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Curriculum Guide

Public school lesson list for Fall 2008

CHEMISTRY

DRY ICE (Grades 1 through 6): Students discover how to make a hollow ice egg, how soap bubbles can float in mid air, how to make fog, and how to make eerie noises. This relates to solids, liquids, gases, sublimation, condensation, dew point, freezing point, vibrations, clouds, greenhouse effect, and respiration.

HOT, COLD, FIZZY, AND COLORFUL (Grades K through 6): Students discover that common chemicals can create a wide variety of results when they are mixed in a certain way. This relates to dissolving, chemical reactions, mixtures, exothermic reactions, endothermic reactions, acids, bases, and acid/base indicators.

KITCHEN CHEMISTRY I (Grades K through 6): Students discover a weird goop that acts as a solid and a liquid made from cornstarch. They compare it to rubber made from white glue and Boraxo (GAK). This relates to mixtures, solutions, chemical reactions, non-Newtonian fluids, viscosity, and elasticity.

KITCHEN CHEMISTRY II (Grades K through 6): Students make magnesium dissolve with vinegar. They discover that red cabbage juice makes a colorful acid/base indicator and they make indicator paper (pH paper) to take home. This relates to dissolving, exothermic reactions, acids, bases, and indicators.

MAKING ICE CREAM (Grades K through 6): Students discover how to lower the freezing point of water enough so that their sample of ice cream becomes a solid. This relates to freezing point depression, solutions, melting point, freezing point, and temperature scales.

SECRET MESSAGE (Grades K through 6): Students discover that ordinary yellow paper can do extraordinary things. They draw on it with household ammonia, baking soda mix, and vinegar to develop a way to send secret

messages. This relates to chemical changes, acids and bases, pH indicators, and evaporation.

SHRINKING PLASTIC (Grades K through 6): Students discover that certain plastics will shrink dramatically upon heating. They then make an ornament on a container of clear plastic and shrink it to show how some areas shrink more than others. This relates to properties of matter, physical changes, scale factors, and recycling.

LIFE SCIENCE

DISEASE SPREADING (Grades K through 6): Students discover how quickly a “disease” can spread through their unicorns and then they try to determine which unicorn had the disease first. This relates to pollution, bacterial infection prevention, acid/base indicators, epidemiology, and logic.

WIND CHILL FACTOR (Grades 1 through 6): Students discover how evaporation of water and rubbing alcohol can feel in the wind. They also make their own device to measure wind speed (a pinwheel). This relates to humidity, wet and dry bulb temperature, evaporation, evaporative cooling, and simple machines.

EARTH SCIENCE

EARTHQUAKES (Grades K through 6): Students discover how different types of shaking motions can affect their tower made from Lego bricks. They will see the shapes of earthquake waves and will be introduced to the numbers associated with earthquakes. This relates to plate tectonics, wave motion, and speed of wave propagation through solids.

VACUUM-PACKED KIDS (Grades K through 6): Students experiment with water by making siphons and then they sit in a bag up to their neck and we remove the air with a vacuum cleaner... the atmospheric hug is terrific!

EARTH SCIENCE (cont.)

OUR SOLAR SYSTEM (Grades 2 through 5): Students work in groups to draw a creature that could survive on their planet. Then, as a field activity, the class forms a scale model of the solar system 100 yards across. *This is an outdoor activity.* This relates to distance, speed of light, atmospheric pressure, temperature, extreme heat, extreme cold, radiation, poison gases, and the human effects of space travel.

SMOKE RINGS (Grades K through 6): Students discover a way to make a puff of air travel across the classroom with amazing efficiency. We then use stage fog to create smoke rings of many sizes. This relates to weather, convection, and properties of matter.

LIGHT and HEAT

COLOR (Grades K through 6): Students discover the nature of additive and subtractive color through the use of filters and mirrors. We also experiment with ultraviolet light and fluorescent materials. *This only works in a darkened room.* This relates to light frequency, wavelength, fluorescence, and the difference between sunlight and incandescent light.

HEAT CONDUCTION (Grades 2 through 6): Students discover how well heat travels through materials (such as copper, zinc, iron, aluminum, magnesium, plastic, wood and foam) that are touching dry ice. This relates to conductivity, specific heat, and insulators.

LASERS AND MIRRORS (Grades K through 6): Students use their reflections in plastic mirrors to discover how to make a million eyes, a “tunnel” through the desk, periscopes, kaleidoscopes, and how the “fun house” mirrors work. A laser is used to show the light path. *This lesson only works in rooms that can be darkened.* This relates to reflection, refraction, interference, rainbows, lasers, light waves, and color.

ELECTRICITY

AN ELECTRIFYING EXPERIENCE (Grades 1 through 6): Students discover what happens when colored Xmas tree light bulbs are hooked up in series and in parallel. They also check a wide variety of materials to see if they are conductors. This relates to batteries, circuits, resistance, short circuits, and energy transformation.

SPIN ART (Grades K through 6): Students discover how electric motors can be made to go faster, slower, and how to change rotation direction. They will also discover the results of mixing primary colors as they create their artwork. This relates to circuits, positive and negative current flow, voltage, resistance, subtractive color mixing, primary colors.

