TEACHER GUIDE

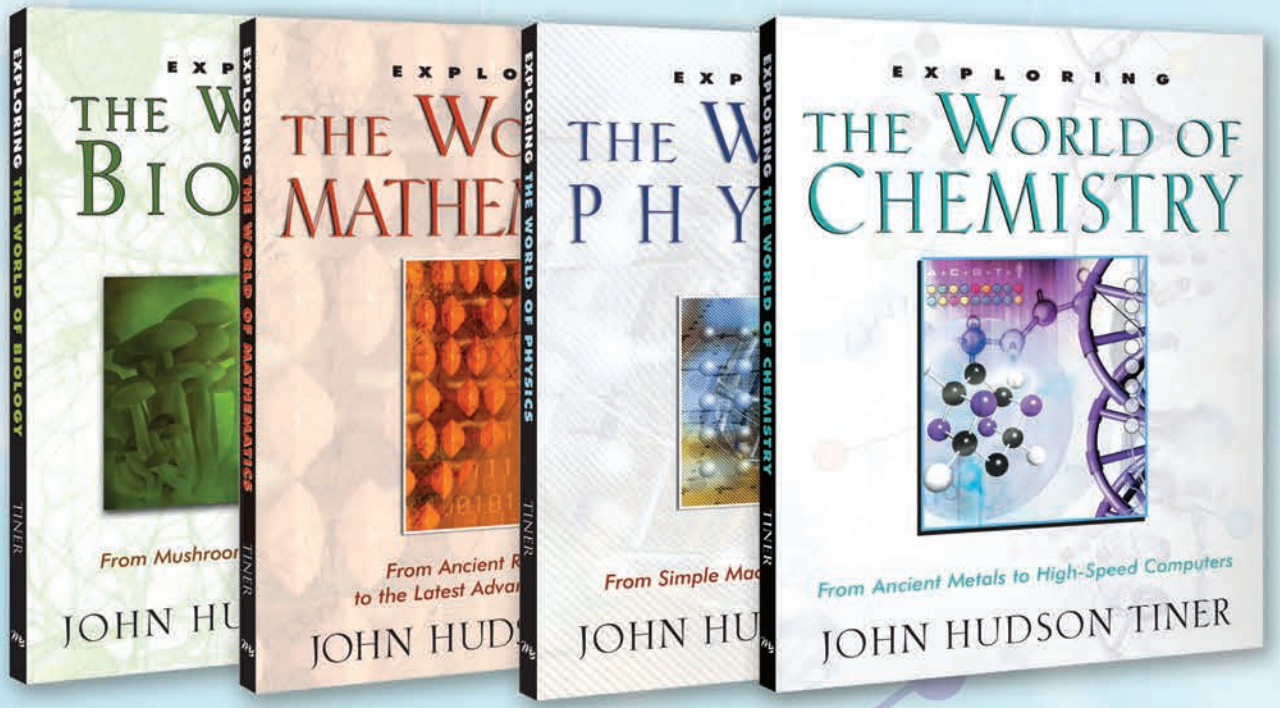
9th–12th Grade

Includes Student Worksheets

Science

- Answer Keys
- Weekly Lesson Schedule
- Worksheets
- Quizzes & Tests

SURVEY OF SCIENCE HISTORY & CONCEPTS



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Survey of Science History & Concepts

MASTER BOOKS CURRICULUM

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Table of Contents

Author Bio:
John Hudson Tiner (*Exploring the World of Mathematics, Exploring the World of Physics*) received five National Science Foundation teaching fellowships during his 12 years as a teacher of mathematics and science that allowed him to study graduate chemistry, astronomy, and mathematics. He also worked as a mathematician and cartographer for the Defense Mapping Agency, Aerospace Center in St. Louis, Missouri.

Tiner has received numerous honors for his writing, including the Missouri Writer's Guild award for best juvenile book for *Exploring the World of Chemistry*. He and his wife, Jeanene, live in Missouri.

