

TEACHER GUIDE

9th–12th Grade

1 Credit

Science



Weekly Lesson Schedule



Worksheets

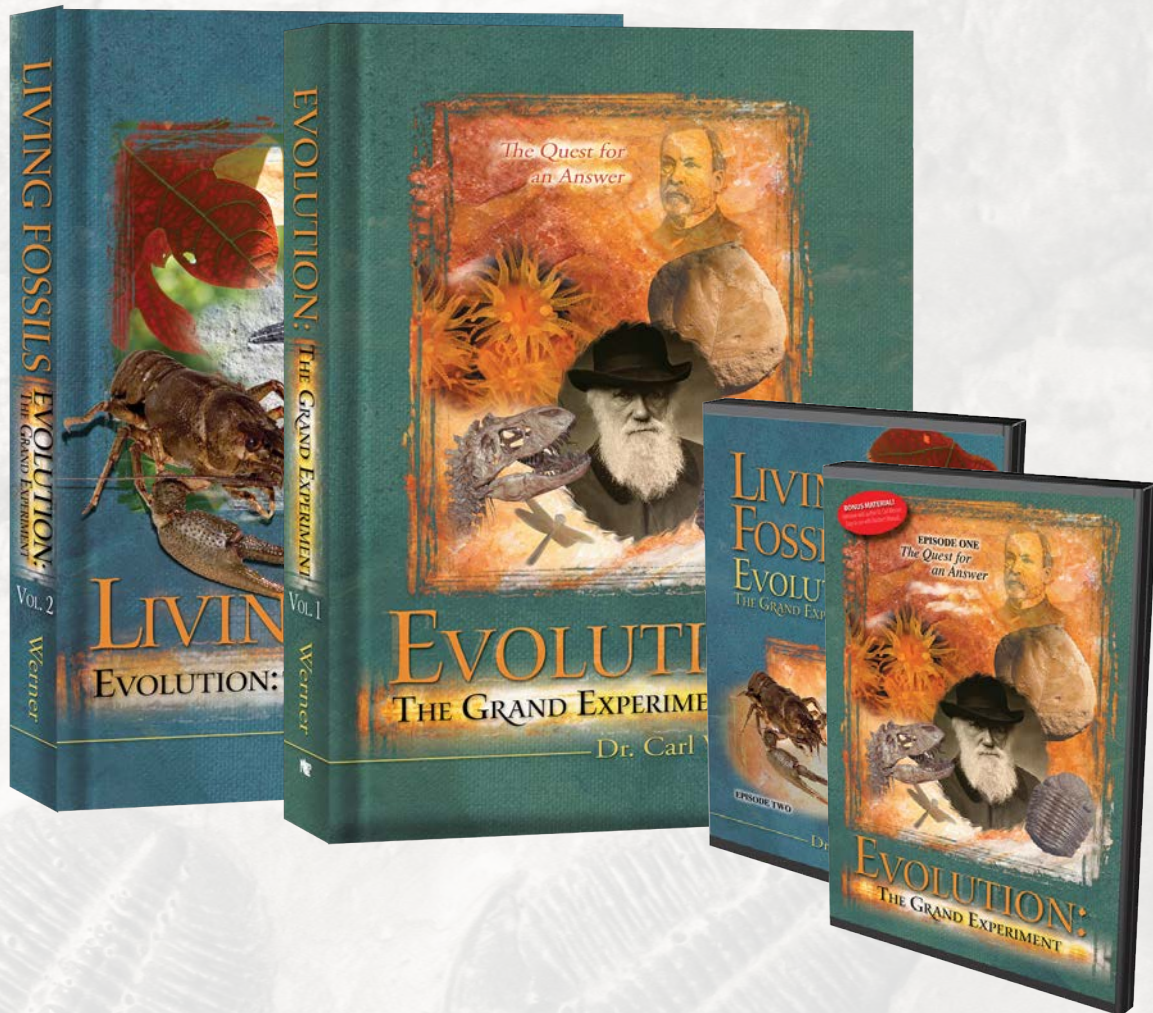


Quizzes & Tests



Answer Key

LIFE SCIENCE: ORIGINS & SCIENTIFIC THEORY





Life Science: Origins & Scientific Theory



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Using This Teacher Guide

Overview: This *Life Science: Origins & Scientific Theory Teacher Guide* contains materials for use with *Evolution: The Grand Experiment Vol. 1* and *Living Fossils*. By developing a deeper understanding of these concepts, students will be able to develop and support a strong worldview.

Course Description: This course is intended to help a student assess information about evolution and creation, and based on the information provided for each, form his or her own understanding of this issue. The author spent 30 years in a challenge to prove evolution, yet the more he learned, the more the truth of God's Word became apparent in the evidence he found while traveling the world viewing artifacts and speaking to scholars and museum officials.

Upon completion of this course, students will have a thorough understanding of the theory of evolution and its limits. Students will develop scientific critical thinking skills through careful analysis of evidence and comparing the merits of different theories. Students will study paleontology, biology, and geology as they relate to the study of origins through an exploration of living fossils.



Chapter Test, Sectional Exams
& Final Exams



Answer Key

Workflow:

Step 1: Teacher leads Discussion Questions.

Step 2: Student watches DVD (if applicable).

Step 3: Student reads chapter.

Step 4: Student is given and completes Chapter Worksheet Questions after reading the chapter.

Step 5: Teacher administers Chapter Test.

Step 6: Teacher administers Sectional Exams where indicated.

Step 7: Teacher administers Comprehensive Final Exams where indicated.

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.

How to Use this Course

You will follow the course calendar whether you are using the course for one or multiple students.

