CONCEPTS OF MATHEMATICS & PHYSICS

Parent Lesson Planner
(PLP)

EXPLORING THE WORLD OF MATHEMATICS

From Ancient Record Keeping to the Latest Advances in Computers

JOHN HUDSON TINER

EXPLORING THE WORLD OF PHYSICS

From Simple Machines To Nuclear Energy

JOHN HUDSON TINER
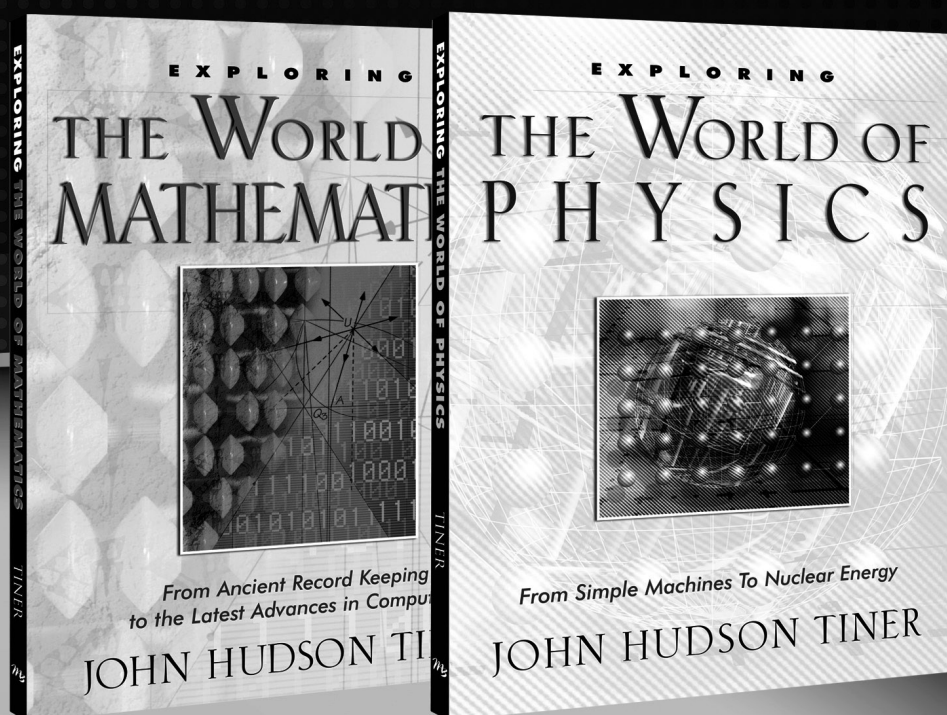
- Weekly Lesson Schedule
- Student Worksheets
- Quizzes & Test
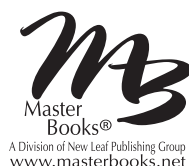- Answer Key

7th – 9th grade

| 1 Year Science | 1/2 Credit |

Unless otherwise noted, Scripture quotations are from the New King James Version of the Bible.

Printed in the United States of America

Where Creation Inspires Education

Since 1975, Master Books has been providing educational resources based on a biblical worldview to students of all ages. At the heart of these resources is our firm belief in a literal six-day creation, a young earth, the global Flood as revealed in Genesis 1–11, and other vital evidence to help build a critical foundation of scriptural authority for everyone. By equipping students with biblical truths and their key connection to the world of science and history, it is our hope they will be able to defend their faith in a skeptical, fallen world.

If the foundations are destroyed, what can the righteous do?
Psalm 11:3; NKJV

As the largest publisher of creation science materials in the world, Master Books is honored to partner with our authors and educators, including:

Ken Ham of Answers in Genesis

Dr. John Morris and Dr. Jason Lisle of the Institute for Creation Research

Dr. Donald DeYoung and Michael Oard of the Creation Research Society

Dr. James Stobaugh, John Hudson Tiner, Rick and Marilyn Boyer, Dr. Tom Derosa, and so many more!

Whether a pre-school learner or a scholar seeking an advanced degree, we offer a wonderful selection of award-winning resources for all ages and educational levels.

