

Create a Chain Reaction: Vocabulary and Technology

Grade Level or Special Area: Connections

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Length of Unit: Four weeks at 60 minutes per lesson

I. ABSTRACT

- A. This unit, designed using research-based, practical strategies, provides engaging chemistry instruction. Our robust vocabulary approach allows for frequent, rich, extended learning opportunities supplemented with online chemistry investigations. Word logs, meaningful activities, and assessments enhance student understanding of properties of matter and changes in our world. Use activities to provide common background for new students or to review concepts with English Language Learners and special needs students. After all, rich vocabulary building is what Core Knowledge is about!

II. OVERVIEW

- A. Concept Objectives:
1. Understand structure and properties of matter and changes that occur in the physical/chemical world. (Oregon Physical Science).
 2. Increase word knowledge through systematic vocabulary development. (Oregon Reading).
 3. Demonstrate general understanding of grade-level informational text across the subject areas. (Oregon Reading).
 4. Access and organize information using one or more technologies. (Oregon Technology).
- B. Content from the *Core Knowledge Sequence*:
1. Chemistry: Basic Terms and Concepts
 - a. Atoms
 - b. Properties of Matter
 - c. Elements
 - d. Solutions
- C. Skill Objectives:
1. Determine meanings of words using contextual and structural clues.
 2. Distinguish and interpret words with multiple meanings by using context clues.
 3. Identify and/or summarize sequence of events, main ideas, facts, supporting details in informational selections.
 4. Identify key facts and information after reading two passages or articles on the same topic.
 5. Access and organize information using one or more technologies.
 6. Use technology to communicate information and ideas.

III. BACKGROUND KNOWLEDGE

- A. For Teachers
1. Beck, Isabel L., M. McKeown, L. Kucan. *Bringing Words to Life, Robust Vocabulary Instruction*. New York, NY: Guilford Press, 2002. ISBN 1-57230-753-6.
 2. Hirsch, Jr. E.D. *What Your Fourth Grader Needs to Know*. New York, NY: Bantam Dell, 2005. ISBN 0-385-33765-5.

3. Stahl, Steven A. *Vocabulary Development*. Brookline, MA: Brookline Books ISBN 1-57129-072-9.
4. <http://www.projectglad.com/glad.html>

B. For Students

1. First Grade: Matter: atoms; states of matter; water as it changes shape

IV. RESOURCES

- A. Bains, Rae. *Molecules and Atoms*. (Lessons 1, 6, 11)
- B. Beck, Isabel L., M. McKeown, & L. Kucan. *Bringing Words to Life, Robust Vocabulary Instruction*. (Lessons 1, 4, 6, 9, 11, 14, 16, 19)
- C. Cole, Ron. *The World of Matter*. (Lessons 1, 6, 16)
- D. Dalton, Cindy Devine. *How Can I Experiment with Atoms?* (Lessons 1, 3)
- E. Guided Language Acquisition Design <http://www.projectglad.com/glad.html> (Lesson 1, 3, 5, 6, 8, 11, 12, 16)
- F. Hirsch, Jr. E.D. *What Your Fourth Grader Needs to Know* (1993 and 2005 versions). (Lessons 1,6,11,16)
- G. Hirsch, Jr. E.D. *What Your Fifth Grader Needs to Know* (1993) (Lesson 6)
- H. Ward, Pat and Barbara. *The Atom, Building Block of Nature* (Lessons 1 ,6, 11, 16)
- I. Computers with internet access for students or LCD projector for teacher (Lessons 2, 7, 12, 17)

V. Lesson One: The Atom's Family: Assess knowledge, Introduce Words (2 days)

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
 - c. Demonstrate general understanding of grade-level informational text across subject areas.
2. Lesson Content
 - a. Chemistry: Basic Terms and Concepts (p. 104)
 - i. Atoms
 - ii. Models of atoms
 - iii. Protons, neutrons, electrons
3. Skill Objective(s)
 - a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.
 - c. Identify key facts and information after reading two passages or articles on the same subject.

B. *Materials*

1. Pocket portfolio with three fasteners, one per student
2. Appendix A, Pre-assessment of unit vocabulary words, one per student
3. Appendix B, Student Word Log, seven copies per student; three-hole punched
4. Appendix C, Who's Who in Chemistry, one per student
5. *What Your Fourth Grader Needs to Know, Revised edition*, by E.D. Hirsch
6. *How Can I Experiment with Atoms?* by Cindy Devine Dalton

7. *The World of Matter* by Ron Cole
8. *Molecules and Atoms* by Rae Bains
9. *The Atom Building Block of Nature* by Pat and Barbara Ward
10. *Matter & Energy* by Daniel J. Spero
11. Chart paper and markers
12. Pictures to illustrate each of The Atom's Family words—made in advance
13. Large pictures of John Dalton and Niels Bohr
14. Notebook paper
15. Paper clips, same size and color; different sizes and colors
16. Are These Matter? Demonstration items: pan or bowl, coffee sized paper cup, smaller size paper cup, rock that will fit into larger cup, flashlight

C. *Key Vocabulary*

1. **Atom:** the smallest unit of an element that still retains the properties of the element
2. **Electron:** a negatively-charged particle that spins around the nucleus of atom
3. **Element:** a pure substance that cannot be broken down into simpler substances
4. **Matter:** anything that has mass and occupies space
5. **Molecule:** smallest unit of matter made up of two or more atoms combined
6. **Neutron:** a neutral particle in the nucleus of an atom
7. **Nucleus:** the center of an atom
8. **Proton:** a positively-charged particle in the nucleus of an atom
9. **Repel:** to drive back or oppose (relate concept to magnets)

D. *Procedures/Activities*

1. Prepare picture cards to illustrate vocabulary & portraits of two scientists.
2. Prepare Student Learning Portfolio using Student Word Log, Appendix B; and Who's Who in Chemistry, Appendix C. Put pages into the pocket portfolio. Add a few sheets of notebook paper.
3. Give each student a copy of Pre-assessment, Appendix A
4. Explain how to mark chart for each word. Allow time to complete.
5. Collect Pre-assessment.
6. Introduce Student Word Log, Appendix B. Tell students you will work together to determine explanations of nine key words in your study of Atoms. This log will be used to record vocabulary in future lessons.
7. Print the nine vocabulary words on the board or overhead. Have students copy each word onto log sheet. Do not fill in anything else yet.
8. Introduce each word in one of the following ways: using the picture that illustrates it; with a simple demonstration or by reading pre-selected passages. Question students to elicit meaning elements of that particular word. You will need to pre-read and mark appropriate passages for these words (Be aware that some content will overlap with concepts in later lessons so some passages will be read later to introduce new vocabulary.)
9. Prepare materials for four simple demonstrations called "Are These Matter?", taken from *Matter & Energy* by Daniel J. Spero. Define matter as anything that takes up space and has mass.
Using items on the Materials list, #15, students will determine if air, rock, light, and water are matter. For each test, you will use a pan or bowl of water, a large paper cup, and a smaller paper cup. Fill the bowl half full with water. Use the smaller cup to fill the larger cup to the top with water. Set the large cup in the bowl so that any overflow will go into the bowl.

- a. Is air matter? Fill the large cup. Empty the small cup and turn it upside down; push it straight down into the larger cup. If air is matter (takes up space) it will overflow.
 - b. Is rock matter? Carefully lower a rock into the water in the large cup. If rock takes up space, the water will overflow.
 - c. Is light matter? Refill the large cup with water. Shine a flashlight into the large cup. If light is matter, it will overflow.
 - d. Is water matter? Refill large cup with water. Use small cup to pour more water into large cup. If water is matter, it will overflow.
10. *The Atom Building Block of Nature* by Pat and Barbara Ward has great overview with examples to explain Matter (pages 1-2)
 11. Read aloud page 258-260 from *What Your Fourth Grader Needs to Know*, Revised edition, “Cutting a Cube”, “What are atoms made of?” “Can we break open an electron?” to explain an atom. To help explain concept of atom and element, use this demonstration from *The Extraordinary Chemistry of Ordinary Things*, 3rd Edition, by Carl H. Snyder. Idea posted on <http://science.howstuffworks.com/atom1/htm>.
 - a. Take a pile of paper clips (all same size and color).
 - b. Divide pile into two equal piles.
 - c. Divide each smaller pile into equal piles.
 - d. Repeat until you are down to a pile with only one paper clip. The one clip still does the job of a paper clip (holds papers together).
 - e. Cut the paper clip in half. Can half of the paper clip do the same job as single paper clip? (no)
 - f. Every element is made up of atoms (pile of paper clips)
 - g. All atoms of any element are same (all clips same size and color)
 - h. Atoms of different elements are different (different size, color of paper clip).
 - i. Atoms of different elements can combine to form compounds (link different sizes and colors of clips together to make new structure)
 12. After reading from several sources (see suggestions below), have students agree on a definition for each word. Write definition on chart paper so students can copy onto individual word log. Then have students sketch or illustrate the meaning; label as needed. Use your pre-made illustration cards as a sample. Do this for all 9 words.
 13. On notebook paper, have students sketch and label models of atoms as described in books (yolk of egg, *How Can I Experiment with Atoms?* pg 19; sun in the solar system, *Molecules and Atoms*, pg 14; pencil erasure, *Molecules and Atoms*, pg 15; *What Your 4th Grader Needs to Know*. Pg 259).
 14. Copy word, meaning, and illustration to Class Vocabulary reference chart.
 15. Review words by having students match each word with its picture.
 16. Display pictures of John Dalton, Niels Bohr. Provide the following general information for students to record on Appendix C, Who’s Who in Chemistry.
 - a. John Dalton: An Englishman who developed the first useful theory about atoms in 1803. He was first to say that everything is made up of atoms. He believed that all atoms were alike. If you put the atoms together in different ways, you could make anything on earth. Dalton devised simple but effective experiments. He recorded all of his work in journals and much of his data is remarkably accurate.

