membrane
4. Nucleus
5. Genes and Chromosomes
6. Nucleus Membrane
7. Cytoplasm

24. Label the parts of the animal cell:

1. Cytoplasm
2. Chloroplast
3. Mitochondrion
4. Cell Wall
5. Nuclear Membrane
6. Nucleus
7. Genes and Chromosomes
8. Cell Membrane
9. Vacuole

Appendix C, pages 1-11

Teacher Cell Booklet Directions

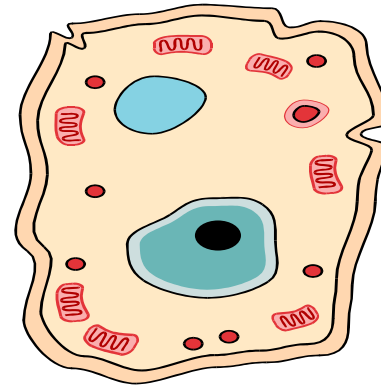
The following pages are the templates for the teacher cell booklet.

Cell Booklet Directions:

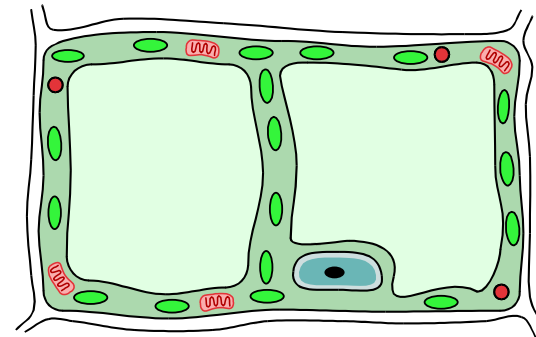
1. Type your name on the front cover of the teacher's book.
2. Print out the cover first – you will want this on a colored piece of card stock to differentiate between the students' book and yours.
3. Print out teacher cell book.
4. Then copy the pages on a copier, *front to back*. It is made to put in a copier as it printed out but every copier is different so you will need to figure out how your copier works. You should have five copies plus the cover – six total.
5. Put the pages in order:
 - a. Lay cover flat.
 - b. Place first sheet on top of the cover, pages Table of Contents, blank, 19, 20 of book.
 - c. Place second sheet on top of the first sheet, pages 3, 4, 17, 18.
 - d. Place third sheet on top of the second sheet, pages 5, 6, 15, 16.
 - e. Place fourth sheet on top of the third sheet, page 7, 8, 13, 14.
 - f. Place the fifth sheet on top of the fourth sheet, pages 9, 10, 11, 12 of book.
6. Staple the pages together in the middle of the paper three times: at the top, in the middle, and at the bottom.
7. Fold pages in half to make a book.

