

TEACHER GUIDE

3rd–6th Grade

Includes Quizzes
& Tests

Science



Answer Key



Weekly Lesson Schedule



Quizzes & Tests



Master Supply List

SCIENCE STARTERS: ELEMENTARY CHEMISTRY & PHYSICS





Science Starters: Elementary Chemistry & Physics



First printing: May 2017

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Author Bio:

Tom DeRosa is an experienced science educator, a committed creationist, and founder/director of a growing national creation organization whose chief focus is education. His experience in the public school, Christian school, and homeschool markets for over 35 years has given him special insights into what really works in engaging young minds. He holds a master's degree in education, with the emphasis of science curriculum.

Carolyn Reeves is especially skilled at creating ways to help students develop a greater understanding of not just scientific concepts, but also how these are applied within the world around us. Carolyn retired after a 30-year career as a science teacher, finished a doctoral degree in science education, and now serves as a writer and an educational consultant.

Using This Teacher Guide

Features: The suggested weekly schedule enclosed has easy-to-manage lessons that guide the reading, worksheets, and all assessments. The pages of this guide are perforated and three-hole punched so materials are easy to tear out, hand out, grade, and store. Teachers are encouraged to adjust the schedule and materials needed in order to best work within their unique educational program.

Lesson Scheduling: Students are instructed to read the pages in their book and then complete the corresponding section provided by the teacher. Assessments that may include worksheets, activities, quizzes, and tests are given at regular intervals with space to record each grade. Space is provided on the weekly schedule for assignment dates, and flexibility in scheduling is encouraged. Teachers may adapt the scheduled days per each unique student situation. As the student completes each assignment, this can be marked with an “X” in the box.



Approximately 30 to 45 minutes per lesson, two to three days a week



Includes answer keys for quizzes and semester tests



Multi-level quizzes and tests are included to help reinforce learning and provide assessment opportunities



Designed for grades 3 to 6 in a one-year course. Master supply list included.



Supports activity-based learning

Course Objectives: Students completing this course will:

- ✓ Investigate the physical properties of chemical substances
- ✓ Become familiar with the difference between chemical changes and physical changes
- ✓ Identify the scientist who organized a chart of the known elements
- ✓ Learn why adding heat causes most chemical changes to react faster
- ✓ Study what happens to light waves when we see different colors
- ✓ Discover how to see an invisible magnetic field
- ✓ Learn about how solar energy can be changed into electrical energy
- ✓ Determine the essential parts of an electric circuit

Course Description

Based on the *Investigate the Possibilities* Series, this course comes alive through experiments that demonstrate scientific principles, while affirming a biblical worldview. It has been developed so multi-age students can learn together. This one-year curriculum provides an activity using household items then gives easy-to-understand explanations and descriptions of the scientific process at work. How big is the solar system? How big is the universe? Can we make a model to help us understand God's wonderful creation? These and other questions are answered through a fun and investigative process created for upper elementary students!

Multi-level Quiz & Test Options

The Science Starters curriculum allows multi-age students between grades 3 and 6 to be taught at the same time. For your convenience, we have included two different levels of quizzes and semester tests so that you can choose the ones most appropriate for your student's age and educational abilities. Suggested levels include:

Level 1 – Grades 3 to 4

Level 2 – Grades 5 and 6

Calculating a Final Grade

Calculate the Average of the student's Activities & Observations grades.

Divide the average by 3 _____

Calculate the Average of the student's Questions & Quizzes grades.

Divide the average by 3 _____

Calculate the Average of the student's Projects, Contest & Dig Deeper grades.

Divide the average by 3 _____

Add up the numbers for the Final Grade: _____

First Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
First Semester-First Quarter — <i>Matter</i>					
Week 1	Day 1				
	Day 2	Investigation #1: The Physical Side of Chemicals Read Pages 4-7 • <i>Matter Book</i> (MB) Complete Page S4 • Student Journal (SJ)			
	Day 3				
	Day 4	Investigation #1: The Physical Side of Chemicals Read Pages 8-9 • (MB) • Complete Page S5 • (SJ)			
	Day 5				
Week 2	Day 6				
	Day 7	Investigation #2: Strange Substances Read Pages 10-11 • (MB) • Complete Page S6 • (SJ)			
	Day 8				
	Day 9	Investigation #2: Strange Substances Read Pages 12-13 • (MB) • Complete Page S7 • (SJ)			
	Day 10				
Week 3	Day 11				
	Day 12	Investigation #3: Light: Chemistry Fun with Bubbles Read Pages 14-15 • (MB) • Complete Page S8 • (SJ)			
	Day 13				
	Day 14	Investigation #3: Chemistry Fun with Bubbles Read Pages 16-17 • (MB) • Complete Page S9 • (SJ)			
	Day 15				
Week 4	Day 16				
	Day 17	Investigation #4: Colors Are Colors Read Pages 18-19 • (MB) • Complete Page S10 • (SJ)			
	Day 18				
	Day 19	Investigation #4: Colors Are Colors Read Pages 20-21 • (MB) • Complete Page S11 • (SJ)			
	Day 20				
Week 5	Day 21	Matter Investigations 1-4 Quiz 1 Level 1 Page 17 • Level 2 Page 31 • Teacher Guide (TG)			
	Day 22				
	Day 23	Investigation #5: How in the World Can You Separate? Read Pages 22-23 • (MB) • Complete Page S12 • (SJ)			
	Day 24				
	Day 25	Investigation #5: How in the World Can You Separate? Read Pages 24-25 • (MB) • Complete Page S13 • (SJ)			

