

Simply Charlotte Mason Lesson Plans for *Discovering Design with Physics*

These lessons plans will guide you through Discovering Design with Physics by Dr. Jay Wile with narration prompts and reminders to enter key people and events into your Book of Centuries.

LESSON 1

Read and narrate these sections in *Discovering Design with Physics*, pages iii–v:

“Introduction,”

“How to Use This Book,”

“Experiments and Activities,”

“Experiment Supplies,”

“Course Website,”

“Question/Answer Service.”

Take a few moments to look over the materials that will be needed for the experiments in chapter 1, “Let’s Move!” and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 1 at <https://bereanbuilders.com/ecommerce/online-content/discovering-design-with-physics/ddp-Chapter-1/>.

Note: A list of what materials are needed for the experiments in each chapter can be found in Appendix C, pages 457–462.

LESSON 2

Read and narrate these sections in *Discovering Design with Physics*, chapter 1:

“Introduction,”

“Let’s Make Sure You Are Ready.”

Answer Comprehension Check questions 1 and 2, either orally or in writing.

Commit to memory any information in a pink box.

LESSON 3

Read and narrate these sections in *Discovering Design with Physics*, chapter 1:

“Sir Isaac Newton,”

“Where Do We Start?,”

“Speed and Velocity.”

Answer Comprehension Check questions 3 and 4.

Commit to memory any information in a pink box.

Enter Sir Isaac Newton in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

Sir Isaac Newton (1642–1727) made discoveries in mechanics, optics, and astronomy and discovered calculus.

LESSON 4

Read and narrate this section in *Discovering Design with Physics*, chapter 1: “Velocity is Relative.”

Complete Experiment 1.1, “Velocity is Relative,” when you come to it in the reading.

Answer Comprehension Check question 5.

Commit to memory any information in a pink box.

LESSON 5

Read and narrate these sections in *Discovering Design with Physics*, chapter 1: “Relating Velocity and Displacement,” “Newton’s First Law of Motion.”

Complete Experiment 1.2, “Newton’s First Law,” when you come to it in the reading.

Answer Comprehension Check questions 6, 7, 8, and 9.

Commit to memory any information in a pink box.

Enter Aristotle and Galileo Galilei in *My Book of Centuries*. Use the suggestions in the Book of Centuries Entries here or customize your own entries.

Book of Centuries Entries

Aristotle (384 B.C.–322 B.C.) 4th century B.C. philosopher who influenced thinking on science for centuries.

Galileo Galilei (1564–1642) showed that objects have a preferred state because of the force of friction.

LESSON 6

Read and narrate this section in *Discovering Design with Physics*, chapter 1: “This Can Be a Bit Tricky!”

Complete Experiment 1.3, “Motion in a Circle,” when you come to it in the reading.

Answer Comprehension Check question 10.

LESSON 7

Read and narrate this section in *Discovering Design with Physics*, chapter 1: “Change Is a Part of Life.”

Complete Experiment 1.4, “Changing Velocity,” when you come to it in the reading.

Answer Comprehension Check questions 11 and 12.

Commit to memory any information in a pink box.

LESSON 8

Read and narrate these sections in *Discovering Design with Physics*, chapter 1:
“A Picture Is Worth a Thousand Words,”
“To Err Is Human.”

Answer Comprehension Check question 13.

Commit to memory any information in a pink box.

LESSON 9

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 10

Review chapter 1: “Let’s Move!” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: significant figures, Isaac Newton, displacement, speed, velocity, relative velocity, Galileo Galilei, Newton’s First Law of Motion, friction, inertia, average velocity, instantaneous velocity, acceleration, random errors, systematic errors.

Begin working on the Review for chapter 1, answering any questions that weren’t included in the narration.

Equations for Chapter 1

$$\text{Equation (1.1) speed} = \frac{\Delta d}{\Delta t}$$

$$\text{Equation (1.2) } v = \frac{\Delta x}{\Delta t}$$

$$\text{Equation (1.3) relative velocity} = \text{velocity of moving object} - \text{velocity of reference object}$$

LESSON 11

Complete the Review for chapter 1.

LESSON 12

Complete the Test for chapter 1.

Take a few moments to look over the materials that will be needed for the experiments in chapter 2, “Force and Acceleration,” and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 2 at <https://bereanbuilders.com/ecomm/online-content/discovering-design-with-physics/ddp-Chapter-2/>.

LESSON 13

Read and narrate these sections in *Discovering Design with Physics*, chapter 2:
“Introduction,”
“The Mathematical Definition of Acceleration.”

Complete Experiment 2.1, “Measuring Acceleration,” when you come to it in the reading.

Answer Comprehension Check questions 1 and 2.

Commit to memory any information in a pink box.

LESSON 14

Read and narrate these sections in *Discovering Design with Physics*, chapter 2:
“More Graphs,”
“Newton’s Second Law.”

Complete Experiment 2.2, “Seeing Newton’s Second Law in Action,” when you come to it in the reading.

Answer Comprehension Check questions 3, 4, and 5.

Commit to memory any information in a pink box.

LESSON 15

Read and narrate this section in *Discovering Design with Physics*, chapter 2:
“Equations of Motion (Part 1).”

Answer Comprehension Check questions 6 and 7.

Commit to memory any information in a pink box.

LESSON 16

Read and narrate these sections in *Discovering Design with Physics*, chapter 2:
“Equations of Motion (Part 2),”
“Free Fall.”

Complete Experiment 2.3, “Measuring the Acceleration Due to Gravity,” when you come to it in the reading.

Answer Comprehension Check questions 8 and 9.

Commit to memory any information in a pink box.

LESSON 17

Read and narrate these sections in *Discovering Design with Physics*, chapter 2:
“More Analysis of Free Fall,”
“The Difference Between Mass and Weight.”

Answer Comprehension Check questions 10, 11, 12, and 13.

Commit to memory any information in a pink box.

LESSON 18

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 19

Review chapter 2, “Force and Acceleration,” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: acceleration, Newton’s Second Law of Motion, free fall, air resistance, acceleration due to gravity, mass and weight.

Begin working on the Review for chapter 2, answering any questions that weren’t included in the narration.