Teacher Cell Booklet

Animal Cell

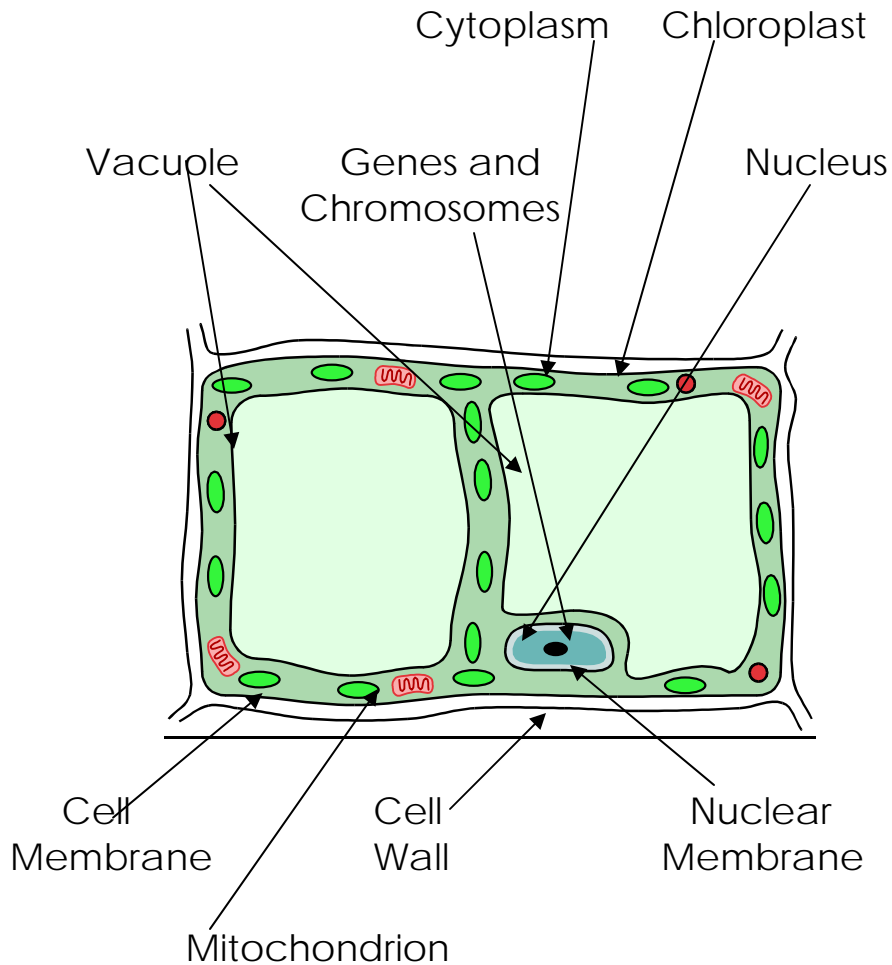


Plant Cell



Teacher _____

Plant Cell



Plant Cell Facts

- Plant cells have a thick wall outside the plant membrane.
- The plasma membrane is very thin and is a living part of the cell.
- The cell wall is thick and is a nonliving part of the cell.
- Plant cells make their own food in the chloroplasts.
- Plant cells contain vacuoles that are much larger than those that are in animal cells.

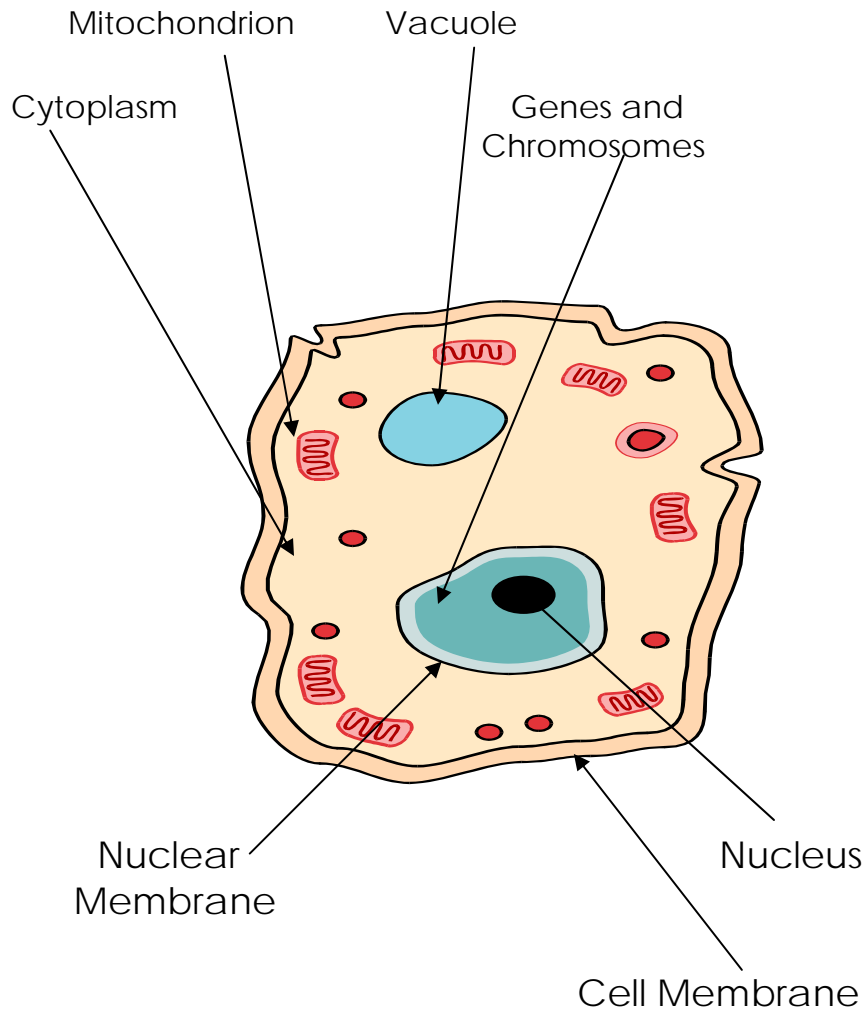
Comparison Chart

Cell Part	Found In Animal Cell	Found in Plant Cell
Nucleus	Yes	Yes
Cytoplasm	Yes	Yes
Plasma Membrane	Yes	Yes
Cell Wall	No	Yes
Chloroplasts	No	In some
Vacuole	Yes	Yes (Larger)
Mitochondria	Yes	Yes

Animal Cell Facts

- Most animal cells have a nucleus.
- All animal cells have a jelly-like material outside the nucleus (cytoplasm).
- All animal cells are surrounded by a cell / plasma membrane which holds the cell together and lets substances pass in and out of the cell.
- There are many kinds of animal cells. For example: multi-cell like humans or made up of just one cell like amoeba or bacteria.