- b. Niels Bohr: A Danish scientist developed the Quantum Theory in 1913. He won the Nobel Prize in 1922 for physics, chiefly for his work on the structure of atoms. He said electrons traveled around the atom's nucleus in a certain orbit. This was called an electron shell. Today scientists have learned that electrons move in electron clouds rather than in orbit.
- c. Additional teacher information can be found at these websites:
 - i. http://www-groups.dcs.st-and.ac.uk/~history/Mathematicians/Bohr_Niels.html
 - ii. <http://nobelprize.org/physics/laureates/1922/bohr-bio.html>
 - iii. http://www.fact-index.com/n/ni/niels_bohr.html
 - iv. http://en.wikipedia.org/wiki/Niels_Bohr
 - v. http://www.slcc.edu/schools/hum_sci/physics/whatis/biography/dalton.html
 - vi. http://en.wikipedia.org/wiki/John_Dalton
 - vii. <http://www.chemheritage.org/EducationalServices/chemach/ppt/jd.html>
 - viii. <http://antoine.frostburg.edu/chem/senese/101/atoms/dalton.shtml>
 - ix. <http://scienceworld.wolfram.com/biography/Dalton.html>

E. *Assessment/Evaluation*

- 1. Appendix A, Pre-assessment of unit vocabulary words
- 2. Appendix B, Student word logs
- 3. Appendix C, Who's Who in Chemistry

Lesson Two: Atom's Family, Web Page Note-Taking

Daily Objectives

- 1. Concept Objective(s)
 - 2.
 - a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
 - c. Demonstrate general understanding of grade-level informational text across the subject areas.
 - d. Access and organize information using one or more technologies.
- 2. Lesson Content
 - e. Chemistry: Basic Terms and Concepts (p. 104)
 - i. Atoms
 - ii. Models of atoms
 - iii. Protons, neutrons, electrons
- 3. Skill Objective(s)
 - f. Determine meanings of words using contextual and structural clues.
 - g. Identify key facts and information after reading two passages or articles on the same topic.
 - h. Access and organize information using one or more technologies.
 - i. Use technology to communicate information and ideas.

F. *Materials*

- 1. Student Learning Portfolio
- 2. Appendix D, Web Page Note-Taking (2 pages), one per student
- 3. Computer with internet access

4. <http://education.jlab.org/>
 5. http://www.chem4kids.com/files/atom_intro.html
Extension Activities
 6. <http://education.jlab.org/qa/index.html>
List of questions and answers about atoms and matter
 7. <http://education.jlab.org/indexpages/teachers.html>
Worksheets, Puzzles and Games, What is Matter?
Worksheet explains history of atom discovery.
- G. *Key Vocabulary*
1. Words from Lesson one, Atom's Family
- H. *Procedures/Activities*
1. Lesson can be done by students in the computer lab or as teacher directed lesson using a LCD projector.
 2. Pass out Appendix D, Web Page sheets. Discuss ethics of citing your sources. Show students step by step how to locate information from website. Record together in citation box at top of page.
 3. Preview note-taking sheets; make sure students understand how to complete.
 4. Allow time for students to work alone or in pairs to complete lesson.
 5. Provide extension activity for those who finish early. See #5 and 6 under materials section. Print off "What is Matter?" worksheets in advance.
 6. Have students put Web Page Note-Taking into their Learning Portfolio.
- I. *Assessment/Evaluation*
1. Check Appendices D for accuracy and completeness of answers.
 2. Provide extra credit for students completing "What is Matter?" Worksheet.

Lesson Three: Vocabulary Cards

- A. *Daily Objectives*
1. Concept Objective(s)
 - a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
 2. Lesson Content
 - a. Chemistry: Basic Terms and Concepts (p. 104)
 - i. Atoms
 - ii. Models of atoms
 - iii. Protons, neutrons, electrons
 3. Skill Objective(s)
 - a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.
- B. *Materials*
1. Student Learning Portfolio
 2. 3 x 5 lined index cards, 9 cards per student
 3. scissors
 4. quart-size zip lock bag, one per student labeled with student name
 5. colored markers
 6. Poster with Atom Poem, Appendix E
 7. Poster with Atom's Family Song (*How Can I Experiment with Atoms?*)
- C. *Key Vocabulary*

Words in list one, Atom's Family

D. *Procedures/Activities*

1. Share Atom Poem Poster with class. Read together. For extra credit, encourage students to write poem of their own, Appendix E.
2. Give 9 lined index cards to each student. Have students fold card down the middle; put their initials in upper corners of all cards.
3. On back (unlined side) of one card, have students make mark of identical color and shape on each half (red star on each). Make a different mark on each half of card two (blue star); continue until all 9 cards have different marks. These markings will provide a self-checking system during vocabulary match games. Do not cut cards in half yet.
4. On front (lined side) of first card, print "atom" on half of card. Copy definition from word log onto other half. Sketch a picture.
5. Continue writing word, definition, and sketch for all 9 cards.
6. Cut cards in half. Mix them; lay them face up. Match word to definition. Turn cards over to see if correct (two red stars).
7. Modification for special needs students—color-code the writing on front of all cards. Have students use brown to write words and definitions for this list of words. For next week's list, use a different color for word & definition. OR use different colored index cards for each new list of words. Use white index cards with list one; yellow index cards with next week's list, etc. This will give students an additional visual cue as they match word to definition or picture.
8. Put vocabulary cards into zip-lock bags.

E. *Assessment/Evaluation*

1. Encourage students to take vocabulary cards home to study. Challenge students to match cards in two minutes, etc.

Lesson Four: Word Relationships

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
 - c. Demonstrate general understanding of grade-level informational text across the subject areas.
2. Lesson Content
 - a. Chemistry: Basic Terms and Concepts (p. 104)
 - i. Atoms
 - ii. Models of atoms
 - iii. Protons, neutrons, electrons
3. Skill Objective(s)
 - a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.
 - c. Identify and/or summarize sequence of events, main ideas, facts, supporting details in informational selections.

B. *Materials*

1. Poster of Atom's Poem
2. Poster of Atom's Family Song

3. Appendix F, Word Relationships Activity
4. Vocabulary Word Cards in ziplock bags
- C. *Key Vocabulary*
Words in list one, Atom's Family
- D. *Procedures/Activities*
 1. Practice Poem together.
 2. Pass out Appendix F, Word Relationships Activity.
 3. Review Venn diagram as a compare/contrast organizer.
 4. Give students time to complete activity.
 5. Sing Atom's Family song together.
 6. Encourage students to take vocabulary cards home to study.
- E. *Assessment/Evaluation*
 1. Grade Appendix F, Word Relationships

Lesson Five: Atom's Family, Vocabulary Quiz

- A.
 1. Concept Objective(s)
 - a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
 2. Lesson Content
 - a. Chemistry: Basic Terms and Concepts (p. 104)
 - i. Atoms
 - ii. Models of atoms
 - iii. Protons, neutrons, electrons
 3. Skill Objective(s)
 - a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.
- B. *Materials*
 1. Appendix G, Atom's Family Quiz
- C. *Key Vocabulary*
 1. Lesson one words
- D. *Procedures/Activities*
 1. Remove Class Vocabulary chart, Atom Poem, and song.
 2. Pass out Appendix G, Atom's Family Quiz.
- E. *Assessment/Evaluation*
 1. Grade vocabulary quiz, Appendix G
 2. Decide which words to include on next week's list.

Lesson Six: Vocabulary: What's The Matter? (2 days with demonstrations)

- A.
 1. *Daily Objectives*
 - a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
 - c. Demonstrate general understanding of grade-level informational text across subject areas.
 2. Lesson Content
 - a. Chemistry: Properties of Matter (p. 104)

- i. Mass
 - ii. Volume
 - iii. Density
 - iv. Vacuum
3. Skill Objective(s)
- a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.
 - c. Identify key facts and information after reading two passages or articles on the same topic.

B. *Materials*

1. Pocket portfolio with word logs, Appendix B
2. *What Your Fourth Grader Needs to Know*, Revised by E.D. Hirsch
3. *What Your Fifth Grader Needs to Know*, (1993 version) by E.D. Hirsch
4. *Science Alive Materials* by Darlene Lauw and Lim Cheng Puay
5. *The World of Matter* by Ron Cole
6. *Molecules and Atoms* by Rae Bains
7. *The Atom Building Block of Nature* by Pat and Barbara Ward
8. *Activities for Geometric Solids* by Barbara Rodriguez
9. *From Here to There with Cuisenaire Rods* by Patricia Davidson
10. Chart paper and markers
11. Pictures to illustrate each “What’s The Matter?” word
12. Density experiment, “The Incredible Floating Egg” from *Science Alive Materials*: glass bowl, hot water, metal spoon, two pounds (1 kg) salt, fresh egg, small pitcher, water.
13. Density experiment, “Floating on Water”, from *Science Alive Materials*: three pieces of thick paper, tape, scissors, syrup or molasses, glass jar, food coloring, cup of water, cup of cooling oil, small slice of candle.
14. Density experiment, “Layered Liquids” from <http://www.nationalgeographic.com/ngkids/trythis/tryfun6.html>: 1/3 cup light corn syrup, 1/3 cup glycerin, 1/3 cup water, 1/3 cup vegetable oil, 4 small glasses, 1 tall, clear glass or jar, food coloring, funnel.
15. Mass and Weight experiment: Balance and gram weights to weigh various objects. Chart showing gravity on different planets and moon compared to earth. Students should have a calculator.
16. Cuisenaire rods, one set for two students to use with *From Here to There with Cuisenaire Rods*.
17. Set of geometric solids and centimeter cubes to fill them from *Activities for Geometric Solids*.

C. *Key Vocabulary*

1. **Density**: mass of a substance per unit of volume
2. **Gas**: state of matter in which substance has no definite shape and does not take up fixed amount of space. Expands to fill the container.
3. **Liquid**: state of matter that has no definite shape but assumes shape of container. Takes up definite amount of space.
4. **Mass**: the amount of matter in an object; mass remains constant but weight varies by location & pull of gravity.
5. **Plasma**: state of matter that has no definite shape and no definite volume. It is like gas but particles are electrically charged.

6. **Property:** how a substance looks, feels, smells, tastes, and behaves.
7. **Solid:** state of matter that has a definite shape and takes up definite amount of space.
8. **Vacuum:** an area devoid of matter; the absence of matter
9. **Volume:** the amount of space an object takes up or occupies.
10. **Weight:** heaviness of something (related to gravity pull)

D. *Procedures/Activities*

1. Find Student Word Log, Appendix B, in front section of Student Learning Portfolio. Tell students you will discuss and conduct experiments together to determine explanations of 10 key words in your study of Properties of Matter. Display pictures to illustrate key words but don't identify them. Students will need notebook paper to record experiment results.
2. Density, Mass, Weight, Volume would best be introduced with simple class demonstrations. Students can observe, discuss, and record results in Learning Portfolio. These demonstrations could be set up as rotation stations (get adult volunteers to help) or as whole class activity.
3. The following are effective sources to choose from:
 - a. *Science Alive Materials* by Darlene Lauw and Lim Cheng Puay, Why do some objects float and others sink? page 8; Floating on Water, page 9.
 - b. Layered Liquids density experiment from <http://www.nationalgeographic.com/ngkids/trythis/tryfun6.html>
 - c. *Activities for Geometric Solids* by Barbara Rodriguez, "Fill Em Up", page 27.
 - d. *From Here to There with Cuisenaire Rods* by Patricia Davidson, Volume section, pages 41-49.
 - e. Provide activities to weigh objects using grams and/or ounces. It is important for students to understand that mass of an object remains constant while weight can vary (weight on moon is 1/6 weight on earth but mass is the same). Give students an opportunity to figure out what a 100 pound person would weigh on other planets. These experiments can be supplemented with content being read aloud from several different sources, including *What Your Fourth Grader Needs to Know*, Revised version, pgs. 262-263. The 1993 version of *What Your Fifth Grader Needs to Know* has a good summary of Matter and Mass.
4. For words that do not require demonstration, you can pre-read and mark appropriate passages. Be aware that some content will overlap with concepts in later lessons. *The Atom Building Block of Nature* by Pat and Barbara Ward has great overview and examples to explain states of matter (pages 3-4).
5. After reading from several sources, have students agree on a definition. Write it on the board or onto chart paper so students can copy it into individual word log. Then have students sketch or illustrate the meaning; label as needed. Use your pre-made illustration cards as a sample.
6. Copy word, meaning and illustration to Class Vocabulary chart.

