ScienceSchoolHouse Discover! Science 15 CDS, 1 DVD and Online Library Comprehensive Table of Contents

3D Virtual Laboratory for Physical Science included in each CD.

The Library has

- 15 CDs = 15 Online Units = 15 Units in one DVD
- 107 chapters (90 main chapters, 17 appendices)
- 1100 illustrated lessons;
- most lessons in 2 text levels, with fully narrated main chapter text;
- 100 interactive exercises;
- 350 video clips;
- 15 approximately 30-minute video documentaries;
- quizzes in each main chapter for students taken from 1800-question Test Banks that are available to teachers;
- a unique 3D Virtual Lab for physical science.

CHAPTERS OF EACH UNIT

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Measurement Systems and SI Units
Careers in Science

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Chapter 5: Renewable and Non-renewable Resources
Mineral Groups
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Chapter 4: Ocean Topography and Shorelines
Chapter 5: Landforms on Earth
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Appalachian Mountains
Geology of California, USA
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Chapter 3: Oceans of Water
Chapter 4: Ocean Heating and Ocean Circulation
Topography on the Ocean Floor
Physical Properties of Seawater
Chemical Properties of Seawater
xMedia Movie: Sea Winds: The Quick Scat Story

Discover! Oceans Volume 2:: Oceans in Motion

Chapter 1: Waves and Tides
Chapter 2: The Coastal Zone
Chapter 3: Life in the Ocean
Light in the Ocean
Sound in the Ocean
Types of Waves
xMedia Movies: Images of Earth
Jason – An Ocean Odyssey

Discover! Oceans Volume 3: Earth's Water Cycle

Chapter 1: The Water Cycle
Chapter 2: Freshwaters
Chapter 3: The Cryosphere
Chapter 4: The Oceans from Space
Watersheds
Physical Properties of Pure Water
xMedia Movie: Earth's Oceans From Space

Discover! Weather Volume 1:: Weather Fundamentals

Chapter 1: Weather Launch
Chapter 2: Introduction to the Weather
Chapter 3: The Hydrologic Cycle and Cloud Formation
Chapter 4: Global Weather Patterns
Chapter 5: Local Climates and Regional Patterns

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xMedia Movie: Hurricane Force (28 min.)

Discover! Weather Volume 2: Extreme Weather

Chapter 1: Stormy Weather
Chapter 2: Billion Dollar Storms
Chapter 3: Hurricanes
Chapter 4: East Coast Winter Storms
Chapter 5: Floods and Droughts
Chapter 6: Tornadoes
xMedia Movie: Hurricane Force (28 minutes)
Online is Flooding: Working on Prevention (22 minutes):

Discover! Weather Volume 3: Weather Forecasting and Climate Change

Chapter 1: Forecasting the Weather
Chapter 2: Backyard Meteorology
Chapter 3: Reading Weather Charts
Chapter 4: Climate and Climate Change
Chapter 5: Remote Sensing of Ocean Climate
El Nino
The Climate System
The Effects of Climate Change
Stratospheric Ozone
The Ozone Hole
xMedia Movie: Earth's Oceans From Space

Discover! Live in the Environment Volume 1: Life Science

Chapter 1: Life on Earth
Chapter 2: Types of Life on Earth: Plants
Chapter 3: Biological Levels of Organization
Chapter 4: Cell Division
Chapter 5: Types of Life on Earth: Animals and Humans
Chapter 6: Life in the Oceans
Chapter 7: Productive Environments
Chapter 8: Introduction to Evolution
Chapter 9: Changing Populations
Life on Planet Earth
xMedia Movie: Good Muscles and Bones (28 minutes)

Discover! Life in the Environment Volume 2: The Environment

Chapter 1: Geologic Time and Processes
Chapter 2: Weathering and Erosion
Chapter 3: How Water Shapes the Landscape
Chapter 4: How Glaciers Shape the Landscape
Chapter 5: How Plants and Animals Reshape the Landscape
Chapter 6: Energy Uses
Chapter 7 :Climate Change
Life on Planet Earth

xMedia Movie: Earth From Space (22 minutes)

Discover! Physical Science: Basic Concepts

Chapter 1: Basic Concepts
Chapter 2: Atomic Theory: Matter and Energy
Chapter 3: Force and Motion: Newton's Laws
Chapter 4: Waves and Vibrations
Chapter 5: Energy
Chapter 6: Basic Electricity Concepts
xMedia Movie: Aircraft and Spacecraft (27 minutes)

SCREEN LESSON TITLES AND INTERACTIVE COMPONENTS OF EACH CHAPTER

Appendices common to all CD/Units:

Scientific Method
Measurement Systems and SI Units
Careers in Science

Scientific Method

1. The Need to Know
2. What Makes Science Different?
3. Problems with Induction
4. The Scientific Method
5. Hypothesis and Deduction
6. Experiments and Observation
7. Acceptance of Hypotheses
8. Theories and Laws
9. The Cycle of Scientific Inquiry
10. Scientists Build Models
11. Scientific Theories and Revolutions
12. Scientists Doing Science
13. Open Communication
14. Ethical Responsibilities
15. Role of Technology
16. Science and Society

Measurement Systems and SI Units

1. The Need for Common Units
2. Some Old Units of Measurement
3. Problems with Different Measurement Systems
4. The SI (Metric) System
5. Basic Units of SI
6. Derived Units
7. More Derived Units
8. Decimal Multipliers
9. SI Prefixes
10. Scientific Notation
11. Large and Small Numbers
12. Exact and Approximate Numbers
13. Precision Measurements
14. Significant Figures
15. Scientific Notation and Precision
16. Accuracy and Precision
17. Dangers of Many Digits
18. Working with Scientific Notation

Careers in Science

1. Careers in Science
2. Careers in Geology
3. Careers in Oceanography
4. Careers in Atmospheric Science

5. Careers in Astronomy
6. Geological Field Safety

Discover! Astronomy Volume 1: Astronomy and the Universe

Interactive Exercises

1_7 Red Shift
2_4 Stellar Equilibrium
2_5 Hertzsprung-Russell Diagram
2_7 Types of Galaxies
3_4 See the Night Sky
3_6 Telescopes
3_6 Spectroscope
3_7 Characteristics of All Waves
3_8 EM Spectrum Properties
3_9 Distances
4_2 Atomic Theory
4_3 The Farm
4_6 Gravity and Mass – The Cavendish Experiment
4_10 Weight, Mass, Volume and Density

Movies and Animations

1_1 Binary Black Holes
1_2 Ways to Find a Planet (There's a Planet Out There!)
1_3 Finding New Planets
1_4 Detecting Infrared Radiation in Space
1_5 Stardust and Comet Wild 2
1_6 Mapping the Stars – The Keys to the Stellar Kingdom
1_8 Images From Near the Big Bang
2_1 Hunting for Planet-forming Dust Disks
2_2 Birth, Life and Death of Stars
2_3 Formation of Stars and Planets
2_7 Galaxies
3_1 Observations of Earth and Beyond
3_2 Our Solar System
3_3 Solar System Images
3_4 Star Clusters
3_5 Copernicus
3_6 Infrared Light
3_7 Supernova Explosion
3_8 Support for Einstein's Constant Speed of Light Theory
3_9 Space Interferometry Mission (S.I.M.)
4_1 Photons
4_2 Atoms
4_3 Energy – $E=MC^2$
4_4 Thermonuclear Blast Consumes Neutron Star
4_5 Conservation of Energy Laws and Black Holes
4_6 Gravitational Waves

Chapter 1: Introduction to the Universe

1_1 Keep Your Feet on the Ground and Reach for the Stars
1_2 What We Know and How We Know

Chapter 2: Stars and Galaxies

Chapter 3: How do we Know?

Chapter 4: Fundamentals of Physical Science

Appendices

Satellite Exploration

8. Exploring Saturn
9. Exploring Neptune
10. Exploring Neptune and Pluto
11. Exploring Asteroids
12. Exploring Comets

History of Rocketry

1. Introduction
2. History of Rocketry

xMedia Movie: Astronomy – Changes in Outlook from Ptolemy to Einstein (30 minutes)

- 00:00:09 Ptolemy
- 00:01:16 The Greeks and Circular Orbits
- 00:02:18 Planetary Motion and Speed
- 00:02:55 Epicycles and Deferents
- 00:05:18 Copernicus and Heliocentric Universe
- 00:09:01 Newton and Laws of Motion
- 00:12:18 Force = Mass x Acceleration
- 00:12:44 Gravitation
- 00:13:44 Einstein and Relativity
- 00:15:57 E = Mc Squared
- 00:16:52 Eddington and the Sun
- 00:17:52 Space is Curved
- 00:19:25 Hubble and Galaxies
- 00:20:11 Expanding Universe
- 00:22:34 Kant and Cosmogony

Discover! Astronomy Volume 2: Earth and the Inner Solar System

Interactive Exercises

1_1 Earth's Tilt
1_4 The Inner Planets
1_4 Structure of the Atmosphere
1_6 Earth's Orbit and Climate
1_7 Elliptical Orbit
1_8 The Sun's Intensity
2_1 Earth's Orbit
2_4 Oxygen in Earth's Atmosphere

Movies and Animations

1_1 The Solar System and Our Earth
1_2 After the Big Bang!
1_3 Solar Wind
1_4 Inner Planets
1_5 Outer Planets
1_10A The Sun
1_10B Sun, Earth, Moon
1_10C The Sun – Rotating Sunspots
1_13 Solar Eclipse of 1999
1_14 Sunspots
2_1 Earth
2_2A Aurorae
2_2B The Weather
2_3 Views of Earth from Space (slide show)
2_6 The Moon
2_7 Modeling the Moon
3_1 Mercury Transit
3_3 The Formation of Mercury
3_5 Venus
3_7A Animations of Venus
3_7B Venus Transit 2004
3_8 Venus
4_3 Mars Temperatures
4_5A Mars Rotates
4_7 Mars Moons
4_10 Mars Rover Landing
4_15 Mars Topography
4_16 Mars on Earth!

