**Curriculum**

**8th grade Integrated Science Course 3**

**Course Overview**

The eighth grade course surveys topics from each of the traditional disciplines – physical, life, and earth – to show their interrelatedness. Units of study include: Forces in Action and Energy at Work, including the Human Body, Density and Buoyancy, Electricity and Magnetism, and Electromagnetic, Light and Sound Waves. During this course students continue to develop laboratory skills including measuring, problem solving, critical thinking, and analyzing data. The integrated approach of the course enhances students’ understanding of the world and its natural systems. Students may be required to do one or more long-term projects and research papers for the course.

**Department Standards**

**STANDARD 1: THE NATURE OF SCIENCE**

**STANDARD 2: SCIENCE AND TECHNOLOGY**

**STANDARD 3: THE PHYSICAL SETTING**

**STANDARD 4: THE LIVING ENVIRONMENT**

**STANDARD 5: SCIENCE AND SOCIETY**

**Benchmarks**:

[Science Department Standards & Benchmarks](http://acidale.on-rev.com/dante/Science/Standards%26BenchmarksK-12.docx)

**Performance Indicators**

**Science 8**

**Performance Indicators**

**First Quarter**

UNIT 1: Measurement

-Identify the steps of the Scientific Method (relate it to problem solving)

-Demonstrate how to measure using the correct lab instrument and reporting the measurement using correct scientific units and estimation.

-Identify the parts of an experiment, given an experiment. (control, I.V., D.V., constants)

-Identify the SI Units for measurements

-Demonstrate conversion from one metric unit to another.

-Explain the difference between:

-Observation and Inference

-Accuracy and Precision

-Exact and Inexact numbers

-Report answers in the correct number of significant figures.

UNIT 2: Density and Buoyancy

-Define Density (it is a physical property)

-Explain how the pressure in a fluid produces a buoyant force.

-Explain floating and sinking using Archimedes’ principle.

-Explain the effects that density of air has on an object moving through air.

-Generate a design for a hot air balloon and analyze its flight as it relates to density.

-Define and calculate pressure.

-Model how pressure varies in a fluid.

-Explain how the pressure in a fluid creates a buoyant force.

-Explain how forces are transmitted through fluids. (Hydraulics)

-Describe Bernoulli’s principle.

**Second Quarter**

UNIT 3: Forces and Motion

-Define distance, speed, and velocity.

-Measure speed and velocity.

-Graph motion -Define acceleration

-Predict what effect acceleration will have on motion.

-Explain the relationship between mass and inertia.

-Define momentum

-Predict motion using the law of conservation of momentum

UNIT 3a: Forces and Motion

-Recognize and describe examples of Newton’s Laws of Motion.

-Distinguish between balanced and net forces.

-Explain how friction affects motion.

-Distinguish between potential and kinetic energy.

-Explain why the direction of force is important.

-Identify the relationship between the forces that object exert on each other.

-Explain the role of gravitational acceleration on Earth.

**Third Quarter**

UNIT 4: Work, Power, and Simple Machines

-Recognize when work is being done.

-Calculate how much work is done.

-Explain the relationship between work and power

-Explain how a machine makes work easier.

-Calculate the mechanical advantage and efficiency of a machine.

-Explain how friction reduces efficiency.

-Distinguish among the different simple machines.

-Explain the purpose of each simple machine and how it makes work easier.

-Describe how to find the mechanical advantage (MA) of each simple machine.

UNIT 4a: Energy

-Explain what energy is.

-Distinguish between kinetic energy (KE) and potential energy (PE).

-Identify the various forms of energy.

-Identify and explain points in the body where energy transformations occur.

-Apply the law of conservation of energy to energy transformations.

-Identify how energy changes form.

-Explain how temperature is related to kinetic energy.

-Describe three scales used for measuring temperature (in UNIT 1).

-Define thermal energy.

-Explain the difference between thermal energy and heat.

UNIT 5: Electricity and Magnetism

-Describe how objects can become electrically charged.