E. *Assessment/Evaluation*

1. Student word logs, Appendix B
2. Experiment results recorded in Learning Portfolio.

Lesson Seven: What State Are We In? Web Page Note-Taking

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
 - c. Demonstrate general understanding of grade-level informational text across subject areas.
 - d. Access and organize information using one or more technologies.
 2. Lesson Content
 - a. Chemistry: Properties of Matter (p. 104)
 - ii. Mass
 - iii. Volume
 - iv. Density
 - iv. Vacuum
 3. Skill Objective(s)
 - a. Determine meanings of words using contextual and structural clues.
 - b. Identify key facts and information after reading two passages or articles on the same topic.
 - c. Access and organize information using one or more technologies.
 - d. Use technology to communicate information and ideas.
- B. *Materials*
1. Student Learning Portfolio
 2. Appendices H & I, Web Page Note-Taking (2 pages), one per student
 3. Computer with internet access
 4. <http://www.bbc.co.uk/schools/revisewise/science/materials/>
 5. http://www.nyu.edu/pages/mathmol/textbook/text_contents.html
- Extension Activities—Experiments for school or home
6. http://www.edinformatics.com/math_science/mass.htm
 7. <http://www.nationalgeographic.com/ngkids/trythis/tryfun6.html>
 8. <http://library.thinkquest.org/11771/english/hi/chemistry/dense.shtml>
 9. http://www.chem4kids.com/files/matter_solid.html
- C. *Key Vocabulary*
1. See list, lesson six, What’s The Matter?
- D. *Procedures/Activities*
1. Lesson can be done by students in the computer lab or as teacher directed lesson using a LCD projector.
 2. Pass out Appendices H & I, Web Page Note-Taking sheets. Discuss ethics of citing your sources. Review with students how to locate information from website. Record citation information together for Appendix H.
 3. Preview note-taking sheets; make sure students understand how to complete.
 4. Allow time for students to work in pairs to complete lesson.
 5. Provide extension activity for those who finish early. See #6 - 9 under materials section. These could also be extra credit options for homework
- E. *Assessment/Evaluation*
1. Check Appendices H & I for accuracy and completeness.
 2. Provide extra credit for completing Extension Activities; allow time for students to share results with class.

Lesson Eight: Vocabulary Cards & Cadence Chant

- A. *Daily Objectives*
1. Concept Objective(s)

- a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
2. Lesson Content
 - a. Chemistry: Properties of Matter (p. 104)
 - i. Mass
 - ii. Volume
 - iii. Density
 - iv. Vacuum
 3. Skill Objective(s)
 - a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.
- B. Materials**
1. 3 x 5 lined index cards, 10 cards per student
 2. scissors
 3. quart-size zip lock bags used in lesson three
 4. colored markers
 5. Poster with Matter Poem and Cadence Chant, Appendix J
- C. Key Vocabulary**
Words from lesson six, What's the Matter?
- D. Procedures/Activities**
1. Share Matter Poem and Cadence Poster with class. Read together. For extra credit, encourage students to write poem of their own.
 2. Give 10 lined index cards to each student. Have students fold card down the middle; put their initials in upper corners of all cards.
 3. On back (unlined side) of one card, have students make mark of identical color and shape on each half. These must be different from the markings used with word list one (lesson three) Continue until all 10 cards have different markings. These markings will provide a self-checking system during vocabulary match games. Do not cut cards in half yet.
 4. On front (lined side) of first card, print "density" on half of card. Copy definition word log onto other half. Sketch a picture.
 5. Continue writing word, definition, and sketch for all 10 cards.
 6. Cut cards in half. Mix them; lay them face up. Match word to definition. Turn cards over to see if correct.
 7. Modification for special needs students—color-code the writing on front of all cards. Have students use blue to write words and definitions for this list of words. For next week's list, use a different color for word & definition. OR use different colored index cards for each new list of words. Use yellow index cards with list two; blue index cards with next week's list, etc. This will give students an additional visual cue as they match word to definition or picture.
 8. Mix cards with words from previous list. Try to match the 19 pairs.
 9. Put vocabulary cards into zip-lock bags.
- E. Assessment/Evaluation**
1. Encourage students to take vocabulary cards home to study.
 2. Have class challenge for matching cards.

Lesson Nine: Word Maps & Relationships

- A. 1. *Daily Objectives* Concept Objective(s)

- a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
 - c. Demonstrate general understanding of grade-level informational text across subject areas.
2. Lesson Content
- a. Chemistry: Properties of Matter (p. 104)
 - i. Mass
 - ii. Volume
 - iii. Density
 - iv. Vacuum
3. Skill Objective(s)
- a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.
 - c. Identify and/or summarize sequence of events, main ideas, facts, supporting details in informational selections.
- B. *Materials*
- 1. Appendix J, Posters of Matter Cadence chant and Atom Poem
 - 2. Appendix K, Word Map: States of Matter (student and answer key)
 - 3. Appendix L, Word Map: Atomic Structure (student and answer key)
 - 4. Appendix M, Word Relationships Activity
 - 5. Vocabulary Word Cards
- C. *Key Vocabulary*
Words in lesson six, “What’s the Matter?”
- D. *Procedures/Activities*
- 4. Practice Matter Cadence and Matter Poem.
 - 5. Pass out Appendix K & L, Word Maps: States of Matter & Atomic Structure. Discuss and complete together or in small groups.
 - 6. Pass out Appendix M, Word Relationships Activity. Do together because it is important for students to have a strong example sentence. Have students make suggestions for ways to complete sentence stems. Then copy the agreed-upon sentence completion on their paper.
 - 7. Encourage students to take vocabulary cards home to study.
- E. *Assessment/Evaluation*
- 4. Completed Word Maps, Word Relationships

Lesson Ten: What’s The Matter? Vocabulary Quiz

- A. 1. *Daily Objectives* Concept Objective(s)
 - a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
- 5. Lesson Content
 - a. Chemistry: Properties of Matter (p. 104)
 - i. Mass
 - ii. Volume
 - iii. Density
 - iv. Vacuum
- 6. Skill Objective(s)

- a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.
- B. *Materials*
- 1. Appendix N, What's The Matter? Vocabulary Quiz
- C. *Key Vocabulary*
- 1. Vocabulary list from lesson six
 - 2. Any review words from lesson one, Atoms
- D. *Procedures/Activities*
- 1. Remove Class Vocabulary chart & Poems
 - 2. Add any review words from lesson one, Atoms, to quiz.
 - 3. Pass out Appendix N, What's The Matter? Quiz
- E. *Assessment/Evaluation*
- 1. Grade Appendix N, vocabulary quiz.
 - 2. Decide which words to include on next week's list.

Lesson Eleven: Vocabulary, "It's Elementary"

- A. *Daily Objectives*
- 1. Concept Objective(s)
 - a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
 - c. Demonstrate general understanding of grade-level informational text across subject areas.
 - 2. Lesson Content
 - a. Elements (page 105)
 - i. Basic blocks of matter
 - ii. Familiar elements
 - 3. Skill Objective(s)
 - a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues
 - c. Identify key facts and information after reading two passages or articles on the same topic.
- B. *Materials*
- 1. Student Learning Portfolio
 - 2. Appendix B, Student Word Log
 - 3. *What Your Fourth Grader Needs to Know*, Revised by E.D. Hirsch
 - 4. *Learning About Atoms* by Susan Knorr, p. 4
 - 5. *Molecules and Atoms* by Rae Bains
 - 6. *The Atom Building Block of Nature* by Pat and Barbara Ward p. 22 & 27
 - 7. Chart paper and markers
 - 8. Illustration cards for vocabulary words
 - 9. Sheet of Aluminum foil
 - 10. Periodic Table of Elements chart
- C. *Key Vocabulary*
- 1. **Different:** unlike or not the same as the rest
 - 2. **Element:** a pure substance that cannot be broken down into simpler substances; made up of two or more of the same kind of atoms
 - 3. **Identical:** the very same in every way

4. **Periodic Table:** chart organized to show the elements
5. **Pure:** without anything mixed in
6. **Substance:** the materials something is made of
7. **Symbol:** a letter or picture used to represent something

D. *Procedures/Activities*

1. Determine student explanations of 7 key words in your study of elements.
2. Print the 7 vocabulary words on the board. Have students copy each word onto log sheet, Appendix B. Do not fill in anything else yet.
3. Introduce each word using the picture that illustrates it. Question students to elicit meaning elements of that particular word.
4. Read aloud from several different sources. You will need to pre-read and mark appropriate passages for these words.
5. *The Atom Building Block of Nature* by Pat and Barbara Ward is good source for description of atom and element. (page 22); periodic table of elements description is on page 27.
 - a. To help explain concept of atom and element, refer to demonstration from lesson one. *The Extraordinary Chemistry of Ordinary Things*, 3rd Edition, by Carl H. Snyder.
 - b. Demonstrate this concept another way:
Remind students that atoms are the building blocks of matter. They are so small that it would take two hundred million atoms in a row to make a line one inch long. An atom is the simplest form of matter that cannot be changed into a simpler form by ordinary means. An element is made of the same kind of atoms. We can break each element down into atoms that make up that element.
Take a piece of aluminum foil. (the element is aluminum because it has many of the same kind of atoms). Tear the foil into smaller and smaller pieces. You will have a pile of aluminum specks that are good for nothing. Each speck has millions and millions of aluminum atoms. Each atom is identical having the exact same properties.
6. Share Periodic Table of Elements chart. Identify familiar elements including: gold, copper, aluminum, oxygen, and iron.
7. After reading from several sources, have students agree on a definition. Write it onto chart paper so students can copy it into individual word log. Then have students sketch or illustrate the meaning; label as needed. Use your pre-made illustration cards as a sample.
8. Copy word, meaning and illustration to Class Vocabulary chart for future reference.
9. Review words by having students match each word with its picture.