About the Author:

In his sophomore year of college, **Dr. Carl Werner** was challenged by a fellow classmate with these words: “I bet you can’t prove evolution.” This began Dr. Werner’s quest for an answer. After 18 years of study, Dr. Werner would begin travelling to the best museums and dig sites around the globe photographing thousands of original fossils and the actual fossil layers where they were found, and interviewing scientists on the issue. After his years of study and the evidence he has seen, Dr. Werner realized he had reached a most unexpected truth – the truth of a biblical creation.

www.thegrandexperiment.com

Chapter Discussion Question: Teachers are encouraged to participate with the student as they complete the discussion questions. The purpose of the Chapter Purpose section is to introduce the chapter to the student. The Discussion Questions are meant to be thought provoking. The student may not know the answers, but should answer with their thoughts, ideas, and knowledge of the subject using sound reasoning and logic. They should study the answers and compare them with their own thoughts. We recommend the teacher discuss the questions, the student's answers, and the correct answers with the student. This section should not be used for grading purposes.

DVD: Each DVD is watched in its entirety to familiarize the student with each book in the course. They will watch it again as a summary when they complete each book. Students may also use the DVD for review, as needed, as they complete the course.

Chapter Worksheets: The worksheets are foundational to helping the student learn the material and come to a deeper understanding of the concepts presented. Often, the student will compare and contrast what we should find in the fossil record and in living creatures if evolution were true with what we actually find. This comparison clearly shows evolution is an empty theory simply based on the evidence. God's Word can be trusted and displayed both in the fossil record and in what we see in living animals.

Tests and Exams: There is a test for each chapter, sectional exams, and a comprehensive final exam for each book.

First Semester Suggested Daily Schedule

Part 1 Evolution: The Grand Experiment: The Quest for an Answer

Date	Day	Assignment	Due Date	✓	Grade
First Semester — First Quarter					
Week 1	Day 1	Watch DVD in entirety to become familiar with course topics			
	Day 2	Complete Chapter 1 Discussion Questions • Pages 17-18 <i>Teacher Guide</i> • (TG) Chapter 1: The Origin of Life: Two Opposing Views Read pages 1-10 • <i>Evolution: The Grand Experiment</i> • (ETGE)			
	Day 3	Complete Chapter 1 Worksheet • Pages 19-20 • (TG)			
	Day 4	Take Chapter 1 Test • Pages 223-224 • (TG)			
	Day 5	Complete Chapter 2 Discussion Questions • Pages 21-22 • (TG) Chapter 2: Evolution's False Start: Spontaneous Generation Read pages 11-22 • (ETGE)			
Week 2	Day 6	Complete Chapter 2 Worksheet • Pages 23-24 • (TG)			
	Day 7	Take Chapter 2 Test • Pages 225-226 • (TG)			
	Day 8	Complete Chapter 3 Discussion Questions • Pages 25-26 • (TG) Chapter 3: Darwin's False Mechanism for Evolution: Acquired ... Read pages 23-30 • (ETGE)			
	Day 9	Complete Chapter 3 Worksheet • Pages 27-28 • (TG)			
	Day 10	Take Chapter 3 Test • Pages 227-228 • (TG)			
Week 3	Day 11	Study Day-Chapters 1-3			
	Day 12	Study Day-Chapters 1-3			
	Day 13	Take Sectional Exam 1 Chapters 1-3 • Pages 315-316 • (TG)			
	Day 14	Complete Chapter 4 Discussion Questions • Pages 29-30 • (TG) Chapter 4: Natural Selection and Chance Mutations Read pages 31-37 • (ETGE)			
	Day 15	Chapter 4: Natural Selection and Chance Mutations Read pages 38-54 • (ETGE)			
Week 4	Day 16	Complete Chapter 4 Worksheet: Questions 1-13 Pages 31-32 • (TG)			
	Day 17	Complete Chapter 4 Worksheet: Questions 14-27 Pages 33-34 • (TG)			
	Day 18	Take Chapter 4 Test • Pages 229-230 • (TG)			
	Day 19	Complete Chapter 5 Discussion Questions • Pages 35-36 • (TG) Chapter 5: Similarities: A Basic Proof of Evolution? Read pages 55-59 • (ETGE)			
	Day 20	Chapter 5: Natural Selection and Chance Mutations Read pages 60-72 • (ETGE)			

Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 21	Complete Chapter 5 Worksheet: Questions 1-13 Pages 37-38 • (TG)			
	Day 22	Complete Chapter 5 Worksheet: Questions 124-22 Pages 39-40 • (TG)			
	Day 23	Take Chapter 5 Test • Pages 231-232 • (TG)			
	Day 24	Complete Chapter 6 Discussion Questions • Pages 41-42 • (TG) Chapter 6: The Fossil Record and Darwin's Prediction Read pages 73-86 • (ETGE)			
	Day 25	Complete Chapter 6 Worksheet • Pages 43-44 • (TG)			
Week 6	Day 26	Take Chapter 6 Test • Page 233 • (TG)			
	Day 27	Complete Chapter 7 Discussion Questions • Pages 45-46 • (TG) Chapter 7: The Fossil Record of Invertebrates Read pages 87-94 • (ETGE)			
	Day 28	Complete Chapter 7 Worksheet • Pages 47-48 • (TG)			
	Day 29	Take Chapter 7 Test • Page 235 • (TG)			
	Day 30	Complete Chapter 8 Discussion Questions • Pages 49-50 • (TG) Chapter 8: The Fossil Record of Fish • Read pages 95-98 • (ETGE)			
Week 7	Day 31	Complete Chapter 8 Worksheet • Pages 51-52 • (TG)			
	Day 32	Take Chapter 8 Test • Page 237 • (TG)			
	Day 33	Complete Chapter 9 Discussion Questions • Pages 53-54 • (TG) Chapter 9: The Fossil Record of Bats • Read pages 99-104			
	Day 34	Complete Chapter 9 Worksheet • Pages 55-56 • (TG)			
	Day 35	Take Chapter 9 Test • Page 239 • (TG)			
Week 8	Day 36	Study Day-Chapters 4-9			
	Day 37	Study Day-Chapters 4-9			
	Day 38	Study Day-Chapters 4-9			
	Day 39	Take Sectional Exam 2 Chapters 4-9 • Pages 317-320 • (TG)			
	Day 40	Complete Chapter 10 Discussion Questions • Pages 57-58 • (TG) Chapter 10: The Fossil Record of Pinnipeds: Seals and Sea Lions Read pages 105-112 • (ETGE)			
Week 9	Day 41	Complete Chapter 10 Worksheet • Pages 59-62 • (TG)			
	Day 42	Take Chapter 10 Test • Page 241 • (TG)			
	Day 43	Complete Chapter 11 Discussion Questions • Pages 63-64 • (TG) Chapter 11: The Fossil Record of Flying Reptiles Read pages 113-116 • (ETGE)			
	Day 44	Complete Chapter 11 Worksheet • Pages 65-66 • (TG)			
	Day 45	Take Chapter 11 Test • Page 243 • (TG)			