Animal Cell



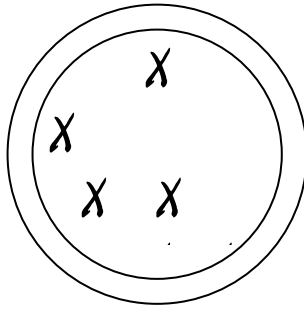
Functions of a Cell

Cell Part	Function / Job
Nucleus	"Command Center"
Nuclear Membrane	Protects the nucleus
Cytoplasm	Jelly-like material; All materials float in this material
Plasma Membrane	Protects Cell; Lets nutrients in and waste out
Mitochondria	Changes nutrients into energy
Vacuole	Store Food
Chloroplast	Uses sun's energy, water, and chlorophyll to make plant cells food and carbon dioxide
Cell Wall	Gives the cell its shape; double protection for the cell
Ribosome	Sends messages around the cell from the nucleus

Mitosis

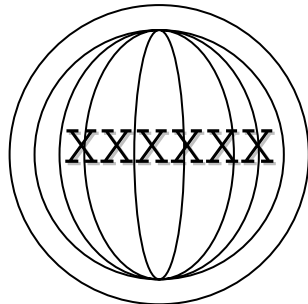
Mitosis – The process of cell division; cells divide into two cells.

1.



- Nuclear membrane breaks; chromosomes get thicker and become attached.

2.



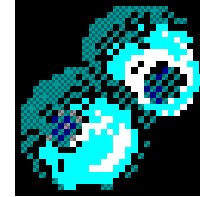
- Chromosomes line up in the center of the Cell; fibers appear to become connected to the chromosomes.

Living / Nonliving Things

To tell if something is living or nonliving scientists have discovered six life processes that all living things do.

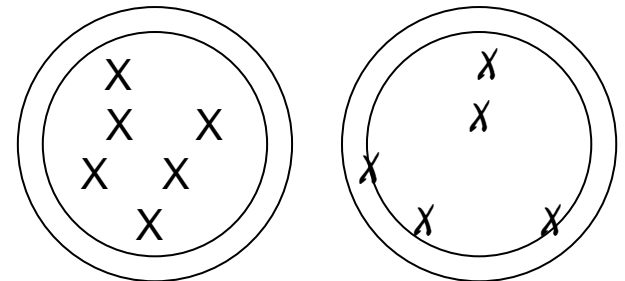
- Living things take in nutrients.
- Living things need and use energy to work.
- Living things reproduce.
- Living things grow.
- Living things respond / react to the world around them.
- Living things get rid of waste.

3.



- Pairs of identical chromosomes separate and pairs go to the opposite ends of the cell.

4.



- Nuclear membrane forms around each group of chromosomes creating **two** separate new identical cells.

Single-Celled Organisms

Single-celled organisms are known as protist. They are microscopic, most live in water / moist places. There are three groups of protists, which include: Animal-like protists, plant-like protists, and bacteria.

Animal-Like Protist

Protozoan are animal-like protist:

- Protozoan do not have chlorophyll.
- Protozoan do not make their own food.
- Protozoan are classified by the way they move and search for food.

Examples: amoeba, paramecium, and euglena

16. chlorophyll – The chemical in plant cells that traps energy from the sunlight to make food.
17. protist – A single-celled organism; microscopic, most live in water / moist places. There are three groups: animal-like, plant-like, and bacteria.
18. protozoan – Animal-like protist.
19. bacteria – The simplest protist.
20. tissue – A team of cells in a plant or animal that does a special job.
21. organ – A group of tissues working together to carry out a body activity.
22. system – A group of organs that work together to do a major job that keeps an organism alive.
23. mitosis – The process by which a cell divides to form two cells.

9. cytoplasm – The jelly-like material outside the cell nucleus.
10. organelles – Are all parts of the cell that float in the cytoplasm. Each of these has a particular function. Parts: vacuoles, mitochondria, nucleus, endoplasmic reticulum, and ribosome.
11. vacuole – The clear, small areas in the cytoplasm that contain stored food for the cell.
12. mitochondria – The part of the cell that converts food to energy.
13. endoplasmic reticulum – An organelle that transports materials through the cell.
14. ribosome – An organelle that produces protein for the cell.
15. chloroplasts – The green structures in the plant cells that contain the green chemical: chlorophyll. Food is made in the chloroplasts.

