

# Cells, Cells, and More Cells

**Grade Level and Special Area:** Second Grade  
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**Length of Unit:** Eleven lessons approximately one hour long each

## I. ABSTRACT

The students will develop an understanding of human body cells. They will explore that all living things are made up of cells too small to be seen with the naked eye. They will investigate the ways that cells make up tissues, tissues make up organs, and organs work in systems.

## II. OVERVIEW

### A. Concept Objectives

1. Students understand the characteristics and structure of living things. (Colorado State Science Standard #3)
2. Students will understand the processes of life. (Colorado State Science Standard #3)
3. Students understand how living things interact with each other and their environment. (Colorado State Science Standard #3)
4. Students will understand the importance of scientific technology.

### B. Content from the *Core Knowledge Sequence*

1. All living things are made up of cells, too small to be seen without a microscope. (page 60)
2. Cells make up tissues. (page 60)
3. Tissues make up organs. (page 60)
4. Organs work in systems. (page 60)
5. Anton Von Leeuwenhoek was an inventor of the early microscope. (page 61)

### C. Skill Objectives

1. The student will compare growth of their bodies from babies to present.
2. The student will identify the parts of a cell.
3. The student will distinguish the differences between living and non-living.
4. The student will identify that only living things are made up of cells.
5. The student will identify cells under a microscope.
6. The student will name the kinds of cells.
7. The student will describe the places that the cells can be found in the body.
8. The student will describe skin cells and their function.
9. The student will identify the place in the body where skin cells can be found.
10. The student will describe muscle cells and their function.
11. The student will identify the place in the body where muscle cells can be found.
12. The student will describe nerve cells and their function.
13. The student will identify the place in the body where nerve cells can be found.
14. The student will describe bone cells and their function.
15. The student will identify the place in the body where bone cells can be found.
16. The student will be able to identify that cells make up tissues, and tissues make up organs, and organs work in systems.
17. The student will be able to describe the importance of Anton Von Leeuwenhoek.

## III. BACKGROUND KNOWLEDGE

### A. For Teachers

1. Bauerele, Patrick A. and Norbert Landa. *The Cell Works*. Barcelona, Spain.

- 2. Barron's. 1997. ISBN 0-7641-5052-9.
- 2. Balkwell, Fran. *Cells Are Us*. Minneapolis, MN. Carole Rhoda Books, Inc. 1990. ISBN 0-87614-762-7.
- 3. Hirsch, E.D. *What Your Second Grader Needs to Know*. New York, NY. Dell Publishing. 1991. ISBN 0-385-31027-7.
- B. For Students
  - 1. The student must have knowledge of the five senses: sight, hearing, taste, touch and smell.
  - 2. The student must have basic knowledge of the body systems: skeletal, muscular, digestive, circulator, and nervous.
  - 3. The student must understand that you must take care of your body to prevent illnesses.

#### IV. RESOURCES

- A. Balkwell, Fran. *Cells Are Us*. Minneapolis, MN. Carole Rhoda Books, Inc. 1990. ISBN 0-87614-762-7. (used in Lessons Five, Six, Seven, Eight, and Ten)
- B. Barnes, Kate and Steve Weston. *How It Works-The Human Body*. Belgium. Barnes and Noble. 1997. ISBN 0-7607-0428-7. (used in Lesson Nine)
- C. Bauerele, Patrick A. and Norbert Landa. *The Cell Works*. Barcelona, Spain. Barron's. 1997 ISBN 0-7641-5052-9. (used in Lessons Three, Six, and Seven)
- D. *Cell Machinery*. St. Louis, MO. Milliken Press. ISBN 1-55863-530-0. (used in Lessons Three and Eleven)
- E. Each lesson has a list of materials that will be needed. See each lesson for specifics.
- F. Hirsch, E.D. *What Your Second Grader Needs to Know*. New York, NY. Dell Publishing. 1991. ISBN 0-385-31027-7. (Background Knowledge)
- G. *How Your Body Works*. Monterey, CA. 1998. Evan-Moor. EMC-856. ISBN 1-55799-685-7. (used in Lesson Eight)
- H. Overhead projector (used in Lessons Three, Nine, and Eleven)
- I. Rowan, Kate. *I Know How My Cells Grow*. Cambridge, MA. Candlewick Press. 1999. ISBN 0-7636-0502-6. (used in Lesson One)
- J. *The Human Body*. Greensboro, NC. The Mailbox. 2000. ISBN 1-56234-372-6. (used in Lesson Nine)
- K. [www.cellsalive.com](http://www.cellsalive.com) (used in Lesson Four)

#### V. LESSONS

##### **Lesson One: What is a Cell?** (approximately one hour long)

- A. *Daily Objectives*
  - 1. Concept Objective(s)
    - a. Students will understand the characteristics and structure of living things. (Colorado State Science Standard #3)
    - b. Students will understand the processes of life. (Colorado State Science Standard #3)
  - 2. Lesson Content
    - a. All living things are made up of cells, too small to be seen without a microscope. (page 60)
  - 3. Skill Objective(s)
    - a. The student will compare growth of their bodies from babies to present.
- B. *Materials*
  - 1. Book: *I Know My Cells Make Me Grow* by Kate Rowan
  - 2. A baby picture of each student
  - 3. A current picture of each student

4. Copy for each student of: What Do I Look Like? (Appendix A)
  5. Glue sticks for each student
  6. Pencils for each student
  7. Cells, Cells, and More Cells Journal (Appendix B) for each student
  8. Rubric for evaluating the comparison worksheet (Appendix C) for each student
- C. *Key Vocabulary*
1. Cell: the smallest unit of life
- D. *Procedures/Activities*
1. In all of the lessons, the students will be using a journal. It is Appendix B. Make copies of each for your students. You will need the cover and at least eleven pages for each student. The journals can be copied and bound in whatever form that the teacher would like to have. Also, the rubric will need to be copied for each student to evaluate the journal daily. So, there must be a rubric copied for each lesson, which is Appendix C.
  2. The students need to be reminded to bring in pictures before this lesson begins.
  3. Introduce the unit by having the students discuss what they look like now and what they were like as a baby.
  4. Give each student the worksheet that will have them compare their growth as a baby and now. The students will glue the picture in the proper place and write two to three sentences about what they did as a baby and now (Appendix A).
  5. The student can share their pictures with the other class members and read their sentences to their classmates. Later their picture and comparisons can be displayed on a bulletin board about cells.
  6. Read the book, *I Know My Cells Make Me Grow* to the class. After reading the story the class can discuss the story, using the following questions:
    - a. How did the little boy discover how he changed?
    - b. What did he learn about cells?
 The students can write down five facts that they learned from the story about cells in their journal.
  7. The students can also write in their journal the vocabulary definition for the word *cell*.
- E. *Assessment/Evaluation*
1. The students' content of their comparisons of themselves as babies until present can be evaluated (Appendix C-Rubric for evaluation).
  2. The students can write in their journal what they learned about cells in a short paragraph. Each day the students will turn in their journals to be rubriced with a checklist form found in Appendix M. The form will include what was the daily lesson, what concepts that they student needed to learn, the vocabulary for the lesson and the skills for that lesson. Appendix M is a generic form that can be used for all ten lessons.

**Lesson Two: What Things Have Cells?** (approximately one hour long)

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand the characteristics and structure of living things. (Colorado State Science Standard 3)
  2. Lesson Content
    - a. All living things are made up of cells, too small to be seen without a microscope. (page 60)
  3. Skill Objective(s)
    - a. The student will distinguish the differences between living and non-

living.