Date	Day	Assignment	Due Date	✓	Grade
First Semester — Second Quarter					
Week 1	Day 46	Complete Chapter 12 Discussion Questions • Pages 67-68 • (TG) Chapter 12: The Fossil Record of Dinosaurs Read pages 117-128 • (ETGE)			
	Day 47	Complete Chapter 12 Worksheet: Questions 1-13 Pages 69-70 • (TG)			
	Day 48	Complete Chapter 12 Worksheet: Questions 14-25 Pages 71-72 • (TG)			
	Day 49	Take Chapter 12 Test • Page 245 • (TG)			
	Day 50	Complete Chapter 13 Discussion Questions • Pages 73-74 • (TG) Chapter 13: The Fossil Record of Whales Read pages 129-146 • (ETGE)			
Week 2	Day 51	Complete Chapter 13 Worksheet 1 • Pages 75-78 • (TG)			
	Day 52	Complete Chapter 13 Worksheet 2 • Pages 79-80 • (TG)			
	Day 53	Take Chapter 13 Test • Page 247 • (TG)			
	Day 54	Complete Chapter 14 Discussion Questions • Pages 81-82 • (TG) Chapter 14: The Fossil Record of Birds Part 1: <i>Archaeopteryx</i> Read pages 147-164 • (ETGE)			
	Day 55	Complete Chapter 14 Worksheet 1 • Pages 83-84 • (TG)			
Week 3	Day 56	Complete Chapter 14 Worksheet 2 • Pages 85-86 • (TG)			
	Day 57	Take Chapter 14 Test • Page 249 • (TG)			
	Day 58	Complete Chapter 15 Discussion Questions • Pages 87-88 • (TG) Chapter 15: The Fossil Record of Birds Part 2: Feathered Dinosaurs Read pages 165-184 • (ETGE)			
	Day 59	Complete Chapter 15 Worksheet 1 • Pages 89-90 • (TG)			
	Day 60	Complete Chapter 15 Worksheet 2 • Pages 91-92 • (TG)			
Week 4	Day 61	Take Chapter 15 Test • Page 251 • (TG)			
	Day 62	Study Day-Chapters 10-15			
	Day 63	Study Day-Chapters 10-15			
	Day 64	Study Day-Chapters 10-15			
	Day 65	Take Sectional Exam 3 Chapters 10-15 • Pages 321-324 • (TG)			
Week 5	Day 66	Complete Chapter 16 Discussion Questions • Pages 93-94 • (TG) Chapter 16: The Fossil Record of Flowering Plants Read pages 185-190 • (ETGE)			
	Day 67	Complete Chapter 16 Worksheet • Pages 95-96 • (TG)			
	Day 68	Take Chapter 16 Test • Page 253 • (TG)			
	Day 69	Complete Chapter 17 Discussion Questions • Pages 97-98 • (TG) Chapter 17: The Origin of Life — Part 1: The Formation of DNA Read pages 191-198 • (ETGE)			
	Day 70	Complete Chapter 17 Worksheet 1 • Pages 99-100 • (TG)			

Date	Day	Assignment	Due Date	✓	Grade
Week 6	Day 71	Complete Chapter 17 Worksheet 2 • Pages 101-102 • (TG)			
	Day 72	Take Chapter 17 Test • Page 255 • (TG)			
	Day 73	Complete Chapter 18 Discussion Questions Pages 103-104 • (TG) Chapter 18: The Origin of Life — Part 2: The Formation of Proteins • Read pages 199-204 • (ETGE)			
	Day 74	Complete Chapter 18 Worksheet • Pages 105-106 • (TG)			
	Day 75	Take Chapter 18 Test • Page 257 • (TG)			
Week 7	Day 76	Complete Chapter 19 Discussion Questions • Pages 107-108 • (TG) Chapter 19: The Origin of Life — Part 3: The Formation of Amino Acids • Read pages 205-210 • (ETGE)			
	Day 77	Complete Chapter 19 Worksheet 1 • Page 109 • (TG)			
	Day 78	Complete Chapter 19 Worksheet 2 • Pages 111-112 • (TG)			
	Day 79	Take Chapter 19 Test • Pages 259-260 • (TG)			
	Day 80	Study Day-Chapters 16-19			
Week 8	Day 81	Study Day-Chapters 16-19			
	Day 82	Study Day-Chapters 16-19			
	Day 83	Study Day-Chapters 16-19			
	Day 84	Take Sectional Exam 4 Chapters 16-19 • Pages 325-328 • (TG)			
	Day 85	Watch DVD in its entirety as a summary.			
Week 9	Day 86	Study Day-Chapters 1-19			
	Day 87	Study Day-Chapters 1-19			
	Day 88	Study Day-Chapters 1-19			
	Day 89	Study Day-Chapters 1-19			
	Day 90	Take Comprehensive Exam Chapters 1-19 Pages 329-332 • (TG)			
		Mid-Term Grade			