But sanctify the Lord God in your hearts, and always be ready
to give a defense to everyone who asks you a reason for the hope
that is in you, with meekness and fear.
1 Peter 3:15; NKJV

Permission to Copy

Contents

Lessons for a 36-week course!

Overview: This *Concepts of Mathematics and Physics PLP* contains materials for use with *Exploring the World of Mathematics* and *Exploring the World of Physics* in the Exploring series. Materials are organized by each book in the following sections:

📧	Study Guide Worksheets
Q	Quizzes
T	Semester Test & Final Exams
🔑	Answer Keys

> Suggested Optional Science Lab
> See page 13

Features: Each suggested weekly schedule has two easy-to-manage lessons that combine reading, worksheets, and vocabulary-building opportunities including an expanded glossary for each book. Designed to allow your student to be independent, materials in this resource are divided by section so you can remove quizzes, tests, and answer keys before beginning the coursework. As always, you are encouraged to adjust the schedule and materials needed to in order to best work within your educational program.

Workflow: Students will read the pages in their book and then complete each section of the PLP. They should be encouraged to complete as many of the activities and projects as possible as well. Tests are given at regular intervals with space to record each grade. If used with younger students, they may be given the option of only choosing activities or projects of interest to them and taking open book tests.

Lesson Scheduling: Space is given for assignment dates. There is flexibility in scheduling. For example, the parent may opt for a M–W schedule rather than a M, W, F schedule. Each week listed has five days but due to vacations the school work week may not be M–F. Adapt the days to your school schedule. As the student completes each assignment, he/she should put an "X" in the box.

🕐	Approximately 30 to 45 minutes per lesson, two days a week
🔑	Includes answer keys for worksheets, quizzes, and semester exams
📧	Worksheet for each chapter.
↻	Quizzes are included to help reinforce learning and provide assessment opportunities; optional semester exams included.
📄	Designed for grades 7 to 9 in a one-year course to earn 1/2 science credit

Course includes books from creationist authors with solid, biblical worldviews:

John Hudson Tiner — *Exploring the World of Mathematics, Exploring the World of Physics*

John Hudson Tiner 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, MO.

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.

Concepts of Mathematics and Physics

Course Description

This is the suggested course sequence that allows one core area of science to be studied per semester. You can change the sequence of the semesters per the needs or interests of your student; materials for each semester are independent of one another to allow flexibility.

Semester 1: Mathematics

Numbers surround us. Just try to make it through a day without using any. It's impossible: telephone numbers, calendars, volume settings, shoe sizes, speed limits, weights, street numbers, microwave timers, TV channels, and the list goes on and on.

The many advancements and branches of mathematics were developed through the centuries as people encountered problems and relied upon math to solve them. 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*.

Semester 2: Physics

Physics is a branch of science that many people condsider to be too complicated to understand. John Hudson Tiner puts this myth to rest as he explains the fascinating world of physics in a way that students can comprehend.

Did you know that a feather and a lump of lead will fall at the same rate in a vacuum? Learn about the history of physics from Aristotle to Galileo to Isaac Newton to the latest advances. Discover how the laws of motion and gravity affect everything from the normal activities of everyday life to launching rockets into space. Learn about the effects of inertia firsthand during fun and informative experiments.

Exploring the World of Physics is a great tool for students who want to have a deeper understanding of the important and interesting ways that physics affects our lives.

First Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
		First Semester-First Quarter — *Exploring the World of Mathematics*			
Week 1	Day 1				
	Day 2	Read pages 4–12 • *Exploring the World of Mathematics* • (EWM)			
	Day 3				
	Day 4	Counting the Years - Questions **Mathematics Ch 1: Worksheet 1** • Page 21 • Lesson Plan • (LP)			
	Day 5				
Week 2	Day 6				
	Day 7	Read Pages 14–22 • (EWM)			
	Day 8				
	Day 9	Counting the Hours - Questions **Mathematics Ch 2: Worksheet 1** • Page 23 • (LP)			
	Day 10				
Week 3	Day 11				
	Day 12	Read Pages 24–28 • (EWM)			
	Day 13				
	Day 14	Read Pages 29–34 • (EWM)			
	Day 15				
Week 4	Day 16				
	Day 17	Muddled Measuring - Questions **Mathematics Ch 3: Worksheet 1** • Page 25 • (LP)			
	Day 18				
	Day 19	Read Pages 36–44 • (EWM)			
	Day 20				
Week 5	Day 21				
	Day 22	Measuring by Metric - Questions **Mathematics Ch 4: Worksheet 1** • Page 27 • (LP)			
	Day 23				
	Day 24	**Mathematics Chs 1–4: Quiz 1** • Page 93 • (LP)			
	Day 25				
Week 6	Day 26				
	Day 27	Read Pages 46–52 • (EWM)			
	Day 28				
	Day 29	Practical Mathematics - Questions **Mathematics Ch 5: Worksheet 1** • Page 29 • (LP)			
	Day 30				
Week 7	Day 31				
	Day 32	Practical Mathematics - Questions **Mathematics Ch 5**: **Worksheet 2** • Page 31 • (LP)			
	Day 33				
	Day 34	Read Pages 54–62 • (EWM)			
	Day 35				

Date	Day	Assignment	Due Date	✓	Grade
Week 8	Day 36				
	Day 37	The Greek Way with Math - Questions **Mathematics Ch 6: Worksheet 1** • Page 33 • (LP)			
	Day 38				
	Day 39	Read Pages 64–72 • (EWM)			
	Day 40				
Week 9	Day 41				
	Day 42	Names for Numbers - Questions **Mathematics Ch 7: Worksheet 1** • Page 35 • (LP)			
	Day 43				
	Day 44	Read Pages 74–82 • (EWM)			
	Day 45				
First Semester-Second Quarter — *Exploring the World of Mathematics*					
Week 1	Day 46				
	Day 47	Number Pattern - Questions **Mathematics Ch 8: Worksheet 1** • Page 37 • (LP)			
	Day 48				
	Day 49	**Chapters 5–8: Quiz 2** • Page 95 • (LP)			
	Day 50				
Week 2	Day 51				
	Day 52	Read Pages 84–94 • (EWM)			
	Day 53				
	Day 54	Endless Numbers - Questions **Mathematics Ch 9: Worksheet 1** • Page 39 • (LP)			
	Day 55				
Week 3	Day 56				
	Day 57	Endless Numbers - Questions **Mathematics Ch 9: Worksheet 2** • Page 41 • (LP)			
	Day 58				
	Day 59	Read Pages 96–106 • (EWM)			
	Day 60				
Week 4	Day 61				
	Day 62	Math for Scientists - Questions **Mathematics Ch 10: Worksheet 1** • Page 43 • (LP)			
	Day 63				
	Day 64	Read Pages 108–118 • (EWM)			
	Day 65				

Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 66				
	Day 67	Pure and Applied Math - Questions **Mathematics Ch 11: Worksheet 1** • Page 45 • (LP)			
	Day 68				
	Day 69	**Mathematics Chs 9–11: Quiz 3** • Page 97 • (LP)			
	Day 70				
Week 6	Day 71				
	Day 72	Read Pages 120–130 • (EWM)			
	Day 73				
	Day 74	Computing Machines - Questions **Mathematics Ch 12: Worksheet 1** • Page 47 • (LP)			
	Day 75				
Week 7	Day 76				
	Day 77	Computing Machines - Questions **Mathematics Ch 12: Worksheet 1** • Page 49 • (LP)			
	Day 78				
	Day 79	Read Pages 132–140 • (EWM)			
	Day 80				
Week 8	Day 81				
	Day 82	Bits and Bytes - Questions **Mathematics Ch 13: Worksheet 1** • Pages 51-52 • (LP)			
	Day 83				
	Day 84	Read Pages 142–152 • (EWM)			
	Day 85				
Week 9	Day 86				
	Day 87	Math on Vacation - Questions **Mathematics Ch 14: Worksheet 1** • Pages 53-54 • (LP)			
	Day 88				
	Day 89	**Mathematics Chs 12–14: Quiz 4** • Page 101 • (LP)			
	Day 90				
		Chapters 1-14: Test • Page 103 • (LP)			
		Mid-Term Grade			

