

Table of Contents

Introduction and Acknowledgments.....	iii
About the Authors	vi
To the Student / To the Instructor	vii
Master List of Apparatus.....	viii

ABOUT SCIENCE

Tuning the Senses — <i>Observation</i>	Activity - Ch. 1	1
Making Cents — <i>Scientific Methods</i>	Activity - Ch. 1	3

PART ONE: MECHANICS

Walking the Plank — <i>Equilibrium</i>	Experiment - Ch. 2	5
Go! Go! Go! — <i>Fundamentals of Graphing Motion</i>	Experiment - Ch. 3	11
Sonic Ranger — <i>Graphing Motion in Real Time</i>	Tech Lab - Ch. 3	15
Motivating the Moving Man — <i>Motion Graphing Simulation</i>	Tech Lab - Ch. 3	19
The Weight — <i>Mass and Weight</i>	Activity - Ch. 4	27
Putting the Force Before the Cart — <i>Newton's Second Law</i>	Activity - Ch. 4	31
Reaction Time — <i>Free Fall</i>	Activity - Ch. 4	35
The Newtonian Shot — <i>Newtonian Mechanics Puzzle</i>	Demonstration - Ch. 4	37
The Force Mirror — <i>Quantitative Observation of Force Pairs</i>	Tech Lab - Ch. 5	39
Blowout — <i>Newton's Three Laws</i>	Demonstration - Ch. 5	41
Egg Toss — <i>Impact Time and Impact Force</i>	Activity - Ch. 6	45
Bouncy Board — <i>Impact Time and Impact Force</i>	Activity - Ch. 6	47
An Uphill Climb — <i>Work on an Inclined Plane</i>	Experiment - Ch. 7	49
The Fountain of Fizz — <i>Physics in the Soda Pop Geyser</i>	Demonstration - Ch. 7	55
Dropping the Ball — <i>Measuring Energy During Free Fall</i>	Experiment - Ch. 7	57
Twin-Baton Paradox — <i>A Rotational Inertia Puzzle</i>	Activity - Ch. 8	61
It's All in the Wrist — <i>Experiencing Torque "First-Hand"</i>	Activity - Ch. 8	65
Will it Go 'Round in Circles? — <i>Acceleration at Constant Speed</i>	Demonstration - Ch. 8	67
Sit on it and Rotate — <i>Conservation of Angular Momentum</i>	Activity - Ch. 8	75
The Big BB Race — <i>Horizontal and Vertical Motion</i>	Demonstration - Ch. 8	79
Bull's Eye — <i>A Projectile Motion Puzzle</i>	Experiment - Ch. 10	81
Blastoff! — <i>Rockets: Real and Virtual</i>	Experiment & Tech Lab - Ch. 10	83
Worlds of Wonder — <i>Orbital Mechanics Simulation</i>	Tech Lab - Ch. 10	89
Bicycle Dancer of Edinburgh — <i>Qualitative Video Analysis</i>	Tech Lab - Part One	93

PART TWO: PROPERTIES OF MATTER

Thickness of a BB Pancake — <i>The Size of an Atom</i>	Experiment - Ch. 11	97
Oleic Acid Pancake — <i>The Size of an Atom</i>	Experiment - Ch. 11	99
Totally Stressed Out — <i>Hooke's Law</i>	Activity - Ch. 12	101
Spring to Another World — <i>Spring-Mass Simulation</i>	Tech Lab - Ch. 12	105
Eureka! — <i>Archimedes' Principle</i>	Activity - Ch. 13	107
Sink or Swim — <i>Sinking vs. Floating</i>	Activity - Ch. 13	109
Boat Float — <i>Flotation</i>	Activity - Ch. 13	111
Tire Pressure and 18-Wheelers — <i>Force, Area, and Pressure</i>	Experiment - Ch. 14	115

PART THREE: HEAT

Dance of the Molecules — <i>Observing Molecular Motion</i>	Demonstration - Ch. 15	117
Bouncing Off the Walls — <i>Kinetic Theory Simulation</i>	Tech Lab - Ch. 15	119
Temperature Mixes — <i>Heat Capacity of Water</i>	Activity - Ch. 15	123
Spiked Water — <i>Specific Heat Capacity</i>	Activity - Ch. 15	125
Canned Heat: Heating Up — <i>Thermal Absorption</i>	Experiment - Ch. 16	129
Canned Heat: Cooling Down — <i>Thermal Emission</i>	Experiment - Ch. 16	131
I'm Melting! I'm Melting! — <i>Conduction and Absorption</i>	Demonstration - Ch. 16	133
Cooling by Boiling — <i>Atmospheric Pressure and Boiling Point</i>	Demonstration - Ch. 17	135
Freezing by Heating — <i>Heat of Fusion</i>	Experiment - Ch. 17	137