Equations for Chapter 2

$$\text{Equation (2.1)} \quad a = \frac{\Delta v}{\Delta t}$$

$$\text{Equation (2.2)} \quad F = m \cdot a$$

$$\text{Equation (2.4)} \quad v_f = v_0 + a \cdot t$$

$$\text{Equation (2.11)} \quad v_f^2 = v_0^2 + 2a \cdot \Delta x$$

$$\text{Equation (2.16)} \quad \Delta x = v_0 t + \frac{1}{2} a t^2$$

$$\text{Equation (2.17)} \quad \text{weight} = m \cdot g$$

LESSON 20

Complete the Review for chapter 2.

LESSON 21

Complete the Test for chapter 2.

Take a few moments to look over the materials that will be needed for the experiments in chapter 3, “Friction,” and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 3 at <https://bereanbuilders.com/ecommerce/online-content/discovering-design-with-physics/ddp-Chapter-3/>.

LESSON 22

Read and narrate these sections in *Discovering Design with Physics*, chapter 3:

“Introduction,”

“Newton’s Third Law.”

Complete Experiment 3.1, “Newton’s Third Law,” when you come to it in the reading.

Answer Comprehension Check question 1.

Commit to memory any information in a pink box.

LESSON 23

Read and narrate these sections in *Discovering Design with Physics*, chapter 3:

“Be Careful How You Apply Newton’s Third Law,”

“Newton’s Third Law and the Normal Force.”

Answer Comprehension Check question 2.

LESSON 24

Read and narrate this section in *Discovering Design with Physics*, chapter 3:
“How Newton’s Third Law Relates to Friction.”

Complete Experiment 3.2, “Friction and the Normal Force,” when you come to it in the reading.

Answer Comprehension Check question 3.

Commit to memory any information in a pink box.

LESSON 25

Read and narrate these sections in *Discovering Design with Physics*, chapter 3:
“Taking Friction into Account When Analyzing Situations,”
“Revisiting Some Old Friends.”

Answer Comprehension Check questions 4, 5, and 6.

LESSON 26

Read and narrate these sections in *Discovering Design with Physics*, chapter 3:
“I Sense Some Tension Here,”
“One More Thing About Tension.”

Complete Experiment 3.3, “Tension and Its Limits,” when you come to it in the reading.

Answer Comprehension Check questions 7, 8, and 9.

Enter Archimedes in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

Archimedes (287 B.C.–212 B.C.) invented the block and tackle pulley system.

LESSON 27

Read and narrate this section in *Discovering Design with Physics*, chapter 3:
“Air Resistance.”

Complete Experiment 3.4, “Some of the Factors that Affect Air Resistance,” when you come to it in the reading.

Answer Comprehension Check questions 10 and 11.

Commit to memory any information in a pink box.

LESSON 28

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 29

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 30

Review chapter 3, “Friction,” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: Newton’s Third Law of Motion, normal force, friction, frictional force, static friction, kinetic friction, tension, block and tackle, mechanical advantage, air resistance, streamlined shape, terminal velocity

Begin working on the Review for chapter 3, answering any questions that weren’t included in the narration.

Equation for Chapter 3

$$\text{Equation (3.1)} f = \mu \cdot F_n$$

LESSON 31

Complete the Review for chapter 3.

LESSON 32

Complete Test for chapter 3.

Take a few moments to look over the materials that will be needed for the experiments in chapter 4, “Two-Dimensional Vectors,” and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 4 at <https://bereanbuilders.com/ecomm/online-content/discovering-design-with-physics/ddp-Chapter-4/>.

LESSON 33

Read and narrate these sections in *Discovering Design with Physics*, chapter 4:

“Introduction,”

“Two-Dimensional Vectors.”

Answer Comprehension Check question 1.

Commit to memory any information in a pink box.

LESSON 34

Read and narrate these sections in *Discovering Design with Physics*, chapter 4:

“Two-Dimensional Vectors Can Be Added,”

“Adding and Subtracting Two-Dimensional Vectors, the Easy Way.”

Complete Experiment 4.1, “Adding Forces in Two Dimensions,” when you come to it in the reading.

Answer Comprehension Check questions 2 and 3.

Commit to memory any information in a pink box.

LESSON 35

Read and narrate this section in *Discovering Design with Physics*, chapter 4: “Mathematical Properties of Two-Dimensional Vectors.”

Answer Comprehension Check questions 4 and 5.

Commit to memory any information in a pink box.

LESSON 36

Read and narrate these sections in *Discovering Design with Physics*, chapter 4: “Adding Two-Dimensional Vectors, the Hard Way,”

“One Very Obvious Application of Adding Vectors Analytically.”

Complete Experiment 4.2, “Adding Vectors Analytically,” when you come to it in the reading.

Answer Comprehension Check question 6.

Commit to memory any information in a pink box.

LESSON 37

Read and narrate this section in *Discovering Design with Physics*, chapter 4: “Other Applications of Adding Vectors Analytically.”

Answer Comprehension Check questions 7, 8, and 9.

LESSON 38

Read and narrate this section in *Discovering Design with Physics*, chapter 4: “This Goes Beyond Adding Vectors.”

LESSON 39

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 40

Review chapter 4, “Two-Dimensional Vectors,” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: Two-dimensional vectors including their magnitude, the arrows representing them, how to indicate their direction; headwind; tailwind.

Begin working on the Review for chapter 4, answering any questions that weren’t included in the narration.

Equations for Chapter 4

Equation (4.1) $A_y = A \cdot \sin(\theta)$

Equation (4.2) $A_x = A \cdot \cos(\theta)$

Equation (4.3) $\tan(\theta) = \frac{A_y}{A_x}$

Equation (4.4) $A = \sqrt{A_x^2 + A_y^2}$

LESSON 41

Finish the Review for chapter 4.

LESSON 42

Complete the Test for chapter 4.

Take a few moments to look over the materials that will be needed for the experiments in chapter 5, “Two-Dimensional Motion,” and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 5 at <https://bereanbuilders.com/ecommerce/online-content/discovering-design-with-physics/ddp-Chapter-5/>.