Second Semester Suggested Daily Schedule

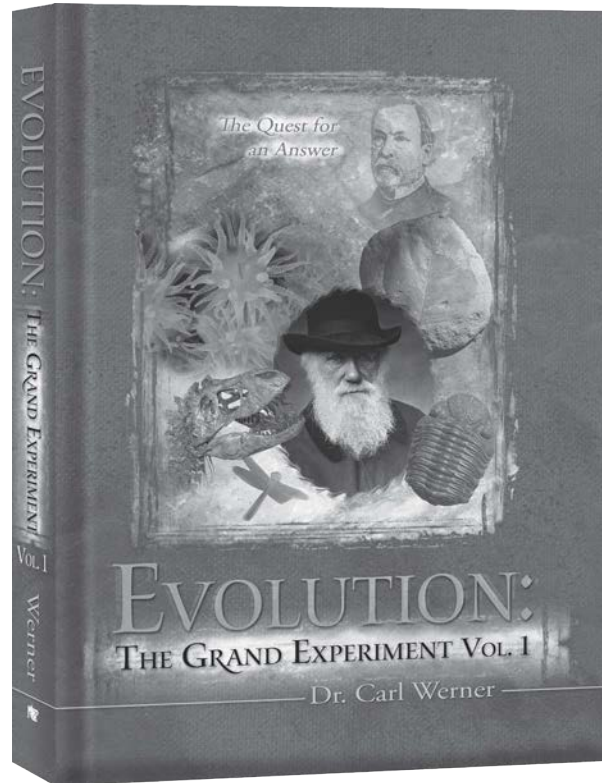
Part 2 Evolution: The Grand Experiment: Living Fossils

Date	Day	Assignment	Due Date	✓	Grade
Second Semester — Third Quarter					
Week 1	Day 91	Complete Chapter 1 Discussion Questions • Pages 115-116 • (TG) Chapter 1: The Challenge That Would Change My Life Read pages 1-6 • (ETGE)			
	Day 92	Complete Chapter 1 Worksheet • Pages 117-118 • (TG)			
	Day 93	Take Chapter 1 Test • Page 263 • (TG)			
	Day 94	Complete Chapter 2 Discussion Questions • Pages 119-120 • (TG) Chapter 2: How Can You Verify Evolution? Read pages 7-14 • (ETGE)			
	Day 95	Complete Chapter 2 Worksheet • Pages 121-122 • (TG)			
Week 2	Day 96	Take Chapter 2 Test • Page 265 • (TG)			
	Day 97	Complete Chapter 3 Discussion Questions • Pages 123-124 • (TG) Chapter 3: The Naming Game • Read pages 15-28 • (ETGE)			
	Day 98	Complete Chapter 3 Worksheet • Pages 125-127 • (TG)			
	Day 99	Take Chapter 3 Test • Page 267 • (TG)			
	Day 100	Complete Chapter 4 Discussion Questions • Pages 129-130 • (TG) Chapter 4: Echinoderms • Read pages 29-44 • (ETGE)			
Week 3	Day 101	Complete Chapter 4 Worksheet • Pages 131-132 • (TG)			
	Day 102	Take Chapter 4 Test • Page 269 • (TG)			
	Day 103	Complete Chapter 5 Discussion Questions • Pages 133-134 • (TG) Chapter 5: Aquatic Arthropods • Read pages 45-56 • (ETGE)			
	Day 104	Complete Chapter 5 Worksheet • Pages 135-136 • (TG)			
	Day 105	Take Chapter 5 Test • Page 271 • (TG)			
Week 4	Day 106	Complete Chapter 6 Discussion Questions • Pages 137-138 • (TG) Chapter 6: Land Arthropods • Read pages 57-70 • (ETGE)			
	Day 107	Complete Chapter 6 Worksheet • Pages 139-140 • (TG)			
	Day 108	Take Chapter 6 Test • Page 273 • (TG)			
	Day 109	Complete Chapter 7 Discussion Questions • Pages 141-142 • (TG) Chapter 7: Bivalve Shellfish • Read pages 71-76 • (ETGE)			
	Day 110	Complete Chapter 7 Worksheet • Pages 143-144 • (TG)			
Week 5	Day 111	Take Chapter 7 Test • Page 275 • (TG)			
	Day 112	Complete Chapter 8 Discussion Questions • Pages 145-146 • (TG) Chapter 8: Snails • Read pages 77-82 • (ETGE)			
	Day 113	Complete Chapter 8 Worksheet • Pages 147-148 • (TG)			
	Day 114	Take Chapter 8 Test • Page 277 • (TG)			
	Day 115	Complete Chapter 9 Discussion Questions • Pages 149-150 • (TG) Chapter 9: Other Types of Shellfish • Read pages 83-88 • (ETGE)			