E. *Assessment/Evaluation*

1. Appendix B, Student word log

Lesson Twelve: It's Elementary, Web Page Note-Taking

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Understand structure and properties of matter and changes in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
 - c. Demonstrate general understanding of grade-level informational text across subject areas.

- d. Access and organize information using one or more technologies.
- 2. Lesson Content
 - a. Elements
 - i. Basic blocks of matter
 - ii. Familiar elements
- 3. Skill Objective(s)
 - a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.
 - c. Access and organize information using one or more technologies.
 - d. Use technology to communicate information and ideas.
- B. *Materials*
 - 1. Student Learning Portfolio
 - 2. Appendix B, Student Word Log
 - 3. www.chem4kids.com/files/elem_intro.html
 - 4. <http://education.jlab.org/itselemental/index.html>.
Periodic Table of Elements printable chart
 - 5. Appendix O, Elements Webpage Note-Taking (one per student)
 - 6. Appendix E, Poetry
- C. *Key Vocabulary* “It’s Elementary” list lesson 11
- D. *Procedures/Activities*
 - 1. Lesson can be done by students in the computer lab or as teacher directed lesson using a LCD projector.
 - 2. Pass out Appendix O, Web Page Note-Taking. Remind students to record citing information from website.
 - 3. Preview note taking sheets; make sure students understand how to complete.
 - 4. Allow time for students to work in pairs to complete lesson.
 - 5. Provide Appendix E as extension activity for those who finish early. Working alone or with others, students can write an Elements poem.
- E. *Assessment/Evaluation*
 - 1. Check Appendix O for accuracy and completeness.

Lesson Thirteen: Vocabulary Cards

- A. *Daily Objectives*
 - 1. Concept Objective(s)
 - a. Increase word knowledge through systematic vocabulary development.
 - b. Demonstrate general understanding of grade-level informational text across subject areas.
 - 2. Lesson Content
 - a. Elements
 - i. Basic blocks of matter
 - ii. Familiar elements
 - 3. Skill Objective(s)
 - a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.
- B. *Materials*
 - 1. Student Learning Portfolio
 - 2. See items listed in lessons three and eight.
- C. *Key Vocabulary*

Words from lesson eleven, “It’s Elementary”

- D. *Procedures/Activities*
 - 1. Refer to procedures in lessons three and eight.
- E. *Assessment/Evaluation*
 - 1. Encourage students to take vocabulary cards home to study.
 - 2. Have class challenge for matching cards.

Lesson Fourteen: Word Relationships

- A. *Daily Objectives*
 - 1. Concept Objective(s)
 - c. Increase word knowledge through systematic vocabulary development.
 - d. Demonstrate general understanding of grade-level informational text across subject areas.
 - e. Demonstrate general understanding of grade-level informational text across the subject areas.
 - 2. Lesson Content
 - a. Elements
 - i. Basic blocks of matter
 - ii. Familiar elements
 - 3. Skill Objective(s)
 - a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.
 - c. Identify and/or summarize sequence of events, main ideas, facts, supporting details in informational selections.
- B. *Materials*
 - 1. Student Learning Portfolio
 - 2. Appendix P, Word Relationships
 - 3. Periodic Table of Elements chart,
<http://education.jlab.org/itselemental/index.html>
 - 4. Miniature colored marshmallows (three different colors); toothpicks
9 - 12 marshmallows (3 colors) 3 - 4 toothpicks per student.
- C. *Key Vocabulary* Words from lesson 11, “It’s Elementary”
- D. *Procedures/Activities*
 - 1. Pass out Appendix P, Word Relationships.
 - 2. Preview activity; make sure students understand how to complete it.
 - 3. Pass out marshmallows and toothpicks. Students will have to decide how many of each they need to make atoms.
 - 4. Provide extension activity for those who finish early.
- E. *Assessment/Evaluation*
 - 1. Check Appendix P for accuracy and completeness.

Lesson Fifteen: It’s Elementary, Vocabulary Quiz

- A. 1. *Daily Objectives* Concept Objective(s)
 - a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
- 2. Lesson Content
 - a. Elements
 - i. Basic blocks of matter

- ii. Familiar elements
 - 3. Skill Objective(s)
 - a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.
- B. *Materials*
 - 1. Appendix Q, It's Elementary Vocabulary Quiz
- C. *Key Vocabulary*
 - 1. Vocabulary list, lesson eleven
 - 2. Review words from Atom's Family and What's The Matter? lists
- D. *Procedures/Activities*
 - 1. Add any review words to quiz from lessons one and six.
 - 2. Remove Class Vocabulary chart & Poems
 - 3. Pass out Appendix Q, It's Elementary Quiz
- E. *Assessment/Evaluation*
 - 1. Grade vocabulary quiz.
 - 2. Decide which words to include on next week's list.

Lesson Sixteen: Vocabulary, It's A Solution

- A. *Daily Objectives*
 - 1. Concept Objective(s)
 - a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
 - c. Demonstrate general understanding of grade-level informational text across subject areas.
 - 2. Lesson Content
 - a. Solutions
 - i. Solutions
 - ii. Concentration
 - 3. Skill Objective(s)
 - a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.
 - c. Identify key facts and information after reading two passages or articles on the same topic.
- B. *Materials*
 - 1. Student learning portfolio
 - 2. Appendix B, Student Word Log
 - 3. *What Your Fourth Grader Needs to Know*, 2005 version by ED Hirsch
 - 4. *The World of Matter* by Ron Cole
 - 5. *The Atom Building Block of Nature* by Pat and Barbara Ward
 - 6. *Science Discovery Activities* Kit by Frances Bartlett Barhydt, pgs .103 – 109, Mixtures and Solutions
 - 7. Pictures to illustrate each of The Solution words—made in advance
 - 8. Notebook paper
 - 9. Mixture demonstration: water, pebbles or marbles, 15 ml salt; stirrer, four empty jars, tweezers, small screen or plastic grid, saucer, paper towels.
 - 10. Solution demonstration #1: sugar, flour, food coloring, large jar of water, three baby food jars, stirrer, three coffee filters.

11. Solution demonstration #2: large jar of water, empty jar for used water, clear jars, stirrer, one coffee filter for each test, sugar cubes, brown sugar, vinegar, pepper, corn starch, cooking oil
- C. *Key Vocabulary*
1. **Concentration:** The amount of solute dissolved in a solvent
 2. **Dissolve:** To make a solid disappear into a liquid solution
 3. **Mixture:** a combination of substances which do not combine chemically and can be divided into the separate parts.
 4. **Saturation Point:** the point at which no more of a solute can be dissolved (teacher word)
 5. **Solute:** any substance dissolved in a solvent
 6. **Solution:** a homogeneous mixture of two or more substances that are blended completely, and the mixture is the same throughout; a liquid containing another substance dissolved in it.
 7. **Solvent:** a substance, often a liquid, that can dissolve another substance
- D. *Procedures/Activities*
1. Prepare picture cards to illustrate vocabulary words.
 2. Prepare materials for class demonstration.
 3. Introduce “mixture” as your first word. “The Making and Separating Mixtures” (lesson 11) activity from *Science Discovery Activities Kit* is simple to do. Students will use a mix of pebbles and salt; pebbles and water; salt and water; and pebbles, salt, and water. Use clean pebbles, salt, and water for each mixture. Pick student(s) to make each mixture and allow time for everyone to record observations. Provide variety of tools that could be used to separate mixtures. Ask students to predict possible ways of separating each mixture. Then have student(s) demonstrate. Students record results on notebook paper in student learning portfolio. Students should understand that a mixture is a combination of substances that do not combine chemically and can be separated without a chemical change.
 4. Introduce “solution” as next word. “The Solution, a Special Kind of Mixture” (lesson 12) and “Identifying and Classifying Items that will/will not form a Solution” (lesson 13) from *Science Discovery Activities Kit* are easy demonstrations. Students should understand that a solution mixes evenly; is transparent; and will not separate when filtered.
 5. Introduce other vocabulary words as appropriate during demonstrations (sugar dissolves in water; water is the solvent; sugar is the solute). Identify each word using the picture that illustrates it. Question students to elicit meaning elements of that particular word. Read aloud from several different sources, including *What Your Fourth Grader Needs to Know*, Revised version.
 6. After reading from several sources, have students agree on a definition for each word. Write definition onto chart paper so students can copy it to individual word log. Then have students sketch or illustrate the meaning; label as needed. Use your pre-made illustration card as a sample. Do for all 7 words.
- E. *Assessment/Evaluation*
1. Student word logs, Appendix B
 2. Observations and notes from demonstrations

Lesson Seventeen: It’s A Solution Web Page Note-Taking

- A. *Daily Objectives*
1. Concept Objective(s)

- a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
 - c. Demonstrate general understanding of grade-level informational text across the subject areas.
 - d. Access and organize information using one or more technologies
2. Lesson Content
- Solutions
 - i. Solutions
 - ii. Concentration
7. Skill Objective(s)
- a. Determine meanings of words using contextual and structural clues.
 - b. Identify key facts and information after reading two passages or articles on the same topic.
 - c. Access and organize information using one or more technologies.
 - d. Use technology to communicate information and ideas.
- B. *Materials*
- 1. Student Learning Portfolio
 - 2. Appendix B, Student Word Log
 - 3. www.bbc.co.uk/schools/revisewise/science/materials/10_act.shtml
 - 4. Appendix R, Webpage Note-Taking (one per student)
 - 5. Appendix J, Cadence Chant (extension activity)
- C. *Key Vocabulary*
- Words from lesson sixteen, It's A Solution
- D. *Procedures/Activities*
- 1. Lesson can be done by students in the computer lab or as teacher directed lesson using a LCD projector.
 - 2. Pass out Appendix R, Web Page Note-Taking sheets. Preview note-taking sheets; make sure students understand how to complete.
 - 3. Allow time for students to work alone or in pairs to complete lesson.
 - 4. Provide Appendix J, Cadence Chant as extension activity for those who finish early. They can work alone or with others to write a Cadence Chant.
 - 5. Have students put Web Page Note-Taking into their Learning Portfolio.
- E. *Assessment/Evaluation*
- 1. Check Appendix R for accuracy and completeness of answers.

Lesson Eighteen: Vocabulary Word Cards

- A. *Daily Objectives*
- 1. Concept Objective(s)
 - a. Increase word knowledge through systematic vocabulary development.
 - b. Demonstrate general understanding of grade-level informational text across subject areas.
 - 2. Lesson Content
 - a. Chemistry: Basic Terms and Concepts
 - i. Solution
 - ii. Concentration
 - 3. Skill Objective(s)
 - a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.