Chapter 1: The Sun and the Solar System

1_1 Solar System Introduction
1_2 News: Pluto is no longer a Planet!
1_3 Composition of the Solar System
1_4 Interplanetary Space
1_5 The Terrestrial Planets
1_6 The Jovian Planets

1_7 Views of the Solar System
1_8 Sun and Planet Summary
1_9 Sun Introduction
1_10 Sun Statistics
1_11 Movies of the Sun
1_12 Views of the Sun
1_13 Images Illustrating Convection
1_14 Eclipses
1_15 Spotting Sunspots

Chapter 2: Earth as a Planet, and its Moon

2_1 Earth
2_2 A Different View
2_3 Views of Earth
2_4 Clouds From Space
2_5 Impact Craters
2_6 The Moon
2_7 Clementine Spacecraft Movie of the Moon
2_8 Views of the Moon
2_9 Phases of the Moon

Chapter 3: Mercury and Venus

3_1 Mercury
3_2 Mercury Statistics
3_3 Formation of Mercury
3_4 Views of Mercury
3_5 Venus
3_6 Venus Statistics
3_7 Animations of Venus
3_8 Views of Venus
3_9 Venusian Impact Craters
3_10 General Characteristics
3_11 Impact Crater Classification
3_12 Distinguishing Impact
3_13 Large Crater (Mead) Properties
3_14 Halos, Outflow Deposits, and Splotches
3_15 Crater Modification
3_16 Venusian Volcanic Features
3_17 Volcanic Plains
3_18 Lava Flows
3_19 Lava Channels
3_20 Small Volcanoes
3_21 Intermediate Volcanoes
3_22 Domes
3_23 Collapse Features
3_24 Large Volcanoes
3_25 Calderas
3_26 Magellan Mission to Venus

Chapter 4 : Mars

4_1 Introduction

4_2 Atmosphere
4_3 Temperature and Pressure
4_4 Mars Statistics
4_5 Animations of Mars
4_6 Views of Mars
4_7 Mars Moon Summary
4_8 Martian Volcanoes
4_9 Views of Martian Volcanoes
4_10 Views of Martian Clouds
4_11 Phobos
4_12 Views of Phobos
4_13 Deimos
4_14 Mosaic of Deimos
4_15 Mars Exploration
4_16 Exploration Program
4_17 Project Viking Summary

xMedia Movie: The Space Shuttle and the Hubble Telescope

- 00:00:00 Introduction
- 00:00:48 Background to Discovery and Crew
- 00:02:01 Launch
- 00:04:41 Deploying NASA Communications Satellite
- 00:07:11 Microgravity Laboratory Experiments
- 00:08:46 Discovery Views/Salute to Challenger Crew
- 00:11:21 Crew Has Fun in Zero Gravity
- 00:14:41 Landing Area and Discovery Landing
- 00:16:20 Touchdown
- 00:17:33 Credits
- 00:17:39 Space Shuttle Endeavour Services Hubble
- 00:18:00 Crew Works on Hubble in Space
- 00:18:34 Image Comes from Repaired Telescope
- 00:18:43 Seven Planets in Solar System by Hubble
- 00:19:26 The Weather on Mars
- 00:20:08 Jupiter Catches a Comet!
- 00:21:16 Saturn at Ring Plane Crossing
- 00:22:16 The Life Cycle of Stars
- 00:24:11 Galaxies and Beyond
- 00:25:43 End

Discover! Astronomy Volume 3: The Outer Solar System

Interactive Exercises

1_2 The Outer Planets
5_4 Other Solar System Objects

Movies and Animations

1_1 Jupiter
1_4 Jupiter's Great Red Spot
1_5 Exploring Jupiter's Moons
1_9 Jupiter's Atmosphere
1_11 Jupiter's Magnetic Field
1_16 Fly By Past Io
2_1 Cassini Orbits Saturn
2_6 Titan
2_9 Oxygen in Saturn's Magnetosphere
2_10 Cassini
3_1 Uranus
3_2 The Magnetic Field of Uranus
3_5 Voyager and Uranus
4_4 Neptune
4_7 Flight over Triton
4_10 Pluto
5_1 Asteroid 4179: Toutatis
5_3 Hale-Bopp Comet Animation
5_8 Verified Craters

Chapter 1: Jupiter

1_1 Introduction
1_2 Jupiter's Ring
1_3 Jupiter Statistics
1_4 Jupiter's Great Red Spot
1_5 Jupiter's Family
1_6 Equator of Jupiter
1_7 Jupiter's Moons Summary
1_8 Voyager Jupiter Science
1_9 Jupiter's Atmosphere
1_10 Satellites and Ring
1_11 Magnetosphere
1_12 Galileo Mission to Jupiter
1_13 Galileo Deployment
1_14 Hubble Finds Oxygen Atmosphere
1_15 Hubble Finds Ozone on Jupiter's Moon – Ganymede
1_16 Io
1_17 Io Statistics
1_18 Views of Io
1_19 Europa
1_20 Ganymede
1_21 Callisto

Chapter 2: Saturn

2_1 Saturn
2_2 Views of Saturn
2_3 Saturn's Moons Summary
2_4 Voyager and Saturn
2_5 The Rings
2_6 Titan
2_7 New Satellites
2_8 Other Satellites
2_9 The Magnetosphere
2_10 Cassini Mission

Chapter 3: Uranus

3_1 Uranus
3_2 Rings of Uranus
3_3 Uranus Moons Summary
3_4 The Moons
3_5 Voyager Uranus Science

Chapter 4 : Neptune and Pluto

4_1 Introducing Neptune
4_2 Rings of Neptune
4_3 Neptune's Moons Summary
4_4 Voyager Science Summary
4_5 Background
4_6 More Details
4_7 Triton
4_8 Small Satellites
4_9 The Rings and 'Ring Arcs'
4_10 Pluto
4_11 News: Pluto is no longer a Planet!
4_12 Charon

Chapter 5: Comets, Asteroids, and Meteoroids

5_1 Asteroids Introduction
5_2 Selected Asteroids
5_3 Comets and Views of Selected Comets
5_4 Educator's Guide to Kitchen Comets
5_5 Meteoroids and Meteorites
5_6 Terrestrial Impact Craters
5_7 Views of Terrestrial Craters
5_8 Impact Craters in your Classroom
5_9 Collecting Micrometeorites

xMedia Movie: Spaceflight: The Application of Orbital Mechanics (35 minutes)

- Introduction
- Ancient Observations - Aristotle
- Geocentric Theory - Ptolemy
- Heliocentric Theory - Copernicus
- Orbital Mechanics
- Kepler's 3 Laws of Planetary Motion
- Newton
- Law of Universal Gravitation
- First Law of Motion
- Second Law of Motion
- Third Law of Motion
- How a Satellite Orbits
- Escape Velocity
- The Six Orbital Elements
- Launch Window Factors
- Types of Rockets and Launch Vehicles
- Launching into Orbit
- Delta V - Burns and Thrusts
- Homan Transfer
- Space Shuttle on Orbit - Plane Change
- Field of View Requirements
- Geosyncronous Orbit
- Geostationary Orbit
- Molniya Orbit
- G.P.S. and Lower Orbits
- Sun Synchronous Orbit - Landsat
- Deviations and Orbital Perturbations
- Satellite Lifetimes
- Space Shuttle Returns - Retrograde Burn
- Credits

Discover! Geology Volume 1: Dynamic Earth

Interactive Exercises

2_3 Radioactive Half-life
2_5 Earth's Orbit and Climate
2_6 Elliptical Orbit
2_8 Earth's Tilt
3_1 Journey to the Center of the Earth
3_7 Earth Systems
3_13 Structure of the Atmosphere
3_16 Biomes of the Earth
5_4 Past Climates
5_7 Continental Drift
5_10 Tectonic Plates
6_15 Fault Folds
7_6 Earthquakes
D_1 History of Science

Movies and Animations

1_1 Earth
1_2 Earth Rotates
1_3 Earth Weather
1_4 Earth & Phytoplankton
1_5 Geologic Time
1_6 Plate Tectonics
1_7 Longer Term Changes
2_1 Hunting for Planet-forming Dust Disks
2_5 The Earth's Dance
2_6 Eccentricity
2_7 Earth's Rotation
3_2 The Ocean Floor From Space
3_4 Inner Core
3_5 Outer Core
3_9 Tectonic Plates
3_14 Biosphere
4_1 Geologic Time
4_4 The Grand Canyon
5_1 Continental Drift
5_3 Pangaea
5_8 Apparent Pole Wandering
5_12 Plate Boundaries
6_2 Subduction
6_6 Sea Floor Spreading
6_8 The Mariana Islands
6_10 Volcanoes
7_2 Pinatubo
7_6 Loma Prieta Earthquake
7_7 Earthquake Animation
7_9 Earthquakes 1960-1995
7_12 Landslides

Chapter 1: Our Dynamic Planet

1_1 Introduction
1_2 Whole Earth System
1_3 The Dramatic Earth: Seconds, Hours and Days
1_4 The Dramatic Earth: Days to Years
1_5 Hundreds to Thousands of Years
1_6 Hundreds of Thousands to Millions of Years
1_7 Hundreds of Millions to Billions of Years

Chapter 2: Planet Earth

2_1 Solar System Formation
2_2 Earth from Space
2_3 The Age of the Earth
2_4 Formation of the Earth
2_5 Motions of the Earth
2_6 Earth Revolves Around the Sun
2_7 Earth Rotates about its Axis
2_8 Earth's Rotation is Tilted
2_9 Earth's Tilt Wobbles
2_10 Shape and Size of the Earth

Chapter 3: The Earth - Inside and Out

3_1 Structure of the Earth
3_2 The Crust
3_3 The Mantle
3_4 The Core - Solid Portion
3_5 The Core - Liquid Portion
3_6 Earth's Magnetic Field
3_7 Earth as a System
3_8 Geosphere
3_9 The Changing Geosphere
3_10 Hydrosphere
3_11 Hydrosphere and Change
3_12 Atmosphere
3_13 Atmospheric Zones
3_14 Biosphere
3_15 Where We Live – Biosphere
3_16 Biomes of Earth

Chapter 4: Earth Through Time

4_1 Glimpses into Geologic Time
4_2 Relative Dating
4_3 Principles of Relative Dating
4_4 Stratigraphy 1
4_5 Stratigraphy 2
4_6 Breaks in the Rock Record – Unconformities
4_7 Sedimentary Facies
4_8 The Puzzle Pieces of Correlation
4_9 Fossils and Stratigraphy

