

Core Knowledge Science 8 (2007-2008 School Year)

Mr. Morse, Mr. Andrews

Course Description

This two semester science course, based on the core knowledge sequence, is required for all 8th grade students. Most of the course material consists of an introduction to the science of physics. Key topics in the physics section include mechanics, light, sound, waves, electricity and magnetism. A short unit on photosynthesis will be included at the end of the second semester. We will include a historical perspective in each major unit, focusing on the questions posed, analyzed and answered by major scientists of their times. Students will do a number of laboratory experiments and investigations. The details of these labs will be recorded in the laboratory notebooks begun in Core Knowledge Science 7. A formal laboratory report will be required for many of the experiments.

Syllabus (subject to change)

First Semester

Week	Topics
	First Quarter - Mechanics
1	Course logistics, nature of physics (<i>chapter 1</i>), speed, velocity and acceleration
2	<i>Linear Motion (chapter 2)</i> – free fall, graphs of motion, air resistance
3	<i>Projectile Motion (chapter 3)</i> – vector and scalar quantities
4	Components of vectors, projectiles, upwardly launched projectiles, satellites
5	<i>Newton's First Law of Motion (chapter 4)</i> – classical theories, inertia, mass
6	Net force, equilibrium
7	<i>Newton's Second Law of Motion (chapter 5)</i> – force and acceleration
	Second Quarter – Mechanics and Fluid Dynamics
8	Friction, pressure, air resistance
9	<i>Newton's Third Law of Motion (chapter 6)</i> – action and reaction
10	Action and reaction on different masses; <i>Momentum (chapter 7)</i> - impulse
11	Bouncing, conservation of momentum, collisions, <i>Energy (chapter 8)</i> – work, power
12	Potential energy, kinetic energy, conservation of energy,
13	Simple machines, efficiency of machines
14	<i>Liquids (chapter 19)</i> – liquid pressure, Archimedes' Principle
15	Flotation, Pascal's principle
16	<i>Vibrations and Waves (Chapter 25)</i> – pendulums, wave motion, wave speed, transverse and longitudinal waves, interference, standing waves

Second Semester

Week	Topics
	Third Quarter – Sound and Light
1	Doppler effect, bow waves, shock waves
2	<i>Sound (chapter 26)</i> – origin of sound, sound in air, speed of sound, loudness, resonance, interference, beats
3	<i>Light (chapter 27)</i> – early theories of light, speed of light, electromagnetic waves

- 4 Opaque and transparent materials, shadows, polarization; *Color (chapter 28)*– color spectrum
- 5 Color by transmission and reflection, mixing colored light, scattering, atomic spectra, *Reflection and Refraction (chapter 29)*– reflection, mirrors,
- 6 Reflection and refraction, rainbows, dispersion, total internal reflection
- 7 *Lenses (chapter 30)* – converging and diverging lenses, image formation, ray diagrams
- 8 *Diffraction and Interference (chapter 31)*, wave aspects of light, interference of light, lasers

Electricity and Magnetism

- 9 *Electrostatics (chapter 32)*– electrical forces and charges, conservation of charge, Coulomb's law

Fourth Quarter

- 10 Conductors and insulators, charging by friction and contact, charging by induction
- 11 *Electric Fields and Potential (chapter 33)* – electric fields, field lines, electric potential energy, electric potential, electric energy storage
- 12 *Electric Current (chapter 34)* – flow of charge, electric current, voltage sources
- 13 Resistance, Ohm's law, direct and alternating current, electric power; *Electric Circuits (chapter 35)* – batteries, series and parallel circuits
- 14 Schematic diagrams, compound circuits
- 15 *Magnetism (chapter 36)*– magnetic poles, magnetic fields, electric currents and magnetic fields, earth's magnetic field
- 16 Meters and motors; *Electromagnetic Induction (chapter 37)* – Faraday's law
- 17 Generators and alternating current, transformers, electromagnetic waves

Cellular Energy and Photosynthesis

- 18 *Cell Energy (Cells: Building Blocks of Light – chapter 4)* - photosynthesis
- 19 Chemical process of respiration

Grading

- 50% Tests and quizzes
- 25% Lab notebooks and lab reports
- 25% Homework/class participation

Tests will be given at the end of each major course unit or about every 2-3 weeks. In addition to unit tests, quizzes will be given in the middle of some of the longer units. Each quiz will count 20-40% of the value of a unit test.

Lab notebooks will be collected and graded at least once per quarter, primarily for completeness and adherence to the Ridgeview Classical Schools Lab Notebook Guidelines.

Lab reports will be required for many lab experiments performed in class. Lab reports should follow the structure outlined at the end of this syllabus.

Homework will be assigned almost every day. Many homework assignments will require the student to answer questions – these assignments will be graded for correctness and completeness. In addition to written homework assignments, students will be required to read material from the texts and from selected other sources. Students are expected to complete the reading assignments and be ready to participate in class discussions based on these assignments. Class participation will be partly evaluated on the student's ability to discuss key points covered in the reading assignments.

Lab Reports

Some lab experiments will require submission of a formal lab report. Experiments requiring these reports will be specifically identified as the course proceeds. The formal lab reports should follow the following template. Include each section described below on every report and label the sections. These lab reports are intended to be a brief (1 single spaced typed page) summary of the experiment performed by the student. Strive for conciseness and readability. Each student is expected to turn in a report (no "team" reports).

Title – the name of the experiment performed. Normally this will be the name assigned in class and written in your lab notebook.

Introduction – explains the hypothesis you set out to test and why you and your class were asked to perform the experiment. It could include a summary of information you already know from previous studies and how that knowledge would be expanded, challenged or verified by doing the experiment. If appropriate it could include references to specific scientific laws or theories.

Materials and methods – provides a brief description of what you did. It should include a list of the materials and equipment used and a description of the experimental procedure. Provide enough detail that another student would be able to perform a similar experiment by referring to this section. Include the names of your lab partner(s) in this section.

Results - presents the key data gathered in the experiment. You don't need to include detailed data tables of all your measurements – this should already be in your lab notebook. Just provide a summary of the data in the form of a simple table or graph to enable the reader to quickly understand your results. Explain how the results relate to the hypothesis you are testing.

Discussion – explains your interpretation of the results of the experiment. Did the experiment provide a valid test of your hypothesis? Did it support or refute your hypothesis? What were the likely sources of error? Include possible ways to minimize errors and improve the overall experimental process.

Texts

Conceptual Physics by Paul G. Hewitt – Pearson Prentice Hall, 2006
Cells: Building Blocks of Life – Prentice Hall Science, 1997

Course materials and other requirements

1. A basic scientific calculator such as a TI Model 30 that includes square root and scientific notation. (Additional functions are OK, but not required.) Much of the course work will consist of solving problems. Students must bring their calculator to class every day.
2. Bound lab notebook. (Most students will use the notebook started in 7th grade core knowledge science)
3. A Student Safety Contract read, understood and signed by the student and his/her parent or guardian. For everyone’s safety in the lab, terms of the safety contract will be strictly enforced. (please return this to Mr. Morse or Mr. Andrews by September 7)
4. A copy of this course description sheet signed by the student and his/her parent or guardian, acknowledging having read it. (please return this to Mr. Morse or Mr. Andrews by September 7)

Signatures

Each student and his/her parent or guardian is to sign this course description sheet, acknowledging having read it. Please return this page of the course description to Mr. Morse or Mr. Andrews.

Additional copies of this course description are available on the Ridgeview Classical Schools website: www.ridgeviewclassical.com.

Student signature

Parent/guardian signature