Plant-Like Protist

- Plant-like protist have chloroplasts and cell wall.
- Plant-like protist make their own food.
- Many plant-like protist are found floating in the ocean / water.

Examples: diatom, euglena

How protist move:

- Some protozoan move by having Their cytoplasm pushes against the cell membrane at a certain place. Example: amoeba
- Some protozoan move by hair like structures. Example: paramecium
- Other protozoan move by a tail-like structure that goes in a circular motion. Example: euglena

Bacteria

- Bacteria are the simplest protist.
- Bacteria have a cell wall.
- Bacteria do not have a nucleus.
- Most bacteria do not have chlorophyll.
- Bacteria cannot make their own food.
- Bacteria are the smallest of all protist.
- Bacteria can be found everywhere: water, soil, and air.
- Some bacteria cause substances to decay.
- Bacteria are classified by their shape.

The three shapes of bacteria are round, rod-shaped, and spiral-shaped.

Vocabulary

1. organism – A living thing.
2. cell – Smallest living part of an organism.
3. nucleus – A round body inside a cell. It's job is to control the cells activities. It contains the chromosomes / genes. It is the "Brain of the Cell."
4. chromosomes – Thread-like structures in the nucleus.
5. genes – Structures, found on chromosomes, that controls cell's activities.
6. plasma membrane – The thin, soft layer that surrounds the cell and helps control the movement of materials into and out of the cell.
7. nuclear membrane – The thin, soft layer that surrounds the nucleus.
8. cell wall – The thick wall outside the plasma membrane in plant cells.

Multi-Celled Organisms

- Plants and animals are made up of many cells.
- Different cells do different jobs.

The three different jobs that cells have are:
tissues, organs, and systems.

Tissue

Tissues are a team of cells in a plant or animal that join together to form organs that does a special job.

Kinds of Tissues:

- Skin tissue – To cover and protect.
- Muscle tissue – Cells that get longer / shorter.
- Nervous tissue – Cells that carry messages from the brain to other parts of the body.

Organs

A group of different kinds of tissues working together to carry out a body function.

Kinds of Organs: eyes, ears, stomach, heart, lungs, pancreas, tongue, liver, mouth, small / large intestines.

Systems

A group of organs that work together to do a major job that keeps an organism alive.

Kinds of Systems: digestive, circulatory, nervous, respiratory, muscular, skeletal.

Table of Contents

Vocabulary.....3 - 5

Notes.....6

Living / Nonliving Things.....7

Animal Cell.....8 - 9

Plant Cell.....10-11

Charts.....12-13

Mitosis.....14-15

Single-Celled Organisms.....16-18

Multi-Celled Organisms.....19-20

Student Cell Booklet Directions

The following pages are the templates for the student cell booklet. You will need one book per student and these will need to be completed before you start the unit.

Cell Booklet Directions:

1. Print out the cover first. This will need to be on white card stock so that they can design their own cover.
2. Print out student cell book.
3. Then copy the pages on a copier, *front to back*. It is made to put in a copier as it printed out but every copier is different so you will need to figure out how your copier works. You should have five copies plus the cover – six total.
4. Put the pages in order.
 - a. Lay cover flat.
 - b. Place first sheet on top of the cover, pages Table of Contents, blank, 19, 20 of book.
 - c. Place second sheet on top of the first sheet, pages 3, 4, 17, 18.
 - d. Place third sheet on top of the second sheet, pages 5, 6, 15, 16.
 - e. Place fourth sheet on top of the third sheet, page 7, 8, 13, 14.
 - f. Place the fifth sheet on top of the fourth sheet, pages 9, 10, 11, 12 of book.
5. Staple the pages together in the middle of the paper three times: at the top, in the middle, and at the bottom.
6. Fold pages in half to make a book.

Cell Booklet # _____

Animal Cell

Plant Cell

Name: _____

Plant Cell

Plant Cell Facts

Directions: Draw, color, and label the parts of the plant cell.

Comparison Chart

Animal Cell Facts

Cell Part	Found In Animal Cell	Found in Plant Cell
Nucleus		
Cytoplasm		
Plasma Membrane		
Cell Wall		
Chloroplasts		
Vacuole		
Mitochondria		

Animal Cell

Functions of a Cell

Cell Part	Function / Job
Nucleus	
Nuclear Membrane	
Cytoplasm	
Plasma Membrane	
Mitochondria	
Vacuole	
Chloroplast	
Cell Wall	
Ribosome	

Directions: Draw, color, and label the parts of the animal cell.