Chapter 5: Earth's Lithosphere in Motion

5_1 Continental Drift - The Discovery
5_2 Continents Adrift
5_3 The Supercontinent – Pangaea
5_4 Paleoclimatic Evidence
5_5 Fossil Evidence
5_6 Landform Evidence 1
5_7 Landform Evidence 2
5_8 Paleomagnetism and Pole-Wandering
5_9 Paleomagnetism and Sea Floor Spreading
5_10 Arrangement of Tectonic Plates
5_11 Relative Plate Motion
5_12 Global View of Plate Boundaries

Chapter 6: Plate Tectonics

6_1 Plate Motion and Convection
6_2 Surface Convection
6_3 Deep Mantle Convection
6_4 Forces Resulting from Convection
6_5 Types of Tectonic Plate Boundaries
6_6 Divergent Plate Boundaries
6_7 Convergent Plate Boundaries and Transform Faults
6_8 Ocean-Ocean Collision
6_9 Continent-Ocean Collision
6_10 Shaping the Land by Tectonics
6_11 Hot Spots
6_12 What Causes Hot Spots?
6_13 Mountain Building
6_14 Faults
6_15 Folding

Chapter 7: Volcanoes and Earthquakes

7_1 Introduction – Volcanoes
7_2 Volcano Types
7_3 Magma
7_4 Magma Formation
7_5 Magma Types and Volcanoes
7_6 Earthquakes
7_7 Seismic Waves
7_8 What are Body Waves and Surface Waves?
7_9 Earthquake Measurements
7_10 How Body Waves Travel Through the Earth
7_11 Evidence for a Layered Earth
7_12 Geohazards

Appendices

History of Geoscience

1. Ancient and Medieval Times
2. The 16th to the 18th Centuries

Energy Flows of Earth

1. Our Home-Earth in Space
2. Human Understanding of Earth
3. The Earth System
4. Time Scales of Change
5. Time Rates of Change
6. Energy and the Earth System
7. Conduction and Convection
8. Earth's Internal Convection
9. Hydrosphere - Convection
10. Earth System Science
11. Radioactivity

Evolution

1. Fundamental to Life
2. The Theory of Natural Selection
3. Formation of New Species
4. Geographic Speciation
5. What Exactly is a Species?
6. Systematics and Taxonomy
7. Phylogentic Relationships
8. Evolution and the Fossil Record
9. Patterns of Evolution
10. Extinction
11. What are Fossils?

Seismicity of North Carolina, USA

1. Seismicity of North Carolina, USA
2. Earthquake History of North Carolina

xMedia Movie: Exotic Terrane – Plate Tectonics

- Introduction
- Hell's Canyon
- Exotic Terranes
- Wallowa Terrane
- Pillow Lavas
- Paleontologists' Results
- Lab Methods for Study of Fossils
- Area is Ancient Coral Reef
- Geological Studies in the Pacific
- Anatahen Island in Mariana Islands
- Active Volcanoes
- Plate Tectonics Explained
- Mariana Trench - Lowest Spot on Earth
- Subduction Zone
- Volcanic Island Arc

- Baker Terrane - Oregon
- Blue Mountains Island Arc
- San Andreas Fault
- How NA West Coast Formed
- Suture Zone
- Vancouver Island and N. Canada
- Lab Methods in Geology
- Western North America Formed Later
- New Subduction Zones and Mt. Rainier
- Mt. St. Helens Erupts
- Columbia River Basalt
- Formation of Hell's Canyon

Discover! Geology Volume 2: Minerals, Rocks and Resources

Interactive Exercises

1_2 The Periodic Table of Elements
1_5 Mineral Identification
1_11 Merry-Go-Rock: The Rock Cycle
2_6 How Well Do You Know Your Rocks and Minerals?
5_2 The Farm
5_12 Surface Coal Mining

Movies and Animations

1_3 Atoms
1_6 Mars on Earth
2_3 Landslides
2_4 Crustal Age
2_5 Volcano Activity from 1960 through 1995
3_3 The Grand Canyon
4_2 Subduction
5_1 Energy Use
5_2 Alternative Energy Sources
5_4 Solar Power
5_8 Wind Power
5_12 Coal Mining
5_13 Natural Gas Formation
5_14 How Oil Forms
5_15 Nuclear Power
5_16 Coal Mining and Reclamation

Chapter 1: Minerals and Rocks

1_1 What are Minerals?
1_2 Minerals are Matter
1_3 Structure of Atoms
1_4 How Minerals are Built – Bonding
1_5 Mineral Identification
1_6 Minerals and Rocks
1_7 Rock Groups
1_8 Igneous Rocks
1_9 Sedimentary Rocks
1_10 Metamorphic Rocks
1_11 The Rock Cycle

Chapter 2: Igneous Rocks

2_1 Igneous Rocks - At the Surface
2_2 Igneous Rocks - At Depth
2_3 Igneous Rocks - Erosion and Uplift
2_4 Crustal Abundance
2_5 Extrusive Igneous Rocks
2_6 Intrusive Igneous Rocks

Chapter 3: Sedimentary Rocks

3_1 Sediments
3_2 Organic Debris
3_3 Sedimentary Rocks
3_4 Clastic Sedimentary Rocks
3_5 Chemical and Biochemical Rocks

Chapter 4: Metamorphic Rocks

4_1 Metamorphic Rocks
4_2 Subduction Zone
4_3 Texture, Composition, and Fabric
4_4 Foliated Metamorphic Rocks
4_5 Nonfoliated Metamorphic Rocks

Chapter 5: Renewable and Non-renewable Resources

5_1 Stop and Think about Energy
5_2 What is Renewable Energy?
5_3 Alternative Energy Sources
5_4 Solar Energy
5_5 Hydroelectric Power
5_6 Tidal Energy
5_7 Geothermal Energy
5_8 Wind Energy
5_9 Biomass Energy
5_10 Non-renewable Resources
5_11 Fossil Fuels
5_12 Coal: Buried Sunshine
5_13 Oil and Natural Gas
5_14 Where Are Oil and Natural Gas Found?
5_15 Nuclear Energy
5_16 Mining and Reclamation
5_17 Conservation
5_18 One Voice – Recycling
5_19 The 4 R's

Appendices:

Mineral Groups

1. Introduction - Mineral Groups
2. Feldspars
3. Micas
4. Quartz
5. Olivines
6. Pyroxenes
7. Amphiboles
8. Clay Minerals
9. Native Elements - Metals, Semimetals, Nonmetals
10. Carbonates

11. Oxides
12. Sulfides
13. Sulfates
14. Halides
15. Hydroxides
16. Phosphates
17. Other Minerals

Mineral ID Table

1. Mineral Identification
2. F.2a Mineral ID Chart - Light-Colored Minerals, Non-Metallic Luster
. F.2b Mineral ID Chart - Dark-Colored Minerals, Non-Metallic Luster
. F.2c Mineral ID Chart - Metallic Minerals, Metallic Luster
3. Mineral ID Chart - Hardness and Luster
4. Mineral ID Chart - By Breaking and Special Features
5. Mineral Properties
6. Rock Identification

xMedia Movie: The Reelfoot Rift (27 minutes)

- Introduction - New Madrid Seismic Zone
- New Madrid Quakes of 1811 - +8 Temblors
- Mississippi River Disruptions
- Reelfoot Lake Created
- Largest Area of Quake Damage on Earth
- Great San Francisco Earthquake of 1906 - 8.3 on Richter Scale
- Plate Tectonics
- Plates' Cores or Cratons are Rigid
- North American and Pacific Plates
- Loma Prieta Earthquake of 1989
- Soft Sand and Mud React to Seismic Waves
- Mississippi Valley Sediment
- Many Large Cities are in the New Madrid Earthquake Zone - Damage Potential High
- Gas and Oil Pipelines Are Also at Risk
- When Will Next Earthquake Occur?
- San Andreas Fault - A Different Geology
- Scientists Must Probe Rock Beneath Mud
- Reelfoot Rift - Earthquake Activity
- Epicenters in Deep Faults
- Area was Formed 500 Million Years Ago
- Tectonic Forces Cause Earthquakes
- Where and When - Next Major Earthquake
- This Area Would Suffer Major Damage
- Sand Blows
- Lateral Spreading - Land Sliding
- Shaking Damage
- Memphis Most Vulnerable
- Modern Earthquake Building Codes Adopted
- Summary

Discover! Geology Volume 3: Carving the Earth: Soils, Erosion and Landforms

Interactive Exercises

1_7 Environmental Site Assessment
1_8 World Land Use
2_1 Hydrologic Cycle Animations
2_5 The Hydrologic Cycle
3_1 Glaciers
4_1 Down in the Flood - Changing Sea Level
4_2 Hypsographic Chart – Land vs. Ocean
6_3 Satellite Images of Earth
6_9 Topography Map

Movies and Animations

1_1 Physical Weathering
1_4 Flying Over Atlanta
1_9 Erosion
2_5 Las Vegas
2_7 The Mississippi River
2_13 Mississippi-Missouri Flood
3_1 Pine Island Glacier
3_4 Accumulation
3_5 Measuring Ice Thickness
3_8 Glacial Movement
4_1 Mapping the Ocean
4_3 Sea Floor Mapping
4_5 East and South Coast
5_1 Earth
5_6 Natural Gas Formation
5_8 Chattanooga Tennessee
5_9 Mt. St. Helens Animation
5_15 Fly Around Glacier Bay, Alaska
5_16 Verified Craters
6_1 Slides and Maps
6_3 Remote Sensing
6_6 Remote Sensing Slides

Chapter 1: Weathering and Soils

1_1 Physical Weathering
1_2 Chemical Weathering
1_3 Mass Wasting
1_4 Soils: Residue of Weathering
1_5 Formation of Soils
1_6 Soil Types
1_7 Soil Uses and Conservation
1_8 Soils of the World
1_9 Soil Problems - Let's Conserve

Chapter 2: Rivers and Groundwater

2_1 Hydrologic Cycle
2_2 Watersheds
2_3 Landforms Created by Running Water
2_4 Rivers
2_5 How Water Moves
2_6 Large Valleys
2_7 Floodplains
2_8 Reaching the Ocean
2_9 Groundwater
2_10 Water Table
2_11 Aquifers
2_12 Removing Groundwater
2_13 Watershed Modification

