Fifth Grade Science

Overview for Parents

Teacher: Peter Faletra

This year you will have a chance to learn what science is and how scientists go about their work. Most of what we will learn is the concepts of science and how scientists solve the puzzles of nature. Concepts have more to do with how and why rather than what something is. For example, rather than memorizing why we call a certain bird a raptor we will be more interested in how raptors came to be what they are and why they behave as they do.

Quizzes & notes	**25%**	
Exams	**25%**	**(about 1/month)**
Experimental reports	**25%**	**(about 2/month)**
Lab Practicals	**25%**	**(about 2/month)**

There are limited chances for extra credit

Quizzes
Expect short quizzes about once per week.

Notes (the Cornell Method):

You are required to bring your lined spiral-bound notebook to class every day. Your notes will be done in what is sometimes called the Cornell Method. You will be given detailed instructions in class on this method of taking and using notes.

Any notes taken in class will be written on the right-facing page. The same night of the day you took your notes, you should copy your notes to the opposite side of the same page (the left page). When you copy over your notes you should use books, internet, or any science expert to add information to your notes to make sure you thoroughly understand what you are copying. This method of note-taking has been shown to be a very dependable approach to remembering and understanding science (and non-science) information. Your notes will be checked periodically and along with quizzes account for 30% of your grade.
YOUR NOTEBOOK IS POSSIBLY THE MOST IMPORTANT THING IN THIS CLASS…DO NOT LOSE IT!

Experiments & Experimental Reports:

Experimental reports will follow a standard format that will be explained to you in detail in class. The experimental report is composed of 4 main sections: 1) Introduction, 2) Materials And Methods, 3) Results, and 4) Discussion

Experimental reports account for 25% of your grade. The grade you receive has little to do with the outcome of your experiment. Many experiments yield uncertain results. Your grade will depend mostly on how you adhere to sound scientific reasoning and the format of standard scientific report. Some of the grade will derive from your skill and proper use of the lab equipment and working safely in the lab. This is probably the hardest part of science and will be your biggest challenge. It will require you to be logical, meticulous in your record keeping, and highly critical of your own work. Some portion of the experimental reports will be done at home.

We will be doing many short experiments and 1 long-term investigation. The short experiments are intended for you to understand certain scientific concepts and become accustomed to how scientists think and act in a laboratory setting. The long-term experiment is a long-term investigation made of numerous experiments of your design. The long-term investigation is intended to allow you to do authentic science. It could take up to 4 years (assuming you began in the 5th grade and continued into the 8th grade). You will work in groups of about 4 students and take some time to choose and design a long-term investigation. I hope that some of you will succeed in publishing your long-term investigation.

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Exams

You will have about 1 exam per month. Some of the exam questions will be multiple choice, and some will be short explanations where you can use a variety of ways on paper to get your point across, such as words, tables and drawings. Some exams will be oral. In this case, I will read questions to the class.

Practicals

A lab practical allows you to use your skill at doing science. Practical exams often ask you to observe something and interpret what is going on or identify something. Sometimes it will require you to actually perform a technique.

Help

If you are struggling with something and class time is not enough to solve your struggle, I am available, Monday, Tuesday and Thursday from 3:00 PM to 3:30 PM.

MAJOR CONCEPTS

Scientific Reasoning

Concept: Science operates on a set of logical intellectual processes with an ordered and systematic approach. One of the first steps in science is the observation and the recording of these observations. Hypotheses and theories are typically formed after many observations. Experimentation is the most common approach in modern science to verify whether either an hypothesis or a theory is supported by the facts. Facts are simply those things that make statements true.
Concept: Scientific knowledge evolves… Scientific knowledge is subject to change. Theories are views of how nature works and as we gain more knowledge of nature, theories are modified. Newton's Laws of gravity and motion were considered "true" until Einstein showed that in some cases they were inaccurate.
Concept: Cause and effect… The notion of some event (or effect) being a consequence of another event (or cause) e.g. When a germ is present in the blood a particular disease arises; under gravitational forces masses are attracted to each other.

Diversity of life

Concept: Life is diverse in outward appearance but all life forms share some features of a physical, chemical, and environmental nature. All life forms we know of have at least some carbon, nitrogen, oxygen, sulfur, and hydrogen. All life forms have to operate within the laws of physics and chemistry. No life form can get more or even the same amount of energy out of a food source than the food source has in it.
Concept: There are complex connections among all forms of life. Although considerable attention is given to "keystone species", all life forms have deep dependencies on other life forms.
Concept: Living things are not static. Organisms are constantly changing with and adapting to their environment. Life affects the environment in which it lives.
Concept: Form and function The function of an organism, a part of an organism, a cell, or a part of a cell is suited to its function as well as its function being suited to its form. A spruce needle has quite a different shape than a maple leaf. It also has a different internal structure. The spruce needle lasts about 3 years and the maple leaf only three seasons. The structure of the spruce needle is to allow for photosynthesis and not have to be regenerated each year. It allows the plant to photosynthesize longer. The shape of the spruce tree helps it shed snow and resist breaking of branches. The red blood cell has a biconcave shape in humans. It has no nucleus. This allows it to contain as much oxygen carrying protein hemoglobin as possible and squeeze through the smallest of capillaries (which are often a little smaller in diameter than the red blood cell) and exchange oxygen for carbon dioxide.

