

# MATTER AND ITS CHANGES

## UNIT OVERVIEW

In this fast-paced unit students discover that "matter" matters. An engaging array of activities combined with interesting worksheets compliments the concepts brought forward in the overhead student notes. Relating the study of matter, atoms, and molecules to the "real world" is essential. Students delight as they learn about DNA fingerprinting and why a grade two class eating pop and chocolate bars is important to the study of chemistry. Optional activities add flexibility and an element of fun to the unit. Finally, a unit on atoms and molecules that will not give students that "glazed eye - dead fish" look.

## STUDENT ASSIGNMENTS AND ACTIVITIES

1. **Matter** - Matter Matters: Introductory Wordsearch
2. **Matter and Its Three States** - Excited States (Worksheet)
3. **Physical and Chemical Properties** - Get Physical (Classifying and Observing)
4. **Amazing Atoms** - Amazing Atom Quizzz
5. **Magnificent Molecules** - DNA: The Crimestopper Molecule (Worksheet)
6. **Elements** - Elementary My Dear Watson (Crossword)
7. **Metal/Non-metal Elements** - Poster Making Activity
8. **Changes In Matter (Physical Changes)** - Which Freezes Faster Hot Water or Cold?
9. **Changes In Matter (Chemical Changes)** - (Worksheet)

## OPTIONAL ACTIVITIES

These optional activities lend a degree of freedom to the structure of the unit. Teachers can use them as they see fit as enrichment for individuals or fun activities for the entire class. Generally, the optional assignments do not fit as well into the specific concepts discussed in the unit but with a bit of imagination, they can usually be integrated without difficulty.

1. **Giant Bubbles**
2. **Can Steel Float?**
3. **Needle Homemade Compass**
4. **Baking Soda And Vinegar**
5. **Crayon Melting Art Activity**
6. **Making Sandpaper**
7. **A Cool Evaporation Garden**

## OVERHEAD NOTES

The overhead notes provide a framework of knowledge and concepts upon which the activities in the unit are based. The student notes work best when photocopied onto overhead transparencies but can be written on the board, dictated or handed out as photocopies, depending on time considerations.

**GET PHYSICAL**

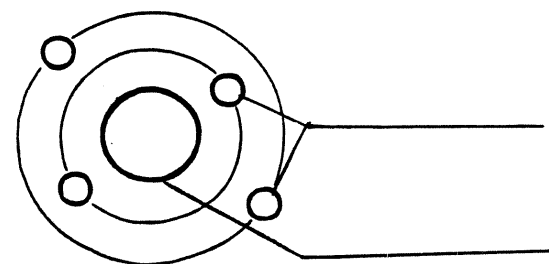
NAME: \_\_\_\_\_

Name of Object	State Solid/Liquid/Gas	Colour	Hardness	Heaviness (Density)	Odour (Smell)	Mass (grams)	Texture
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

## THE AMAZING ATOM QUIZZZ

NAME: \_\_\_\_\_

1. Label the parts of the atom



2. List important points about each.

Atom 1) \_\_\_\_\_

Nucleus 1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

Electrons 1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

3. When two things combine to form a brand new substance a chemical change has taken place. Explain why electrons are so important when chemical changes happens.

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## DNA: THE CRIMESTOPPER MOLECULE

NAME: \_\_\_\_\_

### Molecule Of Life

Inside every cell of every living thing is a molecule called deoxyribonucleic acid. (It is no wonder the name was shortened to DNA!) DNA molecules make up the chromosomes found inside the center of each cell and carry all the information or "genes" that the animal or plant will need to grow. DNA is like an instruction booklet or a "blueprint" telling how to build a living thing. Half of a person's DNA is inherited from their mother and half from their father.

### Big! Big! Big!

Like other molecules, DNA is a combination of two or more elements - except there is a difference. While salt (NaCl) is made by joining sodium atoms (Na) with chlorine atoms (Cl), and water molecules (H<sub>2</sub>O) are made by joining two hydrogen atoms (H) to a single oxygen atom (O), DNA combines thousands or millions of atoms of carbon, oxygen, nitrogen phosphorus and hydrogen. DNA is a complicated molecule.

### The Double Helix

In addition to being large, DNA molecules also have a special shape. The atoms are joined together into two, long spiral chains called the "Double Helix".

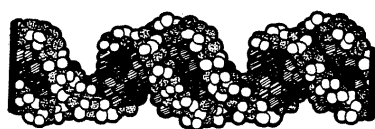
### The DNA Fingerprint

Recently, forensic (crime) scientists have started to use DNA to help solve crimes.

As scientists learned more about DNA they discovered that although most humans have very similar DNA, one person's DNA is a tiny bit different from anyone else's. (except for identical twins) They also learned that the DNA molecules were all the same throughout a person's body. For example the DNA found in a person's blood cells would be the same as the DNA in their bone cells or hair cells. In this way DNA could be used like a sort of "fingerprint" to tell people apart.