Date	Day	Assignment	Due Date	✓	Grade
Week 6	Day 116	Complete Chapter 9 Worksheet • Pages 151-152 • (TG)			
	Day 117	Take Chapter 9 Test • Page 299 • (TG)			
	Day 118	Complete Chapter 10 Discussion Questions • Pages 153-156 • (TG) Chapter 10: Worms • Read pages 89-92 • (ETGE)			
	Day 119	Complete Chapter 10 Worksheet • Page 157 • (TG)			
	Day 120	Take Chapter 10 Test • Page 281 • (TG)			
Week 7	Day 121	Complete Chapter 11 Discussion Questions Pages 159-160 • (TG) Chapter 11: Sponges and Corals • Read pages 93-98 • (ETGE)			
	Day 122	Complete Chapter 11 Worksheet • Page 161 • (TG)			
	Day 123	Take Chapter 11 Test • Page 283 • (TG)			
	Day 124	Study Day-Chapters 1-11			
	Day 125	Study Day-Chapters 1-11			
Week 8	Day 126	Study Day-Chapters 1-11			
	Day 127	Take Sectional Exam 1 Chapters 1-11 • Pages 335-338 • (TG)			
	Day 128	Complete Chapter 12 Discussion Questions • Pages 163-164 • (TG) Chapter 12: Bony Fish • Read pages 99-116 • (ETGE)			
	Day 129	Complete Chapter 12 Worksheet • Pages 165-166 • (TG)			
	Day 130	Take Chapter 12 Test • Page 285 • (TG)			
Week 9	Day 131	Complete Chapter 13 Discussion Questions • Pages 167-168 • (TG) Chapter 13: Cartilaginous Fish • Read pages 117-124 • (ETGE)			
	Day 132	Complete Chapter 13 Worksheet • Pages 169-170 • (TG)			
	Day 133	Take Chapter 13 Test • Page 287 • (TG)			
	Day 134	Complete Chapter 14 Discussion Questions • Pages 171-172 • (TG) Chapter 14: Jawless Fish • Read pages 125-128 • (ETGE)			
	Day 135	Complete Chapter 14 Worksheet • Page 173 • (TG)			
Second Semester — Fourth Quarter					
Week 1	Day 136	Take Chapter 14 Test • Page 289 • (TG)			
	Day 137	Complete Chapter 15 Discussion Questions • Pages 175-176 • (TG) Chapter 15: Amphibians • Read pages 129-136 • (ETGE)			
	Day 138	Complete Chapter 15 Worksheet • Page 177 • (TG)			
	Day 139	Take Chapter 15 Test • Page 291 • (TG)			
	Day 140	Complete Chapter 16 Discussion Questions • Pages 179-180 • (TG) Chapter 16: Crocodilians • Read pages 137-142 • (ETGE)			
Week 2	Day 141	Complete Chapter 16 Worksheet • Pages 181-182 • (TG)			
	Day 142	Take Chapter 16 Test • Page 293 • (TG)			
	Day 143	Complete Chapter 17 Discussion Questions • Pages 183-184 • (TG) Chapter 17: Snakes • Read pages 143-146 • (ETGE)			
	Day 144	Complete Chapter 17 Worksheet • Page 185 • (TG)			
	Day 145	Take Chapter 17 Test • Page 295 • (TG)			

Date	Day	Assignment	Due Date	✓	Grade
Week 3	Day 146	Complete Chapter 18 Discussion Questions • Pages 187-188 • (TG) Chapter 18: Lizards • Read pages 147-154 • (ETGE)			
	Day 147	Complete Chapter 18 Worksheet • Page 189 • (TG)			
	Day 148	Take Chapter 18 Test • Page 297 • (TG)			
	Day 149	Complete Chapter 19 Discussion Questions • Pages 191-192 • (TG) Chapter 19: Turtles • Read pages 155-160 • (ETGE)			
	Day 150	Complete Chapter 19 Worksheet • Pages 193-194 • (TG)			
Week 4	Day 151	Take Chapter 19 Test • Page 299 • (TG)			
	Day 152	Complete Chapter 20 Discussion Questions • Pages 195-196 • (TG) Chapter 20: Birds • Read pages 161-168 • (ETGE)			
	Day 153	Complete Chapter 20 Worksheet • Pages 197-198 • (TG)			
	Day 154	Take Chapter 20 Test • Page 301 • (TG)			
	Day 155	Complete Chapter 21 Discussion Questions • Pages 199-200 • (TG) Chapter 21: Mammals • Read pages 169-182 • (ETGE)			
Week 5	Day 156	Complete Chapter 21 Worksheet 1 • Pages 201-202 • (TG)			
	Day 157	Complete Chapter 21 Worksheet 2 • Pages 203-204 • (TG)			
	Day 158	Take Chapter 21 Test • Page 303 • (TG)			
	Day 159	Complete Chapter 22 Discussion Questions • Pages 205-206 • (TG) Chapter 22: Cone-Bearing Plants • Read pages 183-196 • (ETGE)			
	Day 160	Complete Chapter 22 Worksheet • Pages 207-208 • (TG)			
Week 6	Day 161	Take Chapter 22 Test • Page 305 • (TG)			
	Day 162	Complete Chapter 23 Discussion Questions • Pages 209-210 • (TG) Chapter 23: Spore-Forming Plants • Read pages 197-208 • (ETGE)			
	Day 163	Complete Chapter 23 Worksheet • Page 211 • (TG)			
	Day 164	Take Chapter 23 Test • Page 307 • (TG)			
	Day 165	Complete Chapter 24 Discussion Questions • Pages 213-214 • (TG) Chapter 24: Flowering Plants • Read pages 209-230 • (ETGE)			
Week 7	Day 166	Complete Chapter 24 Worksheet • Pages 215-216 • (TG)			
	Day 167	Take Chapter 24 Test • Page 309 • (TG)			
	Day 168	Complete Chapter 25 Discussion Questions • Pages 217-218 • (TG) Chapter 25: Coming Full Circle — My Conclusions Read pages 231-243 • (ETGE)			
	Day 169	Complete Chapter 25 Worksheet • Pages 219-220 • (TG)			
	Day 170	Take Chapter 25 Test • Page 311 • (TG)			
Week 8	Day 171	Study Day-Chapters 12-25			
	Day 172	Study Day-Chapters 12-25			
	Day 173	Study Day-Chapters 12-25			
	Day 174	Take Sectional Exam 2 Chapters 12-25 • Pages 339-342 • (TG)			
	Day 175	Watch DVD in its entirety as a summary.			

Date	Day	Assignment	Due Date	✓	Grade
Week 9	Day 176	Study Day-Chapters 1-25			
	Day 177	Study Day-Chapters 1-25			
	Day 178	Study Day-Chapters 1-25			
	Day 179	Study Day-Chapters 1-25			
	Day 180	Take Comprehensive Exam Chapters 1-25 • Pages 343-348 • (TG)			
		Second Semester Grade			
		Final Grade			



Worksheets

for Use with

Evolution: The Grand Experiment



Purpose of Chapter: The purpose of Chapter 1 is to help students understand that there is more than one point of view regarding how all forms of life came about. It is important, in a diverse culture such as ours, to understand other points of view and to understand how others have arrived at their conclusions.

Answer the Discussion Questions. Compare your answers to the next page:

1. What are the two opposing views concerning how life came about and how humans came into being?

2. Do you think parents want creationism to be taught in *public* schools along with evolution? Why or why not?

Compare your answers:

1. What are the two opposing views concerning how life came about and how humans came into being?

Answer: Generally, they are:

- (1) That life (in the form of a theoretical bacterium-like organism) came about spontaneously as a result of the big bang, eventually evolving into modern animals and humans over billions of years or
- (2) That all life was created by a higher power or deity not seen by human beings.

