

Activities & Lab Manual

exploring SCIENCE

FIFTH
EDITION



bjupress
Greenville, South Carolina

CONTENTS

| | |
|--------------------------|------|
| Exploring God's Creation | x |
| Safety Icons | xiii |

Part 1

Activities

UNIT 1 MATTER

Chapter 1 Atoms and Molecules 3

| | |
|---|---|
| 1.1 Atomic Structure—Reviewing Atomic Models | 3 |
| 1.2 The Periodic Table of Elements—Using the Periodic Table | 5 |
| 1.3 Molecules and Compounds—Building Molecules | 7 |
| Pine Street Post—Atoms and Molecules | 9 |

Chapter 2 States of Matter and Thermal Energy 11

| | |
|--|----|
| 2.1 Energy—Understanding Energy | 11 |
| 2.2 States of Matter—Categorizing Solids, Liquids, and Gases | 13 |
| 2.3 Phase Changes—Understanding Phase Changes | 15 |
| 2.4 Thermal Energy Transfer—Recognizing Types of Thermal Energy Transfer | 17 |
| Pine Street Post—States of Matter and Thermal Energy | 19 |

Chapter 3 Changes in Matter 21

| | |
|---|----|
| 3.1 Properties of Matter—Identifying Physical and Chemical Properties | 21 |
| 3.2 Physical and Chemical Changes—Using Evidence to Form an Argument | 23 |
| 3.3 Chemical Reactions—Understanding Chemical Reactions | 25 |
| 3.4 Conservation of Matter—Modeling the Conservation of Matter | 27 |
| Pine Street Post—Changes in Matter | 29 |

