

Lab Supplies Needed For Module # 1

- Vegetable oil
- Water
- Maple or corn syrup
- A grape
- A piece of cork
- An ice cube
- A small rock
- A tall glass
- Two glass canning jars or peanut butter jars, both the same size
- Food coloring, any color
- A pan and stove to boil water, and a hotpad to hold the pan
- A plastic, 2-liter bottle
- A balloon (6-9 inch round balloons work best.)
- Clear vinegar
- Baking soda
- A funnel or butter knife
- A few leaves of red (sometimes called purple) cabbage
- A saucepan
- A stove
- Measuring cups
- A pencil
- A sheet of paper (8 ½" by 11")
- Four thumbtacks or pushpins
- A piece of string 8 inches long
- A sheet of cardboard larger than or the same size as the sheet of paper
- Tape

Lab Supplies Needed For Module # 2

- A reasonably heavy book
- A sheet of cardboard about the same size as the book (The cardboard that comes on the back of a pad of paper works well. You can also cut a piece out of an old cardboard box.)
- A sheet of heavy paper (like construction paper or cardstock) about the same size as the book
- A sheet of regular paper about the size of the book
- A metal paper clip
- A small rock (It needs to weigh less than the cardboard, so it should be really small.)
- A working flashlight
- A parent or helper

Lab Supplies Needed For Module # 3

- A tall glass
- Measuring cups for measuring out one and a half cups of water
- An egg
- A teaspoon
- A spoon for stirring
- Water
- Salt
- Four sheet of reasonably thick cardboard (A cut-up cardboard box works nicely.)
- Scissors
- A sheet of facial tissue
- A chunk of soap from a bar of soap
- A stick of chewing gum
- A bathtub or large sink (A bathtub is best.)
- A reasonably large bowl
- Water
- Black pepper
- Tweezers
- A needle
- Thread
- Tape
- Someone to help you

Lab Supplies Needed For Module # 4

- A wooden pencil
- A wooden ruler
- At least 5 quarters, preferably more
- Two brooms or a broom and a mop (You basically need two implements with long handles. The experiment works best when the handles are very smooth.)
- Several feet of rope (Nylon rope works best because it is slick.)
- Two reasonably strong people to help you

Lab Supplies Needed For Module # 5

NONE

Lab Supplies Needed For Module # 6

- Alum (A powder available at any drug store - you need at least 4 ounces)
- Two small glasses (like juice glasses)
- A spoon for stirring
- Some thread
- Two weights (washers, nuts, fishing sinkers, etc.)
- A large plate
- A few rocks from outside (small rocks actually work best)
- A sheet of dark paper (blue, black, etc.)
- A magnifying glass
- Sugar (optional)
- Food coloring (optional)
- A large glass jar with a lid
- Some dirt from your yard
- Some sand
- Some gravel comprised of various sizes of rocks
- Water
- Plaster of Paris
- A medium or large margarine tub
- A few lima beans
- Water
- Paper towels
- Vinegar
- A large glass
- A limestone rock (Most gravel is limestone. You can also go to a home improvement store's garden section and specifically ask for limestone. The rock needs to be small enough to fit in the glass)
- Some steel wool
- A small bowl
- A shoebox
- A gardener's spade (or something else you can use to dig with)
- Scissors
- A spot in the yard in which you can dig
- A water hose and water
- A large rock

Lab Supplies Needed For Module # 7

- A plastic margarine tub
- Water
- A rock that will fit in the tub with a lot of room to spare
- A freezer
- Modeling clay
- Plaster of Paris
- A paper plate
- A shell or something else with a distinctive shape or design
- Vaseline[®] or another petroleum jelly

Lab Supplies Needed For Module # 8

- 18 index cards (The size is irrelevant, as is the presence or absence of lines.)
- A parent or someone else to write on the cards and hold the key