- B. *Materials*
  - 1. A variety of objects that are living and non-living: pencil, pen, marker, rock, nail, a jar, a drinking glass, pictures of animals, a plant, flowers, grass, paper, etc.
  - 2. Worksheet of Venn diagram (Appendix D) for each student
  - 3. Worksheet of living things (Appendix E); circle picture of living things, write examples of non-living, for each student
  - 4. Cells, Cells, and More Cells: A daily journal for each student (Appendix B)
- C. *Key Vocabulary*
  - 1. Living things: objects that are alive
  - 2. Non-living: objects that are not alive
- D. *Procedures/Activities*
  - 1. The students can write the definitions of living and non-living in their journals.
  - 2. Tell the students that all living things are made up of cells and that is what distinguishes them as living or non-living things.
  - 3. Display all of the different objects listed under Materials. Lead a discussion as to which object is a living thing and why.
  - 4. Discuss the reasons that the other remaining items are not living and why. Some question that can be asked:
    - a. What makes them not living?
    - b. Were they living at one time?
    - c. How do you know something is not living?
  - 5. As the class discusses which objects are living and non-living, have them write the items inside the circles of a Venn diagram. The paper and pencil could actually be included into the two circles because they were once living things.
  - 6. If the students come up with other ideas that were once living, but are not now, then they can include them in the diagram.
  - 7. Hand out the worksheet on living and non-living things and the students can complete them independently.
- E. *Assessment/Evaluation*
  - 1. The students will demonstrate their knowledge of living and non-living things by completing the worksheet.
  - 2. The students can write in their journal what they learned about living and non-living things in a short paragraph. Each day the students will turn in their journals to be rubriced with a checklist form found in Appendix M. The form will include what was the daily lesson, what concepts that they student needed to learn, the vocabulary for the lesson and the skills for that lesson. Appendix M is a generic form that can be used for all ten lessons.

**Lesson Three: What Makes Up a Cell?** (approximately one hour long)

- A. *Daily Objectives*
  - 1. Concept Objective(s)
    - a. Students will understand the characteristics and structure of living things. (Colorado State Science Standard 3)
    - b. Students will understand the processes of life. (Colorado State Science Standard #3)
  - 2. Lesson Content
    - a. All living things are made up of cells, too small to be seen without a microscope. (page 60)
  - 3. Skill Objective(s)
    - a. The student will identify the parts of a cell.

B. *Materials*

1. Book: *The Cell Works* by Patrick Baeuerle and Norbert Landa (pages 20, 21)
2. Book: *Cell Machinery* by Milliken Publishing Company (page 4)
3. Overhead projector
4. Cells, Cell, and More Cells: A daily journal for each student (Appendix B)
5. Sugar cookie dough, 2 tablespoons per student
6. Chocolate Hershey Kisses (one for each student)
7. M&M's (six for each student)
8. Red licorice strips (one for each student)
9. Multi-colored, oblong sprinkles (½ teaspoon)
10. Frosting (1 tablespoon)
11. Paper Plates (one per student)
12. Napkins (one per student)
13. Baking sheets (two)
14. Spatula (one)
15. A place to bake the cookies

C. *Key Vocabulary*

1. Nucleus: the ball in the middle of the cell where information is stored
2. Cell membrane: a moist cell that keeps the cell shielded from the outside
3. Cytoplasm: jelly-like soup in which the parts of a cell float
4. Organism: a complete living thing
5. Mitochondria: the power stations of the cell
6. Vacuole: the storage center for food for the cell

D. *Procedures/Activities*

1. Prior to beginning of the lesson assemble the cooking materials for each student to make an edible model of their cell. The sugar cookie dough is the basic shape of the cell. The chocolate chips are the nucleus. The M&M's are the vacuoles. The red licorice strips are the cell membrane. The multi-colored, oblong sprinkles are the mitochondria. The frosting can be any color and will be the cytoplasm.
2. The students will write in their journal the vocabulary words for this lesson.
3. After the students write their vocabulary words, read the book to the students, *The Cell Works* (page 20 and 21).
4. Display on the overhead projector the transparency of the animal cell (*Cell Machinery*, page 4). Have different students identify the parts of the cell.
5. Explain to the students that there are many other parts of the cell, but the class will not be expected to name all of the parts. The students will go into more depth in a further grade level.
6. Give each student their baking materials to assemble their cookie cell.
7. Explain to the students that the cookie dough will be the basic shape of their cell. Cells come in many shapes and sizes, so the students can decide what shape to make their dough. Let them shape their dough on the paper plates and then they can transfer their dough to the cookie sheet. Bake the cookies for the students.
8. After they are baked the students can use the frosting for the cytoplasm, the Hershey Kisses for the nucleus (the students can eliminate the point on the kiss), M&M's for the vacuole, and the sprinkles for the mitochondria.
9. After assembling the cookie, the teacher can ask the students to munch on the different parts of the cookie cell.

E. *Assessment/Evaluation*

1. The students can record in their journal a drawing of the cell and label its parts. Each day the students will turn in their journals to be rubriced with a checklist

form found in Appendix M. The form will include what was the daily lesson, what concepts that they student needed to learn, the vocabulary for the lesson and the skills for that lesson. Appendix M is a generic form that can be used for all ten lessons.

**Lesson Four: What Do Cells Look Like Under a Microscope?** (approximately 45 minutes)

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will understand the characteristics and structure of living things. (Colorado State Science Standard 3)
  - b. Students will understand how living things interact with each other and their environment. (Colorado State Science Standard 3)
2. Lesson Content
  - a. All living things are made up of cells, too small to be seen without a microscope. (page 60)
3. Skill Objective(s)
  - a. The student will identify cells under a microscope.

B. *Materials*

1. Computers with Internet access
2. [www.cellsalive.com](http://www.cellsalive.com)
3. Cells, Cells, and More Cells: A daily journal for each student (Appendix B)

C. *Key Vocabulary*

1. Microscope: an instrument used to view cells that can not be seen with the naked eye

D. *Procedures/Activities*

1. If the teacher has access to a computer lab, then each child will be able to view the website individually. The teacher may wish to consult with the school's technology teacher and coordinate this lesson by using the computer lab.
2. If the teacher is limited to computer access then this lesson can be optional. Or if the teacher has only one computer, then pairs of students can be brought up to the computer to view the website.
3. The students will go to the computer lab for the lesson. The teacher can explain how to pull up the website ([www.cellsalive.com](http://www.cellsalive.com)).
4. After getting to the site, the students can view different kinds of cells that the website offers. The students can attempt to identify the different parts of the cells that they see in the pictures.
5. After viewing the website, the students can record in their journal what they saw in the pictures and any additional facts that they might have learned.

E. *Assessment/Evaluation*

1. The students will record in their journal what they saw on the website. Each day the students will turn in their journals to be rubriced with a checklist form found in Appendix M. The form will include what was the daily lesson, what concepts that they student needed to learn, the vocabulary for the lesson and the skills for that lesson. Appendix M is a generic form that can be used for all ten lessons.