- B. *Materials*
 - 1. Student Learning Portfolio
 - 2. See materials lessons three, eight, and thirteen.
- C. *Key Vocabulary*
Words from lesson sixteen, “It’s a Solution”; review all words.
- D. *Procedures/Activities*
 - 1. Refer to directions in lessons three, eight or thirteen
- E. *Assessment/Evaluation*
 - 1. Encourage students to take vocabulary cards home to study.
 - 2. Have class challenge for matching cards.

Lesson Nineteen: Word Relationships

- A. *Daily Objectives*
 - 1. Concept Objective(s)
 - e. Increase word knowledge through systematic vocabulary development.
 - f. Demonstrate general understanding of grade-level informational text across subject areas.
 - g. Demonstrate general understanding of grade-level informational text across the subject areas.
 - 2. Lesson Content
 - a. Solutions
 - i. Solution
 - iii. Concentration
 - 3. Skill Objective(s)
 - a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues
 - c. Identify and/or summarize sequence of events, main ideas, facts, supporting details in informational selections.
- B. *Materials*
 - 1. Student Learning Portfolio
 - 2. Appendix S, Word Relationships
 - 3. Colored dots (2 colors), 8 – 10 per student.
- C. *Key Vocabulary* Words from lesson 16, “It’s a Solution”
- D. *Procedures/Activities*
 - 1. Pass out Appendix S, Word Relationships.
 - 2. Preview activity; make sure students understand how to complete it.
 - 3. Provide extension activity for those who finish early.
- E. *Assessment/Evaluation*
 - 1. Check Appendix S for accuracy and completeness.

Lesson Twenty: Chemistry Unit Assessment

- A. 1. *Daily Objectives* Concept Objective(s)
 - a. Understand structure and properties of matter and changes that occur in the physical/chemical world.
 - b. Increase word knowledge through systematic vocabulary development.
- 2. Lesson Content
 - a. Elements
 - i. Basic blocks of matter
 - iii. Familiar elements
- 3. Skill Objective(s)

- a. Determine meanings of words using contextual and structural clues.
 - b. Distinguish and interpret words with multiple meanings by using context clues.
- B. *Materials*
 - 1. Appendix A, Create a Chain Reaction Unit Vocabulary Assessment
- C. *Key Vocabulary*
 - 1. Vocabulary lists, lesson one, six, eleven, and sixteen.
- D. *Procedures/Activities*
 - 1. Remove Class Vocabulary charts & Poems
 - 2. Give students a new copy of Appendix A, Create a Chain Reaction Vocabulary Assessment.
- E. *Assessment/Evaluation*
 - 1. Grade Appendix A, Unit Vocabulary post-assessment.
 - 2. Grade student learning portfolios.

VI. CULMINATING ACTIVITY

If time allows, divide students into groups of four. Assign each group a topic and have them create a visual or model. Topics should include: Atoms; States of Matter; Elements; Solutions. Some suggested projects would include: mobiles, 3-D structures, posters, chants etc. Put these into hall display areas. This could also be offered as an extra credit assignment to be done at home.

VII. HANDOUTS/WORKSHEETS

Appendix A, Create a Chain Reaction, Unit Vocabulary pre and post-assessment
 Appendix B, Student Word Log
 Appendix C, Who's Who in Chemistry
 Appendix D, Atom's Family, Web Page Note-Taking
 Appendix E, Atom's Poem
 Appendix F, Word Relationships, Atoms
 Appendix G, Atom's Family Vocabulary Quiz
 Appendix H, What's the Matter? Web Page Note-Taking
 Appendix I, What's the Matter? Web Page Note-Taking
 Appendix J, What's the Matter? Poem and Cadence Chant; Chemistry Chant
 Appendix K, What's the Matter? Word Map: States of Matter
 Appendix L, What's the Matter? Word Map: Atomic Structure
 Appendix M, What's the Matter? Word Relationships
 Appendix N, What's the Matter? Vocabulary Quiz
 Appendix O, It's Elementary, Web Page Note-Taking
 Appendix P, It's Elementary, Word Relationships
 Appendix Q, It's Elementary, Vocabulary Quiz
 Appendix R, It's a Solution, Web Page Note-Taking
 Appendix S, It's a Solution, Word Relationships

VIII. BIBLIOGRAPHY

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Electronic Resources

- A. <http://education.jlab.org/>
- B. <http://www.nationalgeographic.com/ngkids/trythis/tryfun6.html>:
- C. <http://www.bbc.co.uk/schools/revisewise/science/materials/>
- D. http://www.nyu.edu/pages/mathmol/textbook/text_contents.html
- E. http://www.edinformatics.com/math_science/mass.htm
- F. <http://www.nationalgeographic.com/ngkids/trythis/tryfun6.html>
- G. <http://library.thinkquest.org/11771/english/hi/chemistry/dense.shtml>
- H. http://www.chem4kids.com/files/matter_solid.html
- I. www.chem4kids.com/files/elem_intro.html
- J. <http://education.jlab.org/itselemental/index.html>
- K. www.bbc.co.uk/schools/revisewise/science/materials/10_act.shtml
- L. <http://www.school-for-champions.com/science/chemformulas.htm>
- M. <http://www.pbs.org/wgbh/aso/tryit/atom/elempartp.html>
- N. http://www-groups.dcs.st-and.ac.uk/~history/Mathematicians/Bohr_Niels.html
- O. <http://nobelprize.org/physics/laureates/1922/bohr-bio.html>
- P. http://www.fact-index.com/n/ni/niels_bohr.html

- Q. http://en.wikipedia.org/wiki/Niels_Bohr
- R. http://www.slcc.edu/schools/hum_sci/physics/whatis/biography/dalton.html
- S. http://en.wikipedia.org/wiki/John_Dalton
- T. <http://www.chemheritage.org/EducationalServices/chemach/ppt/jd.html>
- U. <http://antoine.frostburg.edu/chem/senese/101/atoms/dalton.shtml>
- V. <http://scienceworld.wolfram.com/biography/Dalton.html>
- W. <http://www.projectglad.com/glad.html>

Appendix A, Create a Chain Reaction, Unit Vocabulary Assessment

Name _____

Word	Do not know	Have seen or heard word	Know something about it & can give example	Example	Know well, can explain & use it	Explain the word & give a clear example of how to use it
1. atom						
2. electron						
3. element						
4. matter						
5. molecule						
6. neutron						
7. nucleus						
8. proton						

Appendix A, Unit Vocabulary (cont.)

Word	Do not know	Have seen or heard word	Know something about & can give example	Example	Know well, can explain & use it	Explain the word & give a clear example of how to use it
9. repel						
10. density						
11. gas						
12. liquid						
13. mass						
14. plasma						
15. solid						
16. property						
17 vacuum						
18. volume						

Appendix A, Unit Vocabulary (cont.)

Word	Do not know	Have seen or heard word	Know something about and can give example	Example	Know well, can explain & use it	Explain the word & give a clear example of how to use it
19. weight						
20. different						
21. element						
22. identical						
23. periodic table						
24. pure						
25. substance						
26. symbol						
27. concentration						
28. dissolve						

Appendix A, Unit Vocabulary (cont.)

Word	Do not know	Have seen or heard word	Know something about and can give example	Example	Know well, can explain & use it	Explain the word & give clear example of how to use it
29. mixture						
30. saturation point						
31. solute						
32. solution						
33. solvent						

Appendix B, Student Word Log

Name _____

Vocabulary Word	Definition(s)	Sketch or Illustration

Appendix C, Who's Who in Chemistry?

Name _____

Scientist _____ Background Information: Family, education, jobs	Major Dates & Important Events:
Contributions to Science: Admirable Traits:	Obstacles:

Scientist _____ Background Information: Family, education, jobs	Major Dates & Important Events:
Contributions to Science: Admirable Traits:	Obstacles:

Appendix D, Atom's Family, Web Page Note-Taking

Name _____

Author's Last Name	
Author's First Name	
Title of Page or Site	
Name of Institution/Organization	Jefferson Laboratory
Date of Visit to Site	
URL of Page or Site	http://education.jlab.org/atomtour/index.html

All About Atoms

What are Atoms?

How many types of atoms are there?

Click on **protons**.

What have scientists discovered?

When did they discover it?

Sketch and label the inside of a proton.

Click on **neutrons**.

When was the neutron first discovered?

What have scientists discovered about the inside of the neutron?

When did they discover this?

Sketch and label the inside of a neutron.

Click on **nucleus**.

When was the nucleus first discovered?

When did scientists identify its parts?

Sketch and label the nucleus.

Click on **electron**.

What are two characteristics of electrons?

1.

2.

How are electrons used?

Click on **Fun Facts**.

How does the weight of an electron compare to a proton?

How does a proton compare to a neutron?

Sketch and label the following:

Hydrogen Atom

Helium Atom

Carbon Atom

Appendix D, Web Page Note-taking cont.

Name _____

Author's Last Name	
Author's First Name	
Title of Page or Site	
Name of Institution/Organization	Andrew Rader Studios
Date of Visit to Site	
URL of Page or Site	http://www.chem4kids.com/files/atom_intro.html

Atoms Around Us

If you want to build molecules, you will need _____. Each element is a little bit _____ than the rest. Elements are the _____ to the language of molecules.

All _____ are made of _____. The three parts of an atom are: _____, _____, _____.

Matter is used in _____; _____ create elements. Elements are used to build _____.

Click on **Structure** (side bar) or go to Next Stop on Tour (bottom of page).
Read passage to answer these questions.

What makes one element different from another?

What is another name for the path electrons take around the nucleus?

Sketch and label a diagram of an atom that shows positive, negative, and neutral charges.

Click on **Electrons** (side bar)

Electrons are found in _____ that surround the _____ of atom.

Power Up

Explain how electrons create current electricity.

Appendix E, Atom Poem

ATOMS

Atoms here, Atoms there,
Atoms, Atoms, everywhere!

Too small to see,
Where can they be,
Found inside of me?

Protons and neutrons
Inside the nucleus
Have positive or no charge
And negative electrons buzzing round

Atoms here, Atoms there,
Atoms, Atoms, everywhere!

Atoms! Atoms! Atoms!

Title _____
By _____

_____ here, _____ there,
_____, _____, everywhere!

_____, _____, _____,
_____, _____, _____,
_____, _____, _____,
And _____, _____, _____!

_____, _____, _____,
_____, _____, _____,
_____, _____, _____,
And _____, _____, _____!

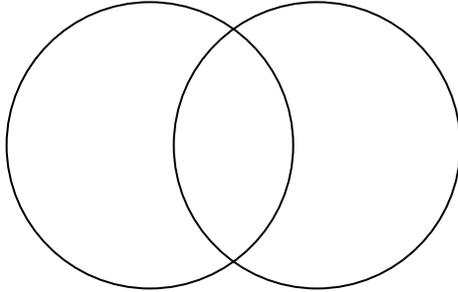
_____ here, _____ there,
_____, _____, everywhere!