Lab Supplies Needed For Module #9

- Long pipe cleaners (the longer the better)
- Four different colors of beads (The beads need to have holes in them large enough for the pipe cleaners to fit through. You can get beads like that at any craft store.)
- Scissors strong enough to cut the pipe cleaners
- One slice of potato (uncooked)
- A pale green leaf (The paler the green, the better this experiment will work.)
- Rubbing alcohol (available at any drug store)
- Iodine (available at any drug store)
- One jar with a lid
- Two shallow dishes
- Tweezers
- A large jar with a lid
- A small potted plant that can fit inside the jar with room to spare
- Some water
- An area of the house that gets sunlight most every day
- A piece of masking tape or a marker
- A few earthworms
- A container that will hold the earthworms and plenty of dirt
- Dirt
- Some water
- A bright light
- Large jar (It must be large enough to fit an banana inside.)
- Nylon stocking large enough to stretch over the mouth of the jar
- Rubber band
- A banana

Lab Supplies Needed for Module #10

- One chicken bouillon cube
- Table salt
- White vinegar
- 4 small glasses
- One large glass
- One measuring cup
- One teaspoon
- Masking tape
- Marker or pen
- The four glasses from the beginning of the experiment
- White paper (no lines if possible)
- Baker's active yeast (available at any supermarket)
- Banana
- Two zippered plastic bags (like ZIPLOC[®] sandwich bags)
- A butter knife
- A marker or some masking tape
- A houseplant (Ivy works best, but most houseplants will work. If you have a few varieties of houseplants and ivy is not among them, you might try a few instead of just one.)
- A glass
- Scissors
- Some water
- A stalk of wilted celery with the leaves still on it
- A glass
- Some water
- A reasonably sharp knife
- Some food coloring (preferably blue)

Lab Supplies Needed for Module #11

- An uncooked chicken bone (preferably a wishbone or wing)
- A jar with a lid
- Vinegar (preferably white)
- Two houseplants. Make sure that your parents won't mind one of them looking really funny once the experiment is over.
- A few books
- A sunny window
- A plastic bandage, such as a Band-Aid[®]

Lab Supplies Needed for Module #12

- A small candle (It needs to be in some kind of heavy holder, but the holder should not be tall. A small tealight candle in a cup-like holder, like the one in the figure under step (F), is ideal.)
- A glass that will cover the candle
- A deep bowl (The bowl should be deep enough so that when the candle is placed at the bottom of the bowl, the sides of the bowl are well above the flame of the candle.)
- One cup of vinegar
- One tablespoon of baking soda
- Matches
- A mirror (A hand-held mirror is best, but any mirror will do.)
- A paper towel
- Red (sometimes called purple) cabbage (You only need a few leaves.)
- Distilled water (You can get it at any large supermarket. You need about a quart.)
- Two drinking straws
- A saucepan
- A stove
- Three small glasses (like juice glasses)
- A ¼-cup measuring cup and a 1-cup measuring cup
- A 2-liter plastic bottle (the kind soda comes in)
- A balloon (6-inch or 8-inch round balloons work best.)
- A small spoon (like a ¼ measuring teaspoon)
- An oral thermometer (The kind you use to take a person's temperature. Do not use one of those strips that you put on your forehead. Use the kind of thermometer you stick in your mouth.)

Lab Supplies Needed for Module #13

- A saltine cracker
- A tablespoon
- Iodine (This is available at any drug store. You used it in Experiment 9.2.)
- Two small glasses
- TUMS antacid tablets (Try to get white ones, or at least a tub of TUMS that have some white ones in it.)
- Toilet bowl cleaner (It should contain hydrochloric acid as an ingredient. The best kind to get is colorless. If you cannot get colorless, get a clear kind that has a light tint of color to it. DO NOT get the kind that clings to the bowl. I used non-clinging THE WORKS[®] when I ran the experiment.)
- Red (sometimes called purple) cabbage
- A teaspoon
- A separate spoon for stirring
- A saucepan
- A measuring cup
- Distilled water (You can get it at any large supermarket. You need about two quarts.)
- A stove for boiling water
- Baking soda