Chapter 3: Glaciers and Glaciation

3_1 What is a Glacier?
3_2 Types of Glaciers
3_3 How do Glaciers Form?
3_4 Glacier Growth – Accumulation
3_5 Glacier Shrinkage – Ablation
3_6 The Glacial Balance
3_7 How Do We Know Glaciers Move?
3_8 Glacial Movement
3_9 How Fast Do Glaciers Move?
3_10 Glacial Erosion and Sediments
3_11 Glacial Erosion
3_12 Glaciation

Chapter 4: Ocean Topography and Shorelines

4_1 Filling up the Oceans
4_2 Where the Land Meets the Ocean
4_3 Topography of Oceans and Continents
4_4 The Coastal Zone
4_5 Types of Coast
4_6 Beaches

Chapter 5: Landforms on Earth

5_1 A Different View
5_2 Stratigraphy and Structure
5_3 Folds and Faults
5_4 Faults and Joints
5_5 Mineral Exploration
5_6 Oil and Gas Exploration
5_7 Geomorphology
5_8 Tectonic Landforms
5_9 Volcanic Landforms
5_10 Rivers Shape the Land

5_11 Deltaic Landforms
5_12 Coastal Landforms
5_13 Karst Landforms
5_14 Aeolian Landforms
5_15 Glacial Landforms
5_16 Impact Craters
5_17 The Big Bump
5_18 Crater Morphology
5_19 Urban Land Use

Chapter 6: Mapping the Earth

6_1 Introduction – Maps
6_2 All About Maps
6_3 Maps and Remote Sensing
6_4 Maps and Mapmaking
6_5 Mapmaking in the Renaissance
6_6 Development of Remote Sensing
6_7 Cartography
6_8 Scales in Mapmaking
6_9 Map Projection
6_10 Cartesian System
6_11 Map Symbology

Appendices:

Appalachian Mountains

1. Appalachian Mountains

Geology of California, USA

1. California is Unique
2. Geology of California
3. Tectonic History of California
4. San Andreas Fault

xMedia Movie: When the Bay Area Quakes (20 minutes)

- Introduction
- San Andreas Fault
- Loma Prieta Earthquake - 1989
- Ground Shaking - Strongest Near Epicenter
- Seismic Waves Spread From Epicenter
- Bedrock and Aluvium
- Flood Plain Response - More Than Bedrock
- Liquefaction
- Sand Volcanoes
- Landslides
- Ground Rupturing
- The Four Main Types of Ground Behavior
- 1906 Earthquake Scenes

- Predicting Earthquakes - Seismometers
- Accelerographs
- Global Satellite Positioning
- Rock Samples Analyzed
- Crustal Plate Slippage
- Hayward Fault Most Likely Next Quake
- Preparing for Future Earthquakes
- Parkfield Earthquake Prediction Experiment

Discover! Oceans Volume 1: Earth's Oceans

Interactive Exercises

1_9 Hydrologic Cycle Animations
2_4 Tectonic Plates Project
2_6 Hypsographic Chart – Land vs. Ocean
3_6 Seasonal Sea Temperatures
3_11 Secchi Depth
3_12 Pressure and Depth
4_2 The Sun's Output
4_8 Ocean Circulation

Movies and Animations

1_1 Earth
1_2 The Water Cycle
1_5 Fly over the Pacific Ocean
1_7 Measuring Ice Thickness
1_10 Evaporation
1_12 The Amazon River
2_1 The Ocean Floor from Space
2_2 Continental Drift
2_3 Sea Floor Spreading
2_5 Area of the Ocean
2_6 Mapping the Ocean
2_9 Trench Sounds
3_1 Water
3_3 Iceberg Flips
3_5 Sea Surface Temperatures
4_1 Solar Radiation
4_4 Outgoing and Reflected Radiation
4_7 Ocean Heat
4_11 Ocean Currents
4_12 The Global Conveyor Belt

Chapter 1: Introduction

1_1 Introduction
1_2 The Hydrosphere
1_3 Water on Earth
1_4 Water Reservoirs
1_5 The Oceans
1_6 Water in the Air
1_7 Frozen Water
1_8 Liquid Water on Land
1_9 Flow between Reservoirs
1_10 Evaporation
1_11 Precipitation
1_12 Flow Over and Through the Land
1_13 Solar Heat Drives the Hydrocycle

Chapter 2: Structure of the Oceans

2_1 Ocean Basin Formation
2_2 Continental Drift
2_3 Sea Floor Spreading
2_4 Growing and Shrinking Oceans
2_5 Area of the Ocean
2_6 Depths and Volumes
2_7 Vertical and Horizontal Extent
2_8 Continental Margins
2_9 Deep Ocean Basins

Chapter 3: Oceans of Water

3_1 Water is Special
3_2 Phase Changes
3_3 Ice Floats
3_4 Seawater
3_5 Ocean Temperatures
3_6 Temperature and Depth
3_7 How Salty?
3_8 Major and Minor Salts
3_9 Density of Seawater
3_10 Density Differences
3_11 What is Pressure?
3_12 Pressure at Depth

Chapter 4: Ocean Heating and Ocean Circulation

4_1 Solar Radiation
4_2 Heat Input and Latitude
4_3 Fate of Incoming Radiation
4_4 Radiation Budget
4_5 Ocean Layers
4_6 Depth Profiles
4_7 The Oceans and Heat
4_8 Surface Currents
4_9 Driving Forces
4_10 Convection in the Ocean
4_11 Deep Ocean Currents
4_12 Global Conveyor Belt

Appendices:

Topography on the Ocean Floor

1. Bathymetry + Topography = Hypsography
2. Average Depths
3. Profiles and Sections

Physical Properties of Seawater

1. Seawater
2. Changes of State

3. Heat Capacity of Seawater
4. Cohesion, Surface Tension and Viscosity
5. Compressibility of Seawater
6. Density of Seawater
7. Temperature and Density
8. Salinity and Density
9. Pressure and Density
10. Hydrostatic Equation
11. Specific Gravity
12. Density Layers and Water Masses
13. Thermoclines and Pycnoclines

Chemical Properties of Seawater

1. Salinity of Seawater
2. Complex Salt Solution
3. Measuring Salt Abundance
4. Constant Proportions
5. Speciation of Elements
6. Residence Times
7. Conservative and Non-conservative Elements
8. Salinity and Chlorinity
8. Dissolved Gases
10. Atmospheric Gases
11. Oxygen Content of Seawater
12. Carbon Dioxide in Seawater
13. Acid-base Balance of the Ocean
14. Water, Water, Everywhere

xMedia Movie: Sea Winds: The Quick Scat Story

- Introduction
- Understanding the Oceans, the Wind and the Atmosphere
- Got a Problem? Get an Engineer
- Scatterometer
- Waves Indicate Wind
- First the NASA Scatterometer
- ADEOS Spacecraft Loses Power
- A New Mission - Quick Scat
- Vibration Testing
- Thermal Vacuum Test
- Last Minute Problems
- Putting it all Together
- Launch!
- Controlling the Spacecraft
- Starting Up the Instruments
- First Wind Data Arrives
- First Pictures Generated
- Questions and Answers
- Credits

Discover! Oceans Volume 2:: Oceans in Motion

Interactive Exercises

1_1 Wave Characteristics
1_3 Characteristics of All Waves
2_2 Down in the Flood - Changing Sea Level
3_1 Secchi Depth

Movies and Animations

1_1 Wave Motion
1_3 Wave Height and Temperature
1_5 Tides
1_7 Tidal Bore
2_1 Clouds and Cities
2_3 California Coast
2_5 Estuary Reserves
2_8 Ocean Currents
2_9 Beach Erosion
3_1 Light and Life
3_2 Biological Diversity
3_5 Phytoplankon Concentration
3_7 Shark Food

Chapter 1: Waves and Tides

1_1 Surface Waves
1_2 Generating Waves
1_3 Wave Sizes
1_4 Tsunamis
1_5 Tides are Waves
1_6 Causes of Tides
1_7 Tidal Bores
1_8 Internal Waves

Chapter 2: The Coastal Zone

2_1 Coasts
2_2 Sea Level
2_3 Submerged Coasts
2_4 Emergent Coasts
2_5 Estuaries
2_6 Mixing in Estuaries
2_7 Tidal Forces
2_8 Coastal Currents
2_9 Types of Beaches
2_10 Longshore Drift
2_11 Deltas

Chapter 3: Life in the Ocean

3_1 Light in the Ocean
3_2 Light and Life
3_3 Twilight and Darkness
3_4 Phytoplankton
3_5 Primary Production
3_6 Food Chains
3_7 Food Webs
3_8 Trophic Levels

Appendices:

Light in the Ocean

1. Light is Electromagnetic Radiation
2. Reflection at the Surface
3. Refraction at the Surface
4. Attenuation by Scattering and
5. Changes in Color

Sound in the Ocean

1. The Nature of Sound Waves
2. The Speed of Sound
3. Refraction of Sound Waves
4. Sonar
5. Acoustical Thermography

Types of Waves

1. Tsunamis

xMedia Movies: Images of Earth

- Introduction
- El Nino
- Ozone
- The Ozone Hole
- Clouds
- Glaciers
- The Biosphere
- Under the Ocean
- The Moon
- Humans and Spaceflight
- Comet Schumacher
- The Sun's Interior
- Solar Wind
- R Aquarii
- Black Holes and Supernovae
- Galaxies
- Dark Matter

- Credits

Jason – An Ocean Odyssey

- Introduction
- Topex Poseidon
- Topography and Ocean Currents
- Sea Level Variations
- Wave Height, Wind Speeds and Tides
- Jason
- The Role of France
- Near Real-time Data will Help Many People
- An Invaluable Weather Forecasting Aid
- Climate Forecasting
- El Nino
- New Ocean Circulation Models
- Argos Buoys
- Oceans' Influence on Climate and the Carbon Cycle
- Operational Oceanography
- Credits

Discover! Oceans Volume 3: Earth's Water Cycle

Interactive Exercises

1_1 The Hydrologic Cycle
1_3 Troposphere Variations
1_4 Atmospheric Temperatures
2_9 Environmental Site Assessment
4_3 Characteristics of All Waves