_____! _____! _____

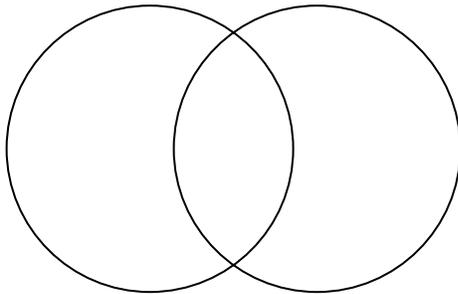
Appendix F, Word Relationships, Atom's Family

Name _____

Use the Venn Diagram to compare/contrast Electrons with Protons



Use the Venn Diagram to compare/contrast Protons with Neutrons



How is an atom related to a molecule?

Arrange these in size from **largest to smallest:**

molecule, dog, proton, nucleus, atom

_____, _____, _____, _____, _____

Arrange these in order from the center (core) of the atom out to the cloud.

neutron, electron, nucleus, cloud

_____, _____, _____, _____

WORD BANK

Atom, electron, element, matter, molecule, neutron, nucleus, proton, repel

Hot is to cold as _____ is to _____.

Yoke is to an egg as _____ is to _____.

An _____ is made up of only one kind of atom.

Appendix G, Atom Vocabulary Quiz

Name _____ Date _____

1. Electron
 - a. Found inside the nucleus
 - b. Has positive charge
 - c. Has negative charge
 - d. Attracts other electrons

2. Nucleus
 - a. Outside shell of atom
 - b. Contains the electrons
 - c. Contains electrons and neutrons
 - d. Center of atom

3. Matter
 - a. Something that does not take up space
 - b. Something that has mass and takes up space
 - c. Center of an atom
 - d. Part of atom that has no charge.

4. Repel
 - a. Electron and proton pulling towards each other
 - b. Two electrons coming together
 - c. Two electrons pushing apart
 - d. Empty space in the nucleus

5. Proton
 - a. Smallest part of an element
 - b. Found outside the nucleus
 - c. Has positive charge
 - d. Has negative charge

6. Atom
 - a. Smallest part of an element
 - b. Center of neutron
 - c. Orbits the nucleus
 - d. Can be seen by naked eye

7. Element
 - a. The number of protons and neutrons in atom
 - b. Made up of only one kind of atom
 - c. Orbits the nucleus
 - d. Has a positive charge

8. Neutron
 - a. Outside shell of atom
 - b. Contains electrons
 - c. Has no charge
 - d. Made up of only one kind of atom

9. Molecule
 - a. Smallest unit of matter made up of two or more atoms combined
 - b. Does not take up space
 - c. Found inside the nucleus
 - d. Smallest part of an atom

Appendix H, What's The Matter? Web Page Note-Taking

Name _____

Author's Last Name	
Author's First Name	
Title of Page or Site	
Name of Institution/Organization	British Broadcasting Company
Date of Visit to Site	
URL of Page or Site	http://www.bbc.co.uk/schools/revisewise/science/materials/

Select **Solids, Liquids, & Gases Activity**

List Main Characteristics	Sketch container and particles within it
Solids 1. 2. 3.	
Liquids 1. 2. 3.	
Gases 1. 2. 3. 4.	

Select **Fact Sheet**. What is steam?

How does heat change material from solid to gas? Sketch ice picture and label	solid	liquid	gas
How does cooling change material from gas to solid? Sketch dew and label.	gas	liquid	solid
Water Cycle Steps 1.	2.	3.	4.

Select **Take the Test**. Record your score. /15 points earned.

Appendix I, Web Page Note-Taking

Name _____

Author's Last Name	
Author's First Name	
Title of Page or Site	
Name of Institution/Organization	MathMol Hypermedia Textbook for Elementary School
Date of Visit to Site	
URL of Page or Site	http://www.nyu.edu/pages/mathmol/Etextbook/text_contents.html

Select **Elementary School**

Select **Grade 4: Matter, Chapter 1- What is Matter?**

Read and record below

Key Word	Definition	Example
Property		
Physical Property		
Density		
Volume		
Chemical Property		
Physical Change		
Chemical Change		

Select **Chapter Two: States of Matter**

State of Matter	Example of Change in size or shape
Solids	
Liquids	
Gases	

Appendix J, Matter Poem and Cadence Chant
By Jennifer England

MATTER

Matter here, Matter there,
Matter, Matter, everywhere!

Filling up some space,
Having mass and weight,
Change from state to state.

Solids like a vase
Liquids flow and race
Gases without shape

Matter here, Matter there,
Matter, Matter, everywhere!
Matter! Matter! Matter!

Matter Cadence Chant

We just know what we've been told,
There are many ways that matter can unfold.
There are three different forms that it can take,
Better listen up; don't make a mistake!

Sound off, solid
Sound off, liquid and gas
1, 2, 3, 4. 1, 2, 3, 4!

Solid is one state that you should know,
Specific shape and volume make it so,
Desks, chairs, and pencils fit this type,
Even juicy peaches that are ripe.

Sound off, solid
Sound off, liquid and gas
1, 2, 3, 4. 1, 2, 3, 4!

The next form is liquids,
That have no shape,
Flowing water and kool-aid
Sometimes evaporate.

Sound off, solid
Sound off, liquid and gas
1, 2, 3, 4. 1, 2, 3, 4!

Now we come to gasses,
With no volume or shape,
Like oxygen and helium,
The invisible ones in space.

Sound off, solid
Sound off, liquid and gas
1, 2, 3, 4. 1, 2, 3, 4!

Appendix J (cont.), Chemistry Chant- Extension Activity
By Becky Mitchell, June 2005

Well is this **matter**?
Tell me, is this **matter**?
Well how do you know?
Well how do you know?
Now tell me more about it.
Now tell me more about it.

Yes Ma'am!
Yes Ma'am!
All objects are made of matter.
You and I are made of matter
Everything and everyone one
Well, we're all made up of matter!

Well is this **matter**?
Tell me, is this **matter**?
Well how do you know?
Well how do you know?
Now tell me more about it.
Now tell me more about it.

Yes Ma'am!
Yes Ma'am!
Everything you touch is matter.
It takes up space and has mass.
Like this desk, your hair and feet
The air you breathe, your shoes, your feet!

Well is this **matter**?
Tell me, is this **matter**?
Well how do you know?
Well how do you know?
Now tell me more about it.
Now tell me more about it.

Yes Ma'am!
Yes Ma'am!
It's composed (made up) of tiny atoms.
The smallest building block of matter..
Is the tiny little atom.
that makes up everyday objects!

Is this an **atom**?
Is this an **atom**?
Well how do you know?
Well how do you know?
Now tell me more about it.
Now tell me more about it.

Yes Ma'am!
Yes Ma'am!
Everything that has mass is matter.
which is made up of smaller pieces.
Those pieces are the atoms-
the basic building blocks of matter.

Is this an **atom**?
Is this an **atom**?
Well how do you know?
Well how do you know?
Now tell me more about it.
Now tell me more about it.

Yes Ma'am!
Yes Ma'am!
It has subatomic particles.
Neutron, proton & electron.
Protons and neutrons stay inside the nucleus
With electrons in the outer orbits!

Is this an **atom**?
Is this an **atom**?
Well how do you know?
Well how do you know?
Now tell me more about it.
Now tell me more about it.

Yes Ma'am!
Yes Ma'am!
Those electrons are always moving.
Spinning quickly 'round the nucleus.
But staying in their own shell
In their orbital energy level.

Is this an **atom**?
Is this an **atom**?
Well how do you know?
Well how do you know?
Now tell me more about it.
Now tell me more about it.

Yes Ma'am!
Yes Ma'am!
Well those little moving electrons
Are so very, very small
And they have a negative charge.
But they stay within their shells

Is this an **atom**?
Is this an **atom**?
Well how do you know?
Well how do you know?
Now tell me more about it.
Now tell me more about it.

Yes Ma'am!
Yes Ma'am!
Because there are protons in the nucleus
And protons have a positive charge
They're much larger than an electron
Bound with neutrons, yes they are

Is this an **atom**?
Is this an **atom**?
Well how do you know?
Well how do you know?
Now tell me more about it.
Now tell me more about it.

Yes Ma'am!
Yes Ma'am!
Neutrons in the nucleus,
They do not carry a charge
About the same size as a proton,
They just don't move very far.

Is this an **element**?
Is this an **element**?
Well how do you know?
Well how do you know?
Now tell me more about it.
Now tell me more about it.

Yes Ma'am!
Yes Ma'am!
All elements are composed of atoms-
Atoms of the same element are exactly alike
Atoms of different elements are different
Elements are the simplest purest substance

Is this an **element**?
Is this an **element**?
Well how do you know?
Well how do you know?
Now tell me more about it.
Now tell me more about it.

Yes Ma'am!
Yes Ma'am!
Gold, Silver, Aluminum and Hydrogen
Are all elements you must know
But wait, oh yes there's more!
Carbon, Neon, Nitrogen and a 100 more!

Is this a **compound**?
Is this a **compound**?
Well how do you know?
Well how do you know?
Now tell me more about it.
Now tell me more about it.