-Explain how an electric charge affects other electric charges.

-Distinguish between electric conductors and insulators

-Describe how electric discharges such as lightning occur.

-Relate voltage to the electrical energy carried by an electric current.

-Describe a battery and how it produces an electric current.

-Explain electrical resistance.

-Explain how voltage, current, and resistance are related in an electric circuit.

-Investigate and explain the difference between series and parallel circuits.

-Determine the electric power used in a circuit.

-Describe how to avoid dangerous electric shock.

-Describe the behavior of magnets.

-Relate the behavior of magnets to magnetic fields.

-Explain why some materials are magnetic or have magnetic properties.

-Explain how electricity can produce motion.

-Explain how motion can produce electricity.

**Fourth Quarter**

UNIT 6: Electromagnetic Radiation

-Explain how electromagnetic waves are produced.

-Describe the properties of electromagnetic waves.

-Explain the differences among kinds of electromagnetic waves.

-Describe different ways of using electromagnetic waves to communicate.

-Compare and contrast AM and FM radio signals.

UNIT 6a: Light

-Describe the wave nature of light.

-Explain how light interacts with materials.

-Determine why objects appear to have color.

-Explain how light is reflected from rough and smooth surfaces.

-Determine how mirrors form an image.

-Describe how concave and convex mirrors form an image.

-Determine why light rays reflect.

-Explain how convex and concave lenses form images.

-Explain how microscopes magnify objects.

-Explain how telescopes make distant objects visible.

-Describe how a camera works.

-Identify the parts of the Human Eye.

UNIT 7: Waves

-Explain the relationship between waves, energy, and matter.

-Describe the difference between transverse waves and compressional waves.

-Describe the relationship between the frequency and wavelength of a wave.

-Explain why waves travel at different speeds

-Explain how waves can reflect from some surfaces.

-Explain how waves change directions when they move from one material into another.

-Describe how waves are able to bend around barriers.

UNIT 7a: Sound Waves

-Identify the characteristics of sound waves.

-Explain how sound travels.

-Describe the Doppler Effect.

-Explain the difference between music and noise.

-Describe how different instruments produce music.

-Explain the different steps important to how you hear.

**Assessments**

**Science 8**

**Assessments**

**First Quarter**

Summative Assessments

Unit, Chapter, and Q1 Tests

-SI Unit, Metrics, Measurement, Scientific Method Quiz

-Safety Quiz

-Accuracy & Precision, Significant Figures Quiz

-Air Density, Fluid, Pressure, and Gas Laws Quizzes

-Unit Test on Density, Buoyancy, and Pressure

-Lab Reports

Formative Assessments

Warm-up Questions/Journal Entries

Homework Assignments

Class discussions

Labs

-Scientific Method/ Problem Solving Activities

Measurement Activities

-Measurement and Volume Lab

Scientific Method Labs

-Reaction Time Lab

-Airplane Lab and Lab Report

-Labs Measuring Density of Solids

-Lab Coke Floats? (Liquid Density)

-Comparing the Buoyancy of Different Objects

-Air Density Webquest and Virtual Lab

-Lab Density Stack (Liquid)

-Lab Foil Boats and Buoyancy (Mass, Volume, Density)

-Lab Measuring Buoyant Force

-Lab Psychrometer (Relative Humidity)

**Second Quarter**

Summative Assessments

-Hot Air Balloon Project (Completed by end the beginning of Q2)

-Report on Hot Air Balloon Project.-Quizzes and Unit and Chapter Tests (on Book M – Motion, Forces, and Energy)

-Semester 1 Exam

Formative Assessments

Warm-up Questions/Journal Entries

Homework Assignments

Class discussions

Labs

-Domino Derby

-Measuring Average Speed Lab - pg 11

-Ramp Labs – (Hot Wheels – Newton’s First Law, Newton’s Third Law)

-Modeling Acceleration Lab - pg 17

-Conservation of Momentum - pg 23

-Collisions Lab - pg 25

-Measuring Force Pairs pg 53

-Observing Friction MiniLab (pg 40)