**Lesson Five: What Are the Types of Cells?** (approximately one hour long)

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will understand the characteristics and structure of living things. (Colorado State Science Standard 3)
  - b. Students will understand the processes of life. (Colorado State Science

Standard #3)

2. Lesson Content
    - a. All living things are made up of cells, too small to be seen without a microscope. (page 60)
    - b. Cells make up tissues. (page 60)
  3. Skill Objective(s)
    - a. The student will name the kinds of cells.
    - b. The student will describe the places that the cells can be found in the body.
- B. *Materials*
1. Book: *Cells Are Us* by Dr. Fran Balkwill
  2. Cells, Cells, and More Cells: A daily journal for each student (Appendix B)
  3. 5" x 7" index cards, approximately six
- C. *Key Vocabulary*
1. Skin cells: the cells that form layers that cover the inside and outside of our bodies
  2. Muscle cells: the cells that contract; they form bundles that make our body move
  3. Red blood cells: carry oxygen to all parts of the body
  4. White blood cells: fight the germs that enter our body
  5. Bone cells: busy in building up and breaking down the bone mass
  6. Nerve cells: connect with other nerve cells to transport signals
- D. *Procedures/Activities*
1. The teacher may preview the book, *Cells Are Us*, and decide to omit pages 3-5, and 12, 13 because it deals with concepts on the reproductive processes.
  2. Introduce the vocabulary words to the class and have them write their words into their journal.
  3. Read the book, *Cells Are Us*, to the class. As you go through the book, stop and discuss all the different types of cells and their functions. The teacher needs to emphasize the material that is read up to page 15.
  4. The students can play a game called "Cell Charades." The teacher must have prepared before Lesson Six 5" x 7" index cards with one of each of the different kinds of cells listed on each card. The teacher needs to put the definition of the kind of cell and different ideas on how to act out the job of that cell.
  5. Explain to the students that they are going to play the game of charades and act out the jobs of each kind of cell. The teacher must divide the class into groups. They cannot talk when they act out the job. The other classmates are going to have to guess what cell the group is portraying.
- E. *Assessment/Evaluation*
1. The students must explain in their journal what they learned in the lesson today. The journal needs to include the different kinds of cells and their jobs. Each day the students will turn in their journals to be rubriced with a checklist form found in Appendix M. The form will include what was the daily lesson, what concepts that they student needed to learn, the vocabulary for the lesson and the skills for that lesson. Appendix M is a generic form that can be used for all ten lessons.

**Lesson Six: What is a Skin Cell?** (approximately one hour long)

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand the characteristics and structure of living things. (Colorado State Science Standard 3)
    - b. Students will understand the processes of life. (Colorado State Science

- Standard #3)
- c. Students understand how living things interact with each other and their environment. (Colorado State Science Standard #3)
2. Lesson Content
    - a. All living things are made up of cells, too small to be seen without a microscope. (page 60)
    - b. Cells make up tissues. (page 60)
  3. Skill Objective(s)
    - a. The student will describe skin cells and their function.
    - b. The student will identify the place in the body where skin cells can be found.
- B. *Materials*
1. Book: *Cells Are Us* by Dr. Fran Balkwill
  2. Book: *The Cell Works* by Patrick A. Baeuerle and Norbert Landa
  3. One bag of small pearl onions
  4. Paper towels (one for each student)
  5. One small sandwich bag for each student
  6. Appendix F-Layers of Skin, a copy for each student
  7. Cells, Cells, and More Cells: A daily journal for each student (Appendix B)
- C. *Key Vocabulary*
1. Pigment: the material in your skin cells that give the color to your skin
  2. Melanin: the pigment in your skin cells that makes a brown color
  3. Carotene: the pigment in your skin cells that makes an orange color
- D. *Procedures/Activities*
1. Read to the students pages 12 and 13 in *The Cell Works* and pages 16-18 in *Cells Are Us*. As you read, discuss the vocabulary terms that are mentioned in the books and other information about skin cells. Be sure to include the ideas that the skin cells protect our body in different ways and that the skin cells are in layers.
  2. The students will write the vocabulary words in their journal.
  3. After the discussion on skin cells, the teacher gives each student an onion, a paper towel, and a small sandwich bag (to bring home their onion after it is in pieces.)
  4. Ask the children to peel off the outer layer of the onion. Explain that this is like the dead skin cells that our body discards after their use. The students can record how the outer skin looks and feels like on their Layers of Skin worksheet. The students can keep peeling off the layers of the onion.
  5. As they peel the layers they can record on their Layers of Skin worksheet the way the skin peels off and the juice that the onion produces as you peel more layers. The teacher can guide the student's discovery and compare it to our skin. What do you see on each layer of the onion? How does each layer differ to the previous one? How is our skin like the onion?
- E. *Assessment/Evaluation*
1. The student's knowledge of the lesson's objectives will be assessed with the completion of the worksheet.
  2. The students will write a summary about their knowledge of skin cells in their journals. Each day the students will turn in their journals to be rubriced with a checklist form found in Appendix M. The form will include what was the daily lesson, what concepts that they student needed to learn, the vocabulary for the lesson and the skills for that lesson. Appendix M is a generic form that can be used for all ten lessons.

**Lesson Seven: What is a Muscle Cell?** (approximately one hour long)

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will understand the characteristics and structure of living things. (Colorado State Science Standard 3)
  - b. Students will understand the processes of life. (Colorado State Science Standard #3)
  - c. Students understand how living things interact with each other and their environment. (Colorado State Science Standard #3)
2. *Lesson Content*
  - a. All living things are made up of cells, too small to be seen without a microscope. (page 60)
  - b. Cells make up tissues. (page 60)
  - c. Tissues make up organs. (page 60)
3. *Skill Objective(s)*
  - a. The student will describe muscle cells and their function.
  - b. The student will identify the place in the body where muscle cells can be found.

B. *Materials*

1. Book: *Cells Are Us* by Dr. Fran Balkwill
2. Book: *The Cell Works* by Patrick A. Baeuerle and Norbert Landa
3. Cells, Cells, and More Cells: A daily journal for each student (Appendix B)
4. Red Vines licorice candy that pulls apart (one package)
5. A cheap cut of beef such as stew meat or chuck steak for each group of students
6. Plastic gloves such as a food service worker would wear for each student
7. Paper plates for each group of students
8. Appendix G - Muscle Exploration a copy for each student
9. Cells, Cell, and More Cells: A daily journal for each student (Appendix B)

C. *Key Vocabulary*

1. Contract: to get shorter
2. Expand: to get bigger
3. Actin and myosin: stretchy material that work together to make muscle cells contract and expand

D. *Procedures/Activities*

1. Read to the students pages 28 and 29 in *The Cell Works* and pages 28 and 29 in *Cells Are Us*. As you read, discuss the vocabulary terms that are mentioned in the books and other information about muscle cells. Be sure to include the ideas that the muscle cells expand and contract and that the muscle cells help our body move.
2. The students will write the vocabulary words in their journal.
3. The teacher will give each student a strand of red licorice candy. Have the students pull apart the strands of the licorice. Explain how the licorice is like muscle cells. The licorice can stretch and contract just like muscle cells. The students can explore the expansion and contraction with the candy. At the end of the lesson the students can eat their "muscle" candy.
4. For the next part of the lesson the teacher must prepare the cut of beef by cutting it up and placing it on plates for the students. The teacher can group the students in cooperative groups of four or five, then give each group a portion of meat.
5. Distribute a pair of gloves for each child in their group. Give each group a portion of the beef and have them examine what the meat looks like. They can

record their observations on the worksheet for the lesson. Each child will have a worksheet to complete (Appendix G), but the information will be shared as a group.

6. The teacher can guide the students in examining the meat. Discuss with the children their findings with examining the meat. Did the students see the bundles of muscle fibers? What does the meat look like? How does it feel?
7. At the close of the lesson, the students can share their ideas of the discoveries.