LESSON 43

Read and narrate these sections in *Discovering Design with Physics*, chapter 5:

“Introduction,”

“Two-Dimensional Motion with Some Old Friends.”

Answer Comprehension Check questions 1 and 2.

Commit to memory any information in a pink box.

LESSON 44

Read and narrate this section in *Discovering Design with Physics*, chapter 5, the first part of “Projectiles in Two Dimensions,” stopping when you get to Example 5.3.

Complete Experiment 5.1, “Gravity’s Effect on Two-Dimensional Motion,” when you come to it in the reading.

Commit to memory any information in a pink box.

LESSON 45

Read and narrate this section in *Discovering Design with Physics*, chapter 5, begin at Example 5.3 and finish reading “Projectiles in Two Dimensions.”

Answer Comprehension Check questions 3 and 4.

Commit to memory any information in a pink box.

LESSON 46

Read and narrate this section in *Discovering Design with Physics*, chapter 5:

“The Range Equation.”

Complete Experiment 5.2, “The Range Equation,” when you come to it in the reading.

Answer Comprehension Check question 5.

Commit to memory any information in a pink box.

LESSON 47

Read and narrate this section in *Discovering Design with Physics*, chapter 5: “Thinking About the Dimensions Independently.”

Answer Comprehension Check questions 6 and 7.

LESSON 48

Read and narrate this section in *Discovering Design with Physics*, chapter 5: “When the Range Equation Doesn’t Apply.”

Complete Experiment 5.3, “Measuring Velocity Without a Timer,” when you come to it in the reading.

Answer Comprehension Check questions 8, 9, and 10.

LESSON 49

Read and narrate this section in *Discovering Design with Physics*, chapter 5: “What About Air Resistance?”

LESSON 50

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 51

Review chapter 5, “Two-Dimensional Motion,” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: projectile, parabolic motion, range, how air resistance relates to range and maximum height of a projectile.

Begin working on the Review for chapter 5, answering any questions that weren’t included in the narration.

Equations for Chapter 5

$$\text{Equation (5.10) range} = \frac{v^2 \cdot \sin(2\theta)}{g}$$

LESSON 52

Finish the Review for chapter 5.

LESSON 53

Complete the Test for chapter 5.

Take a few moments to look over the materials that will be needed for the experiments in chapter 6, “Newton’s Second Law and Two-Dimensional Motion,” and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 6 at <https://bereanbuilders.com/ecommerce/online-content/discovering-design-with-physics/ddp-Chapter-6/>.

LESSON 54

Read and narrate these sections in *Discovering Design with Physics*, chapter 6:
“Introduction,”
the first part of “Translational Equilibrium,” stopping when you complete Experiment 6.1.
Complete Experiment 6.1, “An Accelerometer,” when you come to it in the reading.

LESSON 55

Read and narrate this section in *Discovering Design with Physics*, chapter 6:
the last part of “Translational Equilibrium.”
Answer Comprehension Check question 1.

LESSON 56

Read and narrate this section in *Discovering Design with Physics*, chapter 6:
“Static Translational Equilibrium in Two Dimensions.”
Answer Comprehension Check questions 2 and 3.

LESSON 57

Read and narrate this section in *Discovering Design with Physics*, chapter 6:
“Dynamic Translational Equilibrium.”
Complete Experiment 6.2, “Measuring the Coefficient of Static Friction,” when you come to it in the reading.
Answer Comprehension Check question 4.
Commit to memory any information in a pink box.

LESSON 58

Read and narrate this section in *Discovering Design with Physics*, chapter 6:
“Non-Equilibrium Motion on an Incline.”
Answer Comprehension Check questions 5 and 6.

LESSON 59

Read and narrate this section in *Discovering Design with Physics*, chapter 6:
“Analyzing the Translational Motion of Two Objects.”
Answer Comprehension Check question 7.

LESSON 60

Read and narrate this section in *Discovering Design with Physics*, chapter 6:
the first part of “Rotational Motion,” stopping when you get to Experiment 6.3.
Commit to memory any information in a pink box.

LESSON 61

Complete Experiment 6.3, “Making Your Own Mass Scale.”

Read and narrate these sections in *Discovering Design with Physics*, chapter 6: the last part of “Rotational Motion,” “Rotational Equilibrium.”

Answer Comprehension Check questions 8, 9, and 10.

LESSON 62

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 63

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 64

Review chapter 6, “Making Your Own Mass Scale,” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: translational equilibrium, static translational equilibrium, dynamic translational equilibrium, accelerometer, static translational equilibrium in two dimensions, dynamic translational equilibrium on an incline, non-equilibrium motion on an incline, translational motion of two objects, rotational motion, axis of rotation, lever arm, torque, rotational acceleration, rotational equilibrium.

Begin working on the Review for chapter 6, answering any questions that weren’t included in the narration.

Equations for Chapter 6

$$\text{Equation (6.6) } \mu = \frac{\sin(\theta)}{\cos(\theta)} = \tan(\theta)$$

$$\text{Equation (6.7) } \tau = F_{\perp} \cdot r$$

LESSON 65

Finish the Review for chapter 6.

LESSON 66

Complete the Test for chapter 6.

Take a few moments to look over the materials that will be needed for the experiments in chapter 7, “Uniform Circular Motion and Gravity,” and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 7 at <https://bereanbuilders.com/ecommerce/online-content/discovering-design-with-physics/ddp-Chapter-7/>.

LESSON 67

Read and narrate these sections in *Discovering Design with Physics*, chapter 7:
“Introduction,”
“Uniform Circular Motion.”

Complete Experiment 7.1, “Centripetal Force,” when you come to it in the reading.

Answer Comprehension Check questions 1 and 2.

LESSON 68

Read and narrate this section in *Discovering Design with Physics*, chapter 7:
“Terms and Equations.”

Answer Comprehension Check questions 3 and 4.

Commit to memory any information in a pink box.

LESSON 69

Read and narrate this section in *Discovering Design with Physics*, chapter 7:
“Two Sources of Centripetal Force.”

Answer Comprehension Check questions 5 and 6.

LESSON 70

Read and narrate this section in *Discovering Design with Physics*, chapter 7:
“Gravity: Another Source of Centripetal Force.”