Quantitative Relationships in Basic Physical Laws

Concept: Direct and inverse relationships as well as inverse square relationships are common in nature. Many physical processes operate by an inverse square law…light, sound and magnetic fields fall off with the square of the distance from their source. For example, an observer doubling or tripling their distance from a light results in their observing the light at ¼ and 1/9th the original intensity, respectively.
Concept: The parallelogram law. If two forces act in the same direction, the resultant is the additive of them. When operating in opposite directions they subtract. This is how vectors work. This general notion applies in some respects to a wide variety of events.

CONTENT

SCIENCE AS AN EMPERICAL PROCESS
Employing the basic notions of experiments and logical thinking versus superstition and non-testable notions
Developing observational skills
Designing simple experiments with control groups and experimental groups
Taking notes of observations
Preparing a scientific report in scientific writing style Compiling experimental results into simple tables and graphs for interpretation

CHEMISTRY: MATTER, ENERGY AND CHANGE
Concepts of matter and energy
Elements share electrons to form chemical bonds
Simple chemical reactions
Absorption and release of energy during chemical reactions
Conservation of mass and energy

PHYSICS
Density and Buoyancy
Speed
Acceleration
Newtons 3 laws of motion
Force of gravity: universal attraction
Acceleration of falling bodies
Momentum in a straight line
Kinetic and potential energy

EARTH SCIENCE
Ores and ore deposits
Mining and energy resources for power generation
Fossil energy and alternative energy sources

LIFE SCIENCE
Living things (categorizing life forms, their habitats and roles in ecosystems)
General body forms (radial and bilateral symmetries, cephalization, exoskeletons and endoskeletons)
Cells: overall forms and functions (cells with and without nuclei, with and without walls and cells with and without chloroplasts (animal versus plant cells)
Chromosomes and DNA and heredity (basics of inheritance)
Major organ systems of insects, amphibians and mammals (digestive system, circulatory system, nervous system)
Plant anatomy and growth of two common plants (i.e., bean and corn)
Photosynthesis (the overall process of converting light into chemical energy)
Life Cycles: plants and animals: mosses, ferns, conifers, flowering plants, insects (grasshopper), amphibians (frog), fish (salmon), and birds (chicken), mammal (human). Include human-driven effects on plants and animal life cycles…pesticides and herbicides. (it is not necessary to detail the reproductive phases of the life cycles since these will be covered in detail in the 7th grade.

SCIENCE BIOGRAPHIES
Leucippus/Democritus-Aristotle-Linnaeus –Galileo-Newton-Dalton-Rutherford
Bohr-Linus Pauling-Lavoisier -Barbara McClintock
Martha Chase-Rosalind Franklin-Calvin-Rachael Carson
E. Coli

BENCHMARKS

Students will be able to:

- interpret and apply basic logical notions of induction and deduction
- design simple experiments and recognize proper, simple, experimental design
- observe with care and "see" what escapes the casual observer
- record observations in an orderly manner and represent them in simple graphs
- recognize the differences between a chemical change and a physical change
- recognize forms of potential and kinetic energy
- express simple chemical formulas and reactions in standard form
- recognize forms of energy and why the total amount in an isolated system stays the same
- recognize and demonstrate the relationships among volume, weight and density
- express how laws of motion apply to different objects
- solve simple problems of motion
- express the inverse relationship of gravitational attraction among masses as distance increase between the masses
- explain how falling bodies accelerate
- explain what ores are mined for what energy resources
- identify fossil and non-fossil energy resources
- observe various organisms and record and sort out their physical similarities and differences into a logical framework
- express what constitutes a species and genus and give examples
- name the taxonomical categories up to the domain
- recognize and describe some of the wide variety of organisms and the environments they inhabit, including major ecosystems such as deserts, taiga, and tundra
- identify the main parts of plant and animal cells and how their forms drive their functions
- identify the anatomical structures of a bean and corn seedling
- express how the form of some specific organisms affects their function
- describe how populations of organisms respond to their environment in short and long-term ways to survive
- identify and describe the function of some of the classic examples of tissues and organ systems in lower and upper animals and plants
- identify and explain the functions of tissues and structures of plants
- be able to recognize and describe the stages in the life cycles of representative organisms
- model and/or recreate a landmark experiment in science

Contacting the Teacher

E-mail: peter.faletra@crossroadsacademy.org or
Call Crossroads Academy: (603) 795-3111 ext. 113 until 4:00 pm or leave a voice mail.