-Your Weight on Other Worlds (Web Activity)

-Modeling Motion in Two Directions Lab pg 56-57

-Grasshopper Lab (Newton’s 3rd Law)

**Third Quarter**

Summative Assessment

Rube Goldberg Machine Project (Completed in Q3)

-Construction and Design

-Paper/Procedure

-Video

-Poster

-Individual Self-Assessment and Group Assessment, and Reflection

Quizzes and Unit and Chapter Tests (from Book M - Motion, Forces, and Energy and

Book N – Electricity and Magnetism)

Quarter 3 TEST

Formative Assessment

Warm-up Questions/Journal Entries

Homework Assignments

Class discussions

Labs

-UNIT 4a: Energy (Book M)

-Marbles and Energy Lab pg 125

-Analyzing Energy Transformations Lab p133

-Potential Energy vs. Kinetic Energy Lab

-Calories and Joules Energy Lab

-UNIT 5 Electricity and Magnetism (Book N)

-Static Electricity Lab and Web Activities

-Visualizing Nerve Impulses Web Activity p10-12

-Investigating the Electric Force p16

-Simple Circuits Lab (Parallel vs Series Circuit Lab)

-Current in a Parallel Circuit Lab p27

-A Model for Voltage and Current Lab p28-29 -Observing Magnetic Fields Lab p42

-Using a Compass Lab Activity

-Assembling an Electromagnet p46

-How does an electric motor work? How does an electric generator work? p56-57

**Fourth Quarter**

Summative Assessments

-Research paper on Electromagnetism (Examples of research topics: Aurora Borealis, Maglev Trains, Technology)

-Photo project on Electromagnetic Waves (EM Spectrum)

-Quizzes, Unit and Chapter Tests (From Book O – Waves, Sound, and Light)

-Semester 2 Exam

Formative Assessments

Warm-up Questions/Journal Entries

Homework Assignments

Class discussions

Labs (Book O)

-UNIT 6: Electromagnetic Radiation

-Detecting Invisible Waves p65 / Observing Electric Fields p69

-Observing the Focusing of Infrared Rays p73

-Prisms of Light Lab p80

-Wavelength Activity p83

-Spectrum Inspection Lab p86

-Frequency Lab Activity p88

-UNIT 6a: Light

-Bending Light Lab p95

-Observing Colors in the Dark Lab p97

-Eye Anatomy

-Colorblindness Activity

-Reflection from a Plane Mirror p105

-Forming an Image with a Lens p114

-Image Formation by a Convex Lens p118

-UNIT 7: Waves

-How do waves carry energy? Lab p7

-Comparing Sounds Lab p11

-Waves on a Spring Lab p18

-Observing How Light Refracts Lab p20

-Wave Speed p26-27

-Earthquake (Seismic Waves Labs)

-UNIT 7a: Sound Waves

-Making Human Sounds/Ear Anatomy Lab p35

-Measuring Sound Lab Activity

-Comparing and Contrasting Sounds Lab p38

-How does Doppler radar work? Lab p42

-Lab: Music p56-57

**Core Topics**

UNIT 1: Introduction to Science 8

UNIT 2: Density, Buoyancy and Pressure

UNIT 3: Forces and Motion

UNIT 3a: Newton's Laws of Motion

UNIT 4: Work, Energy, and Power

UNIT 4a: Energy

UNIT 5: Electricity and Magnetism

UNIT 6: Electromagnetic Radiation (and Light)

UNIT 6a: Light

UNIT 7: Waves

UNIT 7a: Sound Waves

**Specific Content**

UNIT 1: Introduction to Science 8

What is Science?