Mitosis

Mitosis – The process of cell division; cells divide into two cells.

1.

- Nuclear membrane breaks; chromosomes get thicker and become attached.

2.

- Nuclear membrane breaks; chromosomes get thicker and become attached.

Living / Nonliving Things

To tell if something is living or non-living scientists have come up with six life processes that all living things do.

1.

2.

3.

4.

5.

6.

3.

- Pairs of identical chromosomes separate, pairs go to the opposite ends of the cell.

4.

- Nuclear membrane forms around each group of chromosomes creating **Two** separate new identical cells.

Single-Celled Organisms

Vocabulary continued

Plant-Like Protist

Bacteria

Multi-Celled Organisms

Multi-Celled Organisms

Tissue

Organs

Systems

Table of Contents

Vocabulary.....3-5

Class Notes.....6

Living / Nonliving Things.....7

Animal Cell.....8-9

Plant Cell.....10-11

Charts.....12-13

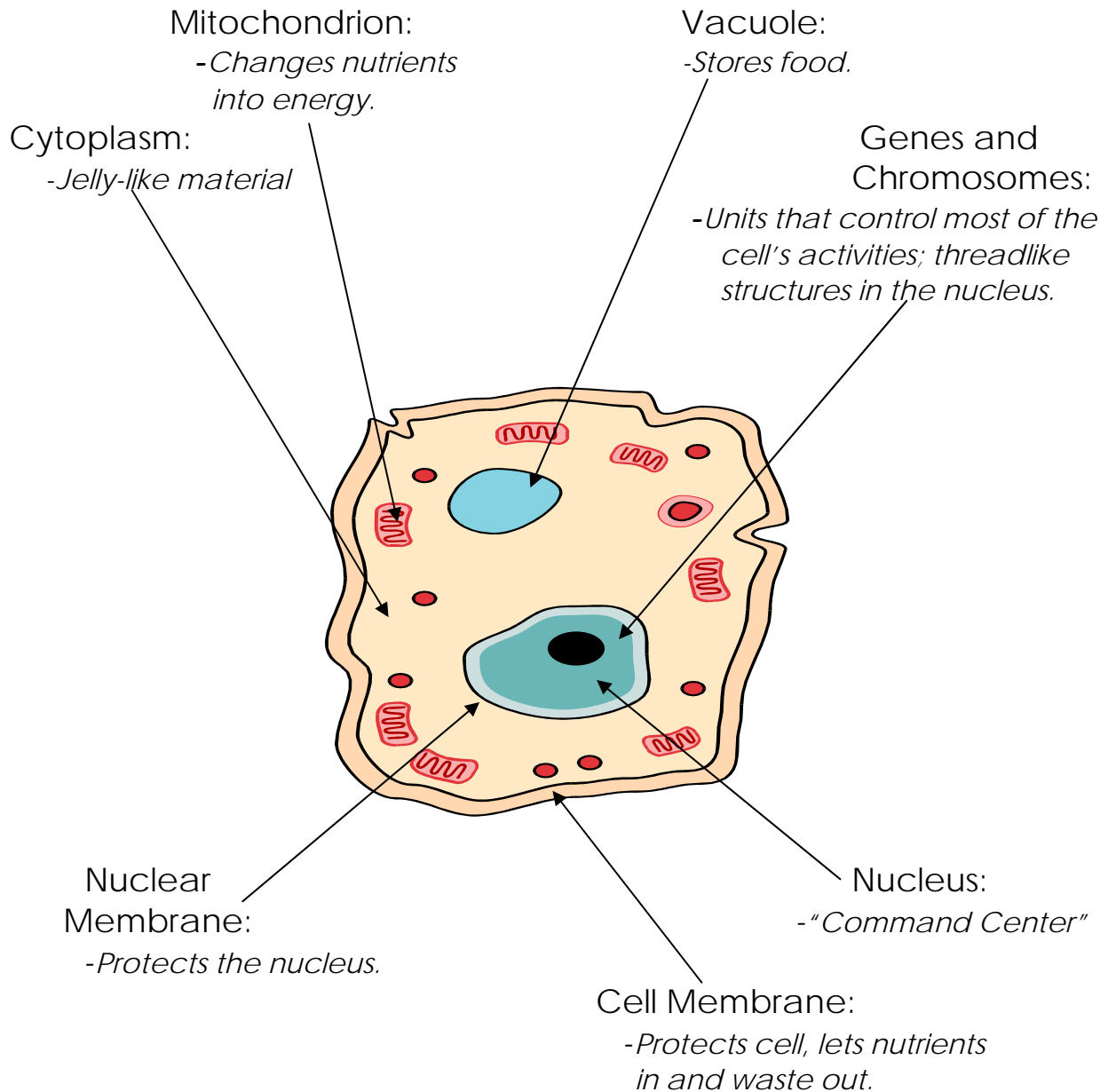
Mitosis.....14-15

Single-Celled Organisms.....16-17

Multi-Celled Organisms.....18-20

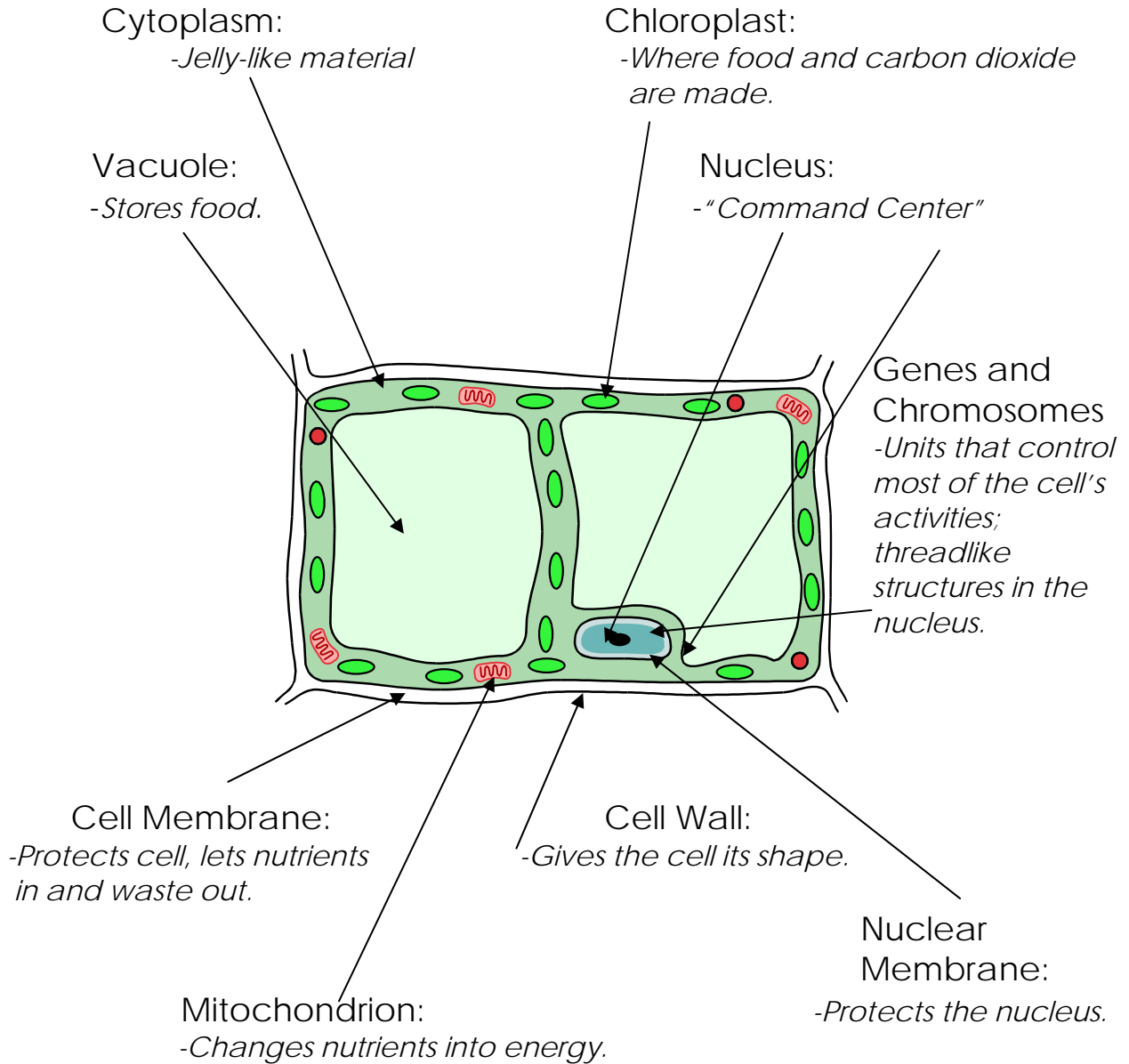
Appendix E

Animal Cell Parts and Functions



Appendix F

Plant Cell Parts and Functions



Cell Unit Vocabulary List Words 1-11

1. organism – A living thing.
2. cell – Smallest living part of an organism.
3. nucleus – A round body inside a cell. Its job is to control the cell's activities. It contains the chromosomes / genes. It is the "Brain of the Cell."
4. chromosomes - Threadlike structures in the nucleus.
5. genes – Units that control most of the cell's activities.
6. plasma membrane – The thin, soft layer that surrounds the cell and helps control the movement of materials into and out of the cell.
