

CONTENTS

How to use this book 10

CHEMISTRY AND PHYSICS 12

What is matter? 14

Kinetic theory 18

Describing matter 20

Atoms 22

Radioactivity 24

Bonds and molecules 26

Crystals 28

Mixtures and compounds 30

What are elements? 34

Periodic table 36

Metals 40

Non-metals 46

Chemical reactions 48

Acids and acidity 54

Chemistry of carbon 58

Polymers 60

Electrochemistry 62

Chemical analysis 64

Forces at work 66

Motion 70

Pressure 74

Simple machines 76

Energy 78

Heat and temperature 82



COMPOUND
MICROSCOPE

Energy sources 86

Electromagnetic radiation 90

Light sources 92

Light and matter 94

Lenses and mirrors 96

Visible spectrum 98

Optical instruments 102

Sound waves 104

Sound recording 110

Magnetism 112

Static electricity 114

Current electricity 116

Electromagnetism 120

Electricity supply 122

Electronics 124

Computers 128

Telecommunications 132

Timeline of scientific

discoveries 134

EARTH AND WEATHER 138

How the Earth was formed 140

The Earth in space 142

Earth's magnetic field 144

Earth's atmosphere 146

Mapping the Earth 148

The Earth's crust 150

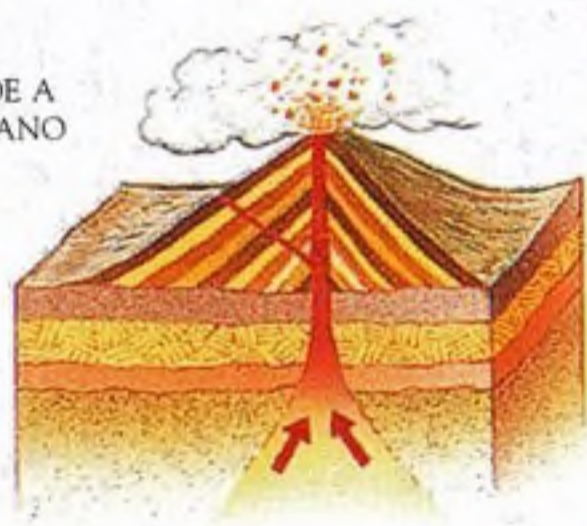
Moving continents 152

Inside the Earth 154

The Earth's volcanoes 156

Volcano shapes 158

INSIDE A VOLCANO



Explosive volcanoes 160

Non-explosive volcanoes 162

Volcanic landscapes 164

When the Earth shakes 166

Measuring earthquakes 168

Earthquake damage 170

Landscapes and soil 172

Erosion in wet climates 174

Erosion in arid climates 176

Igneous rocks 178

Sedimentary rocks 180



Fossils 182

The ages of the Earth 184

Metamorphic rocks 186

Minerals 188

Gemstones 190

Ore minerals 192

Fossil fuels: coal 194

Fossil fuels: oil and gas 196

Other sources of energy 198

The world's mountains 200

Mountain features 202

Valleys 204

Caves 206

The world's glaciers 208

Icecaps and ice ages 210

Avalanches and icebergs 212

The world's oceans 214
 Waves and tides 216
 The ocean floor 218
 Ocean features 220
 Islands 222
 Coasts 224
 The world's rivers 226
 River features 228
 Lakes 230
 Weather and climate 232
 Tropical 234
 Tropical monsoon 236
 Dry 238
 Warm 240
 Cool 242
 Mountain and polar 244
 Weather and seasons 246
 Wind and weather 248
 Temperature and pressure 250
 Air masses 252
 Highs and lows 254
 Clouds 256
 Rain and thunderstorms 258
 Snow, hail, and frost 260
 Hurricanes and tornadoes 262
 Blizzards and sandstorms 264
 Weather mapping 266

SPACE 268

What is the universe? 270
 Scale of the universe 272
 Life story of the universe 274
 What is a galaxy? 276
 Clusters and superclusters 278
 The Milky Way 280