(Note: A possible third view, believed by some, is that life evolved, but God helped the process along.)

2. Do you think parents want creationism to be taught in *public* schools along with evolution? Why or why not?

Answer: According to the Gallup poll presented in this chapter, parents want creationism taught in public schools along with evolution so that students can learn the facts and evidences both for and against each theory.



1. Describe the three world views concerning how life and humans came into existence.
 - a.
 - b.
 - c.
2. Define the big bang. (See Glossary in the student book.)
3. What year did Darwin publish his theory of evolution?
4. Describe the three major scientific developments concerning evolution that have occurred since Darwin first published his theory in 1859. Hint: Fossils, DNA, and genes.
 - a.
 - b.
 - c.
5. Name the artist, the location, and the content of the famous artwork dealing with the origin of life, as seen on page 3 of this chapter.
 - a.
 - b.
 - c.
6. Since the middle of the 20th century there have been a growing number of _____ who reject the theory of evolution based on the discovery of processes and structures of which Darwin was unaware.

7. List the four best evidences against the theory of evolution cited by scientists who oppose evolution.
 - a.
 - b.
 - c.
 - d.

8. List the four best evidences for the theory of evolution cited by scientists who support evolution.
 - a.
 - b.
 - c.
 - d.

9. Describe the problems of teaching creationism and the theory of evolution to students using the dual model approach.

10. Describe the benefits of teaching the theory of evolution to students using the dual model approach.

11. Describe the results of the Gallup poll concerning the opinion of parents as to what should be taught in public schools. When parents were asked if creationism should be taught in *public* schools, what percentage said yes, what percentage said no, and what percentage were unsure?
 - a.
 - b.
 - c.
 - d.



Purpose of Chapter: The purpose of Chapter 2 is to show students that scientists are not infallible. Scientists can make mistakes just like anyone else.

Answer the Discussion Questions. Compare your answers to the next page:

1. Is it possible for a scientist to make a mistake? Give an example.
2. Have scientists made any mistakes in your lifetime?
3. If a majority of scientists believe in something, should you accept what they believe?

Compare your answers:

1. Is it possible for a scientist to make a mistake? Give an example.

Answer: Yes. Scientists used to (incorrectly) believe the earth was the center of our solar system. (Galileo and others later showed that the sun was the center of our solar system.) Also, in the past, scientists thought that the earth was flat. We now know, of course, that the earth is round, like a ball.

2. Have scientists made any mistakes in your lifetime?

Answer: Yes. Recent examples include cold fusion, the belief that certain foods cause certain diseases, etc.

3. If a majority of scientists believe in something, should you accept what they believe?

Answer: No, not necessarily. Scientists can be wrong.



1. What theory did scientists believe *before* Darwin's theory of evolution was published? During what century was this theory first believed? How long was it perpetuated? In what year was it disproved?
 - a.
 - b.
 - c.
 - d.
2. Briefly describe the now disproved theory of spontaneous generation.
3. Describe Dr. von Helmont's "mice from dirty underwear" experiment that he offered as proof of the theory of spontaneous generation.
4. What would happen during von Helmet's time to anyone who dared to challenge spontaneous generation?
5. Describe the "maggots from rotting meat" experiment.
6. Describe Dr. Francesco Redi's experiment and tell whether his experiment was a proof for or against the theory of spontaneous generation.
 - a.
 - b.

7. Give the year of Dr. Francesco Redi's experiment.

8. Describe the "scum from clear pond water" experiment.

9. Describe the experiment of John Needham.

10. Describe Dr. Louis Pasteur's experiment and tell whether his experiment was a proof for or against the theory of spontaneous generation.
 - a.

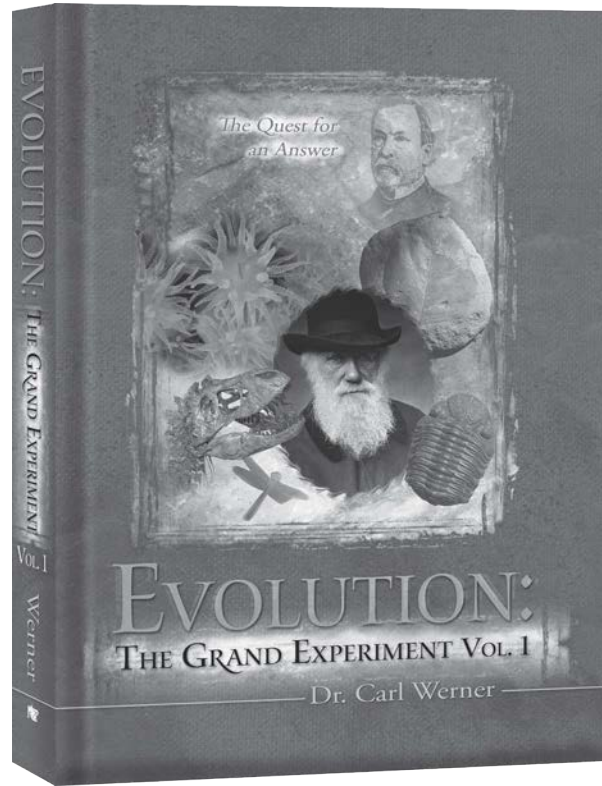
 - b.

11. What year did Dr. Louis Pasteur disprove the spontaneous generation of bacteria from water?

12. What theory eventually replaced the theory of spontaneous generation and is the basis for the modern theory of how life began naturally?

13. What has spontaneous generation taught us, as a society, about the infallibility of scientists?

14. What has spontaneous generation taught us about scientific ideas?



Chapter Tests

for Use with

Evolution: The Grand Experiment



1. What are the two opposing views on the origin of life?
 - a.

 - b.