Date	Day	Assignment	Due Date	✓	Grade
Week 6	Day 26				
	Day 27	Investigation #6: Water Is the Standard Read Pages 26-27 • (MB) • Complete Page S14 • (SJ)			
	Day 28				
	Day 29	Investigation #6: Water Is the Standard Read Pages 28-29 • (MB) • Complete Page S15 • (SJ)			
	Day 30				
Week 7	Day 31	Investigation #7: Bending Streams of Water Read Pages 30-31 • (MB) • Complete Page S16 • (SJ)			
	Day 32				
	Day 33	Investigation #7: Bending Streams of Water Read Pages 32-33 • (MB) • Complete Page S17 • (SJ)			
	Day 34				
	Day 35	Investigation #8: Drops of Water Read Pages 34-35 • (MB) • Complete Page S18 • (SJ)			
Week 8	Day 36	Investigation #8: Drops of Water Read Pages 36-37 • (MB) • Complete Page S19 • (SJ)			
	Day 37				
	Day 38	Matter Investigations 5-8 Quiz 2 Level 1 Page 19 • Level 2 Page 33 • (TG)			
	Day 39				
	Day 40	Investigation #9: Oil and Water Don't Mix Read Pages 38-39 • (MB) • Complete Page S20 • (SJ)			
Week 9	Day 41	Investigation #9: Oil and Water Don't Mix Read Pages 40-41 • (MB) • Complete Page S21 • (SJ)			
	Day 42				
	Day 43	Investigation #10: Acids and Bases Read Pages 42-43 • (MB) • Complete Page S22 • (SJ)			
	Day 44				
	Day 45	Investigation #10: Acids and Bases Read Pages 44-45 • (MB) • Complete Page S23 • (SJ)			
First Semester-Second Quarter — <i>Matter</i>					
Week 1	Day 46				
	Day 47	Investigation #11: Basically—Is It Acid or Base? Read Pages 46-47 • (MB) • Complete Page S24 • (SJ)			
	Day 48				
	Day 49	Investigation #11: Basically—Is It Acid or Base? Read Pages 48-49 • (MB) • Complete Page S25 • (SJ)			
	Day 50				

Date	Day	Assignment	Due Date	✓	Grade
Week 2	Day 51	Investigation #12: Salt—An Ordinary Substance Read Pages 50-51 • (MB) • Complete Page S26 • (SJ)			
	Day 52				
	Day 53	Investigation #12: Salt—An Ordinary Substance Read Pages 52-53 • (MB) • Complete Page S27 • (SJ)			
	Day 54				
	Day 55	Matter Investigations 9-12 Quiz 3 Level 1 Page 21 • Level 2 Page 35 • (TG)			
Week 3	Day 56	Investigation #13: More about the Amazing Periodic Table Read Pages 54-55 • (MB) • Complete Page S28 • (SJ)			
	Day 57				
	Day 58	Investigation #13: More about the Amazing Periodic Table Read Pages 56-57 • (MB) • Complete Page S29 • (SJ)			
	Day 59				
	Day 60	Investigation #14: Electricity and Salt Water Read Pages 58-59 • (MB) • Complete Page S30 • (SJ)			
Week 4	Day 61	Investigation #14: Electricity and Salt Water Read Pages 60-61 • (MB) • Complete Page S31 • (SJ)			
	Day 62				
	Day 63	Investigation #15: Changes—Are They Chemical or Physical? Read Pages 62-63 • (MB) • Complete Page S32 • (SJ)			
	Day 64				
	Day 65	Investigation #15: Changes—Are They Chemical or Physical? Read Pages 64-65 • (MB) • Complete Page S33 • (SJ)			
Week 5	Day 66	Investigation #16: Clues of a Chemical Reaction Read Pages 66-67 • (MB) • Complete Page S34 • (SJ)			
	Day 67				
	Day 68	Investigation #16: Clues of a Chemical Reaction Read Pages 68-69 • (MB) • Complete Page S35 • (SJ)			
	Day 69				
	Day 70	Matter Investigations 13-16 Quiz 4 Level 1 Page 23 • Level 2 Page 37 • (TG)			
Week 6	Day 71				
	Day 72	Investigation #17: A Heavy Gas Read Pages 70-71 • (MB) • Complete Page S36 • (SJ)			
	Day 73				
	Day 74	Investigation #17: A Heavy Gas Read Pages 72-73 • (MB) • Complete Page S37 • (SJ)			
	Day 75				
Week 7	Day 76				
	Day 77	Investigation #18: Large or Small? Hot or Cold? Read Pages 74-75 • (MB) • Complete Page S38 • (SJ)			
	Day 78				
	Day 79	Investigation #18: Large or Small? Hot or Cold? Read Pages 76-77 • (MB) • Complete Page S39 • (SJ)			
	Day 80				