Movies and Animations

1_1 The Water Cycle
1_3 The Troposphere and Clouds
1_6 Clouds
1_8 Flying Over Seattle
1_10 Evaporation
2_1 The Grand Canyon
2_3 Baltimore Area Watershed
2_5 Death Valley California
2_6 The Mississippi River
2_10 Flooding
2_11 Wetlands
3_2 Glacier Bay Alaska
3_6 Antarctica
3_12 Measuring Ice Thickness
4_1 Earth
4_5 Sea Surface Temperatures
4_6 Wave Height / Temperature
4_7 Polar Sea Ice 1990s
4_10 Phytoplankton Concentration
4_11 SeaWIFS
4_12 El Nino

Chapter 1: The Water Cycle

1_1 Introduction to the Water Cycle
1_2 Falling Water
1_3 The Active Troposphere
1_4 Through the Atmosphere
1_5 Humidity, Capacity and Dew Point
1_6 Making Clouds
1_7 Thermals
1_8 Over the Mountain
1_9 At the Leading Edge
1_10 Rain Clouds Complete the Cycle

Chapter 2: Freshwaters

2_1 Movement of Water on Land
2_2 Landforms Created by Water Movement
2_3 How Water Moves in a Watershed

2_4 Streams and Rivers
2_5 Large Valleys
2_6 Floodplains
2_7 Water Tables
2_8 Aquifers
2_9 Removing Groundwater
2_10 Watershed Modification
2_11 Types of Wetlands
2_12 Wetlands under Threat

Chapter 3: The Cryosphere

3_1 Solid Water
3_2 What is a Glacier?
3_3 Types of Glacier
3_4 How do Glaciers Form?
3_5 Glacier Growth -- Accumulation
3_6 Glacier Shrinkage -- Ablation
3_7 The Glacial Balance
3_8 How Do We Know Glaciers Move?
3_9 Glacial Movement
3_10 How Fast Do Glaciers Move?
3_11 Glacier Movement Erodes Landscapes
3_12 Processes of Glacial Erosion

Chapter 4: The Oceans from Space

4_1 Oceans from Space
4_2 Electromagnetic Radiation
4_3 The Electromagnetic Spectrum
4_4 Active and Passive Sensors
4_5 Sea Surface Temperatures
4_6 Wave Heights
4_7 Sea Ice
4_8 Ocean Color
4_9 Ocean Color Satellites
4_10 CZCS
4_11 SeaWIFS
4_12 Oceans and Climate

Appendices:

Watersheds

1. What Is a Watershed?
2. Tectonic Origins
3. Drainage Basins
4. The Aral Sea

Physical Properties of Pure Water

1. The Water Molecule
2. Changes of State

2. Heat Capacity of Pure Water
3. Cohesion, Surface Tension &
4. Compressibility of water
5. Density of Pure Water
6. Solvent Properties of Pure Water

xMedia Movie: Earth's Oceans From Space

- Introduction
- Introduction to Earth's Oceans
- The Earth System
- Oceans in Motion - Tides and Currents
- The Gulf Stream
- Ocean Temperature and Heat Storage
- Oceans' Effects on Weather
- Hurricanes
- Weather vs. Climate
- El Nino
- Temperature, Wave Height and Wind Speed
- Students Take Ocean Measurements from a Boat
- Satellite Measurements
- Topex Poseidon
- Radar Altimeters
- How Accurate are Satellite Measurements?
- Profile of NASA/Goddard Employee
- Scatterometer
- Data is Numbers Sent to Earth
- Ocean Winds and Waves Color Coding
- Ocean Questions
- Ocean Color and Clarity - Introduction to Measurements
- Ocean Life and Plankton
- Zooplankton and Phytoplankton
- Ocean Color from Space
- SeaWiFS
- Profile of NASA/Goddard Employee
- Color - Reflection, Absorption and SeaWiFS
- Phytoplankton Bloom
- El Nino Disrupts Phytoplankton
- La Nina
- Summary of El Nino and La Nina and CO2
- The Global Carbon Cycle
- Summary of Ocean Studies

Discover! Weather Volume 1:: Weather Fundamentals

Interactive Exercises

3_1 Hydrologic Cycle
3_4 Troposphere Thickness
4_8 Global Atmospheric Circulation
4_12 Coriolis Effect
4_16 Air Trivia Questions
5_5 Atmospheric Levels
5_15 Objects in the Sky
5_19 USA Weather

Movies and Animations

1_3 STS Launch
1_4 Satellite Launch
1_5 Our Earth
2_1 The Amazon River
2_2 Visualizing El Nino
2_8 Hurricane Mitch
2_9 Storm of the Century?
2_10 Hurricanes from Space
2_12 Hurricane Ivan 2004
2_13 Hurricane Isabel
3_1 The Water Cycle
3_4 Atmospheric Layers
3_9 Cloud Data Set
3_13 Warm Front
3_18 Cold Front
3_20 World Cloud Cover
4_1 Wind Power
4_2 GMS Satellite
4_3 The Sun
4_5 Solar Radiation
4_6 Earth
4_13 Earth's Tilt
4_15 Cloud Heights
5_8 Sea Surface Temperatures
5_13 Clouds and Cities
5_18 California Coast
5_19 Southwestern Drought
5_21 The Great Lakes
5_22 East and South Coast
5_23 Alaskan Flyover
6_1 Clouds
6_2 Cirrus Clouds
6_6 North Pole Vortex
7_1 Earth's Magnetic Field
8_6 Shuttle Discovery Lands

Chapter 1: Weather Launch

1_1 Welcome
1_2 Keep Your Senses
1_3 Shuttle Launch
1_4 Satellite Launch
1_5 Our Planet

Chapter 2: Introduction to the Weather

2_1 Introducing the Weather
2_2 Rain
2_3 The Weather and World History
2_4 The Storm of March 1993
2_5 In Like a Lion...
2_6 Killer Storm
2_7 New Brunswick
2_8 Space Age Information Collectors
2_9 ”Storm of the Century”?
2_10 Hurricanes
2_11 Hurricane Ivan
2_12 Northward Journey
2_13 Follow-up

Chapter 3: The Hydrologic Cycle and Cloud Formation

3_1 What Goes Up...
3_2 ...Must Come Down
3_3 An Endless Cycle
3_4 Where it All Happens: The Troposphere
3_5 Profile
3_6 Humidity and the Dew Point
3_7 The Miserability Index
3_8 When the Dew Is on the Grass
3_9 Cloud Is Born
3_10 Thermals
3_11 Over the Mountain
3_12 At the Leading Edge
3_13 Warm Fronts
3_14 Cirrocumulus
3_15 Cirrus
3_16 Altostratus
3_17 Nimbostratus
3_18 Cold Fronts
3_19 Towering Cumulus
3_20 Cumulonimbus From a Distance
3_21 Cumulonimbus From Below
3_22 From Up and Down
3_23 Follow-up

Chapter 4: Global Weather Patterns

4_1 Whither the Wind?
4_2 Say Hello to the Earth

Chapter 5: Local Climates and Regional Patterns

Chapter 6: Cloud Types

6_12 Towering Cumulus
6_13 Cumulonimbus
6_14 A Satellite's View

Chapter 7: Unusual Atmospheric Phenomena

7_1 Northern Lights
7_2 Interplanetary Weather
7_3 Rainbows
7_4 Secondary Rainbows
7_5 Halos, Sundogs and Sun Pillars

Chapter 8: What You Can Do - Careers and Awareness

8_1 Risk and Responsibility
8_2 A Place to Start
8_3 Careers in Meteorology
8_4 Big Thinking
8_5 The Little Things
8_6 Shuttle Landing
8_7 Follow-Up

xMedia Movie: Hurricane Force (28 min.)

- Introduction
- Hurricane Prone Coasts and Damages
- Storm Surge
- USGS Scientists Study Hurricane Effects
- Coastal Geology and Hurricanes
- How Hurricanes Form - Tropical Cyclones
- Coriolis Effect
- Hurricane Intensity Categories and Speeds
- The Eye of the Hurricane
- Tremendous Heat and Rain Produced
- Hurricanes at Sea and Storm Surge
- Geologists Explain Louisiana Studies
- Single Costliest Disaster in U.S.A. History - Hurricane Andrew 1992
- Barrier Islands Protect Wetlands
- Sea Floor Elevations Before / After Andrew
- Wetlands Long Term Biological Survey
- Subsidence - Sinking Wetlands
- Wetland Disruptions
- Impacts on Coral Reefs
- Hurricane Hugo 1989 - Colebra
- Hurricane Iniki 1992 - in Hawaiian Islands
- Overwash
- Depth of Offshore Controls Overwash
- Side Scan Sonar Images
- Sub Bottom Profiles
- Importance of Coastal Hurricane Regions and Impacts on Human Development
- Hurricane Gilbert 1988

Discover! Weather Volume 2: Extreme Weather

Interactive Exercises

1_8 Lightning
1_9 Hail
1_13 Wind Directions of the Earth
1_19 Changes of State
1_21 Exposure to Storms
4_1 Winter Air Currents of North America
5_5 Cloud Heights
6_5 Tornado Safety

Movies and Animations

1_1 Hurricane Jeanne
1_3 Tropical Storm Christobal
1_6 Average Global Lightning 1998
1_10 Tornado
1_14 Tropical Cyclone Crystal
1_17 America's Hurricane Prone Coasts
1_19 Hurricanes in Advanced CO2 Climate
2_1 El Nino
2_2 America's Hurricane Prone Coasts
2_5 South Western Drought
3_1 Anatomy of a Hurricane
3_2 Hurricane Floyd
3_5 Hurricane Andrew
3_7 Hurricane Hugo
3_9 Storm Track Map
4_1 Winter 2001-2002
4_3 Winter of 1996-97
5_1 Monitoring a Flood
5_3 North Dakota Flood
5_4 Mid West Floods of 1993
5_7 Red River Flooding
5_9 Desertification
5_10 Dust Bowl of the 1930s
6_1 Tornado

Chapter 1: Stormy Weather

1_1 Dramatic Instability
1_2 Thunderstorms
1_3 Hot Air Rising
1_4 The Anvil
1_5 Inside a Thundercloud
1_6 Charged!