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, three to four days a week**
	**Includes answer keys for worksheets, quizzes, and tests.**
	**Worksheets for each section**
	**Quizzes and tests are included to help reinforce learning and provide assessment opportunities.**
	**Designed for grades 9 to 12 in a one-year course to earn 1 science credit**

Course Objectives: Students completing this course will

- Discover how biological classification gives each different type of plant or animal a unique name
- Learn about the differing ways that seeds spread around the world
- Assess what food the body uses for long-term storage of energy
- Explain how biologists learned about the stomach and digestion
- Identify the important invention that caused the world to be divided into time zones
- Evaluate the simple math problem that caused the Mars Climate Orbiter to burn up in the Martian atmosphere
- Determine the common unit of measurement originally based on the distance from the equator to the North Pole
- Compare what Da Vinci's Last Supper and the Parthenon have in common
- Learn about the history of physics from Aristotle to Galileo to Isaac Newton
- Discover how the laws of motion and gravity affect everything from the normal activities of everyday life to launching rockets into space
- Find out why pure gold is not used for jewelry or coins
- Identify Humphry Davy's chemical discoveries and learn how they shortened his life

Course Description

Students will study four areas: mathematics, physics, biology, and chemistry. Students will gain an appreciation for how each subject has affected our lives, and for the people God revealed wisdom to as they sought to understand Creation. Each content area is thoroughly explored, giving students a good foundation in each discipline. It's amazing how ten simple digits can be used in an endless number of ways to benefit man. The development of these ten digits and their many uses is the fascinating story in *Exploring the World of Mathematics*. And in *Exploring the World of Physics*, students find a great tool to have a deeper understanding of the important and interesting ways that physics affects our lives. *Exploring the World of Biology* is a fascinating look at life — from the smallest proteins and spores, to the complex life systems of humans and animals. *Exploring the World of Chemistry* brings science to life and is a wonderful learning tool with many illustrations and biographical information.

Grading Options for This Course

It is always the prerogative of an educator to assess student grades however he or she might deem best. The following is only a suggested guideline based on the material presented through this course:

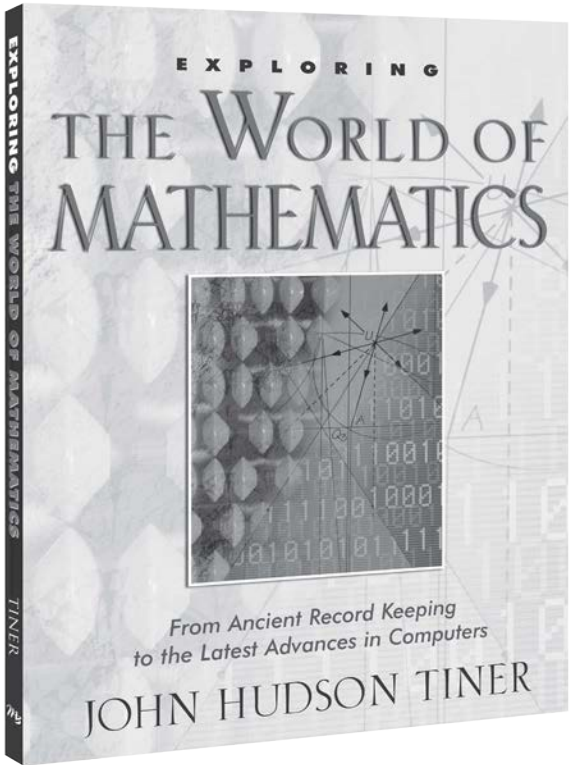
To calculate the percentage of the worksheets, quizzes, and tests, the educator may use the following guide. Divide total number of questions correct (example: 43) by the total number of questions possible (example: 46) to calculate the percentage out of 100 possible. 43/46 = 93 percent correct.

The suggested grade values are noted as follows: 90 to 100 percent = A; 80 to 89 percent = B; 70 to 79 percent = C; 60 to 69 percent = D; and 0 to 59 percent = F.

First Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
First Semester-First Quarter — *Exploring the World of Mathematics*					
Week 1	Day 1	Review Special Project options on page 14 and plan accordingly.			
	Day 2	Read Pages 4-12 • *Exploring the World of Mathematics* (EWM)			
	Day 3	Counting Years **Ch1: Worksheet 1** • Page 17 • Lesson Plan • (LP)			
	Day 4	Read Pages 14-22 • (EWM)			
	Day 5				
Week 2	Day 6	Counting the Hours **Ch2: Worksheet 1** • Page 19 • (LP)			
	Day 7	Read Pages 24-34 • (EWM)			
	Day 8	Muddled Measuring **Ch3: Worksheet 1** • Page 21 • (LP)			
	Day 9				
	Day 10				
Week 3	Day 11	Read Pages 36-44 • (EWM)			
	Day 12	Measuring by Metric **Ch4: Worksheet 1** • Page 23 • (LP)			
	Day 13	**Chapters 1-4 Quiz 1** • Page 139 • (LP)			
	Day 14	Read Pages 46-52 • (EWM)			
	Day 15				
Week 4	Day 16	Practical Mathematics **Ch5: Worksheet 1** • Page 25 • (LP)			
	Day 17	Read Pages 54-62 • (EWM)			
	Day 18	The Greek Way With Math **Ch6: Worksheet 1** • Page 27 • (LP)			
	Day 19	Read Pages 64-72 • (EWM)			
	Day 20				
Week 5	Day 21	Names for Numbers **Ch7: Worksheet 1** • Page 29 • (LP)			
	Day 22	Read Pages 74-82 • (EWM)			
	Day 23	Number Patterns **Ch8: Worksheet 1** • Page 31 • (LP)			
	Day 24	**Chapters 5-8 Quiz 2** • Page 141 • (LP)			
	Day 25				
Week 6	Day 26	Read Pages 84-94 • (EWM)			
	Day 27	Endless Numbers **Ch9: Worksheet 1** • Page 33 • (LP)			
	Day 28	Read Pages 96-106 • (EWM)			
	Day 29	Math for Scientists **Ch10: Worksheet 1** • Page 35 • (LP)			
	Day 30				