Date	Day	Assignment	Due Date	✓	Grade
Week 8	Day 81	Investigation #19: Understanding Phase Changes Read Pages 78-79 • (MB) • Complete Page S40 • (SJ)			
	Day 82				
	Day 83	Investigation #19: Understanding Phase Changes Read Pages 80-81 • (MB) • Complete Page S41 • (SJ)			
	Day 84				
	Day 85	Investigation #20: The Race to Evaporate Read Pages 82-83 • (MB) • Complete Page S42 • (SJ)			
Week 9	Day 86	Investigation #20: The Race to Evaporate Read Pages 84-85 • (MB) • Complete Page S43 • (SJ)			
	Day 87				
	Day 88	Matter Investigations 17-20 Quiz 5 Level 1 Page 25 • Level 2 Page 39 • (TG)			
	Day 89				
	Day 90	Matter Investigations 1-20 Test Level 1 Page 27 • Level 2 Page 41 • (TG)			
		Mid-Term Grade			

Second Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
Second Semester-Third Quarter — <i>Energy</i>					
Week 1	Day 91				
	Day 92	Investigation #1: Where Exactly Does Energy Go? Read Pages 4-7 • <i>Energy Book</i> (EB) Complete Page S4 • Student Journal (SJ)			
	Day 93				
	Day 94	Investigation #1: Where Exactly Does Energy Go? Read Pages 8-9 • (EB) • Complete Page S5 • (SJ)			
	Day 95				
Week 2	Day 96				
	Day 97	Investigation #2: Stored or Active? Read Pages 10-11 • (EB) • Complete Page S6 • (SJ)			
	Day 98				
	Day 99	Investigation #2: Stored or Active? Read Pages 12-13 • (EB) • Complete Page S7 • (SJ)			
	Day 100				
Week 3	Day 101				
	Day 102	Investigation #3: Light: Reflected and Absorbed Read Pages 14-15 • (EB) • Complete Page S8 • (SJ)			
	Day 103				
	Day 104	Investigation #3: Light: Reflected and Absorbed Read Pages 16-17 • (EB) • Complete Page S9 • (SJ)			
	Day 105				
Week 4	Day 106				
	Day 107	Investigation #4: Light and Lenses Read Pages 18-19 • (EB) • Complete Page S10 • (SJ)			
	Day 108				
	Day 109	Investigation #4: Light and Lenses Read Pages 20-21 • (EB) • Complete Page S11 • (SJ)			
	Day 110				
Week 5	Day 111	Energy Investigations 1-4 Quiz 1 Level 1 Page 47 • Level 2 Page 61 • Teacher Guide (TG)			
	Day 112				
	Day 113	Investigation #5: Waving the Red, Green, and Blue Read Pages 22-23 • (EB) • Complete Page S12 • (SJ)			
	Day 114				
	Day 115	Investigation #5: Waving the Red, Green, and Blue Read Pages 24-25 • (EB) • Complete Page S13 • (SJ)			

Date	Day	Assignment	Due Date	✓	Grade
Week 6	Day 116	Investigation #6: Did You Hear That? Read Pages 26-27 • (EB) • Complete Page S14 • (SJ)			
	Day 117				
	Day 118	Investigation #6: Did You Hear That? Read Pages 28-29 • (EB) • Complete Page S15 • (SJ)			
	Day 119				
	Day 120	Investigation #7: When Things Get Hot Read Pages 30-31 • (EB) • Complete Page S16 • (SJ)			
Week 7	Day 121	Investigation #7: When Things Get Hot Read Pages 32-33 • (EB) • Complete Page S17 • (SJ)			
	Day 122				
	Day 123	Investigation #7: When Things Get Hot—Conducting... Read Pages 34-35 • (EB)			
	Day 124				
	Day 125	Investigation #8: Feeling the Heat Read Pages 36-37 • (EB) • Complete Page S18 • (SJ)			
Week 8	Day 126	Investigation #8: Feeling the Heat Read Pages 38-39 • (EB) • Complete Page S19 • (SJ)			
	Day 127				
	Day 128	Energy Investigations 5-8 Quiz 2 Level 1 Page 49 • Level 2 Page 63 • (TG)			
	Day 129				
	Day 130	Investigation #9: Magnets Are Very Attractive Read Pages 40-41 • (EB) • Complete Page S20 • (SJ)			
Week 9	Day 131	Investigation #9: Magnets Are Very Attractive Read Pages 42-43 • (EB) • Complete Page S21 • (SJ)			
	Day 132				
	Day 133	Investigation #10: Magnetism Is Pretty Special Read Pages 44-45 • (EB) • Complete Page S22 • (SJ)			
	Day 134				
	Day 135	Investigation #10: Magnetism Is Pretty Special Read Pages 46-47 • (EB) • Complete Page S23 • (SJ)			
Second Semester-Fourth Quarter — <i>Energy</i>					
Week 1	Day 136				
	Day 137	Investigation #11: How Do Magnets Become Magnets? Read Pages 48-49 • (EB) • Complete Page S24 • (SJ)			
	Day 138				
	Day 139	Investigation #11: How Do Magnets Become Magnets? Read Pages 50-51 • (EB) • Complete Page S25 • (SJ)			
	Day 140				