1_7 Shock Wave
1_8 The Thunderbolt in Myths
1_9 Hail
1_10 The Twister
1_11 The Waterspout
1_12 Extratropical Cyclones
1_13 Born Along the Front
1_14 Life of a Cyclone
1_15 Opposites
1_16 Jet Streams
1_17 The Hurricane
1_18 Bathroom Weather
1_19 The Power Source
1_20 The Eye of the Storm
1_21 The Human Price

Chapter 2: Billion Dollar Storms

2_1 Billion-Dollar Disasters
2_2 Hurricanes and Storms
2_3 Winter Storms and Cold Waves
2_4 Floods
2_5 Droughts and Heat Waves

Chapter 3: Hurricanes

3_1 Anatomy of a Hurricane
3_2 North America
3_3 Natural Forces
3_4 Hurricane Strength
3_5 Hurricanes Andrew and Charley
3_6 Hurricane Mitch
3_7 Hurricane Hugo
3_8 Global Forces
3_9 Hurricane Season

Chapter 4: East Coast Winter Storms

4_1 Winter Storms
4_2 Blizzards
4_3 Blizzard Hazards
4_4 The East-Coast Blizzard of ‘96
4_5 The 1993 “Storm of the Century”
4_6 Blizzard of 1947
4_7 Past Winter Blasts
4_8 Ice Storms

Chapter 5: Floods and Droughts

5_1 Flash Floods
5_2 The Power of Moving Water
5_3 Major Floods of the 1990’s
5_4 The Great Midwest Floods of 1993

5_5 California Cloudbursts of 1995
5_6 Arizona Heavy Rains
5_7 Red River Flood of 1997
5_8 Droughts
5_9 Desertification
5_10 The Dust Bowl
5_11 Droughts Around the World
5_12 Long Term Changes

Chapter 6: Tornadoes

6_1 Tornadoes
6_2 Funnel Clouds
6_3 On the Ground
6_4 Waterspouts
6_5 Tornado Safety

xMedia Movie: Hurricane Force (28 minutes)

- Introduction
- Hurricane Prone Coasts and Damages
- Storm Surge
- USGS Scientists Study Hurricane Effects
- Coastal Geology and Hurricanes
- How Hurricanes Form - Tropical Cyclones
- Coriolis Effect
- Hurricane Intensity Categories and Speeds
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- Subsidence - Sinking Wetlands
- Wetland Disruptions
- Impacts on Coral Reefs
- Hurricane Hugo 1989 - Colebra
- Hurricane Iniki 1992 - in Hawaiian Islands
- Overwash
- Depth of Offshore Controls Overwash
- Side Scan Sonar Images
- Sub Bottom Profiles
- Importance of Coastal Hurricane Regions and Impacts on Human Development
- Hurricane Gilbert 1988
- Summary of Hurricane Impacts - Research and Modern Instrumentation

Online is Flooding: Working on Prevention (22 minutes):

* Introduction
* Upper Mississippi, Lower Missouri Floods

* Map of Flood Areas
* Economic Impacts - Benefits to Wetlands
* Mississippi and Missouri River Basins
* The First Army Engineer Management
* Army Engineers' Responsibilities
* Human Interactions with the Environment
* Levee Systems and Causes of Floods
* S.A.S.T. Formed - Scientists & Engineers
* E.R.O.S. - Headquarters for S.A.S.T.
* Methods of Investigation and Classification
* Regional Terrane Classification System
* Modeling Sample Watersheds
* Soil Conservation Records
* Catchment Areas - Runoff, Groundwater
* Erosion and Sedimentation Evidence
* Ecosystem Studies on Levees
* S.A.S.T. Best Land Mgmt. Principles

Discover! Weather Volume 3: Weather Forecasting and Climate Change

Interactive Exercises

1_2 Natural Weather Clues
1_20 Weather Chart Symbols
2_3 Backyard Weather Station
2_5 Atmospheric Temperatures
4_1 Glaciers
4_2 Climate Zones of North America
4_5 Temperatures Over the Last 20 Millennia
4_7 Radiation Budget
4_8 Earth's Precession
4_8 Milankovitch Cycles
4_10 Solar Incidence
4_13 EM Spectrum Properties

Movies and Animations

1_1 The Weather
1_3 Sea Surface Temperature
1_6 Local Weather Observation Stations
1_10 Pilots and Weather
1_13 Composite Satellite Views
1_22 Isobars
1_23 Warm Front
1_29 Coriolis Effect
2_10 Cloud Data Set
3_5 World Cloud Cover
3_7 Weather Map
3_8 Wind Power
4_1 Ablation - The Ross Ice Shelf in Antarctica
4_4 El Nino
4_5 Measuring Ice Thickness
4_7 Solar Wind
4_8 Tilt and Weather
4_9 20,000 Years - Antarctica's Ice Pack
4_10 Outgoing and Reflected Solar Radiation
4_11 Ice Albedo
4_12 Heat From the Sun
4_13 Earth's Magnetic Field
4_16 Solar Radiation
4_18 Carbon Dioxide
4_22 Greenhouse Warming
4_23 Global Warming
4_27 Phytoplankton Concentration
4_28 Greenhouse Gases
5_1 Wave Height and Temperature
5_2 Polar Sea Ice 1990s
5_3 Arctic Ice
5_4 Antarctic Ice

5_5 Sea Surface Temperatures
5_6 Ocean Temperatures
5_7 North Atlantic Ocean Temperatures
5_8 North Pacific Ocean Temperatures
5_10 Chlorophyll
5_11 North Atlantic Chlorophyll
5_12 North Pacific Chlorophyll

Chapter 1: Forecasting the Weather

1_1 A Difficult Task
1_2 Endless Combinations
1_3 Weather People
1_4 At the Weather Station
1_5 Where It Starts
1_6 Weather Watch
1_7 Condensed Information
1_8 Code
1_9 And There's More
1_10 The Distant Eye
1_11 Geostationary Satellites
1_12 Polar-orbiting Satellites
1_13 What For?
1_14 Key to Forecasting
1_15 Dots and Patterns
1_16 Numeric Forecasting
1_17 International Cooperation
1_18 Supercomputers
1_19 Charting the Weather
1_20 Circles and Flags
1_21 Contours
1_22 Isobars
1_23 Warm and Cold Fronts
1_24 Occluded Front
1_25 Pressure Patterns
1_26 Why the Winds Blow
1_27 Pressure Gradients
1_28 Reading the Isobars
1_29 Coriolis Again
1_30 Friction
1_31 Back to 3-D Thinking

Chapter 2: Backyard Meteorology

2_1 Joining the Weather Watch
2_2 What You Need
2_3 Setting Up
2_4 Taking Readings
2_5 Temperature
2_6 Air Pressure
2_7 Relative Humidity
2_8 Rain and Snow
2_9 Wind Direction
2_10 Clouds
2_11 Other Conditions

Chapter 3: Reading Weather Charts

Chapter 4: Climate and Climate Change

Chapter 5: Remote Sensing of Ocean Climate

5_7 Temperatures of the North Atlantic
5_8 Temperatures of the North Pacific
5_9 Ocean Color
5_10 Chlorophyll Around the World
5_11 Chlorophyll in the North Atlantic
5_12 Chlorophyll in the North Pacific
5_13 Exploration of the Oceans

Appendices:

El Nino

1. Introduction to El Nino
2. Global Impacts of El Nino
3. What is El Nino?
4. El Nino Conditions
5. Winds
6. Temperatures
7. Sea Surface Temperatures in a Normal Year
8. Sea Surface Temperature in an El Nino Year
9. Definitions of El Nino, La Nina and ENSO
10. Benefits of El Nino prediction
11. Regional consequences of El Nino for the U.S.

The Climate System

1. An introduction to the science of man-made climate change
2. The role of greenhouse gases
3. An introduction to the climate system
4. Radiation, climate, and climate change
5. Is the Earth warming up yet?
6. How records from past climates support the case for global warming
7. Measuring the "global warming potential" of greenhouse gases
8. Why three hot summers don't mean global warming
9. Why "climate change" and "global warming" are not the same thing
10. The "missing carbon" problem
11. How much will the climate change?
12. How climate models work
13. Are climate models reliable?
14. What happens when we double CO2 in a climate model?
15. How natural climate variability differs from climate change
16. How researchers develop regional scenarios of climate change
17. Oceans and the carbon cycle
18. Ocean circulation patterns

The Effects of Climate Change

1. The impact of climate change on agriculture
2. Climate change and sea-level
3. Climate change and desertification
4. The impact of climate change on water resources
5. Will climate change lead to more extremes and disasters?
6. How climate change might impact the European Alps
7. A survey of possible social impacts

8. Are we overlooking the social and political implications of climate change?
9. Climate change and North-South relations
10. The issue of winners and losers
11. Why the poor are most vulnerable
12. Will there be growing numbers of environmental migrants?
13. Will the North-South gap widen?
14. More conflict between nations?
15. Societies under stress
16. The possible health effects
17. The possible cultural and psychological impacts
18. Egypt and climate change

Stratospheric Ozone

1. What is the stratosphere?
2. How is the composition of air describe
3. How does the composition of the atmosphere change with altitude?
4. How is ozone created and how much is there? (Dobson Units)
5. How is ozone distributed in the stratosphere?
6. What are the natural variations of the ozone layer?
7. What are CFC's?
8. How do CFC's destroy ozone?
9. What is an "Ozone Depletion Potential"?
10. What about HCFC's and HFC's? Do they destroy ozone?
11. Is the ozone layer getting thinner?
12. Is the middle-latitude ozone loss due to CFC emissions?
13. Will UV penetrate deeper and make more ozone?
14. Do Space Shuttle launches damage the ozone layer?
15. Will commercial supersonic aircraft damage the ozone layer?
16. What is being done about ozone depletion?
17. Where does the Chlorine in the stratosphere come from?
18. How has stratospheric chlorine changed with time?
19. How will stratospheric chlorine change in the future?
20. What are the sources of chlorine in the troposphere?
21. In what molecules is stratospheric chlorine found?
22. What happens to organic chlorine in the stratosphere?
23. How do we know that CFC's are photolyzed in the stratosphere?
24. How is chlorine removed from the stratosphere?
25. How is chlorine distributed in the stratosphere?
26. What happens to the Fluorine from the CFC's?
27. Summary of the Evidence
28. CFC's heavier than air, so how can they reach the stratosphere?
29. CFCs are produced in the north, so how do they get to the Antarctic?
30. Sea salt puts more chlorine into the atmosphere than CFC's.
31. Do volcanoes put more chlorine into the stratosphere than CFC's?
32. Do space shuttles put a lot of chlorine into the stratosphere.
33. Most CFC's are decomposed by terrestrial mechanisms

The Ozone Hole

1. What is the Antarctic ozone hole?
2. How big is the hole, and is it getting bigger?
3. When did the hole first appear?
4. How far back do Antarctic ozone measurements go?
5. Why is the hole in the Antarctic?