Date	Day	Assignment	Due Date	✓	Grade
Week 7	Day 31	Read Pages 108-118 • (EWM)			
	Day 32	Pure and Applied Math **Ch11: Worksheet 1** • Page 37 • (LP)			
	Day 33	**Chapters 9-11 Quiz 3** • Page 143 • (LP)			
	Day 34	Read Pages 120-130 • (EWM)			
	Day 35				
Week 8	Day 36	Computing Machines **Ch12: Worksheet 1** • Page 39 • (LP)			
	Day 37	Read Pages 132-140 • (EWM)			
	Day 38	Bits and Bytes **Ch13: Worksheet 1** • Page 41 • (LP)			
	Day 39	Read Pages 142-152 • (EWM)			
	Day 40				
Week 9	Day 41	Math on Vacation **Ch14: Worksheet 1** • Page 43 • (LP)			
	Day 42	**Chapter 12-14 Quiz 4** • Page 147 • (LP)			
	Day 43	Chapter 1-14 Study Day			
	Day 44	**Chapter 1-14 Test 1** • Page 149 • (LP)			
	Day 45				
First Semester-Second Quarter — ***Exploring the World of Physics***					
Week 1	Day 46	Read Pages 4-12 • Exploring the World of Physics (EWP)			
	Day 47	Motion **Ch1: Worksheet 1** • Page 47 • Lesson Plan • (LP)			
	Day 48	Read Pages 14-22 • (EWP)			
	Day 49	Laws of Motion **Ch2: Worksheet 1** • Page 49 • (LP)			
	Day 50				
Week 2	Day 51	Read Pages 24-32 • (EWP)			
	Day 52	Gravity **Ch3: Worksheet 1** • Page 51 • (LP)			
	Day 53	Read Pages 34-40 • (EWP)			
	Day 54	Simple Machines **Ch4: Worksheet 1** • Page 53 • (LP)			
	Day 55				
Week 3	Day 56	**Chapters 1-4 Quiz 1** • Page 153 • (LP)			
	Day 57	Read Pages 42-52 • (EWP)			
	Day 58	Energy **Ch5: Worksheet 1** • Page 55 • (LP)			
	Day 59				
	Day 60				



Mathematics Worksheets

for Use with

Exploring the World of Mathematics

Answer T or F for true or false, fill in the blank, or select the letter for the phrase that best completes the sentence.

T F 1. The extra day, or leap day, every four years was put in the calendar to honor Augustus Caesar.

T F 2. The Gregorian calendar has 100 leap days every 400 years.

3. What is the main reason to have leap days?

A B C D 4. The first calendar with a leap day every four years was the one
A. authorized by Julius Caesar
B. used by the American colonies after 1752
C. used by the Babylonians
D. used by the Egyptians

Matching

5._____ day	a. due to the tilt of the earth's axis, equal to three months
6._____ week	b. earth revolves around the sun once
7._____ month	c. earth rotates on its axis once
8._____ season	d. moon revolves around the earth once
9._____ year	e. seven days

Try Your Math

10. The Bible says that Methuselah died at age 969 years (Gen. 5:27). What would be that age in days? (Ignore leap years.)

11. Using the Babylonian calendar of 360 days in a year, how many days are in one-third of a year; one-fifth of a year; one-twentieth of a year; one-sixtieth of a year?

12. Find the population of your city and calculate how many people are likely to have a birthday on February 29.

Answer T or F for true or false, or select the letter for the phrase that best completes the sentence.

A B C D 1. The shortest naturally occurring period of time that ancient people could observe was the (A. day, B. hour, C. week, D. year).

T F 2. The Egyptians divided daylight into 8 or 12 hours depending on whether it was winter or summer.