Date	Day	Assignment	Due Date	✓	Grade
Week 2	Day 141	Investigation #12: If It's Invisible, How Can You See It? Read Pages 52-53 • (EB) • Complete Page S26 • (SJ)			
	Day 142				
	Day 143	Investigation #12: If It's Invisible, How Can You See It? Read Pages 54-55 • (EB) • Complete Page S27 • (SJ)			
	Day 144				
	Day 145	Energy Investigations 9-12 Quiz 3 Level 1 Page 51 • Level 2 Page 65 • (TG)			
Week 3	Day 146	Investigation #13: Static Electricity Read Pages 56-57 • (EB) • Complete Page S28 • (SJ)			
	Day 147				
	Day 148	Investigation #13: Static Electricity Read Pages 58-59 • (EB) • Complete Page S29 • (SJ)			
	Day 149				
	Day 150	Investigation #14: A Place Where Electrons Get... Read Pages 60-61 • (EB) • Complete Page S30 • (SJ)			
Week 4	Day 151	Investigation #14: A Place Where Electrons Get... Read Pages 62-63 • (EB) • Complete Page S31 • (SJ)			
	Day 152				
	Day 153	Investigation #15: Switching on a Series Circuit Read Pages 64-65 • (EB) • Complete Page S32 • (SJ)			
	Day 154				
	Day 155	Investigation #15: How Rocks and Dirt Catch a Ride Read Pages 66-67 • (EB) • Complete Page S33 • (SJ)			
Week 5	Day 156	Investigation #16: Is a Parallel Circuit Better Than... Read Pages 68-69 • (EB) • Complete Page S34 • (SJ)			
	Day 157				
	Day 158	Investigation #16: Is a Parallel Circuit Better Than... Read Pages 70-71 • (EB) • Complete Page S35 • (SJ)			
	Day 159				
	Day 160	Energy Investigations 13-16 Quiz 4 Level 1 Page 53 • Level 2 Page 67 • (TG)			
Week 6	Day 161	Investigation #17: The Dishwashing Liquid and Electric... Read Pages 72-73 • (EB) • Complete Page S36 • (SJ)			
	Day 162				
	Day 163	Investigation #17: The Dishwashing Liquid and Electric... Read Pages 74-75 • (EB) • Complete Page S37 • (SJ)			
	Day 164				
	Day 165	Investigation #17: The Dishwashing Liquid and Electric... Read Pages 76-77 • (EB)			

Date	Day	Assignment	Due Date	✓	Grade
Week 7	Day 166				
	Day 167	Investigation #18: Solar Energy Makes a Change Read Pages 78-79 • (EB) • Complete Page S38 • (SJ)			
	Day 168				
	Day 169	Investigation #18: Solar Energy Makes a Change Read Pages 80-81 • (EB) • Complete Page S39 • (SJ)			
	Day 170				
Week 8	Day 171				
	Day 172	Investigation #19: Wind or Water Energy Read Pages 82-83 • (EB) • Complete Page S40 • (SJ)			
	Day 173				
	Day 174	Investigation #19: Wind or Water Energy Read Pages 84-85 • (EB) • Complete Page S41 • (SJ)			
	Day 175				
Week 9	Day 176	Investigation #20: Nuclear Energy Read Pages 86-87 • (EB) • Complete Pages S42-43 • (SJ)			
	Day 177				
	Day 178	Energy Investigations 17-20 Quiz 5 Level 1 Page 55 • Level 2 Page 69 • (TG)			
	Day 179				
	Day 180	Energy Investigations 1-20 Test Level 1 Page 57 • Level 2 Page 71 • (TG)			
		Final Grade			

Quizzes and Test

for Use with

Matter

Testing:

This series is appropriate for elementary students from 3rd to 6th grades. Because of this, we have included quizzes and tests in two different levels, which you can choose from based on your child's abilities and understanding of the concepts in the course.

Level 1: suggested for younger ages or those who struggle with application of the concepts beyond just definitions and basic concepts

Level 2: suggested for older ages or those who can both grasp the scientific concepts and apply them consistently



Choose answers from these terms.

All the terms may not be used and some may be used more than once:

absorb	analytical	chemicals	chromatography
cohesion	elasticity	environmental	faster
curved	fragment	higher	inertia
infrared	kinetic	liquids	medical
minerals	mixtures	physical	polymers
pressure	smaller	solids	surface
temperature	viscosity		

Fill in the Blank: Each question is worth 4 points.

- _____ chemistry includes what chemicals are present, their characteristics, and how much is present.
- _____ labs might test blood and urine for the presence of many kinds of substances.
- An _____ agency may use a lab that analyzes chemical substances to help identify pollutants in the air and water and environment.
- A _____ would have the same properties as the whole substance.
- The _____ properties of a piece of pure iron are the same anywhere pure iron is found.
- _____ can be explained by how slowly a liquid pours from a container or how hard it is to push something through the liquid.
- Viscosity of oils and molasses is often affected by _____.
- _____ (and temperature) affects the viscosity of MX.
- A baby diaper has the unusual property of being able to _____ enormous amounts of liquids.
- _____ are made of many similar small chemicals (called monomers) that were joined together to form long chains of molecules.
- Generally, the attraction between molecules is greater in _____ than in liquids.
- Generally, the attraction between molecules is greater in _____ than in gases.
- The attraction between molecules that are found at the surface of a liquid is called _____ tension.
- The property of matter that causes like molecules to attract each other is called _____.
- The property of matter that allows bubbles to stretch without breaking (up to their limits) is called _____.
- Paper chromatography is used to separate _____.
- Some of the dyes carried up the paper moved _____ than others.
- _____ in a mixture keep their own properties.