Second Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
		Second Semester-Third Quarter — Exploring the World of Physics			
Week 1	Day 91				
	Day 92	Read Pages 4–12 • *Exploring the World of Physics* • (EWP)			
	Day 93				
	Day 94	Motion - Questions **Physics Ch 1: Worksheet 1** • Page 57 • (LP)			
	Day 95				
Week 2	Day 96				
	Day 97	Read Pages 14–22 • (EWP)			
	Day 98				
	Day 99	Laws of Motion - Questions **Physics Ch 2: Worksheet 1** • Page 59 • (LP)			
	Day 100				
Week 3	Day 101				
	Day 102	Read Pages 24–32 • (EWP)			
	Day 103				
	Day 104	Gravity - Questions **Physics Ch 3: Worksheet 1** • Page 61 • (LP)			
	Day 105				
Week 4	Day 106				
	Day 107	Read Pages 34–40 • (EWP)			
	Day 108				
	Day 109	Simple Machines - Questions **Physics Ch 4: Worksheet 1** • Page 63 • (LP)			
	Day 110				
Week 5	Day 111				
	Day 112	**Physics Chs 1–4: Quiz 1** • Page 107 • (LP)			
	Day 113				
	Day 114	Read Pages 42–52 • (EWP)			
	Day 115				
Week 6	Day 116				
	Day 117	Energy - Questions **Physics Ch 5: Worksheet 1** • Page 65 • (LP)			
	Day 118				
	Day 119	Read Pages 54–64 • (EWP)			
	Day 120				

Date	Day	Assignment	Due Date	✓	Grade
Week 7	Day 121				
	Day 122	Heat - Questions **Physics Ch 6: Worksheet 1** • Page 67 • (LP)			
	Day 123				
	Day 124	Heat - Questions **Physics Ch 6: Worksheet 2** • Page 69 • (LP)			
	Day 125				
Week 8	Day 126				
	Day 127	Read Pages 66–76 • (EWP)			
	Day 128				
	Day 129	State of Matter - Questions **Physics Ch 7: Worksheet 1** • Page 71 • (LP)			
	Day 130				
Week 9	Day 131				
	Day 132	**Physics Chs 5–7: Quiz 2** • Page 109 • (LP)			
	Day 133				
	Day 134	Read Pages 78–88 • (EWP)			
	Day 135				
Second Semester-Fourth Quarter — *Exploring the World of Physics*					
Week 1	Day 136				
	Day 137	Wave Motion - Questions **Physics Ch 8: Worksheet 1** • Page 73 • (LP)			
	Day 138				
	Day 139	Wave Motion - Questions **Physics Ch 8: Worksheet 2** • Page 75 • (LP)			
	Day 140				
Week 2	Day 141				
	Day 142	Read Pages 90–100 • (EWP)			
	Day 143				
	Day 144	Light - Questions **Physics Ch 9: Worksheet 1** • Page 77 • (LP)			
	Day 145				
Week 3	Day 146				
	Day 147	Light - Questions **Physics Ch 9: Worksheet 2** • Page 79 • (LP)			
	Day 148				
	Day 149	Read Pages 102–110 • (EWP)			
	Day 150				
Week 4	Day 151				
	Day 152	Electricity - Questions **Physics Ch 10: Worksheet 1** • Page 81 • (LP)			
	Day 153				
	Day 154	Read Pages 112–122 • (EWP)			
	Day 155				

Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 156				
	Day 157	Magnetism - Questions **Physics Ch 11: Worksheet 1** • Page 83 • (LP)			
	Day 158				
	Day 159	**Physics Chs 8–10: Quiz 3** • Page 111 • (LP)			
	Day 160				
Week 6	Day 161				
	Day 162	Read Pages 124–134 • (EWP)			
	Day 163				
	Day 164	Electromagnetism - Questions **Physics Ch 12: Worksheet 1** • Page 85 • (LP)			
	Day 165				
Week 7	Day 166				
	Day 167	Read Pages 136–142 • (EWP)			
	Day 168				
	Day 169	Nuclear Energy - Questions **Physics Ch 13: Worksheet 1** • Page 87 • (LP)			
	Day 170				
Week 8	Day 171				
	Day 172	Read Pages 144–152 • (EWP)			
	Day 173				
	Day 174	Future Physics - Questions **Physics Ch 14: Worksheet 1** • Page 89 • (LP)			
	Day 175				
Week 9	Day 176				
	Day 177	**Physics Chs 11–14: Quiz 4** • Page 115 • (LP)			
	Day 178				
	Day 179	**Physics Chs 1-14: Test** (Optional) • Page 117 • (LP)			
	Day 180				
		Final Grade			