A B C D 3. The inventors of the hourglass were the (A. Babylonians, B. British Navy, C. Egyptians, D. Romans).

A B 4. A watch with a sweep second hand is known as (A. an analog, B. a digital) watch.

T F 5. Meridians are imaginary lines going around the earth parallel to the equator.

A B C D 6. Military time has hours numbered from 0000 to (A. 0400, B. 1200, C. 2400, D. 3600).

A B C D 7. Time zones were introduced when it became common to travel by (A. airplanes, B. ox carts, C. ships, D. trains).

A B 8. The International date line is in the (A. Atlantic, B. Pacific) ocean.

A B 9. Atomic clocks proved that the earth's rotation (A. is, B. is not) uniform.

A B C 10. The United States became an independent nation in 1776. In 1976, the country celebrated the fact that the United States was two (A. decades, B. centuries, C. millenniums) old.

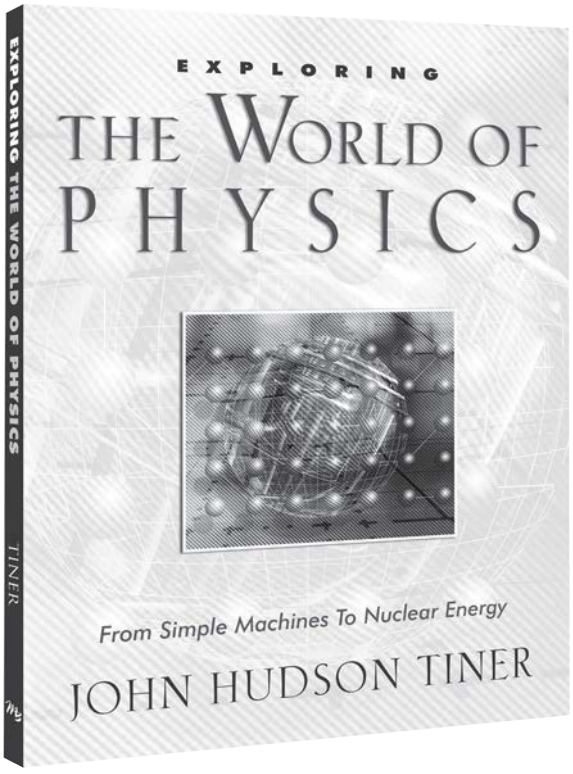
Try Your Math

11. Assume that the first four-hour watch began at midnight. What time would it be at five bells on the second watch?

12. Feel your pulse at the wrist and count the number of beats in a minute. Calculate the number of times your heart beats in a day.

13. An office job is often described as working from 9 to 5. This means 9:00 a.m. to 5:00 p.m. How many hours is this?

14. At 4:00 p.m., a family on vacation drives from Mountain Standard Time into Central Standard Time. Should their watches be set one hour earlier to 3:00 p.m. or one hour later to 5:00 p.m.?



Physics Worksheets

for Use with

Exploring the World of Physics

Answer T or F for true or false, fill in the blank, or select the letter for the phrase that best completes the sentence.

A B C D 1. Physics is the science that explores how energy acts on (A. heat, B. light, C. matter, D. sound).

T F 2. The ancient Greeks were noted for their careful experiments.

T F 3. The regular back and forth motion of a pendulum was used to regulate the first accurate clocks.

T F 4. In Galileo's time, only length and time could be measured with any accuracy.

A B C D 5. A feather and lump of lead will fall at the same speed in (A. a high speed wind tunnel, B. the atmosphere, C. a vacuum, D. water).

6. To calculate speed, divide distance by _____.

A B C D 7. To study the motion of falling objects, Galileo (A. beat them into cubes, B. dropped them from a high tower, C. pushed them from a cliff, D. rolled them down a ramp).

A B C D 8. Acceleration is found by dividing the (A. average velocity, B. distance, C. gravity, D. change in speed) by the change in time.

A B 9. On earth, the acceleration due to gravity is (A. 32 ft/sec^2, B. 60 miles/hour).

For More Study

10. Suppose a canoeist takes 70 days to paddle the entire length of the Mississippi River, a distance of 3,710 miles. The canoeist's average speed in miles per day is _____.

11. An ordinary passenger car can accelerate to 60 miles per hour in about eight seconds. What is the car's acceleration?

12. On the moon, the acceleration due to gravity is 5.3 ft/sec^2 rather than 32 ft/sec^2. If an object fell six seconds before hitting the ground, it strikes the ground with a speed of _____ ft/sec. (Hint: Use the final velocity equation.)