### DNA And The Fight On Crime

Today, forensic scientists use special tests to help solve crimes. If a person is suspected of committing a crime, they can be made to give a sample of their DNA (blood or hair) to the police. If the police have found any evidence at the scene of a crime that has DNA in it - like hair, blood drops or skin cells - they can check it against the suspect's DNA. If the DNA is the same, then the police are more likely to get a conviction and put the person in jail.



### Questions (Answer in Full Sentences)

1. What is the purpose of DNA in a living thing?

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2. How is a molecule of DNA different from a molecule of salt?

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3. Describe the shape of a DNA molecule.

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4. Why is it important to forensic scientists that everyone's DNA is a little bit different?

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5. Describe how DNA evidence might be used to help convict a criminal.

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6. Describe how DNA evidence collected at a crime scene could become contaminated.

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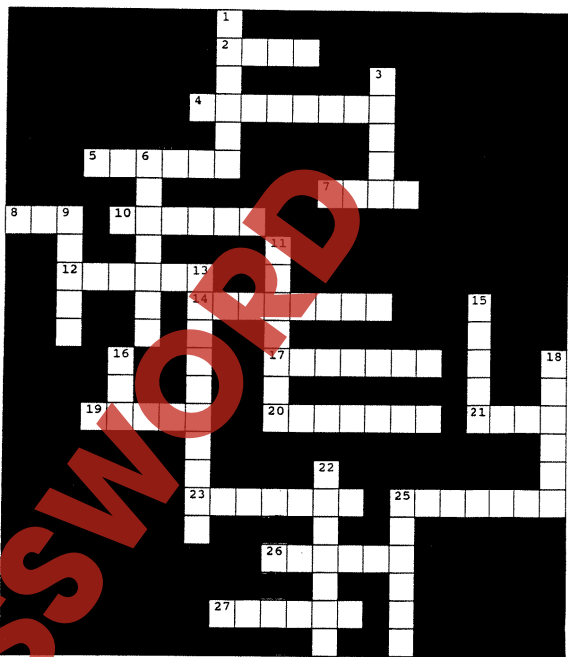
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**ELEMENTARY MY DEAR WATSON**

NAME: \_\_\_\_\_

**Across**

- 2. The Greek word for "small", also called "the building block of matter".
- 4. When two or more atoms combine, they form this.
- 5. Has mass and takes up space.
- 7. A very valuable element.
- 8. Highest energy state with particles far apart and moving fast.
- 10. Animals breathe this.
- 12. Particles are "sliding" past each other.
- 14. Smallest, lightest, part of the atom which are important in chemical changes.
- 17. Contains atoms of only one kind.
- 19. H<sub>2</sub>O
- 20. This important non-metal element is used to make computer chips.
- 21. Pb
- 23. Fuel for nuclear reactors.
- 25. Element in bones and teeth.
- 26. Element found in pennies and wires.
- 27. A gas element that makes balloons rise.



**Down**

- 1. Another word for gas
- 3. A substance that is shiny, ductile and conducts electricity.
- 6. This physical property describes how smooth the surface of an object is.
- 9. Lowest energy state, particles close together and vibrating.
- 11. Heavy, central part of the atom.
- 13. First to think that matter was made of small particles called atoms.
- 15. The elements of iron and carbon are mixed to get this compound.
- 16. Deoxyribonucleic Acid
- 18. Too much of this element may cause high blood pressure.
- 22. Element used in making of matches.
- 25. Element in diamonds, charcoal, living things and graphite. (the stuff in pencils)

Bonus Question: Name the detective who made famous the words "Elementary My Dear Watson" (Hint: Sir Arthur Conan Doyle)

NAME: \_\_\_\_\_

**ART ACTIVITY**

WHERE FOUND:

USES:

INTERESTING FACT:

**WHICH FREEZES FASTER - HOT WATER OR COLD?**

NAME: \_\_\_\_\_

1) **Purpose** (What are you trying to find out?)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

2) **List of Materials**

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) \_\_\_\_\_
- e) \_\_\_\_\_

3) **Procedure** (steps or instructions on how to do the experiment)

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) \_\_\_\_\_
- e) \_\_\_\_\_
- f) \_\_\_\_\_
- g) \_\_\_\_\_

4) **Expected Results** (What I think will happen and why)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



**EXPERIMENT**

**CHEMICAL AND PHYSICAL CHANGES**

NAME: \_\_\_\_\_

1. What is the difference between a chemical change and a physical change?

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

2. What is a compound?

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

3. List the things that tell a person if a chemical change has happened.

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_

4. Five raisins are placed in a jar of water containing vinegar and two tablespoons of baking soda. What do you think will happen?