19. If two samples of ink produce the same _____ pattern and colors, it's a good chance that the ink samples are the same kind of ink.
20. Hard water contains more dissolved _____ than soft water.

Short Answer: Each question is worth 5 points.

21. What are physical properties of chemical substances?
22. Give several physical properties of MX.
23. When scientists want to know what chemical substances are in an item, they seldom consider the size, shape, and amount of the item. Why is that?
24. Suppose a chromatograph was made from a colored marker, and the pattern showed a blue spot above a pink spot. Does this give you a good clue that there are at least two chemicals in the colored marker?

Bonus Question (worth 5 points):

25. Give examples of physical properties used by scientists to describe a chemical substance.

**Choose answers from these terms.****All the terms may not be used and some may be used more than once:**

adhesion	centimeter	chemically	circle
density	displacement	distillation	evaporating
grams	largest	liquid	milligram
milliliter	mixed	negative	polar
rise	separated	sink	smallest
solid	square	surface	tetrahedron
volume	water		

Fill in the Blank: Each question is worth 4 points.

1. When two or more pure substances are _____ together, they keep their individual properties.
2. When two or more pure substances are combined _____, they do not keep their individual properties.
3. _____ is a way of separating mixtures of liquids, a process that depends on differences in their boiling points.
4. A substance that is not dissolved in a liquid can be _____ from the liquid by a funnel and filter paper.
5. You can separate a mixture of salt and water by _____ the water.
6. An example of a metric unit that is used to measure volume is a _____.
7. An example of a metric unit that is used to measure length is a _____.
8. An example of a metric unit that is used to measure an object's mass is a _____.
9. The density of pure _____ is one gram per cubic centimeter (1 g/cm³) or one gram per milliliter (1 g/mL).
10. If a substance has a density of 2.5 g/mL, a block of this substance will _____ in water.
11. A _____ shape explains one reason why water molecules are polar.
12. _____ molecules have strong connecting bonds with a positive charge on one end and a negative charge on the other end.
13. Water is a _____ at room temperature.
14. The formula for _____ is H₂O.
15. An atom is the _____ particle of an element that is still that element.
16. _____ molecules do not break apart easily; one end is slightly positive, and the other end is slightly negative.
17. Soap breaks down the _____ tension of water.
18. There is an attraction between the water and the glass (or plastic) in a graduated cylinder known as _____.

19. If you divide the mass of a substance by its volume, you are calculating the _____ of the substance.
20. One end of a water molecule is positive and one end is _____.

Short Answer: Each question is worth 5 points.

21. Which of the following are examples of mixtures: salt and sand stirred together, crude oil, salt water, distilled water?

22. How would you find the volume of a small, irregularly shaped piece of rock?

23. All matter is made up of what kinds of charges?

24. If several drops of water are placed on a clean penny, what kind of shape will the water have? Why is this?

Bonus Question (worth 5 points):

25. What happens to a person's mass as their distance from the earth increases? What happens to the person's weight?



Choose answers from these terms.

All the terms may not be used and some may be used more than once:

acidic	acid(s)	basic	bases
bitter	boxy	carbonic	circular
easy	elements	formula	hard
indicators	left	magnet	magnetic
neutral	non-polar	north	polar
popular	protons	right	salt
soap	sour	sweet	symbol
water			

Fill in the Blank: Each question is worth 4 points.

1. Some of the most important properties of water occur because water molecules are slightly positive at one end and slightly negative at the other end. These kinds of molecules are called _____ molecules.
2. Oil molecules are _____.
3. Generally, _____ substances will not dissolve in polar substances.
4. _____ molecules have a polar end that can dissolve polar substances and a non-polar end that can dissolve non-polar substances.
5. It is _____ to wash oil off your hands using only water because water, a polar compound, cannot dissolve oil, a non-polar compound.
6. Citrus fruits contain _____.
7. Many common cleaners contain _____.
8. Acids and bases are usually found in _____ solutions .
9. Acids usually have a _____ taste.
10. Chemicals that change color in acids and bases are called _____.
11. _____ acid forms when there is a chemical reaction between carbon dioxide and water.
12. Water and a _____ form when an acid and a base react chemically.
13. Ordinary rain water is slightly _____.
14. A pH number of 7 tells you it is _____.
15. A pH of 2 indicates a strong _____.
16. The Periodic Table contains _____.
17. Metals are found to the _____ of the dividing line on the Periodic Table.

18. A chemical _____ is one or two letters that have been assigned to identify an element on the Periodic Table.
19. A chemical _____ contains symbols to tell which elements are present in a compound and numbers to tell how many of each kind of atom are present.
20. Sodium chloride crystals have a _____ shape.