Answer T or F for true or false, fill in the blank, or select the letter for the phrase that best completes the sentence.

T F 1. Velocity and speed mean the same.

T F 2. A force must act on an object to put the object in motion, give it greater speed, slow it, or change its direction.

T F 3. All objects come to a stop unless some force keeps them going.

T F 4. A ball rolling on a flat surface comes to a stop because of the force of (A. friction, B. gravity).

A B C 5. Isaac Newton's first law of motion was based on experiments done by (A. Aristotle, B. Galileo, C. Newton, himself).

A B C D 6. Inertia is a property of matter that resists changing its (A. electric charge, B. mass, C. momentum, D. velocity).

T F 7. Only very massive objects have inertia.

T F 8. Acceleration is any change of speed or direction.

9. State the second law of motion.

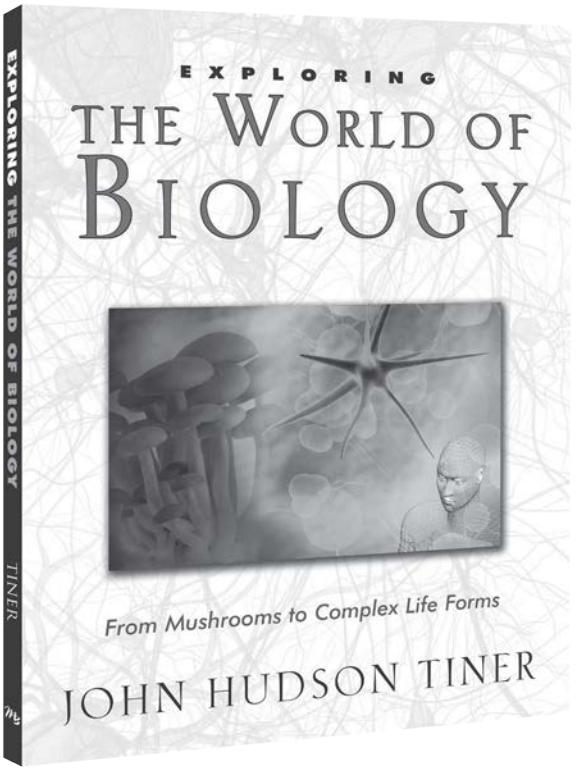
10. State the third law of motion.

11. Momentum is the mass of an object times its _____.

T F 12. The law of conservation of momentum is one of the most firmly established laws of science.

Matching

13. _____ first law of motion	a. $a = f/m$
14. _____ second law of motion	b. $f = m \times a$
15. _____ third law of motion	c. $f_{ab} = -f_{ba}$
16. _____ force equation	d. $I = f \times t$
17. _____ definition of impulse	e. If $f = 0$ then $a = 0$
18. _____ definition of momentum	f. $p = m \times v$



Biology Worksheets

for Use with

Exploring the World of Biology

Answer T or F for true or false, or select the letter for the phrase that best completes the sentence.

T F 1. For most of history, living things were classified as either plants or animals.

A B 2. Mushrooms were studied in detail by (A. the Greeks in 400 B.C., B. scientists in the 1700s).

A B C D 3. To keep mushrooms in the plant kingdom, scientists described mushrooms as plants without (A. cell walls, B. chlorophyll, C. seeds, D. sunlight).

A B C D 4. Today, biologists classify mushrooms as members of the (A. animal kingdom, B. bacteria kingdom, C. fungi kingdom, D. plant kingdom).

T F 5. The only way mushrooms can reproduce is by sending out hyphae.

T F 6. The mat of hyphae and the mushrooms it sends to the surface can be one of the largest living things on earth.

A B C D 7. The above-ground stalk and umbrella of a mushroom is used to (A. absorb carbon dioxide, B. catch sunlight, C. release spores, D. sense the presence of enemies).

A B 8. Pigs are used to hunt for (A. truffles, B. death cap mushrooms).

A B 9. Louis Pasteur realized yeast cells were alive when he saw them (A. cause milk to sour, B. grow and reproduce).

A B C D 10. What do yeast cells consume as food? (A. alcohol, B. carbon dioxide, C. sugar, D. vinegar)

A B C D 11. Fungi that are growing on bread and are just visible to the unaided eye and look like miniature mushrooms are most likely: (A. lichen, B. mold, C. truffle, D. yeast).

A B 12. The mold that grew in Alexander Fleming's dish was there because (A. he was experimenting with bread mold, B. it probably drifted in through an open window).