E. *Assessment/Evaluation*

1. The student's knowledge of the lesson's objectives will be assessed with the completion of the worksheet.
2. The students will write a summary about their knowledge of muscle cells in their journals. Each day the students will turn in their journals to be rubriced with a checklist form found in Appendix M. The form will include what was the daily lesson, what concepts that they student needed to learn, the vocabulary for the lesson and the skills for that lesson. Appendix M is a generic form that can be used for all ten lessons.

**Lesson Eight: What are Nerve Cells?** (approximately one hour long)

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will understand the characteristics and structure of living things. (Colorado State Science Standard 3)
  - b. Students will understand the processes of life. (Colorado State Science Standard #3)
  - c. Students understand how living things interact with each other and their environment. (Colorado State Science Standard #3)
2. Lesson Content
  - a. All living things are made up of cells, too small to be seen without a microscope. (page 60)
  - b. Cells make up tissues. (page 60)
  - c. Tissues make up organs. (page 60)
  - d. Organs work in systems. (page 60)
3. Skill Objective(s)
  - a. The student will describe nerve cells and their function.
  - b. The student will identify the place in the body where nerve cells can be found.

B. *Materials*

1. Yarn (six strands, 4" long per student)
2. Pom-poms (one per student)
3. Glue (one bottle per student)
4. Black markers (one per four student)
5. Construction paper ~ 4.5" x 6" sheet per student
6. Book: *Cells Are Us* by Fran Balkwell
7. The Nerve Cell Song (Appendix H) a copy for each student
8. Transparency of page 23 in *How Your Body Works* teacher resource book (Appendix N)
9. Overhead projector
10. Cells, Cells, and More Cells: A daily journal for each student (Appendix B)

C. *Key Vocabulary*

1. Axons: the threadlike parts of the nerve cell that carries the messages
2. Neuron: the nucleus of the nerve cell

- D. *Procedures/Activities*
1. Introduce to the students the vocabulary words for this lesson. Let them write the words and meanings in their journal.
  2. Read to the students pages 30-31 in the book, *Cells Are Us*, then discuss the information on those pages. Some questions for discussion:
    - a. What do nerve cells do for the body?
    - b. Where can they be found?
    - c. What are neurons?
    - d. What are axons?
  3. To reinforce the information, teach the students The Nerve Cell song (Appendix H). Sing it a few times to make sure the students have learned the words.
  4. The students will make a model of the nerve cell using the yarn, glue, pom-pom, and marker. The teacher can prepare the materials ahead and have the items in a sandwich bag for each student.
  5. Display a picture of a nerve cell by using the transparency from *How Your Body Works*. The teacher may use other resources to find a picture for the children to use as a model for their nerve cell.
  6. Distribute nerve cell model materials to each student. Explain to them that the yarn is the threadlike parts of the nerve cell, the pom-pom is the nerve cell, and the marker will be used to make a black dot on the nerve cell for the neuron. The students need to fray the ends of the yarn to make it look like a picture of the nerve cell.
  7. The students will label the parts of the nerve cell on their model.
  8. The students can glue their model on the half-sheet of construction paper. They can share their creations with each other in the class.
- E. *Assessment/Evaluation*
1. The students will label the parts of their model to evaluate their knowledge of the cell parts.
  2. The students will write in their journal the concepts learned in the lesson and will include the functions and where they are located in the nerve cells. Each day the students will turn in their journals to be rubriced with a checklist form found in Appendix M. The form will include what was the daily lesson, what concepts that they student needed to learn, the vocabulary for the lesson and the skills for that lesson. Appendix M is a generic form that can be used for all ten lessons.

**Lesson Nine: What are Blood Cells?** (may take two, one hour class periods)

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand the characteristics and structure of living things. (Colorado State Science Standard 3)
    - b. Students will understand the processes of life. (Colorado State Science Standard #3)
    - c. Students understand how living things interact with each other and their environment. (Colorado State Science Standard #3)
  2. Lesson Content
    - a. All living things are made up of cells, too small to be seen without a microscope. (page 60)
    - b. Cells make up tissues. (page 60)
    - c. Tissues make up organs. (page 60)
    - d. Organs work in systems. (page 60)
  3. Skill Objective(s)

- a. The student will describe blood cells and their function.
- b. The student will identify the place in the body where blood cells can be found.

B. *Materials*

1. Chart paper, two sheets
2. Markers- different colors
3. Any flat clear glass container
4. Measuring cup
5. Funnel
6. Empty, clean, clear, quart beverage container (e.g. an empty water bottle)
7. Water- 2 cups water
8. Yellow food coloring
9. Salt –a teaspoon
10. Oil-a tablespoon
11. Sugar- a teaspoon
12. Honey- a tablespoon
13. Steak sauce- a tablespoon
14. Milk- ¼ cup
15. Hot sauce- a tablespoon
16. Ketchup-1 ¾ cups
17. Crayons
18. Plain white paper 8 ½” x 11”
19. Book: *The Human Body* from Mailbox (page 17)
20. Overhead projector
21. Transparency of Appendix I Blood Cells, a copy for each student
22. Resource for teacher: *How It Works the Human Body* (pages 10 and 11)
23. Appendix J recipe for making blood
24. Cells, Cells, and More Cells: A daily journal for each student (Appendix B)

C. *Key Vocabulary*

1. Red blood cells: the cells that carry oxygen
2. White blood cells: the cells that fight germs
3. Plasma: the cells that carry food
4. Platelets: the cells that help stop bleeding

D. *Procedures/Activities*

1. The teacher can explore with the students their previous knowledge of blood by doing a KWL chart. On the chart paper, draw three columns. Label the top of each column with the words: What I Know, What I Want to Know, What I Learned. The students will give the teacher the items to put in each category. Each set of words can be put in a different color to help the students distinguish the information.
2. On the chart, the teacher will record the students’ responses. Ask the students what do the students know about blood. Then ask them what would the students like to learn about blood.
3. Display the transparency of the different kinds of blood cells Appendix I). The teacher can explain to the students all the information about the functions of each kind of cell and where they are found in the body.
4. The students can write their vocabulary words in their journals that the teacher has written on the chalkboard or transparency.
5. Explain to the students that we are now going to make blood. (Recipe for blood is Appendix J). As you add each ingredient to the clear glass container, describe each component: plasma, red blood cells, white blood cells, and platelets. Now

pour the blood into the clear quart container and explain to the students that a small child has one quart or four cups of blood in their body. Explain to the students that as you grow you will make more red blood cells and have 5 quarts as an adult.

6. After the demonstration about blood the students can give their responses to the teacher on what they learned, and the teacher can record their answers on the column of the chart that says: What I Learned.
7. The students can make a cartoon strip of the facts that they have learned about blood. The students will draw their cartoon strip on the white paper and use their crayons. They will fold the paper so that they have six sections. Fold the paper lengthwise, then fold into thirds to make the six sections.

E. *Assessment/Evaluation*

1. The student's drawings of their cartoon will serve as their knowledge of the content of the lesson.
2. The students will write in their journal what they learned about blood cells. Each day the students will turn in their journals to be rubriced with a checklist form found in Appendix M. The form will include what was the daily lesson, what concepts that they student needed to learn, the vocabulary for the lesson and the skills for that lesson. Appendix M is a generic form that can be used for all ten lessons.

**Lesson Ten: What Are Bone Cells?** (approximately one hour long)

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will understand the characteristics and structure of living things. (Colorado State Science Standard 3)
  - b. Students will understand the processes of life. (Colorado State Science Standard #3)
  - c. Students understand how living things interact with each other and their environment. (Colorado State Science Standard #3)
2. Lesson Content
  - a. All living things are made up of cells, too small to be seen without a microscope. (page 60)
  - b. Cells make up tissues. (page 60)
  - c. Tissues make up organs. (page 60)
  - d. Organs work in systems. (page 60)
3. Skill Objective(s)
  - a. The student will describe bone cells and their function.
  - b. The student will identify the place in the body where bone cells can be found.