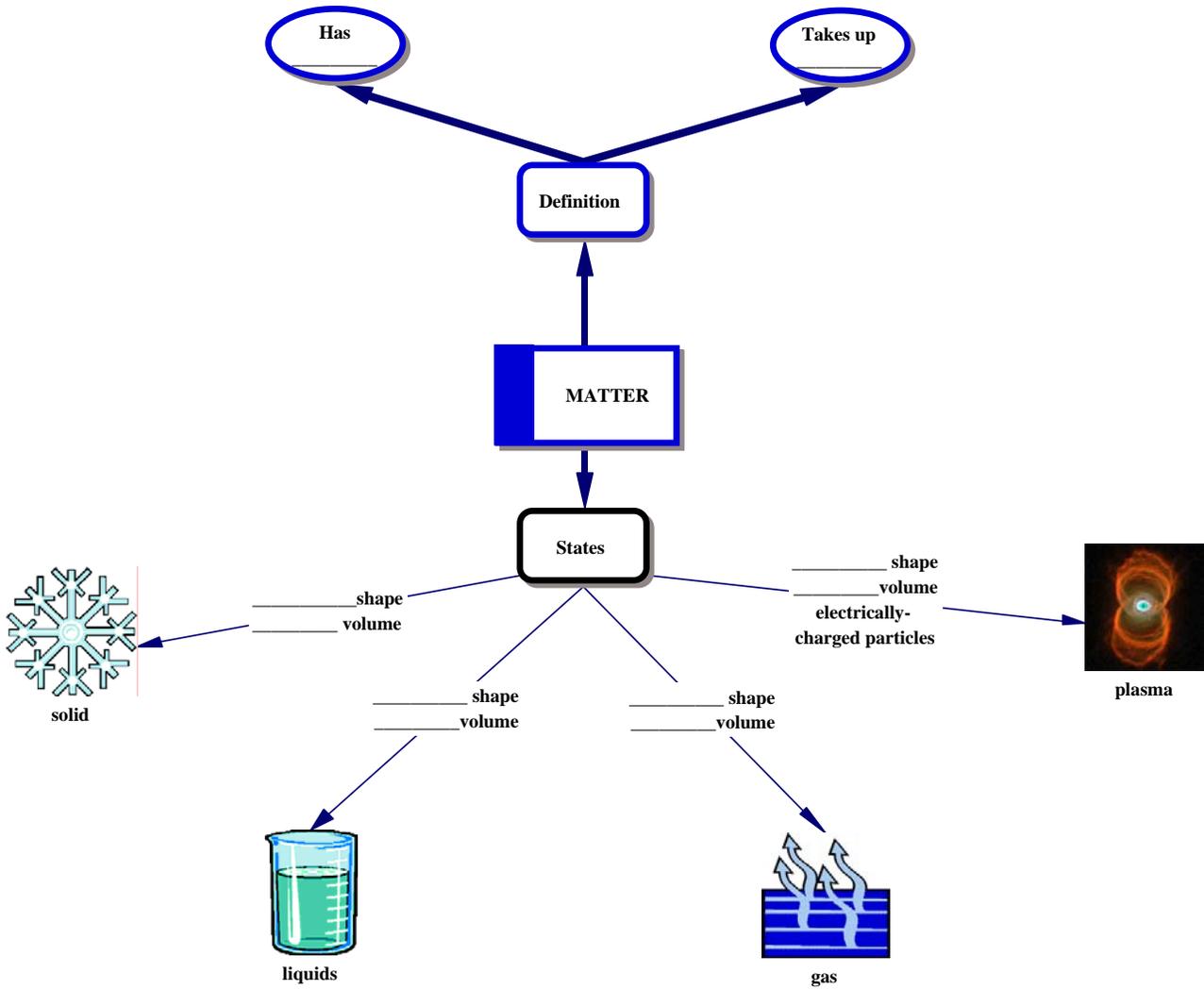
Yes Ma'am!
Yes Ma'am!
Those elements can come together
To form the things you know the best.
Like water (H₂O), and salt (NaCl)
To form compounds- found in stores-

**Like sugar (C₁₂H₂₂O₁₁) and caffeine, C₈H₁₀N₄O₂
Aspirin (C₉H₈O₄) and TNT (C₇H₅(NO₂)₃)
And even the rocks below our feet quartz (silicon), SiO₂
and precious gems, like the ruby, Al₂O₃.**

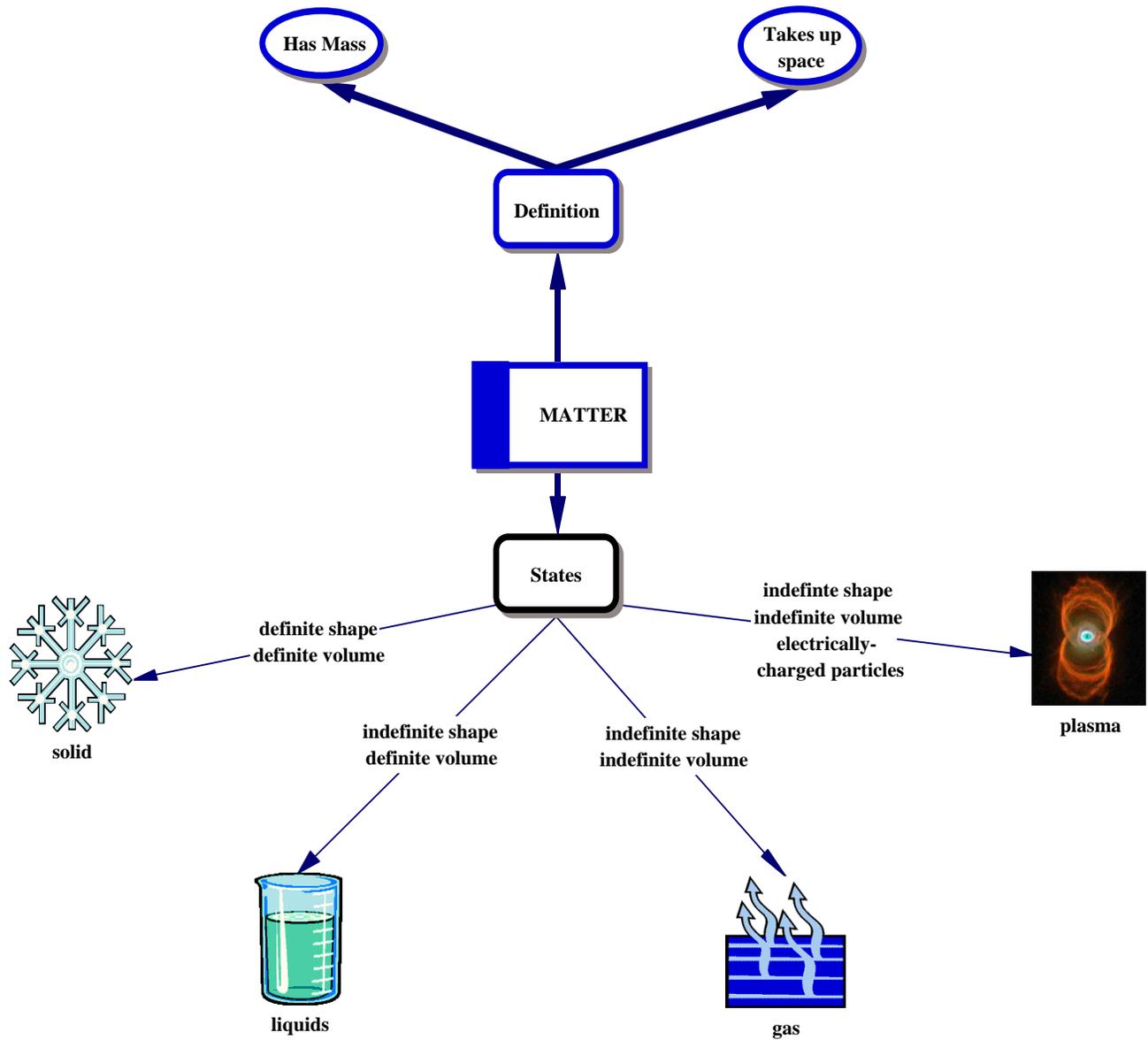
Appendix K, What's The Matter?, Word Map: States of Matter

Name _____

Date _____



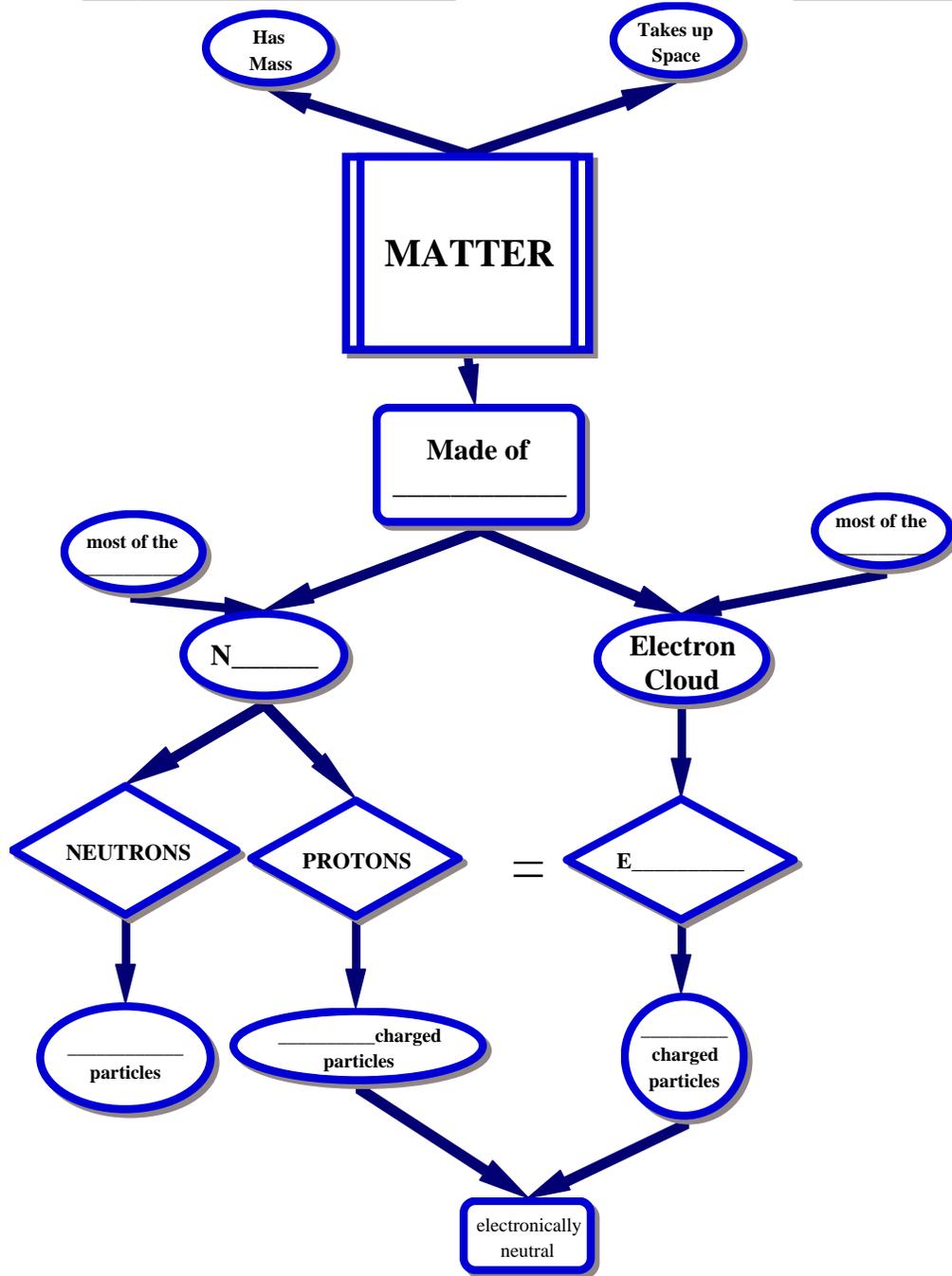
Appendix K, What's The Matter?, Word Map: States of Matter (cont.) (Answer Key)