Explore More

Explore More is an opportunity to explore the subject in your own way. Take a photograph, draw a picture, collect a sample, make a poster, write a poem about the subject, list the pros or cons as to whether the subject is helpful or harmful, or interview a person who has experience with the subject. For example, interview a person who has had pneumonia. How did the doctors treat the disease? Have you ever eaten Roquefort cheese? How would you describe its taste?

Subjects for More Exploration

lichen, rust (plant disease), mildew, Dutch elm disease, Roquefort cheese, pneumonia, penicillin-resistant diseases

Answer T or F for true or false, fill in the blank, or select the letter for the phrase that best completes the sentence.

A B 1. The Royal Society employed (A. Robert Hooke, B. Anton van Leeuwenhoek) to test claims of fellow scientists.

A B 2. The first scientist to see the little life in a drop of canal water was (A. Robert Hooke, B. Anton van Leeuwenhoek).

T F 3. The paramecium and amoeba were given the name *protozoa* because they appeared to be animal-like.

A B C D 4. The one that can change its shape is the; (A. amoeba, B. euglena, C. giardiasis, D. paramecium).

T F 5. A protozoa is called simple because it cannot carry out all of life's functions.

6. The single most deadly protozoa disease is _____.

A B 7. At first, a euglena was called a plant because it (A. could not move, B. had chlorophyll).

A B C D 8. Single-celled algae that surround their cell wall with a coating of silicon dioxide are (A. anaerobic bacteria, B. diatoms, C. giardiasis cysts, D. macrobiotic crust).

T F 9. A member of kingdom Protista must be capable of surviving as a single cell.

10. Lichen is a layer of algae sandwiched between two layers of _____.

T F 11. All living things must have oxygen to survive.

A B 12. Plants need nitrogen to grow, which they must get from (A. the air, B. nitrogen compounds in the soil.)

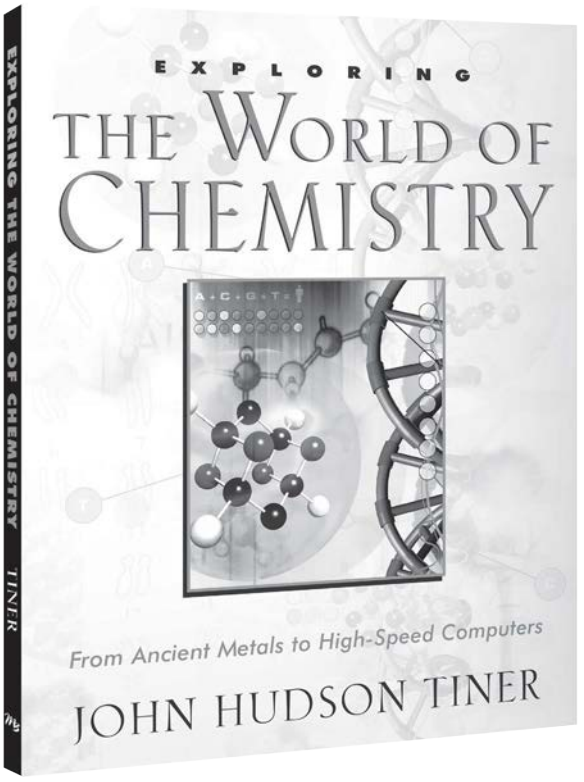
Matching

13.

a. animal	___ nonliving genetic material that only comes alive inside a living cell
b. bacteria	___ multicellular life that can move and has sense organs
c. fungi	___ multicellular life that includes mushrooms
d. plant	___ multicellular life that makes food by photosynthesis
e. protista	___ single-celled life that includes paramecium, amoeba, and euglena
f. virus	___ single-celled life without a nucleus; one form causes Black Death (plague)

Explore More

Explore More is an opportunity to explore the subject in your own way. View little life through a microscope. Describe what you see. Research the prevention of diseases caused by protozoa, bacteria, and viruses. What are the risks and benefits of protista and bacteria? Read about Robert Hooke and Louis Pasteur. What important discoveries did they make? How does vaccination prevent a disease? What is the difference between the prevention of a disease and the treatment of a disease? How do outdoor experts recommend treating drinking water when backpacking?



Chemistry Worksheets

for Use with

Exploring the World of Chemistry

Answer T or F for true or false, fill in the blank, or select the letter for the phrase that best completes the sentence.

1. Ancient people hammered the soft pure iron from _____ into useful tools.

A B C D 2. Charcoal is (A. a meteorite that fell from the heavens, B. a type of coal found in the earth, C. made of almost pure oxygen, D. wood that has been heated without oxygen).

T F 3. The only purpose of carbon in smelting iron from its ore is so it will burn and supply heat.