B. *Materials*

1. Book: *Cells Are Us* by Fran Bilkwell
2. Two dozen Legos for each child
3. Cells, Cells, and More Cells: A daily journal for each student (Appendix B)

C. *Key Vocabulary*

No new vocabulary

D. *Procedures/Activities*

1. Read to the class pages 26 and 27 in the book *Cells Are Us*. Explain to the students that bone cells are like small factories making the hard substance of the bone. Also, the fact that you have billions of bone cells in your body and where they can be found in your body. Ask the following questions:

- a. How are bones cells like little factories?
  - b. How many bone cells do you have?
  - c. Where can you find bone cells?
  2. The teacher can display the transparency that was used in Lesson Eight that shows the different cells. Point out the bone cell to the students and have different students describe what the bone cell looks like to them.
  3. Pass out the Legos for each child and have them assemble them into a bone. Explain to the students that the Legos represent the bone cells making new bones.
  4. Have the students bring their bones together, and the class can try to assemble the bone system called the skeleton.
  5. Have the students write in their journal two sentences telling what the bone cells do and where they are found.
- E. *Assessment/Evaluation*
1. The students write in their journals two sentences telling what the bone cells do and where they are found. Each day the students will turn in their journals to be rubriced with a checklist form found in Appendix M. The form will include what was the daily lesson, what concepts that they student needed to learn, the vocabulary for the lesson and the skills for that lesson. Appendix M is a generic form that can be used for all ten lessons.

**Lesson Eleven: Who Was Anton Von Leeuwenhoek** (approximately one hour long)

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students understand the characteristics and structure of living things. (Colorado State Science Standard #3)
  - b. Students will understand the processes of life. (Colorado State Science Standard #3)
  - c. Students understand how living things interact with each other and their environment. (Colorado State Science Standard #3)
  - d. Students will understand the importance of scientific technology.
2. Lesson Content
  - a. All living things are made up of cells, too small to be seen without a microscope. (page 60)
  - b. Cells make up tissues. (page 60)
  - c. Tissues make up organs. (page 60)
  - d. Organs work in systems. (page 60)
  - e. Anton Von Leeuwenhoek was an inventor of the early microscope. (page 61)
3. Skill Objective(s)
  - a. The student will be able to identify that cells make up tissues, and tissues make up organs, and organs work in systems.
  - b. The student will be able to describe the importance of Anton Von Leeuwenhoek.

B. *Materials*

1. Four different circles of construction paper (Appendix K)
2. White paper one sheet per student
3. Glue (one bottle for each student)
4. Scissors (one pair for each student)
5. Paper Plates- one for each child
6. Curly hair found in craft stores for dolls (enough for each child to frame the paper plate)

7. Large craft stick (one per child)
  8. Transparency in *Cell Machinery* (page 1)
  9. Overhead projector
  10. Cells, Cells, and More Cells: A daily journal for each student (Appendix B)
- C. *Procedures/Activities*
1. Explain to the students that we have been learning about all the different kinds of cells, and that we have learned that cells make up tissues. Additionally, explain that the tissues make up organs and the organs make up systems in the body. The systems, for example the skeletal.
  2. Hand out to each student the four circles and explain that they are going to put together a diagram showing how all of these things work together (Appendix K). The largest circle represents the systems, the next smaller circle the organs, the third circle is the tissue, and the last circle is the cell. The students will glue the circles on top of one another and label each circle.
  3. After discussing the integration of the cells, explain to the students who Anton Von Leeuwenhoek was and his invention of the microscope. Display the transparency for the students and talk about how his microscope was much different from ones that we use today. Ask if any of them have seen different types of microscopes and how did they look.
  4. Pass out a paper plate, craft stick, and a handful of hair for each child. The student will cut out the center circle of the plate for their face. They will glue the hair on the outer edges of the paper plate, and the craft stick on the bottom of the plate. This will be their stick face puppet of Anton Von Leeuwenhoek.
  5. The students can take turns dramatizing the amazing work of Anton and use the plate as his face.
  6. The students will write in their journals who Anton Von Leeuwenhoek was and what he did for the study of cells.
- D. *Assessment/Evaluation*
1. The co-centric circle graph will be evaluated for the students understanding of the lesson's concepts.
  2. The students will write in their journals two sentences about Anton Von Leeuwenhoek and his contribution to the study of cells. Each day the students will turn in their journals to be rubriced with a checklist form found in Appendix M. The form will include what was the daily lesson, what concepts that they student needed to learn, the vocabulary for the lesson and the skills for that lesson. Appendix M is a generic form that can be used for all ten lessons.

## VI. CULMINATING ACTIVITY

- A. The students will take a field trip to a museum with an exhibit of the workings of the human body. (The "Hall of Life" exhibit in the Colorado Natural History Museum)
- B. The student will take a unit test as a culminating assessment of the cell unit (Appendix L).

## VII. HANDOUTS/WORKSHEETS

- A. Appendix A: What Do I Look Like? (Lesson One)
- B. Appendix B: Journal Cover and Pages (All lessons)
- C. Appendix C: The Rubric for Evaluating Appendix A (Lesson One)
- D. Appendix D: Venn Diagram (Lesson Two)
- E. Appendix E: Living and Non-living Things (Lesson Two)
- F. Appendix F: Layers of Skin (Lesson Six)
- G. Appendix G: Muscle Exploration (Lesson Seven)

- H. Appendix H: The Nerve Cell song (Lesson Eight)
- I. Appendix I: Transparency on Blood Cells (Lesson Nine)
- J. Appendix J: Recipe for Blood (Lesson Nine)
- K. Appendix K: Patterns for Circles (Lesson Eleven)
- L. Appendix L: Cells, Cells, and More Cells Unit Test
- M. Appendix M: Rubric for Journal (All lessons)
- N. Appendix N: Cell Transparency (Lessons Six-Nine)

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- C. Bauerele, Patrick A. and Norbert Landa. *The Cell Works*. Barcelona, Spain. Barron's. 1997 ISBN 0-7641-5052-9.
- D. *Cell Machinery*. St. Louis, MO. Milliken Press. ISBN 1-55863-530-0.
- E. *How Your Body Works*. Monterey, CA. 1998. Evan-Moor. EMC-856. ISBN 1-55799-685-7.
- F. Rowan, Kate. *I Know How My Cells Grow*. Cambridge, MA. Candlewick Press. 1999. ISBN 0-7636-0502-6.
- G. *The Human Body*. Greensboro, NC. The Mailbox. 2000. ISBN 1-56234-372-6.
- H. [www.cellsalive.com](http://www.cellsalive.com)

**Appendix A**  
**What Do I Look Like? (Lesson One)**

Name: \_\_\_\_\_

Glue the pictures of you here as a baby and what you look like now in the space below.

--	--

Answer in a complete sentence.

**What did you look like as a baby?**

1. What did your body look like when you were a baby?

---

---

2. What color was your hair? Did you have hair?

---

---

3. What color were your eyes?

---

---

4. Did you walk and talk as a baby?

---

---

Appendix A, page 2

What do you look like now?

1. What does your body look like now?

---

---

2. What color is your hair now?

---

---

3. What color are you eyes?

---

---

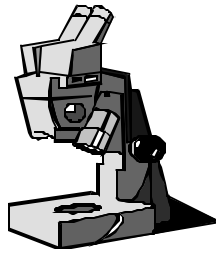
4. Do you walk and talk now? How well do you do that now?