6. What is the evidence for the present theory?
7. Will the ozone hole keep growing?
8. Lateral extent of the Hole
9. Vertical depth of the Hole
10. Duration of the hole
11. Why be concerned about Antarctica?
12. Is there an ozone hole in the arctic?
13. Can the hole be "plugged"?
14. What is "UV-B"?
15. How does UV-B vary from place to place?
16. Is UV-B at the earth's surface increasing?
17. What is the relationship between UV and skin cancer?
18. Is ozone loss to blame for the melanoma upsurge?
19. Does UV-B cause cataracts?
20. Are sheep going blind in Chile?
21. What effects does increased UV have upon plant life?
22. What effects does increased UV have on marine life?
23. Is UV-B responsible for the amphibian decline?
24. References

xMedia Movie: Earth's Oceans From Space

- Introduction
- Introduction to Earth's Oceans
- The Earth System
- Oceans in Motion - Tides and Currents
- The Gulf Stream
- Ocean Temperature and Heat Storage
- Oceans' Effects on Weather
- Hurricanes
- Weather vs. Climate
- El Nino
- Temperature, Wave Height and Wind Speed
- Students Take Ocean Measurements from a Boat
- Satellite Measurements;
- Topex Poseidon
- Radar Altimeters
- How Accurate are Satellite Measurements?
- Profile of NASA/Goddard Employee
- Scatterometer
- Data is Numbers Sent to Earth
- Ocean Winds and Waves Color Coding
- Ocean Questions
- Ocean Color and Clarity - Introduction to Measurements
- Ocean Life and Plankton
- Zooplankton and Phytoplankton
- Ocean Color from Space
- SeaWiFS
- Profile of NASA/Goddard Employee
- Color - Reflection, Absorption and SeaWiFS
- Phytoplankton Bloom
- El Nino Disrupts Phytoplankton

- La Nina
- Summary of El Nino and La Nina and CO2
- The Global Carbon Cycle
- Summary of Ocean Studies

Discover! Live in the Environment Volume 1: Life Science

Interactive Exercises

1_2 Biosphere
1_3 Ecosystem Structure
2_7 The Hydrologic Cycle
2_21 Bonding Roundabout
5_3 Form Follows Function
6_1 Secchi Disk
8_1 Evolution
9_1 How Populations Change
9_2 Resource Limitation and Carrying Capacity
9_3 Predator and Prey Relationship
D_1 History of Science
D-2 Earth's Orbit
D_3 The Sun's Intensity

Movies and Animations

1_1 Biosphere
2_10 A Water Molecule
2_20 Plants in Space!
2_21 Atoms
5_2 The Carbon Cycle
5_7 Cardiopulmonary System
5_9 Cardiovascular System
5_10 Renal/Endocrine System
5_14 Moving in Water
6_1 Biological Diversity
6_2 Phytoplankton
6_5 Shark Food
7_1 Wetlands
7_3 Estuary Reserves
D_10 Iceberg Flip!
D_11 The Sun Radiates Energy

Chapter 1: Life on Earth

1-1 Biosphere
1-2 Where We Live: Biosphere
1-3 What is an Ecosystem?
1-4 Biomes
1-5 Classification

Chapter 2: Types of Life on Earth: Plants

2-1 What are Plants?
2-2 How Plants Work
2-3 The Plant Body Plan
2-4 Structure of Leaves
2-5 Leaves Collect Sunlight

Chapter 3: Biological Levels of Organization

Chapter 4: Cell Division

Chapter 5: Types of Life on Earth: Animals and Humans

5-2 Sources of Organic Carbon
5-3 Animal Senses – Sight and Sound
5-4 Animal Senses – Smell, Taste and Touch
5-5 Digestion – Breaking Down Food
5-6 Digestion – Absorbing Nutrients
5-7 Absorbing Oxygen
5-8 Respiratory Structures
5-9 Circulation
5-10 Getting Rid of Toxic Waste
5-11 Human Reproduction
5-12 Reproduction in Animals
5-13 The Importance of Diet
5-14 Moving in Water
5-15 Moving on Land
5-16 Ethics

Chapter 6: Life in the Oceans

6-1 Light and Life
6-2 Phytoplankton
6-3 Primary Production
6-4 Food Chains
6-5 Food Webs
6-6 Trophic Levels

Chapter 7: Productive Environments

7-1 Types of Wetlands
7-2 Wetlands Under Threat
7-3 Estuaries
7-4 Mixing in Estuaries

Chapter 8: Introduction to Evolution

8-1 What is Evolution?
8-2 Evolution and the Fossil Record
8-3 What are Fossils?
8-4 Patterns of Evolution
8-5 Extinction
8-6 What is a Species?
8-7 Phyletic Speciation
8-8 Geographic Speciation
8-9 Phylogenetic Relationships

Chapter 9: Changing Populations

9-1 What is a Population?
9-2 The Growth and Regulation of Populations
9-3 Predator Prey Relationships
9-4 Other Threats to Populations
9-5 Infectious Diseases
9-6 Non-infectious Diseases
9-7 Viruses

Appendix:

Life on Planet Earth

D.1 Introduction
D.2 The Earth's Location
D.3 The Sun's Heat
D.4 The Small Window of Livability
D.5 Molecules of Life
D.6 Organic Molecules
D.7 Simple Sugars
D.8 Polysaccharides
D.9 Water, Water Everywhere
D.10 Water is Special
D.11 The Need for Sunlight
D.12 How Common is Life?

xMedia Movie: Good Muscles and Bones (28 minutes)

- 00:00 Introduction
- 01:53 A Good Education is the Way
- 02:27 Dealing with Stress
- 03:07 Three Types of Stress
- 03:07 Good Stress
- 03:37 An Athlete Working on Leg Strength
- 03:59 Using Data to Track Progress
- 04:45 Questions About Data
- 05:11 Explaining Data
- 05:59 Organizing Data
- 06:34 Scatter Plot
- 08:26 NASA Experts Examine Athlete's Data
- 09:32 Questions on Muscles
- 09:46 Skeletal - Smooth and Cardiac Muscle
- 10:31 Change Your Workout Plan
- 11:16 Astronauts' Muscles
- 12:51 Warming up Muscles
- 13:50 Middle School Activity on Good Stress
- 14:36 Three Types of Plots
- 18:47 Bone Structure and Function
- 19:35 Questions on Bones
- 20:02 The Skeletal System
- 21:14 Bones Store Minerals, Blood and Tissue
- 22:06 Looking at a Femur Bone
- 23:13 Keeping Bones Healthy
- 24:20 Bone Density Loss in Space
- 24:20 Credits
- 28:26 End

Discover! Life in the Environment Volume 2: The Environment

Interactive Exercises

1_1 Earth Systems
1_7 Distances
1_9 Continental Drift
1_10 Merry-Go-Rock
4_1 Glaciers
5_3 Biomes of the Earth
5_4 Environmental Site Assessment
6_5 The Farm
6_18 Surface Coal Mining
7_10 Land vs. Oceans
7_13 The Ozone Layer
8_1 How Science Works
8_2 The Carbon, Nitrogen and Phosphorous Cycle
D_1 Timeline
D_2 Earth's Orbit
D_3 The Sun's Intensity

Movies and Animations

1_1 Earth
1_2 Dramatic Earth: Seconds, Hours, Days
1_3 Dramatic Earth: Months to Years
1_4 Dramatic Earth: 100s to 1000s of years
1_5 Dramatic Earth: 100s of Thousands to Millions
1_6 Dramatic Earth: 100s of Millions to Billions
1_9 Continental Drift
1_11 Red River Flooding
1_12 Flooding
1_13 Average Global Lightning 1998
2_1 Physical Weathering
2_3 Landslides
3_5 The Grand Canyon
3_6 The Mississippi River
4_1 Measuring Ice Thickness
4_2 Glacial Movement
4_6 Glacier Bay Alaska
6_2 Alternative Energy
6_4 Energy Use
6_7 Solar Power
6_11 Wind Power
6_15 Coal Mining
6_16 Natural Gas Formation
6_18 Coal Mining and Reclamation
7_1 The Weather
7_4 Solar Radiation
7_6 Carbon Dioxide
7_8 The Carbon Cycle
7_9 Greenhouse Warming
7_12 Greenhouse Gases

D_10 Iceberg Flip!
D_11 The Sun Radiates Energy

Chapter 1: Geologic Time and Processes

1-1 Whole Earth System
1-2 The Dramatic Earth: Seconds, Hours, Days
1-3 The Dramatic Earth: Days to Years
1-4 Hundreds to Thousands of Years
1-5 Hundreds of Thousands to Millions
1-6 Hundreds to Millions to Billions of Years
1-7 Distances and Trigonometry
1-8 Glimpses into Geologic Time
1-9 Continental Drift: The Discovery
1-10 The Rock Cycle
1-11 Watershed Modification
1-12 Flash Floods
1-13 Charged
1-14 Sea Level

Chapter 2: Weathering and Erosion

2-1 Physical Weathering
2-2 Chemical Weathering
2-3 Mass Wasting

Chapter 3: How Water Shapes the Landscape

3-1 Watersheds
3-2 Landforms Created by Running Water
3-3 Rivers
3-4 How Water Moves
3-5 Large Valleys
3-6 Floodplains
3-7 Reaching the Ocean
3-8 Groundwater
3-9 Water Table

Chapter 4: How Glaciers Shape the Landscape

4-1 Glaciers
4-2 Movement of Glaciers
4-3 Glacial Movement
4-4 Speed of Movement
4-5 Glacial Erosion and Sediments
4-6 Glacial Erosion
4-7 Glaciation