2. Name *one* of the three best *fossil* evidences *for* evolution, cited by scientists who support the theory.

3. Name one of the three major scientific developments that have occurred since Darwin first published his theory of evolution in 1859.

4. Name *one* of the four best evidences *against* evolution, cited by scientists who oppose the theory.

5. Michelangelo's famous painting from the ceiling of the Sistine Chapel depicts what?

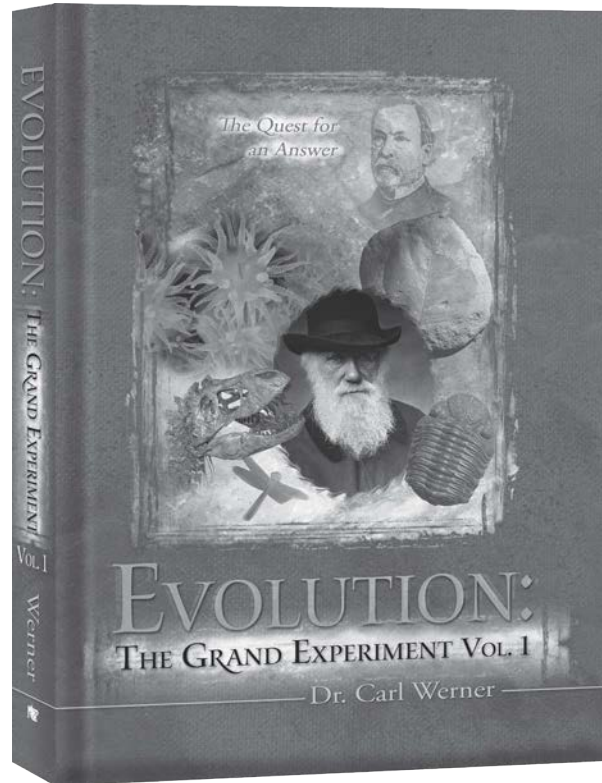
6. According to a Gallup poll taken in 2012, many Americans, 46 percent, believe God created man in the last _____ years.

7. What percentage of Americans believe evolution did occur, but that God guided the process?

8. *True or False:* Only 15 percent of Americans believe in evolution, that humans evolved from apes, and God had no part in the process.

9. *True or False:* The majority of Americans believe creationism should *not* be taught in *public* schools.

10. Name one of the fears educators have in teaching two opposing theories about the origin of life.



Answer Keys for Worksheets

for Use with

The Grand Experiment

Evolution: The Grand Experiment — Worksheet Answer Keys

Chapter 1

The Origin of Life: Two Opposing Views

- An all-powerful God created the entire universe and all forms of life, such as humans and dinosaurs, at the same time (creation).
 - The universe began naturally, billions of years ago as a result of an explosion (big bang). Later, a bacterium-like organism arose spontaneously from a mixture of chemicals (abiogenesis) and this single-cell organism evolved into all modern life forms, including humans (evolution).
 - A third view is that God caused the big bang and then helped the process of evolution along (big bang and evolution with God's aid).
- The theory that the universe was created by a large explosion in space 10 to 20 billion years ago. The theory is based on the observation of the universe expanding.
- 1859
- Scientists have collected nearly one billion fossils.
 - They have described the structure and function of DNA.
 - They have identified how genes are passed on to the next generation.
- Michelangelo
 - The ceiling of the Sistine Chapel
 - Depicts God creating man
- Scientists
- Gaps in the fossil record
 - Problems with the big bang theory
 - The amazing complexity of even the simplest organisms
 - The inability of scientists to explain the origin of life using natural laws
- Observations of natural selection in action
 - The evolution of birds from dinosaurs
 - The evolution of whales from a land animal
 - The evolution of man from apes
- Some fear that teaching two opposing theories would confuse the students. Others believe that creation is a religious idea and should not be taught

in government schools.

- Some believe this approach would encourage students to think critically and openly about the world around them.
- According to the Gallup poll presented in this chapter, parents want creationism taught in public schools along with evolution so that students can learn the facts and evidences both for and against each theory.
 - Yes-54%
 - No-22%
 - Unsure-24%

Chapter 2

Evolution's False Start: Spontaneous Generation

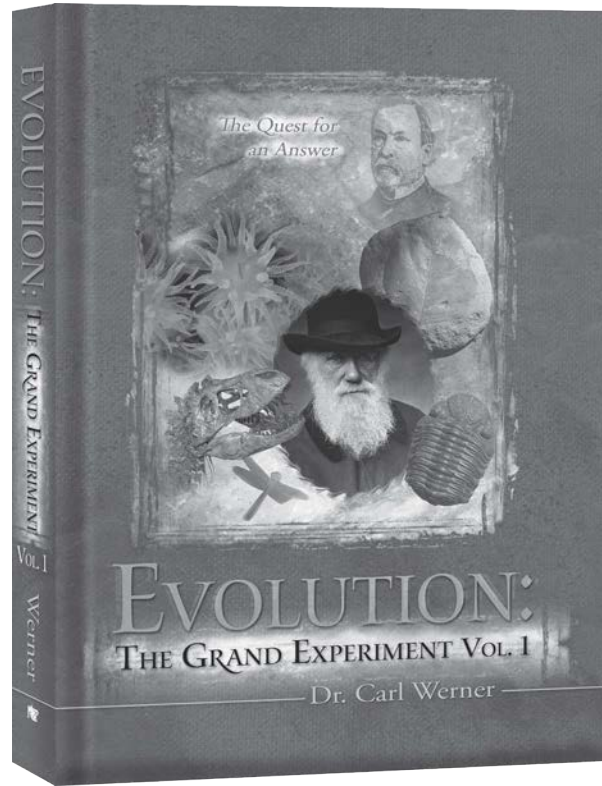
- The theory of spontaneous generation
 - Fourth century B.C.
 - Over 2100 years
 - 1859
- Living organisms could come into being rapidly and "spontaneously" over a period of just a few days or weeks.
- "If you press a piece of underwear soiled with sweat, together with some wheat in an openmouthed jar, after about 21 days the odor changes and the fermentation, coming out of the underwear and penetrating through the husks of wheat, changes the wheat into mice...But what is even more remarkable is that the mice, which come out of the wheat and underwear, are not small mice, not even miniature adults or aborted mice, but adult mice emerge!"
- Questioning spontaneous generation was tantamount to questioning science itself. They would be thought of as fools.
- Put a piece of meat into an open jar. Wait two weeks for spontaneous generation of maggots on the meat.
- When Dr. Redi placed a piece of cheesecloth over the jar of meat, maggots never formed because flies were unable to land on the meat and lay their eggs.
 - It was proof against the theory of spontaneous generation.