Answer Comprehension Check questions 7 and 8.

Commit to memory any information in a pink box.

Enter Henry Cavendish in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

Henry Cavendish (1731–1810) measured the gravitational constant 100 years after Isaac Newton developed his Law of Universal Gravitation.

LESSON 71

Read and narrate these sections in *Discovering Design with Physics*, chapter 7:
“But Isn’t Gravity Constant Near the Surface of the Earth?”
“Gravity at Work in the Solar System.”

Answer Comprehension Check questions 9 and 10.

LESSON 72

Read and narrate this section in *Discovering Design with Physics*, chapter 7:
“Kepler’s Laws.”

Answer Comprehension Check questions 11 and 12.

Commit to memory any information in a pink box.

Enter Johannes Kepler and Tycho Brahe in *My Book of Centuries*. Use the suggestions in the Book of Centuries Entries here or customize your own entries.

Book of Centuries Entries

Johannes Kepler (1571–1630) showed that the planets move about the sun in elliptical, not circular, orbits.

Tycho Brahe (1546–1601), Kepler’s assistant, whose very accurate observations of the planets’ positions in the night sky helped Kepler develop his Laws.

LESSON 73

Read and narrate these sections in *Discovering Design with Physics*, chapter 7:

“One Consequence of Centripetal Force,”

“Centrifugal Force.”

Complete Experiment 7.2, “One Consequence of Centripetal Force for the Earth,” when you come to it in the reading.

LESSON 74

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 75

Review chapter 7, “Uniform Circular Motion and Gravity,” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: centripetal force, centripetal acceleration, period, frequency, hertz, tension as it relates to centripetal force, static friction as it relates to centripetal force, radius of curvature, gravity, Law of Universal Gravitation, gravity and the solar system, satellites, Johannes Kepler, geosynchronous satellites, centrifugal force.

Begin working on the Review for chapter 7, answering any questions that weren’t included in the narration.

Equations for Chapter 7

$$\text{Equation (7.1)} f = \frac{1}{T}$$

$$\text{Equation (7.2)} v = \frac{2 \cdot \pi \cdot r}{T}$$

$$\text{Equation (7.3)} F_c = \frac{m \cdot v^2}{r}$$

$$\text{Equation (7.4)} a_c = \frac{v^2}{r}$$

$$\text{Equation (7.5)} F_g = \frac{G \cdot m_1 \cdot m_2}{r^2}$$

LESSON 76

Finish the Review for chapter 7.

LESSON 77

Complete the Test for chapter 7.

Take a few moments to look over the materials that will be needed for the experiments in chapter 8, “Energy,” and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 8 at <https://bereanbuilders.com/ecommm/online-content/discovering-design-with-physics/ddp-Chapter-8/>.

LESSON 78

Read and narrate these sections in *Discovering Design with Physics*, chapter 8:

“Introduction,”

the first part of “The Modern Definition of Energy.” Stop when you get to Experiment 8.1.

Answer Comprehension Check questions 1 and 2.

Commit to memory any information in a pink box.

Enter James Prescott Joule in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

*James Prescott Joule (1818–1889)
determined that heat is a form of energy,
not an element.*

LESSON 79

Complete Experiment 8.1, Work and Energy.

Read and narrate this section in *Discovering Design with Physics*, chapter 8:
the last part of “The Modern Definition of Energy.”

LESSON 80

Read and narrate this section in *Discovering Design with Physics*, chapter 8:
“Different Forms of Energy.”

Answer Comprehension Check questions 3 and 4.

Commit to memory any information in a pink box.

LESSON 81

Read and narrate this section in *Discovering Design with Physics*, chapter 8:
“The Interplay Between Kinetic and Potential Energy.”

Answer Comprehension Check questions 5 and 6.

Commit to memory any information in a pink box.

LESSON 82

Read and narrate this section in *Discovering Design with Physics*, chapter 8: the first part of the “Taking Friction Into Account,” up to Experiment 8.2.

Complete Experiment 8.2, “The Work Done by Friction,” when you come to it in the reading.

LESSON 83

Read and narrate this section in *Discovering Design with Physics*, chapter 8: the last part of “Taking Friction Into Account.”

Answer Comprehension Check questions 7 and 8.

Commit to memory any information in a pink box.

LESSON 84

Read and narrate this section in *Discovering Design with Physics*, chapter 8: the first part of “What About That Equation We Have Been Using in Experiments?” up to Experiment 8.3.

Complete Experiment 8.3, “Rotational Energy,” when you come to it in the reading.

LESSON 85

Read and narrate this section in *Discovering Design with Physics*, chapter 8: the last part of “What About That Equation We Have Been Using in Experiments?”

Answer Comprehension Check question 9.

LESSON 86

Read and narrate these sections in *Discovering Design with Physics*, chapter 8: “Energy and Power,” “Household Energy and Power.”

Answer Comprehension Check question 10.

Commit to memory any information in a pink box.

Enter James Watt in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

James Watt (1736–1819) developed the concept of power while improving steam engine design.

LESSON 87

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 88

Review chapter 8: “Energy” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: Energy, work, James Prescott Joule, potential energy, kinetic energy, The First Law of Thermodynamics, friction and energy, translational kinetic energy and rotational kinetic energy, power, energy use in a household.

Begin working on the Review for chapter 8, answering any questions that weren't included in the narration.

Equations for Chapter 8

$$\text{Equation (8.1)} \quad W = F_{\parallel} \cdot \Delta x$$

$$\text{Equation (8.2)} \quad PE = m \cdot g \cdot h$$

$$\text{Equation (8.3)} \quad KE = \frac{1}{2} m \cdot v^2$$

$$\text{Equation (8.4)} \quad TE = KE + PE = \text{Constant}$$

$$\text{Equation (8.5)} \quad KE + PE + W_f = \text{Constant}$$

$$\text{Equation (8.6)} \quad P = \frac{\Delta W}{\Delta t}$$

LESSON 89

Finish the Review for chapter 8.

LESSON 90

Complete the Test for chapter 8.

Take a few moments to look over the materials that will be needed for the experiments in chapter 9, "Momentum and Its Conservation," and gather them.