---

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Appendix B  
Cells, Cells, and More Cells Journal Cover



Cells, Cells, and More Cells  
Daily Journal

Name: \_\_\_\_\_

Class: \_\_\_\_\_



Muscle Cell



Blood Cell



Skin Cells



Nerve Cell

**Appendix B (continued)**  
**Cells, Cells, and More Cells Journal**

**What were the ideas that I learned today in lesson\_\_\_\_\_?**

---

---

---

---

---

**3. What did I think was interesting about cells that I learned today?**

---

---

---

---

---

**My vocabulary words for today:**

**1.** \_\_\_\_\_

---

**2.** \_\_\_\_\_

---

**3.** \_\_\_\_\_

---

**4.** \_\_\_\_\_

---

**Appendix B (continued)**  
**Cells, Cells, and More Cells Journal**

5. \_\_\_\_\_

\_\_\_\_\_

6. \_\_\_\_\_

\_\_\_\_\_

7. \_\_\_\_\_

\_\_\_\_\_

8. \_\_\_\_\_

\_\_\_\_\_

**Draw a picture about what you learned today:**

Appendix C

Rubric for Lesson One

Name: \_\_\_\_\_

**Checklist Questions**

**0 1 2 3 4**

**Did the student answer all of the questions answered in complete sentences?**

**Did the student bring in the two pictures?**

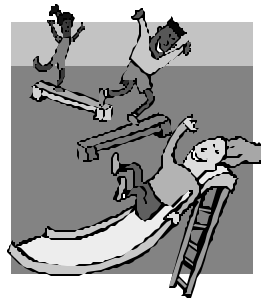
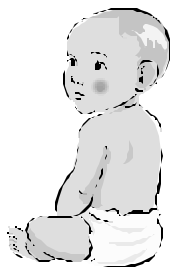
**Did the student compare the two ages?**

**Does the student list all of the important facts?**

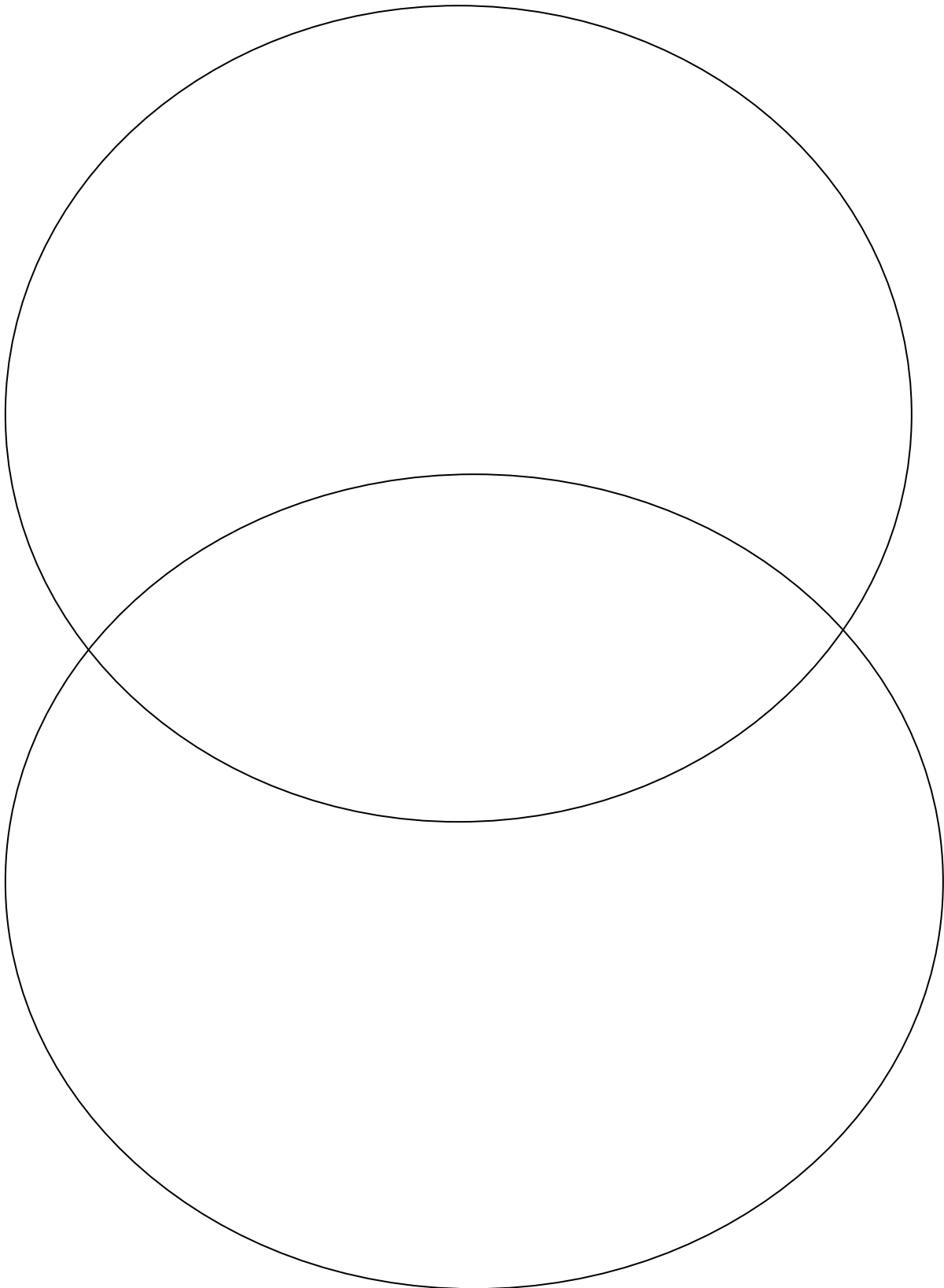
**The writing made a difference in the description of the ages?**

**Student's score: \_\_\_\_\_**

**Possible points: 20**



**Appendix D**  
**Venn Diagram (Lesson Two)**

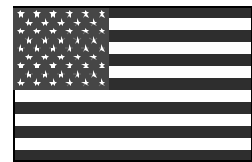
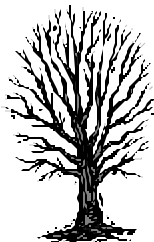


Appendix E  
Living and Non-living Things (Lesson Two)

Name: \_\_\_\_\_

LIVING AND NON-LIVING THINGS

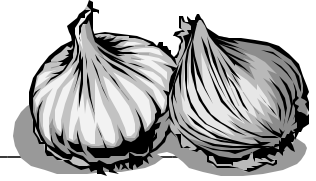
Circle the living things and put an X on the non-living things.



**Appendix F**  
**Layers of Skin (Lesson Six)**

Name: \_\_\_\_\_

**Layers of Skin**



1. What does your onion look like?

---

---

2. When you peel off the outer layer, what does that layer look and feel like?

---

---

3. As you peel off the next layer, is it as thick as the outer layer of the onion?

---

---

4. Compare the two layers. Are they the same or different? Why or Why not?

---

---

5. How does the color change on the onion as you peel the layers?

---

---

6. Does the onion have more juice inside or outside? Why?

---

---

7. How is the onion like your skin?

---

---

**Appendix G**  
**Muscle Exploration (Lesson Seven)**

Name: \_\_\_\_\_

**Muscle Exploration**

Answer each question with a complete sentence.