Short Answer: Each question is worth 5 points.

21. Why is it hard to get oily substances, such as lipstick, out of clothing using only water?

22. What happens to acids and bases when they are in water solutions?

23. Give some examples of indicators.

24. What kinds of elements are generally found in salt?

Bonus Question (worth 5 points):

25. If you accidentally spilled a strong acid or base on your skin, what is the first thing you should do?

**Choose answers from these terms.****All the terms may not be used and some may be used more than once:**

AC	atom(s)	blanks	carbon
chemical	electricity	electrolysis	energy
gas	good	horizontally	hydrogen
liquid	less	long	mechanical
metals	more	negative	nonmetals
ocean tides	oxygen	physical	positive
properties	repel	solid	steam
scary	thin	ultraviolet	vertically
water			

Fill in the Blank: Each question is worth 4 points.

1. Similar groups of elements are found _____ on the Periodic Table.
2. Except for hydrogen, you find _____ on the left side of the Table.
3. A block of gold weighs _____ than an equal size block of uranium.
4. Dmitri Mendeleev organized the known elements into a Periodic Table and left _____ where he predicted undiscovered elements would go.
5. Krypton is a _____.
6. _____ is a chemical change produced by an electrical current.
7. When water is separated by electrolysis, _____ forms at the positive electrode.
8. When water is separated by electrolysis, _____ forms at the negative electrode.
9. Pure _____ will not conduct an electric current.
10. When water is separated by electrolysis, there are more _____ bubbles formed.
11. During a chemical change, new compounds with different _____ form.
12. _____ is the black substance that is left after sugar decomposes.
13. _____ is the name of the white smoke that forms when hydrogen and oxygen atoms are released from sugar.
14. The decomposition of sugar is a _____ change.
15. Dissolving sugar in water is a _____ change.
16. Adding vinegar to baking soda and combining an acid and a base are examples of _____ changes.
17. A color change and the formation of an insoluble substance are two clues that a _____ reaction occurred.
18. In _____ changes, the arrangement of the atoms and molecules remains the same.
19. In _____ changes, there is a rearrangement of the atoms and molecules.
20. Bubbles and a temperature change are two clues that a _____ reaction occurred.

Short Answer: Each question is worth 5 points.

21. Predict: Which element in each pair would be more dangerous or more reactive — potassium or calcium; sulfur or chlorine; krypton or selenium?

22. Give several examples of physical changes.

23. Give several examples of chemical changes.

24. What are four clues that a chemical reaction has taken place?

Bonus Questions (worth 5 points):

25. Suppose someone in the 1500s had invented some method to separate water into oxygen and hydrogen gases. This would have been strong evidence against what popular theory?

**Choose answers from these terms.****All the terms may not be used and some may be used more than once:**

air	burn	carbon dioxide	cold
connected	controls	cooling	dry ice
electric	electricity	evaporation	freeze
gas	heat	infrared	light
liquid	molecules	natural gas	nuclear energy
oil	oxygen	physical	procedure
solid	surface	temperatures	warming
water	wind		

Fill in the Blank: Each question is worth 4 points.

- _____ is the name of the gas that is produced when vinegar and baking soda react.
- In order for any substance to burn, _____ must be present.
- _____ is very cold carbon dioxide in a solid state.
- Carbon dioxide is colorless, odorless, heavier than ordinary air, and doesn't _____.
- A green plant takes in and uses _____ as it makes food.
- In order for two _____ to react chemically with each other, they need to bump into each other.
- Adding _____ causes atoms and molecules to move faster, farther, and with more energy.
- Steel production requires very high _____ to cause a chemical reaction to proceed better.
- _____ are the things that are kept the same in scientific experiments.
- The _____ is how an experiment is conducted.
- Molecules are closer together in a liquid than they are in a _____.
- Molecules are closer together in a _____ than they are in a liquid.
- Phase changes are _____ changes.
- When _____ is added to a substance, the molecules begin to move slower and closer together.
- _____ is an important exception to the general rule that solids shrink when they are frozen.
- Substances go into the _____ when they evaporate.
- Substances take the form of a _____ after they evaporate.
- Heat and movement of air increase the rate of _____.
- Evaporation is a _____ process.
- Evaporation occurs at the _____ of a liquid.

Short Answer: Each question is worth 5 points.

21. Explain why a burning candle will go out when carbon dioxide is produced around it.

22. Why will small pieces of an effervescent tablet react faster than one big piece?

23. Why are cement sidewalks made with cracks between the blocks?

24. Explain how sweating helps to keep your body cool if you are running on a hot day.

Bonus Question (worth 5 points):

25. What is a peer review?



Fill in the Blank Questions: (2 Points Each)

Choose answers from these terms.

