

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

DISCOVER! ASTRONOMY

Astronomy and the Universe
Earth and the Inner Solar System
The Outer Solar System

DISCOVER! GEOLOGY

Dynamic Earth
Minerals, Rocks and Resources
Carving the Earth: Soils, Erosion and Landforms

DISCOVER! OCEANS

Earth's Oceans
Oceans in Motion
Earth's Water Cycle

DISCOVER! WEATHER

Weather Fundamentals
Extreme Weather
Weather Forecasting and Climate

DISCOVER! LIFE IN THE ENVIRONMENT / PHYSICAL SCIENCE

Life Science
The Environment
Physical Science Basic Concepts

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

Appendices common to all CD/Units:

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Measurement Systems and SI Units
Careers in Science

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

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xMedia Movie: The Space Shuttle and the Hubble Telescope

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History of Geoscience
Energy Flows of Earth
Evolution
Seismicity of North Carolina, USA
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Discover! Geology Volume 2: Minerals, Rocks and Resources

Chapter 1: Minerals and Rocks
Chapter 2: Igneous Rocks
Chapter 3: Sedimentary Rocks
Chapter 4: Metamorphic Rocks

Chapter 5: Renewable and Non-renewable Resources

Mineral Groups

Mineral ID Table

xMedia Movie: The Reelfoot Rift (27 minutes)

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

Chapter 1: Weathering and Soils

Chapter 2: Rivers and Groundwater

Chapter 3: Glaciers and Glaciation

Chapter 4: Ocean Topography and Shorelines

Chapter 5: Landforms on Earth

Chapter 6: Mapping the Earth

Appalachian Mountains

Geology of California, USA

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

Discover! Oceans Volume 1: Earth's Oceans

Chapter 1: Introduction

Chapter 2: Structure of the Oceans

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

Chapter 6: Cloud Types
Chapter 7: Unusual Atmospheric Phenomena
Chapter 8: What You Can Do - Careers and Awareness
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

- 1_3 What is the Universe? Space!
- 1_4 What is the Universe? Energy!
- 1_5 What is the Universe? Matter!
- 1_6 Space, Energy and Matter
- 1_7 Introduction to Theories of the Universe
- 1_8 The Big Bang

Chapter 2: Stars and Galaxies

- 2_1 Early Life Stages of Stars
- 2_2 Life of a Star
- 2_3 The Void of Space is Not Void
- 2_4 First Fusion
- 2_5 Life on the Main Sequence
- 2_6 Red Giants and Beyond
- 2_7 Galaxies

Chapter 3: How do we Know?

- 3_1 How do we Know?-- The Sky during the Day
- 3_2 How do we Know?-- The Sky at Night
- 3_3 Patiently Map the Skies
- 3_4 The Celestial Sphere
- 3_5 The Copernican Revolution
- 3_6 Telescopes and Spectroscopes
- 3_7 Electromagnetic Spectrum
- 3_8 Light
- 3_9 Distances and Trigonometry

Chapter 4: Fundamentals of Physical Science

- 4_1 Matter and Energy
- 4_2 Atomic Theory, Elements, Atoms
- 4_3 Energy
- 4_4 Thermonuclear Fusion
- 4_5 Conservation of Matter and Energy
- 4_6 Gravity
- 4_7 Orbital Motion (Kepler's Laws)
- 4_8 Motion and Position
- 4_9 Forces and Motion (Newton's Laws)
- 4_10 Weight, Mass, Volume, Density

Appendices

Satellite Exploration

1. Exploring the Solar System
2. Exploring our Sun
3. Exploring Mercury
4. Exploring Venus
5. Exploring our Moon
6. Exploring Mars
7. Exploring Jupiter

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
 - Geosynchronous 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 Phytoplankton 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

- 4_3 The Source
- 4_4 Solar Powerhouse
- 4_5 Saying No to the Heat
- 4_6 Hurling Through Space
- 4_7 Hot Spot
- 4_8 The Flow of Air
- 4_9 Global Patterns
- 4_10 Curve Ball
- 4_11 The Coriolis Effect
- 4_12 How About the Kitchen Sink?
- 4_13 Spinning at Full Tilt
- 4_14 Delayed Reaction
- 4_15 Are You Under Pressure?
- 4_16 Why the Wind Blows
- 4_17 Pressure and Temperature

Chapter 5: Local Climates and Regional Patterns

- 5_1 Three-dimensional Thinking
- 5_2 Weather Glasses
- 5_3 An Aura of Red
- 5_4 Floating on Air
- 5_5 The Vertical Temperature Gradient
- 5_6 Looking Down
- 5_7 Over Fields and Lakes
- 5_8 Water, the Moderator
- 5_9 Coastal Breezes
- 5_10 Sea Breeze by Day
- 5_11 Land Breeze by Night
- 5_12 Cells
- 5_13 Surfaces, Elevation
- 5_14 Clouds
- 5_15 The Real Picture
- 5_16 Always in Motion
- 5_17 The North American Troposphere
- 5_18 The West Coast
- 5_19 Dry Valleys
- 5_20 The Prairies
- 5_21 Midwest and Southern States
- 5_22 Maritime and Continental Climates
- 5_23 Hot and Cold