A B C D 4. Which of these forms of iron is the purest? (A. cast iron, B. charcoal, C. steel, D. wrought iron).

A B 5. Cast iron is (A. brittle and will shatter if struck, B. soft and easily hammered into shape).

A B C D 6. Steel is quenched by (A. burying it in the earth, B. heating it in an oven for several days, C. heating it white hot and thrusting it into cold water, D. raising it overhead for lightning to strike).

7. Cast iron, steel, and wrought iron differ only in the amount of _____ they contain.

A B 8. Rusting is a (A. slow, B. rapid) oxidation.

A B 9. A tin can is made mostly of (A. tin, B. steel).

A B C D 10. The one that looks more like silver is (A. brass, B. bronze, C. gold, D. pewter).

T F 11. Metals maintain their properties regardless of temperature.

A B 12. The more expensive metal is (A. aluminum, B. tin).

Answer T or F for true or false, fill in the blank, or select the letter for the phrase that best completes the sentence.

1. Gold, silver, and _____ are known as the coinage metals.

A B C D 2. The first metal mentioned in both the Old and New Testaments is (A. copper, B. gold, C. iron, D. tin).

T F 3. A 14-carat gold ring is pure gold.

T F 4. Gold resists being beaten into thin layers.

T F 5. Pure silver, unlike gold, is hard enough to resist daily wear.

A B C D 6. Bronze and brass are both alloys that contain (A. copper, B. gold, C. iron, D. silver).

A B C D 7. Ancient people made musical instruments of (A. copper alloy, B. iron and mercury, C. sulfur and carbon, D. tin and lead).

A B C D 8. The Statue of Liberty has a skin of (A. copper, B. gold, C. steel, D. zinc).

9. The seven ancient metals are gold, silver, copper, iron, tin, lead, and _____.

A B C D 10. Another name for mercury is (A. calliston, B. cuprum, C. plumbum, D. quicksilver).

T F 11. A block of lead would float in a pool of mercury.

A B C D 12. The metal used in thermometers and barometers is (A. barium, B. lithium, C. mercury, D. silver).

13. The seven ancient planets (wanderers) are sun, moon, Venus, Jupiter, Mars, Saturn, and _____.

A B C D 14. Ancient people matched the metal gold with (A. Mars, B. the moon, C. Saturn, D. the sun).

A B C D 15. The Apostle Paul was compared to (A. Mercury, known as Hermes, B. the moon, known as Luna, C. the sun, known as Sol, D. Venus, known as Aphrodite).

Quizzes and Tests Section

	Exploring Mathematics Concepts & Comprehension	Quiz 1	Scope: Chapters 1–4	Total score: ____of 100	Name

Matching (2 Points Each Question)

1. ____ day	a. due to the tilt of the earth's axis, equal to three months
2. ____ week	b. earth revolves around the sun once
3. ____ month	c. earth rotates on its axis once
4. ____ season	d. moon revolves around the earth once
5. ____ year	e. seven days

Fill-in-the-Blank Questions (4 Points Each Question)

6. The length of a mile in feet is _____.

7. "A pint is a _____ the world around."

Multiple Choice Questions (4 Points Each Question)

8. The first calendar with a leap day every four years was the one
   A. authorized by Julius Caesar
   B. used by the American colonies after 1752
   C. used by the Babylonians
   D. used by the Egyptians

9. The inventors of the hourglass were the
   A. Babylonians
   B. British Navy
   C. Egyptians
   D. Romans

10. Military time has hours numbered from 0000 to
   A. 0400
   B. 1200
   C. 2400
   D. 3600

11. Time zones were introduced when it became common to travel by
   A. airplanes
   B. ox carts
   C. ships
   D. trains

12. NASA's Climate Orbiter to Mars failed because
   A. American and French engineers did not communicate with one another
   B. engineers used two different measures of force
   C. fuel had been measured improperly
   D. the spacecraft weighed too much

13. A scruple was a standard of weight for measuring
   A. barley
   B. diamonds
   C. drugs
   D. potatoes

14. Most early measures of distance were based on
   A. animal strides
   B. the human body
   C. parts of ships
   D. Roman military terms

15. Until 1960, the meter was considered
    A. 1,640,763.73 wavelengths of krypton gas
    B. 1/10,000,000 of the distance from the equator to the North Pole
    C. the distance between two scratch marks on a metal rod
    D. the distance light travels in 1/299,792,458 of a second

16. Daniel Fahrenheit set the boiling temperature of water on his thermometer at
    A. 0 degrees B. 32 degrees
    C. 100 degrees D. 212 degrees

Multiple Answer Questions (3 Points Each Answer – 18 Points Total)

17. Using the Babylonian calendar of 360 days in a year, how many days are in one-third of a year; one-fifth of a year; one-twentieth of a year; one-sixtieth of a year?

    a. b. c. d.