PART FOUR: SOUND

Slow-Motion Wobbler — <i>Slowing Motion with a Strobe Light</i> Demonstration - Ch. 19	139
Water Waves in an Electric Sink — <i>Wave Mechanics Simulation</i> Tech Lab - Ch. 19	141
High Quiet Low Loud — <i>Sound Wave Manipulation</i> Tech Lab - Ch. 20	145
Fork it Over — <i>Determination of the Speed of Sound</i> Experiment - Ch. 20	149
Sound Off — <i>Sound Wave Cancellation</i> Demonstration - Ch. 20	153
Wah-Wahs and Touch-Tones — <i>Sound Wave Interference</i> Tech Lab - Ch. 20	155

PART FIVE: ELECTRICITY AND MAGNETISM

A Force to be Reckoned — <i>Electrostatic Force</i> Activity - Ch. 22	159
Electroscopia — <i>Conduction, Induction, Conductors, and Insulators</i> Experiment - Ch. 22	163
Charging Ahead — <i>The Van de Graaff Generator</i> Demonstration - Ch. 22	171
Electric Field Hockey — <i>Field Manipulation Challenge Simulation</i> Tech Lab - Ch. 22	173
The Lemon Electric — <i>Battery Basics and a Basic Battery Puzzle</i> Activity - Ch. 23	177
Ohm, Ohm on the Range — <i>Connect Meters, Determine Resistance</i> Experiment - Ch. 23	181
Ohm, Ohm on the Digital Range — <i>Real-Time Electricity Graphs</i> Tech Lab - Ch. 23	187
Resistance is Not Futile — <i>The Nature of Electrical Resistance</i> Tech Lab - Ch. 23	191
Batteries and Bulbs — <i>Electric Circuit Basics</i> Activity - Ch. 23	195
An Open and Short Case — <i>Defective Circuits</i> Activity - Ch. 23	199
Be the Battery — <i>Powering Circuits By Hand</i> Activity - Ch. 23	205
Seeing Magnetic Fields — <i>The Patterns of Attraction and Repulsion</i> Activity - Ch. 24	209
Electric Magnetism — <i>Electric Currents and Magnetic Fields</i> Activity - Ch. 24	213
Motor Madness — <i>Simple DC Motors</i> Activity - Ch. 24	217
Bobbing for Magnets — <i>Electromagnetic-Mechanical Transducer</i> .. Demonstration - Ch. 25	221
Generator Activator — <i>Induction and Generators</i> Activity - Ch. 25	225

PART SIX: LIGHT

Pinhole Image — <i>Image Formation</i> Activity - Ch. 26	227
Pinhole Camera — <i>Image Formation</i> Activity - Ch. 26	229
Image of the Sun — <i>Image Formation</i> Activity - Ch. 26	231
Sunballs — <i>The Size of the Sun</i> Activity - Ch. 26	233
Why the Sky is Blue — <i>Scattering</i> Demonstration - Ch. 27	235
Mirror rorriM — <i>The Geometry of Plane Mirror Images</i> Activity - Ch. 28	239
Trapping the Light Fantastic — <i>Total Internal Reflection</i> Activity - Ch. 28	241
A Sweet Mirage — <i>Gradual Refraction</i> Activity - Ch. 28	245
Light Rules — <i>Turn a mm into a μ to Find λ</i> Demonstration - Ch. 29	247
Diffraction in Action — <i>Diffraction of Light</i> Activity - Ch. 29	249
Laser Tree — <i>Diffraction Maxima Geometry</i> Activity - Ch. 29	253
Pole-Arizer — <i>The Polarization of Mechanical Waves</i> Demonstration - Ch. 29	257
Blackout — <i>The Polarization of Light Waves</i> Demonstration - Ch. 29	261
Bright Lights — <i>Spectroscopy</i> Activity - Ch. 30	267

PART SEVEN: ATOMIC AND NUCLEAR PHYSICS

Get a Half-Life! — <i>Radioactivity</i> Activity - Ch. 33	271
Chain Reaction — <i>Fission</i> Activity - Ch. 34	275

APPENDICES

A. Accuracy, Precision, and Error	277
B. Significant Figures	278
C. Percent Error and Percent Difference	280
D. SI Prefixes and Conversion Factors	280
E. Graphing	281

The accompanying samples are taken from Pearson Addison Wesley's
Conceptual Physics Laboratory Manual: Activities · Experiments · Demonstrations · Tech Labs
By Paul G. Hewitt and Dean Baird • ISBN 0-321-73248-0