All the terms may not be used and some may be used more than once:

adhesion	analytical	bases	carbon
carbon dioxide	chemical	cohesion	controls
cooling	distillation	elasticity	electrolysis
evaporating	heat	indicators	kinetic
minerals	metals	nonpolar	oxygen
physical	polar	potential	radiation
recharge	soap	sour	surface
sweet	viscosity	water	upside-down

1. _____ chemistry includes what chemicals are present, their characteristics, and how much is present.
2. _____ can be demonstrated by how slowly a liquid pours from a container or how hard it is to push something through the liquid.
3. The property of matter that causes like molecules to attract each other is called _____.
4. The property of matter that allows bubbles to stretch without breaking (up to their limits) is called _____.
5. Hard water contains more dissolved _____ than soft water.
6. _____ is a way of separating mixtures of liquids, a process that depends on differences in their boiling points.
7. You can separate a mixture of salt and water by _____ the water.
8. _____ molecules have strong connecting bonds with a positive charge on one end and a negative charge on the other end.
9. Soap breaks down the _____ tension of water.
10. There is an attraction between the water and the glass (or plastic) in a graduated cylinder known as _____.
11. _____ molecules have a polar end that can dissolve polar substances and a non-polar end that can dissolve non-polar substances.
12. Many common cleaners contain _____.
13. Acids and bases are found in _____ solutions.

14. Acids usually have a _____ taste.
15. Chemicals that change color in acids and bases are called _____.
16. Except for hydrogen, you find _____ on the left side of the Table.
17. _____ is a chemical change produced by an electrical current.
18. _____ is the black substance that is left after sugar decomposes.
19. In _____ changes the arrangement of the atoms and molecules remain the same.
20. In _____ changes, there is a rearrangement of the atoms and molecules.
21. In order for any substance to burn, _____ must be present.
22. A green plant takes in and uses _____ as it makes food.
23. Adding _____ causes atoms and molecules to move faster, farther, and with more energy.
24. _____ are the things that are kept the same in an experiment.
25. Evaporation is a _____ process.

Short Answer: Each question is worth 5 points each.

26. What are physical properties of chemical substances?

27. When scientists want to know what chemical substances are in an item, they seldom consider the size, shape, and amount of the item. Why is that?

28. How would you find the volume of a small, irregularly shaped piece of rock?

29. All matter is made up of what kinds of charges?

30. What happens to acids and bases when they are in water solutions?
31. Give some examples of indicators.
32. Give several examples of chemical changes.
33. Why are cement sidewalks made with cracks between the blocks?
34. What happens to a person's mass as the distance from the earth increases?
35. If you accidentally spilled a strong acid or base on your skin, what is the first thing you should do?

Quiz and Test Answers

for Use with

Science Starters: Elementary Chemistry and Physics

Matter Quiz Answer Keys

Level 1 & 2

Quiz 1 Level 1, chapters 1-4

1. analytical
2. medical
3. environmental
4. fragment
5. physical
6. viscosity
7. temperature
8. pressure
9. absorb
10. polymers
11. solids
12. liquids
13. surface
14. cohesion
15. elasticity
16. mixtures
17. faster
18. chemicals
19. chromatography
20. minerals
21. Physical properties include characteristics you can see, hear, taste, smell, or feel, but could be any physical characteristic of a substance.
22. It is a dull white color. It can flow like a liquid when poured from a container. When pressure is applied quickly, it will have properties like a solid. Its viscosity varies with pressure.
23. A substance's physical properties will be present regardless of the size, shape, or amount of the substance. Scientists look for characteristics that will remain the same no matter where the chemical is found.
24. Yes, this is a good clue that there are at least two chemicals in the marker.
25. Density, boiling point, melting point, solubility in water, color, odor, taste, shininess, hardness, magnetic effects, and many other things.

Quiz 2 Level 1, chapters 5-8

1. mixed
2. chemically
3. distillation
4. separated

5. evaporating
6. milliliter
7. centimeter
8. milligram
9. water
10. sink
11. tetrahedron
12. polar
13. liquid
14. water
15. smallest
16. polar
17. surface
18. adhesion
19. density
20. negative
21. Salt and sand stirred together, crude oil, and salt water are all mixtures. (Distilled water is a pure substance.)
22. Measure enough water in a graduated cylinder to cover the rock. Carefully add the rock, and measure the level of water. Subtract the two water levels to find the volume of the rock.
23. Positive and negative.
24. The water will round up on the penny. There are strong cohesive forces between the water molecules, especially at the surface of the water.
25. A person's mass would remain the same. What happens to the person's weight? A person's weight would decrease as the distance from the earth increased.

Quiz 3 Level 1, chapters 9-12

1. polar
2. non-polar
3. non-polar
4. soap
5. hard
6. acids
7. bases
8. water
9. sour
10. indicators
11. carbonic
12. salt
13. acidic
14. neutral

15. acid
16. elements
17. left
18. symbol
19. formula
20. boxy
21. Lipstick and other oily substances are non-polar compounds, and water is a polar compound. Polar compounds do not dissolve non-polar compounds.
22. Their molecules break apart. One part becomes positive and one part becomes negative.
23. Phenol red, litmus paper, pH paper (many others).
24. A metal and a nonmetal (or groups of atoms that behave as if they were a single metal or nonmetal. Examples of such groups of atoms are carbonates, CO₃⁻ or phosphates, PO₄⁻).
25. You should dilute the chemical by pouring lots of water on your skin.