Suggested Optional Science Lab:

There are a variety of companies that offer science labs that complement our courses. These items are only suggestions, not requirements, and they are not included in the daily schedule. We have tried to find materials that are free of evolutionary teaching, but please review any materials you may purchase. The following items are available from www.HomeTrainingTools.com.

Concepts of Math & Physics

The World of Physics

KT-PHSKIT Physics Workshop Kit

Special Projects

The Exploring series offers a unique perspective filled with biographical, historical, and scientific perspectives. By highlighting the work and relevance of scientists and innovators, students are introduced to the people behind the knowledge and discoveries that continue to impact their world. This provides exceptional learning opportunities above and beyond the worksheets, quizzes, and tests. Below are three areas of possible activities or bonus point projects that can be undertaken to enhance study.

Biographical

- Select your favorite scientist mentioned in the book and do a research paper on this person's life and/or work. Be sure to include details that enhance the understanding of why they worked in the area of science that they chose, information on their worldview (Christian or secular), and why their work remains relevant.

- There have been some amazing discoveries by women — see if you can find three discoveries by researching at your local library or online at parent-approved sites.

Historical

- Do three short essays — no more than two typed pages each — on discoveries that laid the groundwork for future science fields or the advancement of knowledge.

- Discover where 25 important discoveries related to mathematics or science took place; mark the map for each place and label with the name of each discovery.

- The Bible contains some amazing mathematical and scientific information. Using the geneaological information in Genesis 5, see if you can calculate how many years took place between creation and the Flood of Noah.

Scientific

- Imagine an invention related to mathematics or physical science that could change the way you and others live. See if you can visualize your invention by drawing it out or providing details that would enable someone else to understand the relevance of your invention and how it works.

Applied Learning

These ideas provide a way for the student to acquire knowledge and then apply it — whether that is done in a technical sense or by being able to recognize the concepts at work in the course of their daily experiences. Consider doing one of the two following options as an opportunity to earn bonus points or to extend the learning process:

- Take a spiral notebook and name it "My Learning Observations." Then, using the following concepts, mark the date and time you observe each example over a two-week period. Remember, science is happening around you all the time in every day life, so make sure your observations correlate with mathematics or physical science.

- You can keep a running study journal using the words and people to know on the following pages. By writing down the definition of words, or the contribution of an individual, you can develop a deeper understanding of the subject matter and have notes available when studying for quizzes and exams.

Exploring the World of Mathematics

People and Words to Know

Exploring the World of Physics

People and Words to Know

Chapter 1 (p. 4–13)

energy

heat

matter

nuclear energy

Galileo

Aristotle

current

intensity

pendulum

Leaning Tower of Pisa

resistance

Apollo 15

David Scott

Robert Boyle

vacuum

gravity

force

friction

velocity

acceleration

parabola

projectile motion

Chapter 2 (p. 14–23)

first law of motion

second law of motion

force equation

third law of motion

impulse

Robert Goddard

conservation of momentum

vector

Johannes Kepler

Chapter 3 (p. 24–33)

ellipse

first law of planetary motion

second law of planetary motion

third law of planetary motion

bubonic plague

center of gravity

density

center of mass

Principia

global positioning system

Chapter 4 (p. 34–41)

incline plane

pulley

simple machines

fulcrum

Sicily

Great Pyramid of Giza

windlass

block and tackle

Chapter 5 (p. 42–53)

