

TABLE OF CONTENTS

CHAPTER 1.

THINGS THAT MOVE

1

- 1.1 Skating 2
- 1.2 Falling Balls 10
- 1.3 Ramps 17

CHAPTER 2.

MORE THINGS THAT MOVE

29

- 2.1 Seesaws 30
- 2.2 Wheels 41
- 2.3 Bumper Cars 49

CHAPTER 3.

MECHANICAL THINGS

59

- 3.1 Spring Scales 60
- 3.2 Bouncing Balls 69
- 3.3 Carousels and Roller Coasters 79

CHAPTER 4.

MORE MECHANICAL THINGS

87

- 4.1 Bicycles 88
- 4.2 Rockets and Space Travel 96
- 4.3 The Earth, Moon, and Sun 109
- 4.4 Elevators 117

CHAPTER 5.

THINGS INVOLVING FLUIDS

125

- 5.1 Balloons 126
- 5.2 Water Distribution 137

CHAPTER 6.

THINGS THAT MOVE WITH FLUIDS 147

- 6.1 Garden Watering 148
- 6.2 Balls and Air 160
- 6.3 Airplanes 168
- 6.4 Vacuum Cleaners 190

CHAPTER 7.

THERMAL THINGS 197

- 7.1 Woodstoves 198
- 7.2 Water, Steam, and Ice 212
- 7.3 Incandescent Lightbulbs 219
- 7.4 Clothing and Insulation 228
- 7.5 Thermometers and Thermostats 238

CHAPTER 8.

THINGS THAT WORK WITH HEAT 249

- 8.1 Air Conditioners 250
- 8.2 Automobiles 258
- 8.3 The Atmosphere 275
- 8.4 Water Purification 284

CHAPTER 9.

THINGS WITH RESONANCES AND MECHANICAL WAVES 293

- 9.1 Clocks 294
- 9.2 Musical Instruments 303
- 9.3 The Sea 315

CHAPTER 10.

ELECTRIC THINGS 323

- 10.1 Static Electricity 324
- 10.2 Xerographic Copiers 332
- 10.3 Flashlights 343

CHAPTER 11.

MAGNETIC AND ELECTROMAGNETIC THINGS 351

- 11.1 Household Magnets 352
- 11.2 Electric Power Distribution 362
- 11.3 Electric Generators and Motors 374
- 11.4 Magnetically Levitated Trains 385
- 11.5 Magnetic Recording 392

CHAPTER 12.

ELECTRONIC THINGS 399

- 12.1 Power Adapters 400
- 12.2 Audio Players 414

CHAPTER 13.

**THINGS THAT USE
ELECTROMAGNETIC WAVES** 427

- 13.1 Radio 428
- 13.2 Microwave Ovens 436
- 13.3 Television 442

CHAPTER 14.

THINGS THAT INVOLVE LIGHT 453

- 14.1 Sunlight 454
- 14.2 Discharge Lamps 461
- 14.3 Lasers and LEDs 470
- 14.4 Paint and Makeup 476

CHAPTER 15.

OPTICAL THINGS 489

- 15.1 Cameras and Vision 490
- 15.2 Optical Recording and Communication 506
- 15.3 Telescopes and Microscopes 517

CHAPTER 16.

THINGS THAT USE RECENT PHYSICS 527

- 16.1 Nuclear Weapons 528
- 16.2 Nuclear Reactors 543
- 16.3 Medical Imaging and Radiation 552

CHAPTER 17.

THINGS THAT INVOLVE MATERIALS 563

- 17.1 Knives and Steel 564
- 17.2 Windows and Glass 574
- 17.3 Plastics 587

CHAPTER 18.

**THINGS THAT INVOLVE
CHEMICAL PHYSICS** 599

- 18.1 Oil Refineries 600
- 18.2 Laundry 617
- 18.3 Batteries 632

APPENDICES

- A Relevant Mathematics 647
- B Units, Conversion of Units 649

GLOSSARY 653

PHOTO CREDITS 693

INDEX 695