Chapter 5: How Plants and Animals Reshape the Landscape

5-1 Soils: Residue of Weathering
5-2 Formation of Soils
5-3 Soil Types

5-4 Soil Uses and Conservation
5-5 Plants Shape the Land
5-6 Animals Shape the Land

Chapter 6: Energy Uses

6-1 Matter and Energy
6-2 Energy
6-3 Stop and Think about Energy
6-4 Energy and the Earth System
6-5 What is Renewable Energy?
6-6 Alternative Energy Sources
6-7 Solar Energy
6-8 Hydroelectric Power
6-9 Tidal Energy
6-10 Geothermal Energy
6-11 Wind Energy
6-12 Biomass Energy
6-13 Non-renewable Resources
6-14 Fossil Fuels
6-15 Coal - Buried Sunshine
6-16 Oil and Natural Gas
6-17 Nuclear Energy
6-18 Mining and Reclamation

Chapter 7 :Climate Change

7-1 What is Climate?
7-2 Climate Cycles
7-3 Climate Connections
7-4 Earth Traps the Heat
7-5 A Comfortable Balance
7-6 Greenhouse Gases
7-7 The Human Role
7-8 The Carbon Cycle
7-9 The Question
7-10 Why Don't We Know?
7-11 More Meddling or Less?
7-12 What Will Global Warming Do?
7-13 Reasons to Worry
Chapter 8: What People Are Doing
8-1 Conservation
8-2 One Voice Recycling
8-3 The Four R's

Appendix:

Life on Planet Earth

D.1 Introduction
D.2 The Earth's Location
D.3 The Sun's Heat
D.4 The Small Window of Livability
D.5 Molecules of Life

D.6 Organic Molecules
D.7 Simple Sugars
D.8 Polysaccharides
D.9 Water, Water Everywhere
D.10 Water is Special
D.11 The Need for Sunlight
D.12 How Common is Life?

xMedia Movie: Earth From Space (22 minutes)

- 00:00 Introduction
- 00:15 Introduction to Systems
- 01:53 Earth from Space and Satellites
- 02:19 Satellite Components and Links
- 03:05 Types of Satellite Images
- 03:35 Computers on Earth Translate Data
- 03:50 Weather and Communication Satellites - Geostationary Orbit
- 04:54 Orbiting Satellites
- 05:54 Earth Fact
- 06:12 Everything is Tied Together
- 06:41 El Nino
- 07:49 Phytoplankton and Food Chains
- 08:53 El Nino upsets Balance World Wide
- 10:08 Earth Fact
- 10:26 Impact on Glaciers
- 11:46 Global Warming
- 14:32 Things We Can Do to Help
- 15:17 Reduce, Reuse, Recycle
- 15:34 Drought
- 17:39 Sahara Dust and Hurricanes
- 17:57 Hurricanes
- 20:01 Summary
- 21:07 Credits
- 21:53 End

Discover! Physical Science: Basic Concepts

Interactive Exercises

1-2 History of Science
1-13 Gravity and Mass - The Cavendish Experiment
2-7 Changes of State
2-10 Atomic Theory
2-11 The Periodic Table
2-16 Bonding Roundabout
2-20 Mass, Weight, Volume and Density
3-1 Distance
3-13 Coriolis Effect
3-23 Electromagnetic Spectrum
4-1 Characteristics of All Waves
4-3 Wave Characteristics
6-3 The Water Model of Current Flow
6-7 Ohm's Law and Series, Parallel and Series/Parallel Circuits
6-10 Power and Time

Movies and Animations

1-2 Satellite Launch
1-3 The Speed of Light and Time
1-10 Scatter Plots
1-12 Area and Volume
2-1 Feather in the Wind
2-5 A Water Molecule
2-6 Cool Gas!
2-9 Atoms
2-10 Atomic Particles
2-15 An Electric Circuit
2-16 Chemical Reaction
2-18 Energy: E=MC2
3-2 Friction
3-3 Using a Model of the Universe
3-4 Running Speed
3-5 Speed and Velocity
3-9 Force
3-10 Newton's Laws
3-13 Coriolis Effect
3-21 Earth's Magnetic Field
3-23 Solar Radiation
4-3 Wave Motion
4-6 Infrared Light
4-8 Sound Waves
4-9 Outgoing and Reflected Solar Radiation
4-13 Photons
5-1 Energy Use
5-6 Potential and Kinetic Energy
5-10 Solar Power
5-12 Machines… Force and Distance
6-1 Static Electricity

6-2 Charging by Conduction and Charging by Induction
6-3 Atoms
6-4 Alternating Current
6-7 Ohm's Law
6-8 Measuring Amperes, Volts and Ohms

Chapter 1: Basic Concepts

1-1 Basic Concepts
1-2 Events
1-3 Time
1-4 Space
1-5 Position
1-6 Distance
1-7 Direction
1-8 Co-ordinate Systems in General
1-9 Co-ordinate Systems in One Dimension
1-10 Co-ordinate Systems in 2 Dimensions
1-11 Co-ordinate Systems in 3 Dimensions
1-12 Length, Area and Volume
1-13 Mass and Weight
1-14 Density
1-15 Pressure
1-16 Standard Temperature and Pressure: STP

Chapter 2: Atomic Theory: Matter and Energy

2-1 Models
2-2 Introduction to Matter and Energy
2-3 Solid, Liquid or Gas
2-4 Solid has a Definite Form
2-5 Liquid Will Fill the Container
2-6 Gas Will Expand
2-7 Solid, Liquid and Gas
2-8 Atoms and Molecules; Elements and Compounds
2-9 Atoms and Elements
2-10 Atomic Structure and Science Models
2-11 Element Means Number of Protons
2-12 Strong Nuclear Forces
2-13 Isotopes Mean Number of Neutrons
2-14 Ions Mean the Difference Between Number of Electrons and the Number of Protons
2-15 Electrons and Electricity
2-16 Molecules and Compounds
2-17 Mixtures and Solutions
2-18 Elements, Compounds and Mixtures
2-19 Conservation of Matter and Energy
2-20 Mass, Weight and Gravity
2-21 Physical Properties
2-22 Chemical Properties
2-23 Chemical Properties from its Electronic Structure

Chapter 3: Force and Motion: Newton's Laws

3-1 Distance and Time
3-2 Friction

3-3 Models in Science
3-4 Speed and Velocity
3-5 Average and Instantaneous Speed and Velocity
3-6 Relativity and Adding Velocities
3-7 Earth Moving Relative to the Sun
3-8 Acceleration
3-9 Force and Cause: Newton's Laws
3-10 Newton's First Law
3-11 Newton's Second Law
3-12 Newton's Third Law
3-13 Motion in Curves
3-14 Harmonic Motion
3-15 Mass, Weight and Universal Gravity
3-16 Units of Mass and Weight
3-17 Why the Units are Important: Mass and Weight
3-18 Momentum and Inertia
3-19 Momentum Calculation
3-20 The Four Forces of Nature
3-21 Fields
3-22 Gravity Force
3-23 Electromagnetic Force
3-24 Strong Nuclear Forces
3-25 Weak Nuclear Force
3-26 Particles and Wave Energy

Chapter 4: Waves and Vibrations

4-1 Waves as Energy and Matter
4-2 Reflection of Waves
4-3 Liquids Move Up and Down, Waves Move Outwards
4-4 3-Dimensional Waves
4-5 Water and Sound: Waves in a Medium
4-6 Light is Waves, but also Particles, and are Not in a Medium
4-7 Velocity, Amplitude, Wavelength and Frequency
4-8 Vibrations and Waves
4-9 Reflection
4-10 Refraction
4-11 Wave Heights Add: Interference
4-12 Diffraction
4-13 Light Comes From Electrons

Chapter 5: Energy

5-1 Introduction to Energy: the Great Chain of Energy
5-2 Conservation of Mass-energy
5-3 Models of the Big, Models of the Small, Models of Energy
5-4 Closed Systems
5-5 Conservation of Energy, Conservation of Mass
5-6 Energy Force Fields: Potential Energy
5-7 More Force Fields: Inverse Square with Distance, Direct with Source
5-8 Energy of Motion
5-9 Changing Energy from Kinetic to Heat
5-10 Heat Energy and Temperature
5-11 Work
5-12 Machines

Chapter 6: Basic Electricity Concepts

6-1 Static Electricity
6-2 Charging Objects
6-3 Electric Current
6-4 AC/DC Overview
6-5 Series Circuits
6-6 Parallel Circuits and Series-Parallel Circuits
6-7 Ohm's Law
6-8 Measuring Voltage, Resistance and Current
6-9 Watts and Power
6-10 Time and Energy
6-11 Efficiency
6-12 Wind Power
6-13 Hydroelectric Power
6-14 Nuclear Power
6-15 Coal Power
6-16 Solar Power
6-17 Natural Gas and Petroleum (Gasoline)
6-18 Hydrogen Fuel Cells
6-19 Biomass Power

xMedia Movie: Aircraft and Spacecraft (27 minutes)

- 00:00:00 Titan
- 00:00:31 The Building Blocks of Life - Nitrogen and Carbon
- 00:00:47 Mission to Saturn and Titan
- 00:01:44 Titan has an Atmosphere
- 00:02:33 The Atmosphere of Titan Explained
- 00:03:47 Organic Rain - Like Earth's Origin
- 00:04:03 Life on Titan
- 00:05:17 Collecting Data on Titan and Future Explorations
- 00:06:38 Next Generation Exploration
- 00:08:08 Summary of Possibilities of Titan Life
- 00:11:23 Density and Specific Gravity
- 00:11:51 Aerobraking
- 00:12:16 Breaking Free of Gravity
- 00:13:11 Deceleration
- 00:13:35 Aerocapture
- 00:16:07 Other Techniques to Slow Vehicles Down
- 00:18:25 Magellan Mission - First Aerobraking
- 00:19:14 Revolutionary Materials
- 00:19:52 Protective Clothing and Kevlar
- 00:20:32 History of Materials
- 00:21:35 Polymer Molecules
- 00:22:31 Space is a Hostile Environment
- 00:23:23 Space Station Protection
- 00:23:32 Carbon Nanotubes
- 00:24:07 Self Healing Materials

- 00:24:54 Credits
- 00:26:33 End