7. nuclear membrane – The thin, soft layer that surrounds the nucleus.
8. cell wall – The thick wall outside the plasma membrane in plant cells.
9. cytoplasm – The jelly-like material outside the nucleus in an animal cell.
10. organelles – Are all the parts of the cell that float in the cytoplasm. Each of these has a particular function. Parts: vacuoles, mitochondria, nucleus, reticulum, and ribosome.
11. vacuole – The clear, small areas in the cytoplasm that contain stored food for the cell.

Cell Unit Vocabulary List

Words 12 – 23

12. mitochondria – The part of the cell that converts food to energy.
13. endoplasmic reticulum – an organelle that transports materials through the cell.
14. ribosome – an organelle that produces protein for the cell.
15. chloroplasts – The green structures in the plant cells that contain the green chemical: chlorophyll. Food is made in the chloroplasts.
16. chlorophyll – The chemical in plant cells that traps energy from the sunlight to make food.
17. protist – A single-celled organism; microscopic, most live in water / moist places. There are three groups: animal-like, plant-like, and bacteria.
18. protozoan – Animal-like protist
19. bacteria – The simplest protist.
20. tissue – A team of cells in a plant or animal that does a special job.
21. organ – A group of tissues working together to carry out a body activity.
22. system – A group of organs that work together to do a major job that keeps an organism alive.
23. mitosis – The process by which a cell divides to form two cells.

Appendix I

Cells Video Worksheet