18. A hand is four inches. How tall is a horse in inches that is 15 hands tall? How tall in feet?

    a. b.

Short Answer Questions (4 Points Each Question)

19. What is the main reason to have leap days?

20. Assume that the first four-hour watch began at midnight. What time would it be at five bells on the second watch?

21. At 4:00 p.m., a family on vacation drives from Mountain Standard Time into Central Standard Time. Should their watches be set one hour earlier to 3:00 p.m. or one hour later to 5:00 p.m.?

22. The tallest mountain on earth is Mt. Everest. Its summit is 29,035 feet above sea level. How high is the mountain in miles?

Applied Learning Activities (2 Points Each Answer)

23. Feel your pulse at the wrist and count the number of beats in a minute. Calculate the number of times your heart beats in a day.

24. Change your weight from pounds to ounces.

Choose the larger:

25. A. foot B. yard
26. A. fathom B. yard
27. A. nautical mile B. statute mile
28. A. cup B. quart

Answer Keys

Chapter 1

1. F, 2. F

3. So the calendar will match the seasons. Or, so the calendar year will be the same length as the solar year.

4. a, 5. c, 6. e, 7. d, 8. a, 9. b

10. 969 years x 365 days per year = 353,685 days

11. 120 days, 72 days, 18 days, 6 days (divide 360 by 3, 5, 20, and 60)

12. divide the population by 1,461

Chapter 2

1. A, 2. F, 3. D, 4. A, 5. F,

6. C, 7. D, 8. B, 9. B, 10. B

11. 6:30 a.m. The second watch began at 4:00 a.m. Each bell is ½ hour. Five bells are 2½ hours: 4:00 a.m. + 2 hr. 30 min. = 6:30 a.m.

12. Answer varies depending on actual heart rate. For 72 beats per min: 72 beats per min. x 60 min. per hr. x 24 hr. per day = 103,680 beats per day

13. 8 hours. One way to solve the problem is to change to military time and subtract — 9:00 a.m. is 0900 and 5:00 p.m. is 1700: 1700 – 0900 = 0800 or 8 hours.

14. one hour later, 4:00 p.m. MST is 5:00 p.m. CST

Chapter 3

1. B, 2. A, 3. C, 4. A, 5. F

6. B, 7. 5,280, 8. pound, 9. B

10. A, 11. A, 12. B, 13. A

14. 60 inches, 5 feet. Multiplying 15 hands by 4 inches per hand gives 60 inches. Sixty inches is equal to five feet: 60 in ÷ 12 in. per ft. = 5 ft.

15. Answer varies. Multiply weight in pounds by the conversion factor of 16 ounces per pound.

16. 5.499 miles or about 5.5 miles. Divide 29,035 feet by the conversion factor of 5,280 feet per mile.

Chapter 4

1. B, 2. B, 3. F, 4. D, 5. T

6. B, 7. B, 8. B, 9. A, 10. D

11. D, 12. F, 13. C

Chapter 5

1. B, 2. T, 3. F, 4. B, 5. D

6. F, 7. A, 8. D, 9. A, 10. A

11. e, 12. a, 13. d , 14. c, 15. b

16. d, 17. e, 18. f, 19. b, 20. a

21. c

22. 140 tiles. The area of the room is 140 square feet, A = L x W = 14 ft. x 10 ft. = 140 sq. ft., and each tile covers one square foot, so 140 tiles are needed.

Chapter 6

1. B

2. squares, square

3. A, 4. D, 5. A, 6. e, 7. d, 8. c

9. a, 10. b, 11. b, 12. d, 13. a

14. c

Chapter 7

1. T, 2. F, 3. T, 4. T, 5. F, 6. T

7. T, 8. F, 9. F, 10. F, 11. F

12. F, 13. F

Chapter 8

1. B, 2. C, 3. A, 4. A, 5. A

6. C, 7. B, 8. A, 9. B, 10. F

11. T, 12. B, 13. C

14. 233 = 89 + 144

15. F, 16. b, 17. c, 18. a, 19. d

20. e

Chapter 9

1. B, 2. B, 3. T, 4. T, 5. F, 6. T

7. D, 8. C, 9. B, 10. A, 11. A

12. F, 13. B, 14. D, 15. a, 16. g

17. b, 18. e, 19. c, 20. f, 21. d

Chapter 10