

**Orange School District** 



# Curriculum Guide - Grade 8 2011 Edition

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## Philosophy

Science is a way of relating to and experiencing our world as a process that helps one search for solutions to problems faced everyday. This curriculum aims to provide students with the knowledge and understanding of scientific concepts and processes required for personal decision-making, participation in civic and cultural affairs, and productivity in a global economy. It emphasizes critical thinking skills through an inquiry-based and hand-on approach to learning.

The goal of science education is to develop scientifically literate students who understand how science, technology and society influence one another; and who are able to use this knowledge and its applications in their every day decision-making processes as members of a global society. Essential to this conceptual understanding is the philosophy that science is a process rather than an accumulation of facts.

## **Course Description**

This course is an inquiry based, hands-on science program for Physical Science classes. Physical, Earth, and Space Science is an integrated approach. Earth and space science concepts are integrated with physics and chemistry concepts. For example, students learn how major science concepts such as energy, heat, and forces apply to earth and space sciences. Recurring themes found throughout the program include energy, forces systems, and property of matter. Many of the important science concepts are repeated in different ways to support a variety of learning styles.

### Physical, Earth, and Space Science

Physical, Earth, and Space Science provides an integrated approach to inquiry based, hands-on science programs for high school Physical Science classes. Earth and space science concepts are integrated with physics and chemistry concepts. For example, students learn how major science concepts such as energy, heat, and forces apply to earth and space sciences.

## **Curriculum Outline Based on**

## **CPO:** Physical, Earth, and Space Science: An Integrated Curriculum

Unit 1: Science Skills

#### I. Measurement

- 1. Investigation 1A: Measurement
- 2. Lesson 1.1: Measurements
- 3. Investigation 1B: Measuring Time
- 4. Lesson 1.2 Time and Distance
- 5. Lesson 1.3: Converting Units
- 6. Lesson 1.4: Measurement and Graphing
- 7. Answers

#### II. The Scientific Process

- 1. Lesson 2.1: Inquiry and the Scientific Method
- 2. Investigation 2A: Observation, Question, and Hypothesis
- 3. Investigation 2B: Experiments and Variables
- 4. Lesson 2.2: Experiments and Variables
- 5. Lesson 2.3: The Nature of Science and Technology
- 6. Answers

#### III. Mapping Earth

- 1. Investigation 3A: Positive and Negative Position
- 2. Lesson 3.1: Position, Coordinates, and Maps
- 3. Investigation 3B: Topographic Mapping
- 4. Lesson 3.3: Bathymetric Maps
- 5. Answers

#### Unit 2: Motion, Force, and Energy

- I. Motion
  - 1. Lesson 4.1: Speed and Velocity
  - 2. Investigation 4A: Speed
  - 3. Lesson 4.2: Graphs of Motion
  - 4. Investigation 4B: Acceleration
  - 5. Lesson 4.3: Acceleration
  - 6. Answers

#### II. Forces

- 1. Investigation 5A: What Is a Newton?
- 2. Lesson 5.1: Forces
- 3. Investigation 5B: Friction
- 4. Lesson 5.2: Friction
- 5. Lesson 5.3: Forces and Equilibrium
- 6. Answers

#### III. Laws of Motion

- 1. Lesson 6.1: Newton's First Law
- 2. Investigation 6A: Newton's First and Second Laws
- 3. Lesson 6.2: Newton's Second Law
- 4. Investigation 6B: Newton's Third Law
- 5. Lesson 6.3: Newton's Third Law and Momentum
- 6. Answers

#### IV. Work and Energy

- 1. Lesson 7.1: Force, Work, and Machines
- 2. Investigation 7A: Energy in a System
- 3. Investigation 7B: Work and Energy
- 4. Lesson 7.2: Energy and the Conservation of Energy
- 5. Lesson 7.3: Efficiency and Power
- 6. Answers

#### Unit 3: Matter, Energy, and Earth

- I. Matter and Temperature
  - 1. Lesson 8.1: The Nature of Matter
  - 2. Lesson 8.2: Temperature
  - 3. Investigation 8A: Determining Freezing/Melting Point
  - 4. Lesson 8.3: The Phases of Matter
  - 5. Investigation 8B: Freezing Point of a Stable Mixture
  - 6. Answers

#### II. Heat

- 1. Investigation 9A: Temperature and Heat
- 2. Lesson 9.1: Heat and Thermal Energy
- 3. Investigation 9B: Convection in Earth's Atmosphere
- 4. Lesson 9.2: Heat Transfer
- 5. Answers

#### III. Properties of Matter

- 1. Investigation 10A: Density
- 2. Lesson 10.1: Density
- 3. Lesson 10.2: Properties of Solids
- 4. Lesson 10.3: Properties of Fluids
- 5. Investigation 10B: Buoyancy
- 6. Lesson 10.4: Buoyancy
- 7. Answers

#### IV. Earth's Atmosphere and Weather

- 1. Investigation 11A: Heating Land and Water
- 2. Lesson 11.1: Earth's Atmosphere
- 3. Investigation 11B: Observing the Weather
- 4. Lesson 11.2: Weather Variables
- 5. Lesson 11.3: Weather Patterns
- 6. Answers

#### Unit 4: Matter and Its Changes

- I. Atoms and the Periodic Table
  - 1. Investigation 12A: Atomic Structure
  - 2. Lesson 12.1: The Structure of the Atom
  - 3. Lesson 12.2: Electrons
  - 4. Investigation 12B: The Periodic Table
  - 5. Lesson 12.3: The Periodic Table of the Elements
  - 6. Lesson 12.4: The Properties of the Elements
  - 7. Answers
- II. Compounds
  - 1. Investigation 13A: Chemical Bonds
  - 2. Lesson 13.1: Chemical Bonds and Electrons
  - 3. Investigation 13B: Chemical Formulas
  - 4. Lesson 13.2: Chemical Formulas and Electrons
  - 5. Lesson 13.3: Molecules and Carbon Compounds
  - 6. Answers