Make note of what experiment samples, videos, and articles are available for chapter <https://bereanbuilders.com/ecommerce/online-content/discovering-design-with-physics/ddp-Chapter-9/>.

Note: If your student is completing the final exams, have him study for the Semester 1 Final Exam and complete the exam.

LESSON 91

Read and narrate these sections in *Discovering Design with Physics*, chapter 9:

"Introduction,"

"Momentum."

Answer Comprehension Check question 1.

Commit to memory any information in a pink box.

LESSON 92

Read and narrate this section in *Discovering Design with Physics*, chapter 9:

"Impulse: The Change in Momentum."

Complete Experiment 9.1, "Impulse and Time," when you come to it in the reading.

Answer Comprehension Check questions 2 and 3.

Commit to memory any information in a pink box.

LESSON 93

Read and narrate this section in *Discovering Design with Physics*, chapter 9: “The Conservation of Momentum.”

Complete Experiment 9.2, “The Conservation of Momentum,” when you come to it in the reading.

Answer Comprehension Check questions 4 and 5.

Commit to memory any information in a pink box.

LESSON 94

Read and narrate this section in *Discovering Design with Physics*, chapter 9: “Using Momentum Conservation to Analyze Situations.”

Answer Comprehension Check questions 6 and 7.

LESSON 95

Read and narrate this section in *Discovering Design with Physics*, chapter 9: “Energy Conservation in Collisions.”

Answer Comprehension Check questions 8 and 9.

LESSON 96

Read and narrate this section in *Discovering Design with Physics*, chapter 9: “Angular Momentum.”

Complete Experiment 9.3, “Angular Momentum.”

Answer Comprehension Check questions 10 and 11.

Commit to memory any information in a pink box.

LESSON 97

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 98

Review chapter 9, “Momentum and Its Conservation,” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: momentum, impulse, Law of Momentum Conservation, recoil velocity, energy conservation in collisions, elastic collision, inelastic collision, Law of Angular Momentum Conservation.

Begin working on the Review for chapter 9, answering any questions that weren’t included in the narration.

Equations for Chapter 9

Equation (9.1) $p = m \cdot v$

Equation (9.4) $\Delta p = F \cdot \Delta t$

Equation (9.5) $\Delta p = p_{\text{final}} - p_{\text{initial}}$

Equation (9.6) When the net external force is zero: $p_{\text{before}} = p_{\text{after}}$

Equation (9.7) $L = m \cdot v \cdot r$

Equation (9.8) When the sum of the torques is zero: $L_{\text{before}} = L_{\text{after}}$

LESSON 99

Finish the Review for chapter 9.

LESSON 100

Complete the Test for chapter 9.

Take a few moments to look over the materials that will be needed for the experiments in chapter 10, “Periodic Motion,” and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 10 at <https://bereanbuilders.com/ecommm/online-content/discovering-design-with-physics/ddp-Chapter-10/>.

LESSON 101

Read and narrate this section in *Discovering Design with Physics*, chapter 10: “Introduction,” the first part of “Hooke’s Law,” up to Experiment 10.1.

Complete Experiment 10.1, “Hooke’s Law,” when you come to it in the reading.

Enter Robert Hooke in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

Robert Hooke (1635–1703), scientist who studied living things, chemical processes, and physical phenomena. He contributed to physics with his law, Hooke’s Law, concerning the force exerted on an elastic object.

LESSON 102

Read and narrate these sections in *Discovering Design with Physics*, chapter 10: the last part of “Hooke’s Law,” “Using Hooke’s Law.”

Answer Comprehension Check questions 1, 2, 3, and 4.

Commit to memory any information in a pink box.

LESSON 103

Read and narrate this section in *Discovering Design with Physics*, chapter 10: “Periodic Motion in a Mass/Spring System.”

Complete Experiment 10.2, “The Properties of a Mass/Spring System,” when you come to it in the reading.

Answer Comprehension Check questions 5 and 6.

Commit to memory any information in a pink box.

LESSON 104

Read and narrate this section in *Discovering Design with Physics*, chapter 10: “Terminology and the Use of Equation (10.5).”

Answer Comprehension Check questions 7 and 8.

Commit to memory any information in a pink box.

LESSON 105

Read and narrate this section in *Discovering Design with Physics*, chapter 10: “Energy in a Mass/Spring System.”

Answer Comprehension Check questions 9 and 10.

Commit to memory any information in a pink box.

LESSON 106

Complete Experiment 10.3, “Properties of a Simple Pendulum.”

LESSON 107

Read and narrate this section in *Discovering Design with Physics*, chapter 10: “The Simple Pendulum.”

Answer Comprehension Check question 11.

Commit to memory any information in a pink box.

LESSON 108

Read and narrate these sections in *Discovering Design with Physics*, chapter 10: “But What About Friction?”

“Keeping Time.”

LESSON 109

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 110

Review chapter 10, “Periodic Motion,” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: periodic motion, Robert Hooke, Hooke's Law, amplitude, simple harmonic motion, simple pendulum, damped harmonic motion.

Begin working on the Review for chapter 10, answering any questions that weren't included in the narration.

Equations for Chapter 10

Equation (10.3) $F = -k \cdot \Delta x$

Equation (10.5) $T = 2\pi \sqrt{\frac{m}{k}}$

Equation (10.6) $PE = \frac{1}{2}k \cdot \Delta x^2$

Equation (10.7) $TE = \frac{1}{2}k \cdot A^2$

Equation (10.11) $T = 2\pi \sqrt{\frac{L}{g}}$

LESSON 111

Finish the Review for chapter 10.

LESSON 112

Complete the Test for chapter 10.

Take a few moments to look over the materials that will be needed for the experiments in chapter 11, "Sound and Light," and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 11 at <https://bereanbuilders.com/ecommm/online-content/discovering-design-with-physics/ddp-Chapter-11/>.

LESSON 113

Read and narrate these sections in *Discovering Design with Physics*, chapter 11:

"Introduction,"

"Two Kinds of Waves and an Equation That Goes Along with Them."

Answer Comprehension Check questions 1 and 2.

Commit to memory any information in a pink box.