\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

5. Explain a possible reason for your answer in question 4.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## MATTER MATTERS

NAME: \_\_\_\_\_

C H E M I C A L C H A N G E R  
 Q Y R C O N D U C T O R G U F  
 I E V A P O R A T I O N O A G  
 Q M E T A L O I T P A P B H S  
 E G M O L V U A L H A D E U Y  
 I Y E M C U S H C V D R E G D  
 N T L L H N Z L D E U L X I N  
 M A T T E R A I T T C P U C E  
 P V I D M C L A X U T Q J L C  
 G T N H I O T E N N I U V E S  
 C O G S S S T R E L L W O W T  
 C L Y S T F A M O L E C U L E  
 T H A F R E E Z I N G D C J W  
 P M J S Y L H G P W S W O R F  
 F X B K E K O A X H S Y H P X

Find These Words:

ALCHEMIST  
 ATOM  
 CHEMICAL CHANGE  
 CHEMISTRY  
 CONDENSATION  
 CONDUCTOR  
 DUCTILE  
 ELECTRONS

ELEMENT  
 EVAPORATION  
 FREEZING  
 GAS  
 LIQUID  
 MASS  
 MATTER  
 MELTING

METAL  
 MOLECULE  
 NUCLEUS  
 PHYSICAL CHANGE  
 SOLID  
 STATE  
 TEXTURE  
 VAPOUR

ANSWER KEY

### #1 - MATTER

#### Objectives and Activities

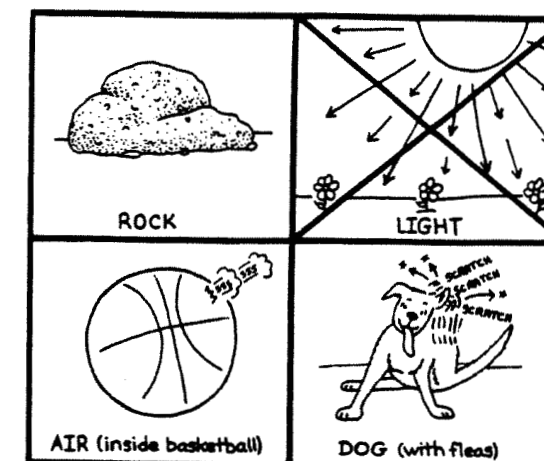
Students learn and understand what matter is and are able to classify things as matter or non-matter by applying the definition.

Students complete a wordsearch "Matter Matters" which helps to familiarize them with vocabulary introduced during the course of the unit.

#### Guided Teaching Strategies

Begin by showing students the diagram on the first page of the overhead notes *without* giving them the definition of matter or the topic of the unit.

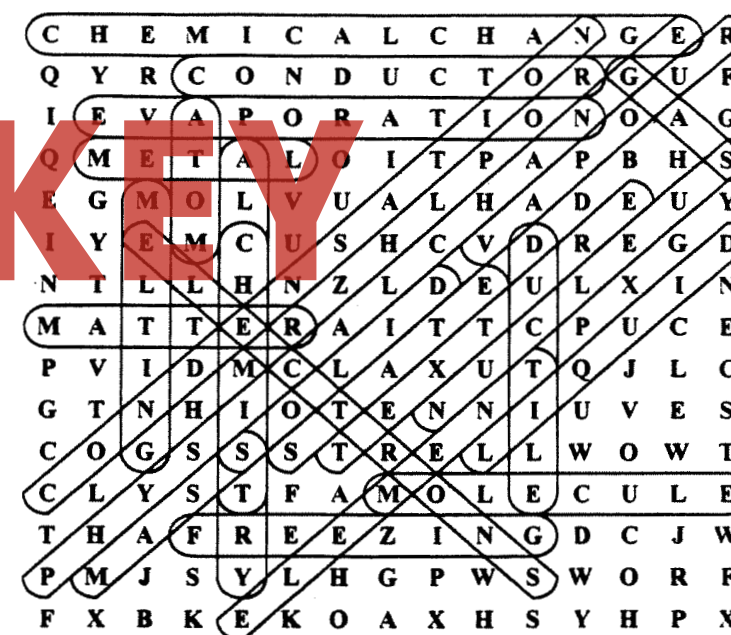
Introduce the unit topic with that old familiar game of "One Of These Things Is Not Like The Others." Hopefully, some students will remember the words and tune to the song, adding a sense of realism to the activity)



Most students will likely guess correctly that light is "not like the others" but then ask the students to explain why. This will lead into the topic and a discussion of what matter is. (Put an "X" through light)

Complete the notes with students answering a question about matter. Then, handout the wordsearch. Clues are horizontal, vertical and diagonal but not inverted.

#### Matter Matters (Solution)



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The publishers have declined to include the words to "One Of These Things Is Not Like The Others" as a result of threats posed by the notorious "Sesame Street Copyright Violation Police" and a wish not to confront Big Bird when his feathers are "ruffled."