7. 1668
 8. They took clear pond water, boiled it, and poured it into a jar. After a few weeks or so, the pond water became cloudy and scum formed on the water.
 9. He boiled broth to kill the living things that may have been present in the liquid but later the broth turned cloudy.
 10. a. Dr. Pasteur started with a flask filled with boiled meat broth. He then heated the neck of the flask and stretched it. After heating the neck of the flask again, Pasteur then made it s-shaped. The open end of the s-shaped glass neck pointed upward. Due to gravity, bacteria from the air could only settle in the lowest part of the neck and were prevented from reaching the broth. Even after months of waiting, the liquid in the flask never became cloudy. Pasteur then tilted the flask, allowing the liquid in the flask to come in contact with the neck. Within a short period of time, the liquid became cloudy. The microorganisms that had settled in the neck contaminated the broth.
 - b. This proved that bacteria (or in this case scum) do not form spontaneously from clear water!
 11. 1859
 12. The theory that all life must come from pre-existing life.
 13. Scientists can be wrong, even though they may be confident in their convictions.
 14. A generous dose of skepticism goes a long way in science. Also, a scientific idea may not be disproved for hundreds, if not thousands, of years.
- c. Which evolved into a fish
 - d. Evolved into a semi-aquatic amphibian
 - e. Evolved into a land-based reptile
 - f. One type of land-based reptile changed into a bird
 6. a. A single-cell organism
 - b. Evolved into a multicellular invertebrate
 - c. Which evolved into a fish
 - d. Evolved into a semi-aquatic amphibian
 - e. Evolved into a land-based reptile
 - f. Another type of land-based reptile changed into a mammal
 - g. Evolved into a primate (ape)
 - h. Evolved into humans
 7. a. Millions and millions of years
 - b. It supposedly took 2-3 weeks for spontaneous generation to generate life.
 8. The disproved idea that changes acquired in the body during life, such as enlarged muscles or a suntan, can be passed on to the next generation.
 9. a. The law of use and disuse
 - b. "Lamarckianism"
 10. a. "I think that there can be little doubt that use in our domestic animals strengthens and enlarges certain parts, and disuse diminishes them; and that such modifications are inherited."
 - b. *The Origin of Species*

Chapter 3

Darwin's False Mechanism for Evolution: Acquired Characteristics

1. 1859
 2. *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*
 3. A primordial prototype
 4. A primordial single-cell organism
 5. a. A single-cell organism
 - b. Evolved into a multicellular invertebrate
- a. Muscle building- even though a man lifts weights every day and develops large muscles, his baby will not be born with large muscles.
 - b. Neck stretching- Stretching neck muscles has no effect on the DNA in the reproductive cells of the horse. A longer neck cannot be passed on to the next generation.
 - c. Sun tanning- If a woman tans her skin every day, her children will not be born with a suntan. Tanning has no effect on the genes of the reproductive cells; therefore, tanned skin is not passed on to the next generation.



Answer Keys for Tests

for Use with

The Grand Experiment

Evolution: The Grand Experiment — Test Answer Keys

Chapter 1

The Origin of Life: Two Opposing Views

1. One view is that an all-powerful God created the universe and all forms of life. Another view proposes that the universe began billions of years ago as a result of the big bang. Later, life in the form of a bacterium-like organism arose spontaneously from a mixture of chemicals. Subsequently, this single-cell organism slowly began to evolve into all modern life forms.
2. One of the three possible answers:
 - the evolution of whales from a land mammal
 - the evolution of birds from dinosaurs
 - the evolution of men from apes
3. One of the three possible answers:
 - Scientists have collected over one billion fossils.
 - Scientists have described the structure of DNA.
 - Scientists have identified how genes are passed on to the next generation .
4. One of the four possible answers:
 - gaps in the fossil record
 - problems with the big bang theory
 - the amazing complexity of even the simplest organisms
 - the inability of scientists to explain the origin of life using natural laws
5. God creating man
6. 10,000
7. 32 percent
8. True
9. False
10. Some educators fear teaching two opposing theories would confuse the students.

Chapter 2

Evolution's False Start: Spontaneous Generation

1. Jan Baptista von Helmont
- 2–4.
 - a. Mice came from dirty underwear.

- b. Maggots came from rotting meat.
 - c. Bacteria (scum) came from clear boiled pond water (or meat broth).
5. 1668
 6. Bacteria
 7. Dr. Louis Pasteur
 8. Over 2,100 years (322 B.C. + A.D. 1859 = 2,181 years)
 9. 1859
 10. The theory of evolution

Chapter 3

Darwin's False Mechanism for Evolution: Acquired Characteristics

1. 1859
2. The disproved idea that changes acquired in the body during life, such as enlarged muscles or a suntan, can be passed on to the next generation
3.
 - a. Muscle building (is not passed on to the offspring).
 - b. Sun tanning (is not passed on to the offspring).
 - c. Stretching the neck (is not passed on to the offspring).
 - d. Disuse or cutting off body parts (is not passed on to the offspring).
4. True
5. False
6. "If this implies that many parts are not modified by use and disuse during the life of the individual, I differ widely from you, as every year I come to attribute more and more to such agency."
7. The law of *use* and *disuse*.
8. August Weisman
9. August Weisman cut off the tails of mice for twenty generations in a row. (No matter how many tails he cut off, the baby mice were always born with a tail.)
10. No.