LESSON 114

Read and narrate this section in *Discovering Design with Physics*, chapter 11:

"Sound Waves."

Complete Experiment 11.1, "Wavelength, Frequency, and Amplitude in Sound Waves," when you come to it in the reading.

Answer Comprehension Check question 3.

Commit to memory any information in a pink box.

LESSON 115

Read and narrate this section in *Discovering Design with Physics*, chapter 11: “The Speed of Sound.”

Answer Comprehension Check questions 4 and 5.

Commit to memory any information in a pink box.

LESSON 116

Read and narrate this section in *Discovering Design with Physics*, chapter 11: “The Doppler Effect.”

Answer Comprehension Check questions 6 and 7.

Commit to memory any information in a pink box.

Enter Christian Doppler in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

Christian Doppler (1803–1853) proposed the idea of a change in the observed frequency of a wave caused by the motion of the wave’s source and / or the observer of the wave.

LESSON 117

Read and narrate these sections in *Discovering Design with Physics*, chapter 11: “How We Hear Sounds and Why There Are Some Sounds We Cannot Hear,” “Sound in Other Media.”

Answer Comprehension Check question 8.

Commit to memory any information in a pink box.

LESSON 118

Read and narrate this section in *Discovering Design with Physics*, chapter 11: “The Wave Nature of Light.”

Answer Comprehension Check question 9.

Enter Thomas Young and James Clerk Maxwell in *My Book of Centuries*. Use the suggestions in the Book of Centuries Entries here or customize your own entries.

Book of Centuries Entries

Thomas Young (1773–1829) showed that light is a wave with his double-slit experiment.

James Clerk Maxwell (1831–1879) showed the mathematical relationship between electricity and magnetism and light, solving the mystery of what medium light waves oscillate.

LESSON 119

Read and narrate these sections in *Discovering Design with Physics*, chapter 11:

“A Few Details about Light,”

“It’s Actually a Bit More Complicated Than That!”

Answer Comprehension Check questions 10, 11, and 12.

Commit to memory any information in a pink box.

Enter Albert Einstein in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

Albert Einstein (1879–1955) determined that photons with enough energy cause electrons to escape metals.

LESSON 120

Read and narrate these sections in *Discovering Design with Physics*, chapter 11:

“Is Light a Particle or a Wave?”

“The Doppler Effect and Light.”

LESSON 121

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 122

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 123

Review chapter 11, “Sound and Light,” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: crest, trough, transverse waves, wavelength, longitudinal wave, compression, rarefaction, Doppler effect, sonic waves, ultrasonic waves, infrasonic waves, timbre, interference pattern, electromagnetic waves, visible light, electromagnetic spectrum, colors of light and their wavelengths, photoelectric effect, photons, work function, wave-particle duality.

Begin working on the Review for chapter 11, answering any questions that weren’t included in the narration.

Equations for Chapter 11

$$\text{Equation (11.1)} f = \frac{v}{\lambda}$$

$$\text{Equation (11.2)} v_{\text{sound}} = (331.3 + 0.606 \cdot T_C) \frac{m}{s}$$

$$\text{Equation (11.3)} f_{\text{observed}} = \left(\frac{v_{\text{sound}} \pm v_{\text{observer}}}{v_{\text{sound}} \pm v_{\text{source}}} \right) \cdot f_{\text{stationary}}$$

$$\text{Equation (11.5)} \text{Maximum Electron Kinetic Energy} = h \cdot f - \Phi$$

LESSON 124

Finish the Review for chapter 11.

LESSON 125

Complete the Test for chapter 11.

Take a few moments to look over the materials that will be needed for the experiments in chapter 12, “Optics,” and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 12 at <https://bereanbuilders.com/ecomm/online-content/discovering-design-with-physics/ddp-Chapter-12/>.

LESSON 126

Read and narrate these sections in *Discovering Design with Physics*, chapter 12:

“Introduction,”

“The Law of Reflection.”

Complete Experiment 12.1, “The Law of Reflection,” when you come to it in the reading.

Enter Euclid in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

Euclid (c. 330 B.C.–270 B.C.), Greek mathematician who attempted to work out the mathematics associated with vision.

LESSON 127

Read and narrate these sections in *Discovering Design with Physics*, chapter 12:

“Reflection in Flat Mirrors,”

“Curved Mirrors.”

Answer Comprehension Check questions 1, 2, and 3.

Commit to memory any information in a pink box.

LESSON 128

Read and narrate this section in *Discovering Design with Physics*, chapter 12: “More Ray Tracing with Concave Spherical Mirrors.”

Answer Comprehension Check question 4.

LESSON 129

Read and narrate this section in *Discovering Design with Physics*, chapter 12: “Ray Tracing with Convex Spherical Mirrors.”

Complete Experiment 12.2, “Convex and Concave Mirrors,” when you come to it in the reading.

Answer Comprehension Check question 5.

LESSON 130

Read and narrate this section in *Discovering Design with Physics*, chapter 12: “Refraction and Snell’s Law.”

Answer Comprehension Check questions 6, 7, and 8.

Commit to memory any information in a pink box.

LESSON 131

Read and narrate these sections in *Discovering Design with Physics*, chapter 12:

“Refraction and Rainbows,”

“Refraction and Converging Lenses.”

Answer Comprehension Check question 9.

Commit to memory any information in a pink box.

LESSON 132

Read and narrate these sections in *Discovering Design with Physics*, chapter 12:

“Refraction and Diverging Lenses,”

“Our Eyes and Corrective Lenses.”

Answer Comprehension Check question 10.

Commit to memory any information in a pink box.

LESSON 133

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 134

Review chapter 12, “Optics,” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: The Law of Reflection, virtual image, real image, Snell’s Law, rainbows, converging lens, spherical aberration, chromatic aberration, diverging lens.

Begin working on the Review for chapter 12, answering any questions that weren’t included in the narration.

Equations for Chapter 12

$$\text{Equation (12.1) focal length} = \frac{R}{2}$$

$$\text{Equation (12.2) } n = \frac{\text{speed of light in a vacuum}}{\text{speed of light in the medium of interest}}$$

$$\text{Equation (12.3) } n_1 \cdot \sin(\theta_1) = n_2 \cdot \sin(\theta_2)$$

LESSON 135

Finish the Review for chapter 12.