1. What does the meat look like?

---

---

2. How does it feel?

---

---

3. Do you see connected bundles of cells in the meat?

---

---

Draw a picture of what you see.

**Appendix H**  
**Nerve Cell Song (Lesson Eight)**

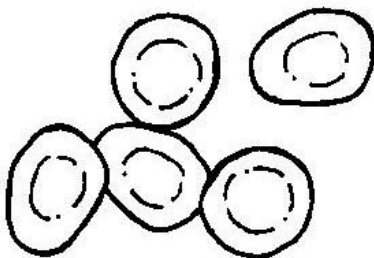
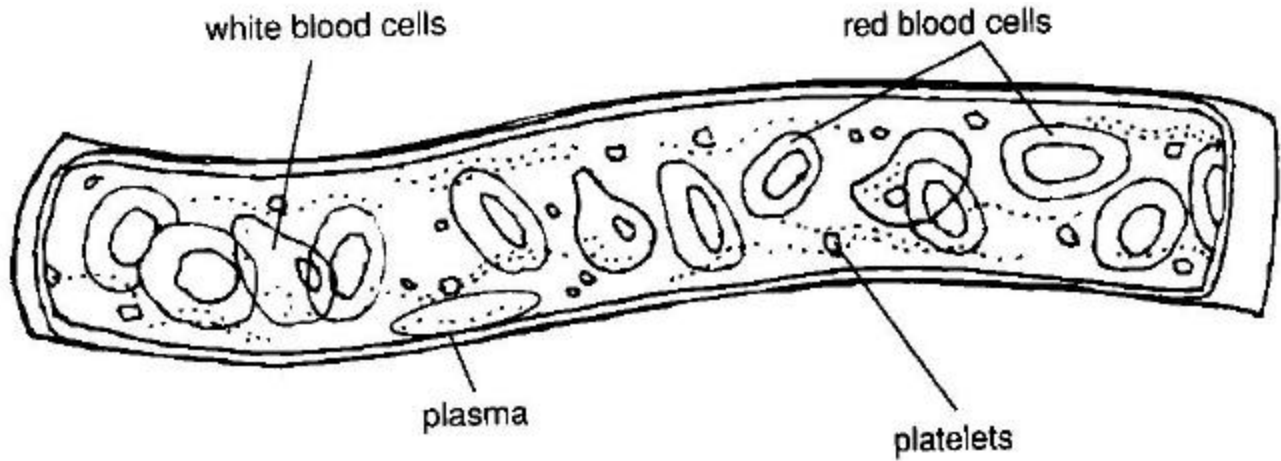
**NERVE CELL SONG**  
**(Sung to the tune of “I’m a Little Teapot”)**

**I’m a little neuron short and stout  
Here are my axons stretching out.  
When I send a message to the brain  
SNAP! I’m on my way again.**

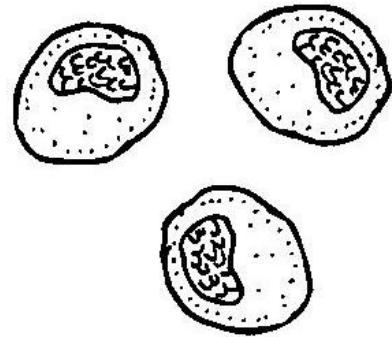
**Out into the muscles I will go  
To tell your body to go fast or slow.  
You don’t have to remember what to do  
Nerve cells will send the message for you!**

**Appendix I**  
**Pictures of the Blood Cells (Lesson Nine)**

**Plasma carries food. Platelets help stop bleeding.**



**Red blood cells carry oxygen.**



**White blood cells fight germs.**

## Appendix J

### The Recipe of the Blood (Lesson Nine)

This recipe is taken from *The Human Body by Mailbox*

#### What's In Blood?

##### Plasma (54%)

- 2 cups water (representing the water in plasma)
- Several drops of yellow food coloring (protein)
- Dash of salt (salt in blood)
- Splash of vegetable oil (represents the fat)
- Dash of sugar (represents the glucose)
- Squirt of honey (hormones)
- Splash of steak sauce (waste)

##### White Blood Cells and Platelets (1%)

- $\frac{1}{4}$  cup of milk
- Splash of hot sauce (platelets)

##### Red Blood Cells (45%)

- $1\frac{3}{4}$  cups of ketchup

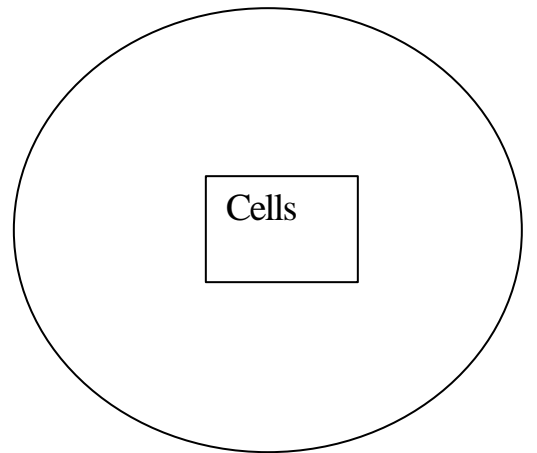
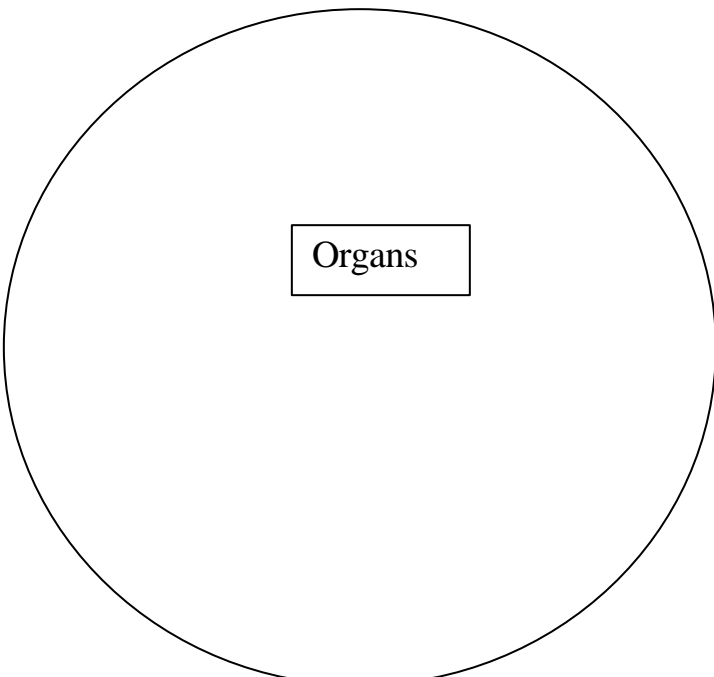
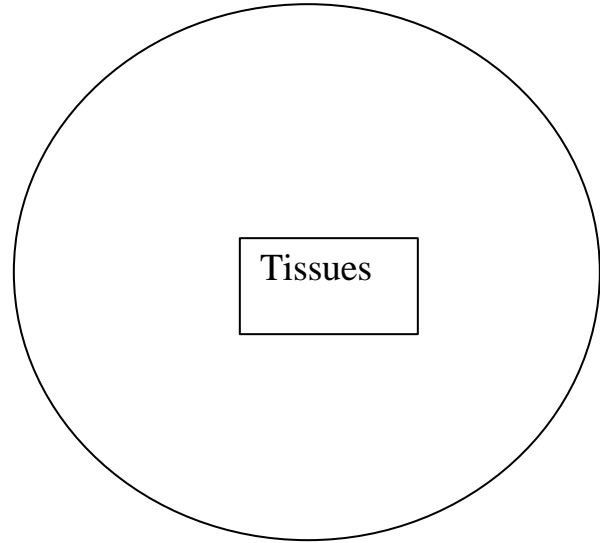
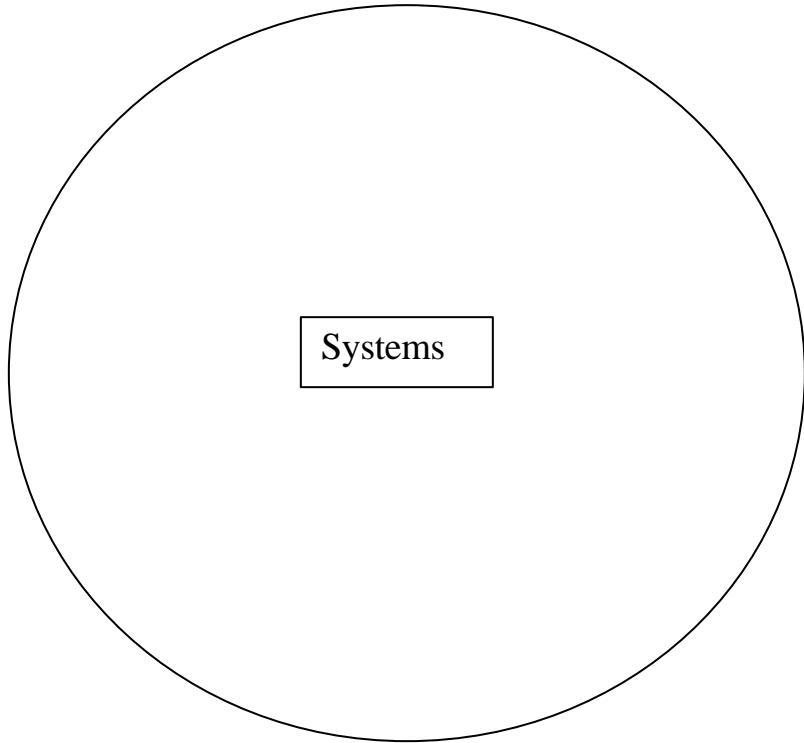
Share this intriguing demonstration, and your students will appreciate their hardworking circulatory systems! Gather ahead of time a large clear bowl; a measuring cup; funnel; an empty, clean, quart beverage container. As you mix the ingredients listed, on the recipe card, use the information on the box below to help describe the main components of blood: plasma, red blood cells, white blood cells, and platelets. Then pour the "blood" into the quart container, using the funnel to prevent spills. Display the blood-filled container as you explain to students that a small child has one quart (four cups) of blood in his body. As he grows to be an adult, more red blood cells will be made in the bone marrow, of some of his bones, and he will have five quarts of blood.