Quiz 4 Level 1, chapters 13-16

1. vertically
2. metals
3. less
4. blanks
5. gas
6. electrolysis
7. oxygen
8. hydrogen
9. water
10. hydrogen
11. properties
12. carbon
13. steam
14. chemical
15. physical
16. chemical
17. chemical
18. physical
19. chemical
20. chemical
21. Most reactive: potassium, chlorine, and selenium.
22. Tearing paper, grinding up chalk, boiling water, freezing water, melting ice, drying wet clothes, and dissolving sugar in a glass of tea are a few examples of physical changes.
23. Burning paper, combining vinegar and baking soda, rusting of iron, removing iron from iron ore, and

- combining sulfuric acid and zinc are a few examples of chemical changes. There are many other examples.
24. Formation of bubbles, temperature change, formation of an insoluble chemical, and color change.
 25. This would have been strong evidence against the theory that water was one of the four basic elements.

Quiz 5 Level 1, chapters 17-20

1. carbon dioxide
2. oxygen
3. dry ice
4. burn
5. carbon dioxide
6. molecules
7. heat
8. temperatures
9. controls
10. procedure
11. gas
12. solid
13. physical
14. cold
15. water
16. air
17. gas
18. evaporation
19. cooling
20. surface
21. Carbon dioxide is a heavy gas that doesn't burn. It will settle over the burning candle and cut off the oxygen supply.
22. Small pieces of an effervescent tablet have more surface area than one big piece and more places where the water molecules can come in contact with them.
23. When the cement gets hotter, its molecules begin to move faster and get farther apart. This causes the cement to expand. The cracks help to keep it from breaking as it expands.
24. In order for a liquid to change into a gas, it must absorb energy. As sweat drops evaporate, energy is absorbed from your skin.
25. A peer review is where fellow scientists review an experiment someone has conducted. They may comment about the things that were done right, but they especially look for things that should have been done differently or might be a weakness in the experiment. They are often called critical peer

reviews. They are an important part of scientific research.

Quiz 1 Level 2, chapters 1-4

1. Physical properties include characteristics you can see, hear, taste, smell, or feel, but could be any physical characteristic of a substance.
2. A substance's physical properties will be present regardless of the size, shape, or amount of the substance. Scientists look for characteristics that will remain the same no matter where the chemical is found.
3. Density, boiling point, melting point, solubility in water, color, odor, taste, shininess, hardness, magnetic effects, and many other things.
4. An element or a compound; a fragment would have the same properties as the whole substance.
5. Analytical chemistry includes what chemicals are present, their characteristics, and how much is present.
6. Medical labs might test blood and urine for the presence of many kinds of substances.
7. These labs might help identify pollutants in the air, water, and environment.
8. How slowly a liquid pours from a container or how hard it is to push something through the liquid.
9. Pressure (and temperature)
10. It has the unusual property of being able to absorb enormous amounts of liquids.
11. They are made of many similar small chemicals (called monomers) that were joined together to form long chains of molecules.
12. In solids
13. In liquids
14. Surface tension
15. Cohesion
16. Elasticity
17. Hard water contains more dissolved minerals than soft water. Hard water is more difficult to lather than soft water.
18. Surface tension
19. Mixture
20. A device used to help analyze the chemicals in substances.

Quiz 2 Level 2, chapters 5-8

1. Salt and sand stirred together, crude oil, and salt water are all mixtures. (Distilled water is a pure substance.)

2. Every piece of a pure substance has the same properties as the whole substance. A mixture is made of two or more substances that can be separated on the basis of some physical property.
3. Yes, except that they may be temporarily hidden from view.
4. No
5. Their boiling points
6. One that is not dissolved in the liquid
7. By evaporating the water
8. A person's mass would remain the same.
9. A person's weight would decrease as the distance from the earth increased.
10. Milliliter, liter, cubic centimeter (other units)
11. 25 grams
12. Positive and negative
13. Acids, bases, salts, sugars (many other things)
14. Hydrogen and oxygen
15. A tetrahedron
16. Polar molecules
17. Water is a liquid at room temperature; it expands when it freezes; drops of water are rounded in shape; it can dissolve many substances. There are many other properties as well.
18. The positive and negative charges attract each other.
19. Surface tension
20. The density of the substance
21. The formula for water is H_2O . H is the symbol for hydrogen and O is the symbol for oxygen. The subscript 2 means there are 2 atoms of hydrogen in each molecule of water. No number after oxygen means there is one atom of oxygen in each molecule of water.
22. An atom is the smallest particle of an element that is still that element. A molecule is made up of two or more atoms joined together by a chemical bond.

Quiz 3 Level 2, chapters 9-12

1. Polar molecules
2. Lipstick is a non-polar compound.
3. Water, a polar compound, cannot dissolve oil, a non-polar compound.
4. Citrus fruits contain acids.
5. Many common cleaners contain bases.
6. Acids and bases are found in water solutions.
7. Their molecules break apart. One part become positive and one part becomes negative.

Matter Test Answer Key

Level 1 & 2

Test 1 Level 1

1. analytical
2. viscosity
3. cohesion
4. elasticity
5. minerals
6. distillation
7. evaporating
8. polar
9. surface
10. adhesion
11. soap
12. bases
13. water
14. sour
15. indicators
16. metals
17. electrolysis
18. carbon
19. physical
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Test 1 Level 2

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15. Their boiling points