UNIT 2 ENERGY AND MOTION

Chapter 4 Forces 31

4.1 Introduction to Forces—Identifying When Forces Are at Work 31

4.2 Types of Forces—Classifying Forces 33

4.3 Gravity—Understanding Gravity 35

4.4 Electromagnetism—Generating Electricity 37

Pine Street Post—Forces 39

Chapter 5 Laws of Motion 41

5.1 Describing Motion—Graphing Motion 41

5.2 Newton's First Law—Identifying Forces 43

5.3 Newton's Second Law—Predicting Motion with Newton's Second Law 45

5.4 Newton's Third Law—Applying Newton's Third Law 47

Pine Street Post—Laws of Motion 49

Chapter 6 Mechanical Energy 51

6.1 Kinetic Energy—Comparing Kinetic Energies 51

6.2 Potential Energy—Mapping Potential Energy 53

6.3 Energy Transformations—Putting Energy Transformations to Good Use 55

Pine Street Post—Mechanical Energy 57

Chapter 7 Mechanical Waves 59

7.1 Introduction to Waves—Comparing Longitudinal and Transverse Waves 59

7.2 Wave Behavior—Showing How Waves Behave 61

7.3 Sound Waves—Understanding Characteristics of Sound 63

Pine Street Post—Mechanical Waves 65

Chapter 8 Light 67

8.1 Electromagnetic Waves—Understanding Electromagnetic Waves 67

8.2A The Electromagnetic Spectrum—Puzzling Out the Spectrum 69

8.2B The Electromagnetic Spectrum—Seeing Is Believing 73

8.3 Using Waves in Technology—Evaluating Analog and Digital Instruments 75

Pine Street Post—Light 77

CONTENTS

UNIT 3 LIVING THINGS

Chapter 9 Cells 79

9.1 Characteristics of Living Things—Using Microscopes to Study Cells 79

9.2 Cell Structure—The Cell Is Like . . . 81

9.3 Levels of Organization—Levels of Organization Card Sort 83

9.4 The History of Cell Theory—Learning about a Famous Scientist 87

Pine Street Post—Cells 89

Chapter 10 Heredity and Genetics 91

10.1 Heredity, Genes, and DNA—Hereditary Terms 91

10.2 Passing Down Traits—Inheritance Patterns 93

10.3 Human Impact—Artificial Selection 95

Pine Street Post—Heredity and Genetics 97

Chapter 11 Plant Classification 99

11.1 Introduction to Classification—Understanding Levels of Organization 99

11.2 Introduction to Plants—What Are Plants? 101

11.3 Nonvascular Plants and Ferns—Nonvascular vs. Seedless Vascular Plants 103

11.4 Cone-Bearing Vascular Plants—Classifying Plants 105

11.5 Flowering Vascular Plants—Fact or Opinion? 107

Pine Street Post—Plant Classification 109

Chapter 12 Animal Classification 111

12.1 Sponges, Cnidarians, and Mollusks—Invertebrates Part 1 111

12.2 Echinoderms and Worms—Invertebrates Part 2 113

12.3 Arthropods—Invertebrates Part 3 115

12.4 Fish and Amphibians—Vertebrates Part 1 117

12.5 Reptiles and Birds—Vertebrates Part 2 119

12.6 Mammals—Mammal Report 121

Pine Street Post—Animal Classification 123

Chapter 13 Reproduction and Adaptations of Organisms 125

13.1 Reproduction of Organisms—Comparing Types of Reproduction 125

13.2 General Adaptations—Summer Camp News 127

13.3 Reproductive Adaptations in Plants—Productive Pollinators 129

13.4 Reproductive Adaptations in Animals—Evaluating Worldview in Scientific Articles 131

Pine Street Post—Reproduction and Adaptations of Organisms 133

UNIT 4 EARTH SCIENCE

Chapter 14 Natural Resources 135

14.1 What Are Natural Resources?—Nonrenewable Energy 135

14.2 Location of Natural Resources—Mineral Resources 137

14.3 Stewarding Our Natural Resources—Natural Resource Scavenger Hunt 139

14.4 Synthetic Materials—Natural or Synthetic? 141

Pine Street Post—Natural Resources 143

Chapter 15 Weathering and Erosion 145

15.1 Weathering—Understanding Rocks and Weathering 145

15.2 Erosion and Deposition—Understanding How Sediment Moves 147

15.3 Human Impact—People and Weathering, Erosion, and Deposition 149

Pine Street Post—Weathering and Erosion 151

Chapter 16 Earthquakes and Volcanoes 153

16.1 Earthquakes—Modeling Faults 153

16.2 Volcanoes—Classifying Volcanoes 155

16.3 Human Impact—Prepare in Advance 157

Pine Street Post—Earthquakes and Volcanoes 159

CONTENTS

Part 2

Labs

UNIT 1 MATTER

Chapter 1 Atoms and Molecules 163

Lab 1 Scientific Investigations—Planning an Experiment 163

Chapter 2 States of Matter and Thermal Energy 169

Lab 2A Warm-Up Exercise—Inquiring into Thermal Energy Transfer 169

Lab 2B Keep Your Cool!—Designing an Insulated Beverage Container 173

Chapter 3 Changes in Matter 179

Lab 3A Sink or Swim—Inquiring into Density 179

Lab 3B Mix It Up—Examining Signs of a Chemical Reaction 183

UNIT 2 ENERGY AND MOTION

Chapter 4 Forces 189

Lab 4 Three, Two, One, Launch!—Relating Force and Mass to Changes in Motion 189

Chapter 5 Laws of Motion 195

Lab 5A Water Bottle Bowling—Exploring Newton's First and Second Laws 195

Lab 5B Safety First!—Designing a Helmet Using Newton's Third Law 199

Chapter 6 Mechanical Energy 205

Lab 6A Making an Impact—Visualizing Gravitational Potential Energy 205

Lab 6B Marble Madness!—Designing a Marble Run 209

Chapter 7 Mechanical Waves 215

Lab 7A Keep It Down!—Designing Noise-Canceling Earmuffs 215

Lab 7B The Sound of Music—Exploring the Relationship between Pitch and Frequency 221

Chapter 8 Light 225

Lab 8A Seeing the Light—Designing a Device to See around an Obstacle 225

Lab 8B Trying to Communicate—Evaluating Analog and Digital Communication 231

UNIT 3 LIVING THINGS

| | |
|--|-----|
| Chapter 9 Cells | 235 |
| Lab 9A It's a Small World—Using Microscopes to Observe Cells | 235 |
| Lab 9B A Model Cell—Modeling Cells | 241 |
| Chapter 10 Heredity and Genetics | 245 |
| Lab 10 Paper Pet Genetics—Examining Inheritance | 245 |
| Chapter 11 Plant Classification | 249 |
| Lab 11 Guess Who?—Classifying an Unknown Organism | 249 |
| Chapter 12 Animal Classification | 253 |
| Lab 12 Mealworm Movement—Observing How a Mealworm Responds to Its Environment | 253 |
| Chapter 13 Reproduction and Adaptations of Organisms | 259 |
| Lab 13 Gummy Games—Observing Natural Selection | 259 |



CONTENTS

UNIT 4 EARTH SCIENCE

| | |
|--|-----|
| Chapter 14 Natural Resources | 267 |
| Lab 14A Natural Resources—Exploring the Resources God Has Provided | 267 |
| Lab 14B It's Only Natural—Inquiring into the Impacts of Natural Resource Production | 271 |
| Chapter 15 Weathering and Erosion | 277 |
| Lab 15A Mass Transit—Inquiring into Mass Movement | 277 |
| Lab 15B On the Move—Investigating Erosion and Deposition | 281 |
| Chapter 16 Earthquakes and Volcanoes | 285 |
| Lab 16A Shaky Ground—Designing a Seismograph | 285 |
| Lab 16B Flow Time!—Exploring Viscosity | 291 |

APPENDIXES

| | |
|---|-----|
| A Laboratory and First-Aid Rules | 295 |
| B Laboratory Equipment | 297 |
| C Laboratory Techniques | 298 |
| D Engineering Design Process | 301 |
| Periodic Table of Elements | 304 |