**Plasma:** a watery liquid called plasma makes up 54% of blood. Plasma contains hundreds of substances, from blood clotting chemicals, to chemical messengers known as hormones.

**White blood cells and platelets:** Blood is 1% white blood cells and platelets. White blood cells keep the blood clean and help the body fight disease. And platelets help blood clot to stop bleeding.

**Red blood cells:** Blood is 45% red blood cells. A chemical in the red blood cells gives blood its red color. Red blood cells transport oxygen from the lungs to the rest of the body.

**Appendix K**  
**Four Circles for Patterns (Lesson Eleven)**



**Appendix L**  
**Unit Test**

Name: \_\_\_\_\_

**Cell, Cells, and More Cells Unit Test**

**Circle the correct answer.**

**1. The basic unit of all life is:**

- a. a tree
- b. a cell
- c. a car
- d. a phone

**2. The contents of the cell, not including the nucleus is called:**

- a. oxygen
- b. milk
- c. cytoplasm
- d. jello

**3. The outside lining of the cell that lets oxygen in and waste out is:**

- a. the brain
- b. the cell membrane
- c. a bubble
- d. an egg

**4. How many cells do our bodies make every minute?**

- a. ten
- b. fifty
- c. one thousand
- d. over a billion

Appendix L, page 2

5. The largest single cell in the world is:

- a. a skin cell
- b. a nerve cell
- c. an ostrich egg
- d. a blood cell

6. Cells:

- a. are all the same size
- b. are very large creatures
- c. are all the same shape
- d. are many different sizes and shapes

7. Anton Von Leeuwenhoek invented the first:

- a. sewing machine
- b. tractor
- c. microscope
- d. car

8. The job of the nerve cell is:

- a. send messages to the brain
- b. protect us
- c. let in food
- d. pick up oxygen

9. The job of the muscle cell is:

- a. tell if something is hot
- b. help us move
- c. keep us cool
- d. keep us warm

Appendix L, page 3

10. The job of the red blood cells is:

- a. to carry oxygen
- b. to give us help in moving
- c. make us turn blue
- d. be a building block

Fill in the missing words.

Word Bank:    layer    fight    factories    platelets    grow
cytoplasm    cell membrane    nucleus

11. White blood cells help our body \_\_\_\_\_ disease.

12. Skin cells form a protective \_\_\_\_\_ around our body and organs.

13. Our bone cells are like little \_\_\_\_\_ that tear down and rebuild our bones.

14. The \_\_\_\_\_ in our blood cells help us to stop bleeding.

15. The cells in our bodies make us \_\_\_\_\_.

16. The three parts of a cell are \_\_\_\_\_,  
\_\_\_\_\_, and \_\_\_\_\_.

**Appendix L, page 4**  
**Answer Key for Cell Unit Test**

**Multiple-choice answers:**

- |      |       |
|------|-------|
| 1. a | 6. d  |
| 2. c | 7. c  |
| 3. b | 8. a  |
| 4. d | 9. b  |
| 5. c | 10. a |

**Fill in the missing words:**

11. **fight**
12. **layer**
13. **factories**
14. **platelets**
15. **grow**
16. **cell membrane, cytoplasm, nucleus**

Appendix M

**Rubric for Journal  
Cells, Cells, and More Cells Rubric**

Student's Name: \_\_\_\_\_

Date: \_\_\_\_\_ Lesson Number: \_\_\_\_\_

Concepts for the lesson:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

Criteria					Points
	1	2	3	4	
<b>The student has included all vocabulary words.</b>	The student has 25 % of the vocabulary words.	The student has 50% of the vocabulary words.	The student has 75% of the vocabulary words.	The student has 100% of the vocabulary words.	
<b>The student has listed all the concepts for the lesson.</b>	The student has listed none the concepts for the lesson.	The student has listed some the concepts for the lesson.	The student has listed most the concepts for the lesson.	The student has listed all the concepts for the lesson.	
<b>The student has stated the ideas in a clear and concise manner.</b>	The student has not stated the ideas in a clear and concise manner.	The student has somewhat stated the ideas in a clear and concise manner.	The student has stated most of the ideas in a clear and concise manner.	The student has stated all of the ideas in a clear and concise manner.	
<b>Punctuation and capitalization are correct.</b>	There are four or more errors in punctuation and capitalization.	There are two or three errors in punctuation and capitalization.	There are one error in punctuation and capitalization.	Punctuation and capitalization or correct.	
<b>The student states the conclusions in the lesson.</b>	No conclusion is reached from the evidence offered.	Some conclusion is made from the evidence offered.	Several detailed conclusions are reached from the evidence offered.	Numerous detailed conclusions are reached from the evidence offered.	
					Total Points

Appendix N  
Cell Transparency (Taken from page 23 of How Your Body Works)