1. Cells are the building blocks for what? _____
2. The three characteristics of cells are: _____,
_____, and _____.
3. The three shapes of bacteria are: _____,
_____, and _____.
4. An animal cell has three main parts: _____,
_____, and _____.
5. What does the mitochondria do? _____

6. A plant cell has three main parts: _____,
_____, and _____.
7. Plant cells have two things that animal cells don't have.
They are: _____ and _____.
8. Cells vary in three different ways. They are:
_____, _____, and _____.
9. What is the smallest living thing? _____

Appendix J

Cells Video Worksheet TEACHER KEY

1. life
2. reproduction, react and homeostasis
3. spiral, rods, and spherical
4. membrane, cytoplasm and nucleus
5. Stores energy in the cell
6. membrane, cytoplasm, and nucleus
7. chloroplasts and cell wall
8. shape, size, and structure
9. cells

Appendix K, pages 1-5

Cell Project

Instructions for Cell Project:

The following pages are the pages that make up the cell project packet for the Cumulating Activity for the cells unit.

Page 1: Cover

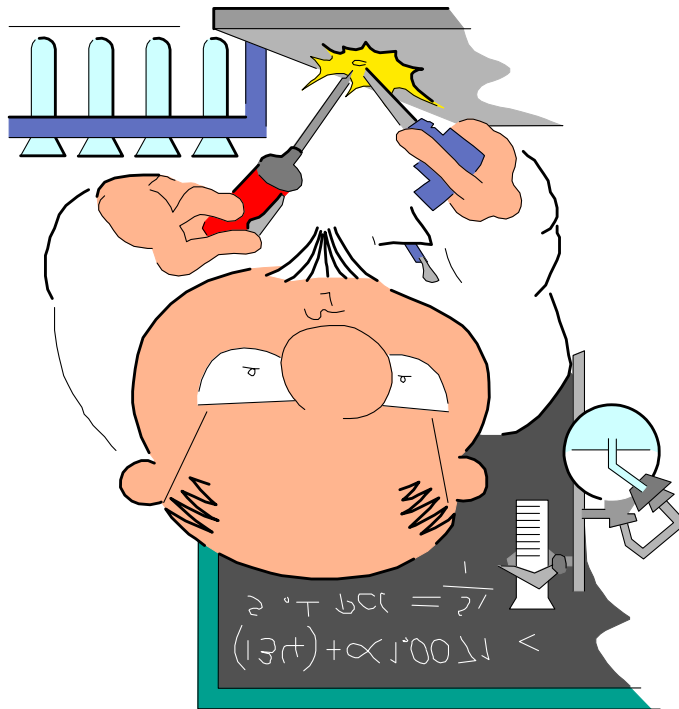
Page 2: Cell Menu Project Criteria

Page 3: Cell Menu

Page 4: Cell Project Rubric

Page 5: Play Dough Recipe

Cell Project



Cell Menu Project Criteria

1. Select one project from the menu.
2. Must include both plant and animal.
3. The project must show all parts of the cells that we have studied.
4. Must include an explanation of all the functions of each part of both types of cells.
5. Write legibly, use color, and do it neatly (need props for song/play).
6. Clearly explain your project to the class in one–two minutes (exception for play/song).