MILKY WAY



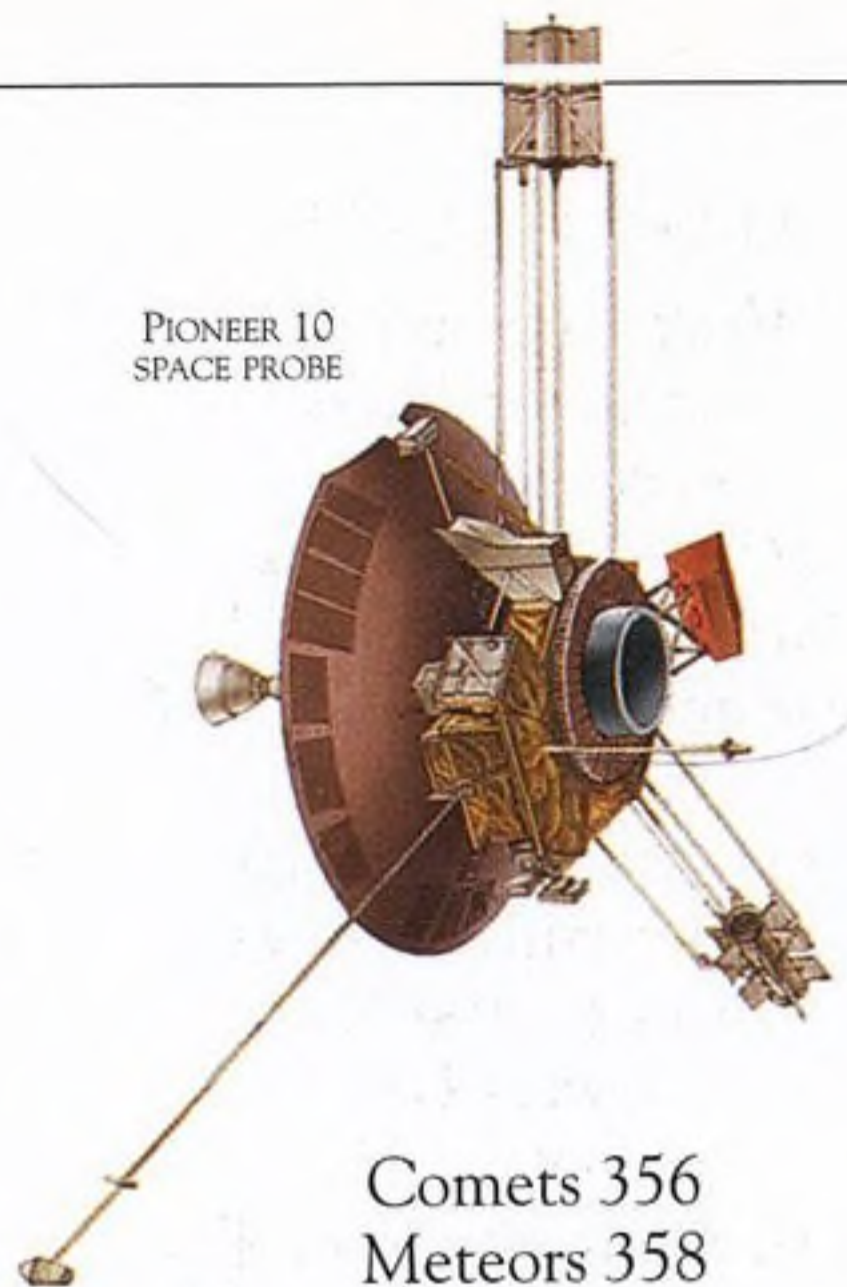
The Local Arm 282
 What is a star? 284
 Star birth 286
 Life cycle of a star 288
 Death of massive stars 290
 Stellar classification 292
 Brightness 294
 Above our heads 296
 Special effects 298
 Constellations 300

CONTENTS

Cataloguing stars 302
Near or far? 304
The northern sky 306
The southern sky 308
What is the solar system? 310
Solar gravity 312
The Sun 314
Solar energy and influence 316
Mercury 318
Venus 322
Earth 326
Earth's moon 330
Mars 334
Jupiter 338
Saturn 342
Uranus 346
Neptune 350
Pluto 354



SUN
STRUCTURE



PIONEER 10
SPACE PROBE

Comets 356
Meteors 358
Asteroids 360
Information from space 362
Optical telescopes 364
Radio astronomy 366
Images of space 368
Observatories 370
Telescopes in space 372
Rockets 374
Fly-bys and orbiters 376
Landers 378
Working in space 380
Milestones in astronomy 382
Space missions I 388
Space missions II 390

LIVING WORLD 392
 What is nature? 394
 How life began 396
 Evolution 398
 Microscopic life 402
 Fungi and lichens 404
 Algae and simple plants 406
 Conifers 408
 Flowering plants 410
 Photosynthesis 414
 Plant growth 416
 Flowers 418
 Pollination 420
 Fertilization and fruits 422
 Simple invertebrates 424
 Molluscs and
 echinoderms 426
 Arthropods 428
 Insects 430
 Fish 432
 Amphibians 434
 Reptiles 436
 Birds 438
 Mammals 440
 Primates 442
 Nutrition and
 digestion 444
 Teeth and jaws 446
 Breathing 448

Blood and circulation 450
 Skeletons 452
 Muscles and movement 456
 Nervous system and brain 460
 Senses 462
 Behaviour 466
 Reproduction 470
 Growth and
 development 472



FOX CUB

Metamorphosis 474
 Ecosystems 476
 Nutrient cycles 478
 Food webs and
 chains 480
 Conservation 482
 Classification I 484
 Classification II 486
 Units of measurement 488
 Index 492