Chapter 6: Cloud Types

- 6_1 Naming What You See
- 6_2 Cirrus
- 6_3 Cirrocumulus
- 6_4 Cirrostratus
- 6_5 Cirrus at Sunset
- 6_6 Altostratus
- 6_7 Altocumulus 1
- 6_8 Altocumulus 2
- 6_9 Stratocumulus
- 6_10 Fog and Stratus
- 6_11 Fair Weather Cumulus

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
 - 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
 - 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

2_12 Data Fun

Chapter 3: Reading Weather Charts

- 3_1 Weather Map Symbols
- 3_2 Surface Temperatures
- 3_3 Surface Air Pressures
- 3_4 Moving Weather Fronts
- 3_5 Fronts, Clouds and Rain
- 3_6 Above the Surface
- 3_7 Synoptic Weather Maps
- 3_8 What the Satellite Sees

Chapter 4: Climate and Climate Change

- 4_1 Ice Ages Ago
- 4_2 What is Climate?
- 4_3 Climate Cycles
- 4_4 Climate Connections
- 4_5 Traces of Ancient Weather
- 4_6 The Little Ice Age
- 4_7 Solar Influence
- 4_8 Orbital Shape and Axial Tilt
- 4_9 Small Difference, Big Change
- 4_10 Solar Radiation Budget
- 4_11 Reflections
- 4_12 What Next?
- 4_13 Energy Transformed
- 4_14 The Electromagnetic Spectrum
- 4_15 Inside a Greenhouse
- 4_16 Earth Traps the Heat
- 4_17 A Comfortable Balance
- 4_18 Greenhouse Gases
- 4_19 Seasonal Differences
- 4_20 The Human Role
- 4_21 The Carbon Cycle
- 4_22 The Question
- 4_23 Why Don't We Know?
- 4_24 Feedback Loops
- 4_25 More Heat
- 4_26 The Oceans
- 4_27 More Meddling or Less?
- 4_28 What Will Global Warming Do?
- 4_29 Reasons to Worry
- 4_30 Facing the Issues

Chapter 5: Remote Sensing of Ocean Climate

- 5_1 Introduction to Remote Sensing of the Oceans
- 5_2 Ice Concentrations
- 5_3 Arctic Ice Concentrations
- 5_4 Antarctic Ice Concentrations
- 5_5 Sea Surface Temperatures
- 5_6 Temperatures of the Global Oceans

- 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

- 2-6 Stomata
- 2-7 Roots Collect Water and Minerals
- 2-8 Stems and Transport
- 2-9 Moving Water Upwards
- 2-10 Transpiration
- 2-11 Parts of a Flowering Plant
- 2-12 Plant Sexual Reproduction
- 2-13 Life Cycle
- 2-14 Pollination
- 2-15 Fertilization
- 2-16 Advantages and Disadvantages of Sexual Reproduction
- 2-17 Plant Asexual Reproduction
- 2-18 Advantages and Disadvantages of Asexual Reproduction
- 2-19 What are Fruits Anyway?
- 2-20 Adaptations of Plants
- 2-21 Structure of Atoms

Chapter 3: Biological Levels of Organization

- 3-1 Biological Levels of Organization
- 3-2 The Cell Level
- 3-3 Types of Cells
- 3-4 The Animal Cell
- 3-5 DNA
- 3-6 RNA
- 3-7 The Plant Cell
- 3-8 The Tissues Level
- 3-9 The Organ Level
- 3-10 The Organ System Level

Chapter 4: Cell Division

- 4-1 Cells Divide and Grow
- 4-2 Mitosis
- 4-3 Interphase
- 4-4 Stage 1: Prophase
- 4-5 Stage 2: Metaphase
- 4-6 Stage 3: Anaphase
- 4-7 Stage 4: Telophase
- 4-8 Mitosis and Cell Division in Plant and Animal Cells
- 4-9 Meiosis
- 4-10 Interphase 1
- 4-11 Stage 1: Prophase 1
- 4-12 Stage 2: Metaphase 1
- 4-13 Stage 3: Anaphase 1
- 4-14 Stage 4: Telophase 1
- 4-15 Stage 5: Prophase II
- 4-16 Stage 6: Metaphase II
- 4-17 Stage 7: Anaphase II
- 4-18 Stage 8: Telophase II

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

- 5-1 How Animals Work

- 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

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xMedia Movie: Aircraft and Spacecraft (27 minutes)

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 - 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
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 - 00:19:14 Revolutionary Materials
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