Science Process Skills

Scientific Method

Measurement (Units and Tools), Estimation

Lab Safety

SI Units and Metric Conversion

Graphing Skills

Accuracy and Precision

Exact and Inexact Numbers

Significant Figures

UNIT 2: Density, Buoyancy, and Pressure

Density of solids

Density of liquids

Density of gases

Boyle’s and Charles’ Laws (Gas Laws)

Pressure and Buoyant force

Archimedes’, Pascal’s, Bernoulli’s principles

Lift

UNIT 3: Forces and Motion

Speed and Velocity

Measuring Motion

Acceleration

Mass and Inertia in Motion

Law of conservation of momentum

UNIT 3a: Newton's Laws of Motion

Newton’s Laws of Motion

Newton’s First Law of Motion (Law of Inertia)

Newton’s Second Law of Motion (F= ma)

Newton’s Third Law of Motion (action-reaction)

UNIT 4: Work, Energy, and Power

Work

Power

Simple Machines

Body Machines: Muscular and Skeletal Systems

UNIT 4a: Energy

Energy of Motion

Kinetic vs. Potential Energy

Energy Transformations

Law of Conservation of Energy

Temperature, Thermal Energy, and Heat

UNIT 5: Electricity and Magnetism

Electricity

-Electric Charge

-Electric Current

-Electric Circuits

Magnetism

UNIT 6: Electromagnetic Radiation (and Light)

Electromagnetic Waves

Electromagnetic Spectrum

UNIT 6a: Light

Properties of Light

Reflection and Mirrors

Refraction and Lenses

Using Mirrors and Lenses

The Anatomy of the Human Eye

UNIT 7: Waves

Waves

Wave Properties

Wave Behavior

-Reflection

-Refraction

-Diffraction

-Wave Interference

UNIT 7a: Sound

Sound Waves

The Anatomy of the Human Ear

Music

**Resources**

**Science 8**

**Resources**

UNIT 1: Introduction to Science

Book A Chp 1

Glencoe-McGraw Hill Resources website for Book A: http://glencoe.mcgraw-hill.com/sites/0078617340/

Big Ideas in Science

Online Measurement WebQuest

http://antoine.frostburg.edu/cgi-bin/senese/tutorials/sigfig/index.cgi

Measurement WS Packet

SI Unit/Metrics WS Packet

Science and Measurement WS Packet

UNIT 2: Density, Buoyancy and Pressure

Book M Chp 3 – Forces and Fluids

Glencoe-McGraw Hill Resources website for Book M: http://glencoe.mcgraw-hill.com/sites/0078617707/

Density Webquest http://www.explorelearning.com/index.cfm?method=cResource.dspView&ResourceID=17

Air Density Webquest

http://www.usatoday.com/weather/wdensity.htm

http://www2.gi.alaska.edu/ScienceForum/ASF13/1308.html

http://www.usatoday.com/weather/tg/wbasebal/wbasebal.htm

http://www.aopa.org/special/weather/0307jw.html

http://www.usatoday.com/weather/resources/basics/2004-03-18-auto-race-weather\_x.htm

Hot Air Balloon

http://www.pbs.org/wgbh/nova/balloon/science/density/index.html

UNIT 3: Forces and Motion

Book M Chp 1 –Motion and Momentum

Glencoe-McGraw Hill Resources website for Book M: http://glencoe.mcgraw-hill.com/sites/0078617707/

Examples of motion:

http://www.physicsclassroom.com/mmedia/kinema/trip.html

Weight on Other Worlds Lab http://www.exploratorium.edu/ronh/weight/

Roller Coaster Physics: http://search.eb.com/coasters/ride.html

UNIT 3a: Newton's Laws of Motion

Book M Chp 1 - Motion and Momentum and Chp 2 – Force and Newton’s Laws

Glencoe-McGraw Hill Resources website for Book M: http://glencoe.mcgraw-hill.com/sites/0078617707/

http://www.glenbrook.k12.il.us/GBSSCI/PHYS/CLASS/1DKin/U1L1d.html

http://www.che.wsu.edu/home/modules/95modules/breidenbach/velocity.html

Newton’s Toy Box Lab Activity Workbook (Delta Science Modules)