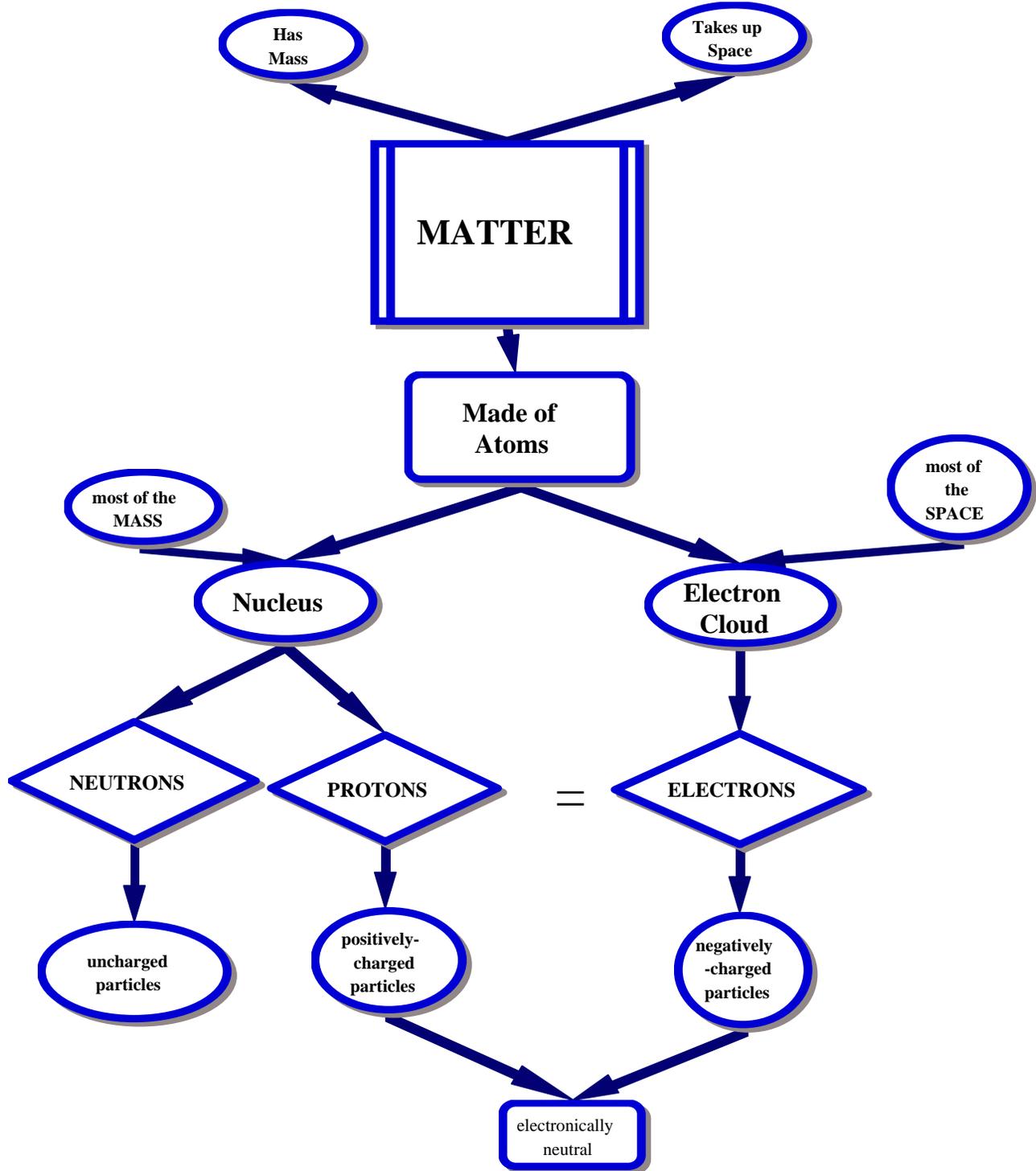


Appendix L, What's The Matter?, Word Map: Atomic Structure

Name _____

Date _____





Appendix M, What's The Matter?, Word Relationships

Name _____ Date _____

1. (density)
I was surprised when the oil floated on water because _____.
2. (mass)
You can't use weight alone to figure out how much matter an object has. Instead you have to use _____ because _____.
3. (vacuum)
We tried to pump the air out of the bottle but _____.
4. (gas)
The water began to boil so _____.
5. (property)
We wanted to compare electrons to protons and the _____.
6. (volume)
At first I thought the containers were the same size so I poured the milk from one to another but _____.
7. (solid)
The frozen water was no longer liquid because _____.
8. (liquid)
The ice melted so that it no longer had _____.
9. (plasma)
The surface of the sun is like a gas but _____.
10. When molecules are heated, the molecules move: faster slower.
11. When molecules get colder, they move: faster slower
12. Compared to earth, your mass on moon would be: more less same
13. Compared to earth, your weight on moon would be: more less same
14. The volume of a box 2 x 4 x 3 would be _____ cubic inches.
15. The amount of water a container can hold is measure of _____.

Appendix N, What's The Matter?, Vocabulary Quiz

Name _____ Date _____

1. Matter in a liquid state has:
 - a. no definite volume and no definite shape
 - b. a definite volume and a definite shape
 - c. a definite volume and no definite shape

2. This form of matter does not take the shape of the container
 - a. solid
 - b. liquid
 - c. gas

3. Which of these does not describe a property of a liquid?
 - a. flows
 - b. takes shape of its container
 - c. has no volume

4. What is the same on earth and on the moon?
 - a. weight
 - b. mass

5. The amount of space an object takes up is:
 - a. vacuum
 - b. density
 - c. volume

6. Matter that is less dense than water will
 - a. sink to the bottom
 - b. stay in the middle
 - c. go to the top

7. A state of matter that is electronically charged
 - a. gas
 - b. plasma
 - d. electron

8. A measure of how tightly packed matter is
 - a. volume
 - b. vacuum
 - d. density

9. Another name for the absence of matter is
 - a. volume
 - b. vacuum
 - c. density

Appendix O, It's Elementary, Web Page Note-Taking

Name _____

Author's Last Name	
Author's First Name	
Title of Page or Site	
Name of Institution/Organization	Andrew Rader Studios
Date of Visit to Site	
URL of Page or Site	http://www.chem4kids.com/files/elem_intro.html

Periodic Table and the Elements

Elements are the _____ of all matter. Scientists have discovered or created over _____ elements.

Scroll down; click on **Element one: Helium**.

Name of Element	Symbol for Element	Solid, Liquid, Gas	Click on Find It. List 3 places found
1. Helium	H	Gas	1. 2. 3.
2.			1. 2. 3.
3.			1. 2. 3.
4.			1. 2. 3.
5.			1. 2. 3.
6.			1. 2. 3.
7.			1. 2. 3.
8.			1. 2. 3.
9.			1. 2. 3.
10.			1. 2. 3.

Appendix P, It's Elementary, Word Relationships

Name _____ Date _____

(different)

1. It was obvious that the substances were _____ because _____
_____.

(element)

2. When a material is an _____, the atoms _____
_____.

(identical)

3. It was obvious the materials were _____ because _____
_____.

(periodic table)

4. Dmitri Mendeleev created the _____ which
_____.

(pure)

5. You can describe an element as _____ because _____
_____.

(substance)

6. Water is _____.

(symbol)

7. The Periodic Table uses _____ to _____
_____.

Use colored marshmallows and toothpicks to build a 3-D atom. It should have 2 protons, 2 neutrons, and 2 electrons.

Sketch your atom here.

Sketch an element with two of these atoms.

Appendix Q, It's Elementary, Vocabulary Quiz

Name _____

Date _____

1. An element is
 - a. only found in nature
 - b. many atoms of the same kind
 - c. the smallest part of anything
 - d. many atoms of different kinds

2. The periodic table is
 - a. a list of common atoms
 - b. an arrangement of the nucleus of an atom
 - c. a chart that shows the elements
 - d. many of the same kind of atoms

3. A pure substance is
 - a. mixed with other materials
 - b. has nothing else mixed in it
 - c. always white
 - e. found in the electrons of an atom

4. A symbol is
 - a. one, two, or three letters used to represent an atom
 - b. the sum of protons and neutrons
 - c. found in the electron shell of the atom
 - d. always only one letter

5. Something is different if
 - a. there is another one like it
 - b. it is not the same as the rest
 - c. it has more protons than neutrons
 - d. it matches other atoms

6. A substance is
 - a. what something is made of
 - b. found on the periodic table
 - c. found only in nature
 - d. part of an atom

7. To be identical is
 - a. unlike in every way
 - b. similar to the rest
 - c. exactly the same in every way
 - d. the same in some ways

Appendix R, It's A Solution, Web Page Note-Taking

Name _____

Author's Last Name	
Author's First Name	
Title of Page or Site	
Name of Institution/Organization	British Broadcasting Company (BBC)
Date of Visit to Site	
URL of Page or Site	www.bbc.co.uk/schools/revisewise/science/materials/10_act.shtml

Click on **Activity—Wise Up**. Fill in the chart.

Word	What It Means	Some Examples
dissolving		
soluble		
insoluble		
evaporation		
sieving		
filtering		

Click on **Fact Sheet**.

Word	What It Means	Some Examples
solution		
saturated		

Sketch and label the steps to separate a soluble substance from a liquid.

Sketch and label the steps to separate an insoluble substance from liquid.

Steps to separate two insoluble liquids—decanting

1. Oil and water
2. Solids in dirty water

Click on **Test**. Record your score /15 points.

Appendix S, It's a Solution, Word Relationships

Name _____ Date _____

Use colored dots to represent:

An Atom	An Element	A Mixture

Explain your thinking: _____
 _____.

Match the following:

- 1. Matter ___ any material that takes up space
- 2. Solid ___ matter that flows without taking up a lot more space
- 3. Liquid ___ type of small unit from which all matter is made
- 4. Gas ___ changing from solid to liquid
- 5. Atom ___ changing from liquid to solid
- 6. Element ___ changing from liquid to gas
- 7. Mixture ___ changing from gas to liquid
- 8. Evaporating ___ matter that has a shape of its own
- 9. Melting ___ matter made of just one kind of atom
- 10. Molecule ___ more than one kind of atom together
- 11. Freezing ___ matter that spread out to take up available space
- 12. Solution ___ when no more can be dissolved in the liquid
- 13. Concentration ___ a mixture of two or more substances completely blended
- 14. Saturation point ___ the liquid into which something dissolves
- 15. Solute ___ the substance that dissolves in a liquid
- 16. Solvent ___ a measure of how much solute is dissolved
- 17. Condensing ___ a group of atoms combined into a unit (water=hydrogen + oxygen)

Draw a glass of salt water. Leave some salt on the bottom. **Label the solvent and the solute.**