#### III. Changes in Matter

- 1. Investigation 14.A: Conservation of Mass
- 2. Lesson 14.1: Chemical Reactions
- 3. Investigation 14B: Balancing Chemical Equations
- 4. Lesson 14.2: Types of Reactions
- 5. Lesson 14.3: Energy and Chemical Reactions
- 6. Lesson 14.4: Nuclear Reactions
- 7. Answers
- IV. Chemistry and Earth's Resources
  - 1. Investigation 15A: Carbon Dioxide and Living Things
  - 2. Lesson 15.1: Chemical Cycles
  - 3. Investigation 15B: Oceans and the Carbon Cycle
  - 4. Lesson 15.2: Global Climate Change
  - 5. Answers

#### Unit 5: Electricity and Magnetism

- I. Electricity
  - 1. Lesson 16.1: Charge and Electric Circuits
  - 2. Investigation 16A: Electricity
  - 3. Lesson 16.2: Current and Voltage
  - 4. Investigation 16B: Resistance and Ohm's Law
  - 5. Lesson 16.3: Resistance and Ohm's Law
  - 6. Lesson 16.4: Types of Circuits
  - 7. Answers

#### II. Magnetism

- 1. Investigation 17A: Magnetism
- 2. Lesson 17.1: Properties of Magnets

- 3. Investigation 17B: Electromagnets
- 4. Lesson 17.2: Electromagnets
- 5. Lesson 17.3: Electric Magnets and Generators
- 6. Lesson 17.4: Generating Electricity
- 7. Answers

#### Unit 6: Earth's Structure

- I. Earth's History and Rocks
  - 1. Investigation 18A: Time and Tree Rings
  - 2. Lesson 18.1: Geologic Time
  - 3. Investigation 18B: Relative Dating
  - 4. Lesson 18.2: Relative Dating
  - 5. Lesson 18.3: The Rock Cycle
  - 6. Answers

#### II. Changing Earth

- 1. Investigation 19A: All Cracked Up
- 2. Lesson 19.1: Inside Earth
- 3. Investigation 19B: Plate Tectonics
- 4. Lesson 19.2: Plate Tectonics
- 5. Lesson 19.3: Plate Boundaries
- 6. Lesson 19.4: Metamorphic Rocks
- 7. Answers
- III. Earthquakes and Volcanoes
  - 1. Investigation 20A: Earthquakes
  - 2. Lesson 20.1: Earthquakes
  - 3. Investigation 20B: Volcanoes
  - 4. Lesson 20.2: Volcanoes
  - 5. Lesson 20.3: Igneous Rocks
  - 6. Answers

#### Unit 7: Earth's Water

- I. Water and Solutions
  - 1. Lesson 21.1: Water
  - 2. Investigation 21A: Solubility
  - 3. Investigation 21B: Solubility Curve of KNO3 (fix)
  - 4. Lesson 21.2: Solutions
  - 5. Lesson 21.3: Acids, Bases, and pH
  - 6. Answers
- II. Water Systems
  - 1. Investigation 22A: Modeling a River
  - 2. Lesson 22.1: Water on Earth's Surface
  - 3. Investigation 22B: The Water Cycle
  - 4. Lesson 22.2: The Water Cycle
  - 5. Lesson 22.3: Oceans
  - 6. Answers

#### III. How Water Shapes the Land

- 1. Investigation 23A: Water Systems
- 2. Lesson 23.1: Weathering and Erosion
- 3. Investigation 23B: Coastal Erosion
- 4. Lesson 23.2: Shaping the Land
- 5. Lesson 23.3: Sedimentary Rocks
- 6. Answers

#### Unit 8: Waves

- I. Waves and Sound
  - 1. Investigation 24A: Harmonic Motion
  - 2. Lesson 24.1: Harmonic Motion
  - 3. Investigation Harmonic Motion
  - 4. Investigation 24B: Waves in Motion
  - 5. Lesson 24.2: Properties of Waves
  - 6. Lesson 24.3: Sound
  - 7. Answers

#### II. Light and Optics

- 1. Lesson 25.1: Properties of Light
- 2. Investigation 25Å: Color
- 3. Lesson 25.2: Color and Vision
- 4. Investigation 25B: Reflection and Refraction
- 5. Lesson 25.3: Optics
- 6. Answers

#### Unit 9: Matter and Motion in the Universe

- I. The Solar System
  - 1. Investigation 26A: Phases of the Moon
  - 2. Lesson 26.1: Motion and the Solar System
  - 3. Lesson 26.2: Motion and the Astronomical Cycles
  - 4. Investigation 26B: Earth's Seasons
  - 5. Lesson 26.3: Objects in the Solar System
  - 6. Answers
- II. Stars
  - 1. Lesson 27.1: The Sun
  - 2. Investigation 27A: Stars and Spectroscopy
  - 3. Lesson 27.2: Stars
  - 4. Lesson 27.3: The Life Cycles of Stars
  - 5. Investigation 27B: Star Life Cycle and the H-R Diagram
  - 6. Answers
- III. Exploring the Universe
  - 1. Investigation 28A: How Does a Telescope Work?
  - 2. Lesson 28.1: Tools of Astronomy
  - 3. Lesson 28.2: Galaxies
  - 4. Investigation 28B: Astronomy and Light

- 5. Lesson 28.3: Theories about the Universe
- 6. Answers