James Prescott Joule

joule

foot-pounds

British thermal units

James Watt

Bryan Allen

Gossamer Albatross

law of conservation of energy

Chapter 6 (p. 54–65)

heat capacity

specific heat

Josiah Wedgwood

pyrometer

thermistor

Anders Celsius

Antoine Lavoisier

caloric

Count Rumford

John Dalton

atomic theory of matter

Robert Brown

steam engine

thermodynamics

Kelvin

Nicolas Carnot

entropy

first law of thermodynamics

heat pumps

law of entropy

second law of thermodynamics

third law of thermodynamics

Chapter 7 (p. 66–77)

standard pressure

standard temperature

elasticity

elastic limit

McPherson struts

Hooke's law

Robert Hooke

Christopher Wren

Edmund Halley

Great Fire of London

hydraulic press

Pascal's principle

Blaise Pascal

buoyancy

Marie Curie

permanent magnet

Pierre Curie

cow magnets

Curie temperature

horseshoe magnet

Hans Christian Oersted

electromagnetism

Joseph Henry

William Sturgeon

electromagnet

electromagnetic induction

Michael Faraday

atomic fusion

circuit breaker

magnetic levitation

speed of light

Polarized light

Chapter 12 (p. 124–135)

Cavendish Laboratory

James Clerk Maxwell

infrared light

Maxwell's field equations

spectrum

ultraviolet

electromagnetic waves

frequency

amplitude

Guglielmo Marconi

Rudolf Hertz

Albert Einstein

microwaves

radiation

x rays

interference

wavelength

amplitude modulation

bandwidth

frequency modulation

ionosphere

gamma rays

Wilhelm Roentgen

Archimedes

Ernest Rutherford

first scientific revolution

second scientific revolution

special theory of relativity

photoelectric effect

Brownian motion

general theory of relativity

Arthur Holly Compton

photon

chain reaction

cosmic rays

Manhattan Project

nuclear chain reaction

Charles Wilson

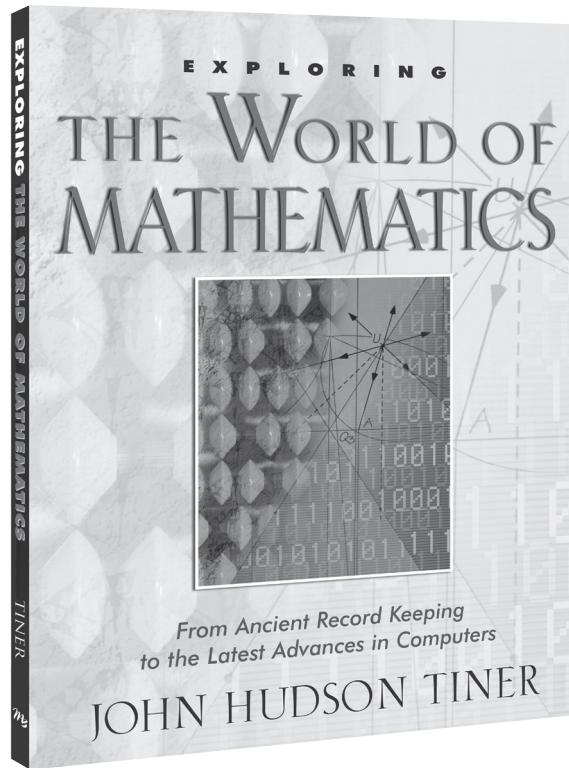cloud chamber

Compton effect

momentum

Chapter 13 (p. 136–143)

neutron

carbon-14

quarks

uranium-235

uranium-238

alpha particle

nuclear fusion

Enrico Fermi

Lise Meiter

yellowcake

plutonium

breeder reactor

moderator

fusion reaction

kinetic energy

mass energy equation

cold fusion

Chapter 14 (p. 144–153)

ultraviolet catastrophe

proportionality constant

quantum

Max Planck

Planck's constant

ground state

Niels Bohr

Prince Louis de Borglie

fundamental frequency

Thomas Young

Simon Laplace

Heisenberg uncertainty principle

Werner Heisenberg

quantum mechanics

resonance

absolute zero

cryogenic

nanotechnology

superconductors

Kitt Peak

acoustics

conduction

convection

Daniel Fahrenheit

decibels

lever

mechanical advantage

pitch

potential energy

watt

wheel and axle

EXPLORING

THE WORLD OF
MATHEMATICS

*From Ancient Record Keeping
to the Latest Advances in Computers*

JOHN HUDSON TINER

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.