STATIC ELECTRICITY (Grades K through 6): Students learn about thunder, lightning, and electrons. They discover how to separate a mixture of salt and pepper, lightning

safety, and with one hair-raising experience, they discover the nature of static electricity. This relates to weather, lightning safety, electrons, positive and negative charges, voltage, lightning bolts, and cloud formation.

MAGNETISM

COMPASS (Grades 2 through 6): Students make their own compass to find the earth's magnetic poles and then they try to guide their partner to the goal using only compass directions. *This is an outdoor activity.* This relates to direction, distance, mapping, magnetic fields, and animal migrations.

MAGNETIC CREATURES (Grades K through 5): Students discover all the weird things that magnets can do. Students make their own weird creature that moves magnetically through the habitat they create. This relates to magnetic fields, electrons, magnetic materials, attraction and repulsion, and north versus south poles.

OBJECTS THE SAME (Grades 1 through 6): Three groups of ten objects each are presented with one overriding characteristic in common. The students eventually discover that characteristic. This relates to the scientific method, density, magnetism, ultraviolet light, and electrical conductivity.

SOUND

SOUND EFFECTS (Grades 1 through 6): Students discover the feel and sound of vibrations as they make a ‘tin can telephone’ that is capable of many sound effects. We cover safety with headphones and the students create many decibel levels outside. *This is partly an outdoor activity.* This relates to sound intensity, vibrations, echoes, decibels, sound amplification, and structure of the ear.

STETHOSCOPE (Grades 1 through 6): Students discover how sounds can travel through solids, liquids, and air using a simple stethoscope that they make and can keep. This relates to the anatomy of the ear, vibrations, sound amplification, and anatomy of the heart.

SIMPLE MACHINES

BALANCE (Grades 1 through 6): Students discover that the center of gravity for an object can be way off to one end of the object or even off the object altogether! Students make their own gravity-defying butterfly. This relates to balance, density, and center of mass.

BRIDGE FAILURE ANALYSIS (Grades 3 through 6): Students build a bridge from popsicle sticks and then we put it on the test stand to see how much weight it will hold. Students keep their bridge if they like or they may test it to destruction. This relates to strength of shapes, material strength, and 3-dimensional thought.

SIMPLE MACHINES (Cont.)

CATAPULTS (Grades 2 through 6): Students discover the best way to launch fuzz balls with a catapult that converts mechanical energy into kinetic energy. This relates to kinetic and potential energy, simple machines, levers, drag, and Newton's laws of motion.

GYROSCOPES (TOPS) (Grades 2 through 6): Students discover how the gyroscopic effect can help them steer a bicycle, then they make their own gyroscopic top and try to make it spin as long as possible. This relates to momentum, balance, center of mass, and guidance of missiles and aircraft.

MOUNTAIN RESCUE (Grades K through 6): Students find out how it feels to lift a fellow student 2 feet off the ground with a rope having no pulley, a rope with a single pulley, and with 4 pulleys. They also discover how much friction is created by pulling their friend up the slide and with tug-of-war. *This is an outdoor activity.* This relates to simple machines, mechanical advantage, friction, and vectors.

ROLLER COASTERS (Grades 2 through 6): Students work in groups to make a roller coaster with split foam tubes, marbles and tape. They discover amazing ways to get as many energy conversions as possible. This relates to potential and kinetic energy, friction, and inertia.

SAMPSON'S COLUMNS (Grades 2 through 6): Students decide which structural shapes are the strongest by forming paper to see how many books they can support with one sheet of ordinary paper. The record is 152 pounds! This relates to properties of matter, structures, compression strength, and force.

WEIRD WATER (Grades K through 6): Students make water flow uphill with no power added, they make water stay in a jar that is upside down, and they discover how to

make a musical instrument from a tube and some water. Students keep the instrument. This relates to siphons, suction, and air pressure.

FLIGHT

GIGANTIC BUBBLES (Grades K through 6): Students try making bubbles in their hands, on the tabletop, and outdoors. We also create a bubble tube large enough for a student to stand inside. This is related to buoyancy, air convection, reflection of light, evaporation, and light interference.

HELIUM BALLOONS (Grades 1 through 6): Students discover how to make neutrally buoyant helium balloons maneuver through suspended hula-hoops and they will see what keeps airplanes up in the air. This relates to density, mass, volume, adhesion, and lift.

KIMOTO FLYERS (Grades 2 through 6): Students discover the importance of a well-placed weight in the performance of their rubber band-launched glider. *This is an outdoor activity.* This relates to stored energy, center of mass, center of drag, and friction.

STRAW ROCKETS (Grades 2 through 6): Students discover ways to make their straw travel further by adding just the right parts. *This is an outdoor activity.* This relates to center of drag, center of gravity, air friction, pressure, and Newton's three laws of motion.

WATER BOTTLE ROCKETS (Grades K through 6): Students launch water bottles with bicycle pumps and discover how to make them go higher and farther by adding weight! *This is an outdoor activity.* This experiment demonstrates Newton's laws of motion in a way that they will not forget. This relates to pressure, friction, air drag, momentum, compression of air, energy storage, and Newton's laws.