LESSON 136

Complete the Test for chapter 12.

Take a few moments to look over the materials that will be needed for the experiments in chapter 13, “The Electrostatic Force,” and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 13 at <https://bereanbuilders.com/ecommerce/online-content/discovering-design-with-physics/ddp-Chapter-13/>.

LESSON 137

Read and narrate these sections in *Discovering Design with Physics*, chapter 13:

“Introduction,”

“Charging Objects.”

Complete Experiment 13.1, “Charging by Induction and Conduction,” when you come to it in the reading.

Answer Comprehension Check questions 1 and 2.

LESSON 138

Read and narrate these sections in *Discovering Design with Physics*, chapter 13:

“The Electrostatic Force,”

“The Electrostatic Force as a Centripetal Force.”

Answer Comprehension Check questions 3 and 4.

Commit to memory any information in a pink box.

Enter Charles-Augustin de Coulomb in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

*Charles-Augustin de Coulomb (1736–1806),
French army officer who conducted
experiments that led to the first detailed
understanding of the electrostatic force.*

LESSON 139

Read and narrate this section in *Discovering Design with Physics*, chapter 13: “The Electrostatic Force with Multiple Charges.”

Answer Comprehension Check questions 5 and 6.

LESSON 140

Read and narrate this section in *Discovering Design with Physics*, chapter 13: “The Electric Field.”

Answer Comprehension Check questions 7, 8, 9, 10, and 11.

Commit to memory any information in a pink box.

Enter Michael Faraday in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

Michael Faraday (1791–1867), English scientist who suggested that a charged particle transmits lines through space, producing a “web” of influence in the space surrounding the charge.

LESSON 141

Read and narrate this section in *Discovering Design with Physics*, chapter 13: “Conductors, Insulators, and the Reality of the Electric Field.”

Complete Experiment 13.2, “There Is No Electric Field Inside a Conductor,” when you come to it in the reading.

LESSON 142

Read and narrate these sections in *Discovering Design with Physics*, chapter 13:

“The Strength of an Electric Field,”

“A Few Words about Michael Faraday.”

Answer Comprehension Check questions 12 and 13.

Commit to memory any information in a pink box.

LESSON 143

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 144

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 145

Review chapter 13, “The Electrostatic Force,” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: electrostatic force, triboelectric charging, electroscope, charging by conduction, charging by induction, Coulomb's Law, conductor, insulator, Faraday cage.

Begin working on the Review for chapter 13, answering any questions that weren't included in the narration.

Equations for Chapter 13

$$\text{Equation (13.1)} \quad F = k \cdot \frac{q_1 \cdot q_2}{r^2}$$

$$\text{Equation (13.2)} \quad F = q \cdot E$$

LESSON 146

Finish the Review for chapter 13.

LESSON 147

Complete the Test for chapter 13.

Take a few moments to look over the materials that will be needed for the experiments in chapter 14, "Electricity Has Potential!" and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 14 at <https://bereanbuilders.com/ecomm/online-content/discovering-design-with-physics/ddp-Chapter-14/>.

LESSON 148

Read and narrate these sections in *Discovering Design with Physics*, chapter 14:

"Introduction,"

"The Electric Potential."

Answer Comprehension Check questions 1 and 2.

Commit to memory any information in a pink box.

LESSON 149

Read and narrate this section in *Discovering Design with Physics*, chapter 14:

"Potential Difference."

Answer Comprehension Check question 3.

Commit to memory any information in a pink box.

LESSON 150

Read and narrate these sections in *Discovering Design with Physics*, chapter 14:

"The Voltage Rating of a Battery,"

"Potential Difference Due to Multiple Charges."

Complete Experiment 14.1, "The Major Difference Between 1.5-volt and 9-volt Batteries," when you come to it in the reading.

Answer Comprehension Check questions 4, 5, and 6.

LESSON 151

Read and narrate this section in *Discovering Design with Physics*, chapter 14: “Storing Charges in a Leyden Jar.”

Complete Experiment 14.2, “A Leyden Jar,” when you come to it in the reading.

Enter Ewald Georg von Kleist and Pieter van Musschenbroek in *My Book of Centuries*. Use the suggestions in the Book of Centuries Entries here or customize your own entries.

Book of Centuries Entries

Ewald Georg von Kleist (1700–1748) did experiments with electricity involving a jar of alcohol.

Pieter van Musschenbroek (1692–1761) discovered that an electric charge could be stored in a device if there was a conductor inside the device and a conductor outside the device.

LESSON 152

Read and narrate this section in *Discovering Design with Physics*, chapter 14: “Storing Charges in a Capacitor.”

Answer Comprehension Check question 7.

Commit to memory any information in a pink box.

LESSON 153

Read and narrate this section in *Discovering Design with Physics*, chapter 14: “Putting Charges in a Parallel Plate Capacitor.”

Answer Comprehension Check questions 8 and 9.

Commit to memory any information in a pink box.

Enter Benjamin Franklin in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

Benjamin Franklin (1706–1790) conducted many experiments with electricity including his kite experiment that showed that lightning is an electrical phenomenon. He was also the first to use the words “positive” and “negative” in relation to electricity, which we still use today.

LESSON 154

Read and narrate this section in *Discovering Design with Physics*, chapter 14: “Electric Circuits and Conventional Current.”

Answer Comprehension Check question 10.

LESSON 155

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 156

Review chapter 14, “Electricity Has Potential!” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: electric potential, electron volt, lightning, Leyden jar, capacitor, capacitance, electric permittivity, permittivity of free space, ground (electrical), Law of Charge Conservation, electric current, electric circuit, conventional current.

Begin working on the Review for chapter 14, answering any questions that weren’t included in the narration.

Equations for Chapter 14

$$\text{Equation (14.1) } PE = q \cdot V$$

$$\text{Equation (14.2) } V = \frac{k \cdot Q}{r}$$

$$\text{Equation (14.3) } \Delta PE = q \cdot \Delta V$$

$$\text{Equation (14.4) } C = \frac{\epsilon \cdot A}{d}$$

$$\text{Equation (14.5) } Q = C \cdot \Delta V$$

LESSON 157

Finish the Review for chapter 14.