Project Due: (date)

CELL MENU

<p>Make two play dough models: One of the animal cell and one of the plant cell. Make sure all parts are labeled.</p>	<p>Write a three-stanza poem. Be sure to include information on both an animal and a plant cell.</p>	<p>Write and perform a play about all cell parts and their functions.</p>
<p>Write a report on the parts and functions of both types of cells: animal and plant</p>	<p>Create and perform a song or rap about the parts and functions of both types of cells.</p>	<p>Construct TWO 3-D models, one of an animal cell and one of a plant cell.</p>
<p>Construct a mobile of both an animal and plant cell with their parts and functions labeled.</p>	<p>Prepare a power point presentation on the parts of an animal and plant cell, including their functions.</p>	<p>Create two travel brochures that take you on a trip inside both types of cells. (Be sure you also point out functions of each cell part.)</p>

Play Dough Recipe

1 cup flour

½ cup salt

1 cup water

2 teaspoons cream of tartar

1 tablespoon oil

food coloring

Put all ingredients into a pan over medium heat. Stir until a ball forms (very obvious when this happens). Remove from the pan and knead.

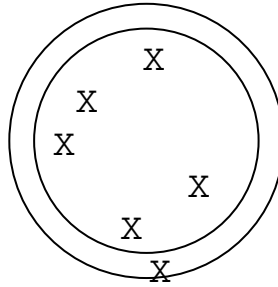
Cell Project Rubric

	Level 1	Level 2	Level 3	Level 4
<p>Understanding and Knowledge</p> <ul style="list-style-type: none"> - animal cell and plant cell parts. - animal cell and plant cell functions. 	Shows minimal understanding of animal cell and plant cell parts and functions; some errors in the use of terms and vocabulary	Shows some understanding of animal cell and plant cell parts and functions; a few errors in the use of terms and vocabulary	Shows considerable understanding of animal cell and plant cell parts and functions; no errors in the use of terms or vocabulary	Shows a thorough understanding of animal cell and plant cell parts and functions; demonstrates high competency in the use of terms and vocabulary
<p>Making Connections</p> <ul style="list-style-type: none"> - using knowledge of the animal cell and plant cell functions to create a presentation. 	Cell project and presentation is done poorly or inconsistently; the structure is poorly made with little attention to detail	Cell project and presentation works but incorporates very few components; structure needs some finishing touches in presentation	Cell project and presentation has interesting features and works well; structure is both functional and nicely finished in appearance	Cell project and presentation demonstrates creative design and works well; structure is of high quality with fine attention to detail
<p>Communication</p> <ul style="list-style-type: none"> - clarity of information - well organized - language skills - creativity 	Errors interfere with overall message; ideas are unclear, poorly organized; poor sense of audience; diagram has some errors.	Few errors, ideas need to be more clearly stated; needs better organization and sense of audience; minimal errors in diagram.	No errors, good language skills, well organized and has a sense of audience; correct and clear understanding.	Uses letter or advertisement format creatively and effectively; no errors, effective language skills, strong organization and sense of audience; project is detailed and free of errors.

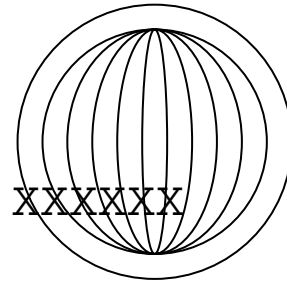
The Four Main Stages of Mitosis

Mitosis is the process of cell division; one cell divides into two cells. There are six stages of mitosis, but the following are the four main stages:

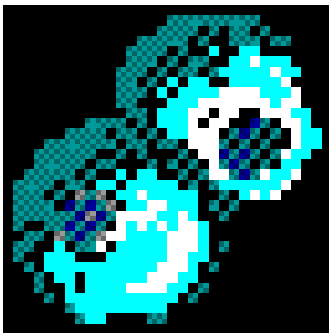
1. The nuclear membrane breaks; chromosomes get thicker and become attached.



2. Chromosomes line up in the center of the cell; fibers appear to become connected to the chromosomes.



3. Pairs of identical chromosomes separate, pairs go to the opposite ends of the cell.



4. The nuclear membrane forms around each group of chromosomes creating two separate new identical cells.