UNIT 4: Work, Energy, and Power

Book M Chp 4

Glencoe-McGraw Hill Resources website for Book M: http://glencoe.mcgraw-hill.com/sites/0078617707/

Simple Machines Web Activities

http://www.edheads.org/activities/simple-machines/frame\_loader.htm

http://www.fi.edu/qa97/spotlight3/spotlight3.html

Rube Goldberg Website http://www.rubegoldberg.com/Bones as Levers Activity WS packet

www.science-class.net/Lessons/Anatomy/.../Bones%20as%20levers.pdf

UNIT 4a: Energy

Book M Chp 5 Sect 1 and 2, Book M Chp 6 Sect 1

Glencoe-McGraw Hill Resources website for Book M: http://glencoe.mcgraw-hill.com/sites/0078617707/

Kinetic Energy http://www.brainpop.com/science/energy/kineticenergy/

Potential Energy http://www.brainpop.com/science/energy/potentialenergy/

Heat http://www.brainpop.com/science/energy/heat/

Temperature http://www.brainpop.com/science/energy/temperature/

UNIT 5: Electricity and Magnetism

Book N Chp 1 and 2

Glencoe-McGraw Hill Resources website for Book N: http://glencoe.mcgraw-hill.com/sites/0078617731/

Brain Pop Electricity http://www.brainpop.com/science/energy/electricity/

Static Electricity http://phet.colorado.edu/en/simulation/balloons

 http://phet.colorado.edu/en/simulation/travoltage

http://phet.colorado.edu/en/simulation/ohms-law

Virtual Circuits Lab http://www.mhhe.com/physsci/physical/giambattista/circuits/circuits.html

Brain Pop Magnetism http://www.brainpop.com/science/motionsforcesandtime/magnetism/

UNIT 6: Electromagnetic Waves

Book N Chp 3

Glencoe-McGraw Hill Resources website for Book N: http://glencoe.mcgraw-hill.com/sites/0078617731/

EM Waves site http://school.discoveryeducation.com/lessonplans/interact/electromagneticspectrum.html

EM Waves Virtual Lab http://glencoe.mcgraw-hill.com/sites/0078778409/student\_view0/chapter3/virtual\_lab.html

Brain pop EM Induction http://www.brainpop.com/technology/energytechnology/electromagneticinduction/

UNIT 6a: Waves

Book N Chp 4

Glencoe-McGraw Hill Resources website for Book N: http://glencoe.mcgraw-hill.com/sites/0078617731/

http://environment.nationalgeographic.com/environment/natural-disasters/forces-of-nature.html?section=e

Brainpop Waves http://www.brainpop.com/science/energy/waves/

UNIT 7: Light

Book N Chp 1

Glencoe-McGraw Hill Resources website for Book N: http://glencoe.mcgraw-hill.com/sites/0078617731/

Brain pop Light http://www.brainpop.com/science/energy/light/

Brain pop Diffraction Refraction http://www.brainpop.com/science/energy/refractionanddiffraction/

UNIT 7a: Sound

Book N Chp 2

Glencoe-McGraw Hill Resources website for Book N: http://glencoe.mcgraw-hill.com/sites/0078617731/

Brain pop Sound http://www.brainpop.com/science/energy/sound/

Brain pop Hearing http://www.brainpop.com/health/bodysystems/hearing/

**Textbooks: Glencoe (McGraw-Hill Series) – Science 15 Book Series © 2005.**

 A Life's Structure and Function © 2005

  B From Bacteria to Plants © 2005

  C Animal Diversity © 2005

  D Human Body Systems © 2005

  E Ecology © 2005

 F Earth's Material and Processes © 2005

  G The Changing Surface of Earth © 2005

  H The Water Planet © 2005

  I The Air Around You © 2005

  J Astronomy © 2005

 K The Nature of Matter © 2005

  L Chemistry © 2005

  M Motion, Forces, and Energy © 2005

  N Electricity and Magnetism © 2005

  O Waves, Sound, and Light © 2005