LESSON 158

Complete the Test for chapter 14.

Take a few moments to look over the materials that will be needed for the experiments in chapter 15, “Electric Circuits,” and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 15 at <https://bereanbuilders.com/ecommerce/online-content/discovering-design-with-physics/ddp-Chapter-15/>.

LESSON 159

Read and narrate these sections in *Discovering Design with Physics*, chapter 15:

“Introduction,”

“Current Flow in a Circuit.”

Answer Comprehension Check question 1.

LESSON 160

Read and narrate this section in *Discovering Design with Physics*, chapter 15, the first part of “Current and Ohm’s Law,” stopping after you complete the Comprehension Check questions.

Answer Comprehension Check questions 2 and 3.

Commit to memory any information in a pink box.

Enter Georg Ohm in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

*Georg Ohm (1789–1854), German physicist
who discovered Ohm’s Law.*

LESSON 161

Read and narrate this section in *Discovering Design with Physics*, chapter 15: the last part of “Current and Ohm’s Law.”

Complete Experiment 15.1, “Building Two Simple Circuits,” when you come to it in the reading.

Answer Comprehension Check question 4.

LESSON 162

Read and narrate these sections in *Discovering Design with Physics*, chapter 15: “Comparing Series and Parallel Circuits,” “More on Series and Parallel Circuits.”

Answer Comprehension Check questions 5, 6, 7, and 8.

Commit to memory any information in a pink box.

LESSON 163

Read and narrate this section in *Discovering Design with Physics*, chapter 15: “This Can Get a Little Complicated.”

Answer Comprehension Check question 9.

LESSON 164

Read and narrate this section in *Discovering Design with Physics*, chapter 15: “Fuses and Circuit Breakers.”

Answer Comprehension Check question 10.

LESSON 165

Read and narrate these sections in *Discovering Design with Physics*, chapter 15: “Capacitors and Multiple Batteries,” “André-Marie Ampère.”

Answer Comprehension Check question 11.

Enter André-Marie Ampère in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

André-Marie Ampère (1775–1836), called the father of electrodynamics because of his work with electricity.

LESSON 166

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 167

Review chapter 15, “Electric Circuits,” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: resistor, drift velocity, complete circuit, incomplete circuit, open circuit, ampere, current and Ohm’s Law, ohm, simple series circuit vs. parallel circuit, effective resistance.

Begin working on the Review for chapter 15, answering any questions that weren’t included in the narration.

Equations for Chapter 15

Equation (15.1) $V = I \cdot R$

Equation (15.2) $P = I^2 \cdot R$

Equation (15.3) $P = I \cdot V$

Equation (15.4) When the resistors are in series: $R_{\text{eff}} = R_1 + R_2 + R_3 + \dots$

Equation (15.5) When the resistors are in parallel: $\frac{1}{R_{\text{eff}}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$

LESSON 168

Finish the Review for chapter 15.

LESSON 169

Complete the Test for chapter 15.

Take a few moments to look over the materials that will be needed for the experiments in chapter 16, “Magnetism,” and gather them.

Make note of what experiment samples, videos, and articles are available for chapter 16 at <https://bereanbuilders.com/ecommerce/online-content/discovering-design-with-physics/ddp-Chapter-16/>.

LESSON 170

Read and narrate these sections in *Discovering Design with Physics*, chapter 16:
“Introduction,”
“Magnets, Poles, and the Basic Law of Magnetism.”

Answer Comprehension Check question 1.

LESSON 171

Read and narrate this section in *Discovering Design with Physics*, chapter 16:
“Magnetic Fields and the Speed of Light.”

Answer Comprehension Check questions 2 and 3.

Commit to memory any information in a pink box.

LESSON 172

Read and narrate this section in *Discovering Design with Physics*, chapter 16:
“The Relationship Between Electricity and Magnetism.”

Complete Experiment 16.1, “Ørsted’s Experiment,” when you come to it in the reading.

Answer Comprehension Check questions 4 and 5.

Enter Hans Christian Ørsted in *My Book of Centuries*. Use the suggestion in the Book of Centuries Entry here or customize your own entry.

Book of Centuries Entry

*Hans Christian Ørsted (1777–1851)
accidentally discovered the relationship
between electricity and magnetism.*

LESSON 173

Read and narrate this section in *Discovering Design with Physics*, chapter 16:
“More on the Relationship Between Electricity and Magnetism.”

Complete Experiment 16.2, “A Variation of Ørsted’s Experiment,” when you come to it in the reading.

Answer Comprehension Check questions 6 and 7.

LESSON 174

Read and narrate this section in *Discovering Design with Physics*, chapter 16:
“Faraday’s Law of Magnetic Induction.”

Answer Comprehension Check questions 8, 9, and 10.

LESSON 175

Read and narrate these sections in *Discovering Design with Physics*, chapter 16:
“A Consequence of Faraday’s Law of Magnetic Induction,”
“Some Final Thoughts.”

Complete Experiment 16.3, “One Magnetic Field Making Another Magnetic Field,” when you come to it in the reading, if you choose to do it.

Answer Comprehension Check question 11.

LESSON 176

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 177

Use today to catch up on any readings, Comprehension Check questions, or experiments as needed.

LESSON 178

Review chapter 16, “Magnetism,” in *Discovering Design with Physics*.

Narrate either orally or in writing. Try to cover these points: Basic Law of Magnetism, similarities and differences between magnetism and electricity, the relationship between magnetism and electricity in regards to the speed of light, magnetic permeability, right-hand rule, electromagnets, permanent magnets, diamagnetic substance, paramagnetic substance, ferromagnetic substance, Faraday’s Law of Magnetic Induction, electromotive force, alternating current, direct current, rectifier, inverter, Lenz’s Law.

Begin working on the Review for chapter 16, answering any questions that weren’t included in the narration.

LESSON 179

Finish the Review for chapter 16.

LESSON 180

Complete the Test for chapter 16.

Note: If your student is completing the final exams, have him study for the Semester 2 Final Exam and complete it.