Lab Supplies Needed for Module #14

- A watch with a second hand or (better yet) a stopwatch
- A place that you can do jumping jacks
- Flexible tubing (If you don't have some, the best place to get it is anywhere that sells aquarium products. It is typically called "aquarium tubing," and it is used to connect the aquarium air pump to the filter.)
- A plastic one gallon jug with a lid
- A sink with a plug
- A measuring cup
- A plastic, 2-liter bottle (the kind soda pop comes in)
- Strong scissors
- A plastic sandwich bag (It needs to be large enough for the bottom of the 2-liter bottle to fit into the bag.)
- Tape
- A round balloon (12-inch is ideal, but any size greater than 6-inch will do.)
- A rubber band (It should be large enough to fit around your wrist without stretching. If the rubber band is larger, it will work fine, but a smaller one will not work.)
- A reasonably fresh white carnation (Almost all big supermarkets sell them these days.)
- Two glasses
- Blue food coloring
- Red food coloring
- A knife
- Two spoons for stirring

Lab Supplies Needed for Module #15

- Three onions (any size)
- A cutting knife (In this experiment, a dull knife works better than a sharp one!)
- A freezer
- A cutting board
- A sink in which you can cut
- A tea bag
- Three small glasses (like juice glasses)
- A paper towel
- A coffee filter
- A funnel
- Scissors
- A tea kettle or pot
- A stove
- A spoon for stirring
- A pile of 2 to 3 books (The pile needs to be at least $\frac{3}{4}$ as high as one of the glasses.)

Lab Supplies Needed for Module #16

- Scissors
- A pencil
- Paper
- A ball (It needs to be small enough to be thrown with one hand, like a baseball, softball, or golf ball.)
- A coin
- Some stairs or porch steps
- A paper towel tube or rolled-up piece of thick paper
- A few people to test (8 years or older)
- A glass
- A mirror
- A room with a light switch that when closed off gets *really* dark
- A candle
- Matches
- Salt
- Sugar
- Water
- Lemon juice
- Onion juice (Tonic water is a substitute, but it is not as effective. To make onion juice, cut a few slices of onion and put them in a zippered plastic bag. Then strongly press a rolling pin back and forth across the bag several times. In this way, you will squeeze the juice right out of the onion! You do not need a lot of juice.)
- Several toothpicks
- 5 glasses
- Apple
- Onion
- Blindfold
- A knife
- Two paper towels
- Two sheets of paper
- A black marker or pen
- Two well-sharpened pencils
- Some tape

Exploring Creation With General Science

Dr. Jay L. Wile

Table of Contents

Module 1 : A Brief History of Science

Introduction	1
The First Inklings of Science	1
True Science Begins to Emerge	4
Experiment 1.1: Density in Nature	5
Experiment 1.2: Atomic Motion	7
Three Other Notable Greek Scientists	8
The Progress of Science Stalls For a While	12
Experiment 1.3: A Chemical Reaction	12
Science Begins To Pick Up Some Speed Again	16
The Renaissance: The “Golden Age” of Science	19
Experiment 1.4: Mapping the Paths of the Planets	21
The Era of Newton	23
The “Enlightenment” and the Industrial Revolution	25
The Rest of the Nineteenth Century	27
Modern Science (1900 A.D. - Present)	29
Summing it Up	31

Module 2 : Scientific Inquiry

Introduction	35
What Science is NOT	35
Experiment 2.1: How Does Weight Affect the Speed	35
Experiment 2.2: Learning More About Weight and Speed	36
The Scientific Method	40
Experiment 2.3: The Broken Flashlight	43
Failures of the Scientific Method	45
The Limitations of Science	49
Science and Christianity	50

Module 3: How to Analyze and Interpret Experiments

Introduction	59
Experiments and Variables	59
Experiment 3.1: A Floating Egg?	60
Using a Series of Experiments	63
Experiment 3.2: Which “Boat” Will Move?	63
Experiment 3.3: What Does Soap Do To Water? - Part 1	66
Experiment 3.4: What Does Soap Do To Water? - Part 2	67
Recognizing Experimental Variables When They are not Obvious	70
Interpreting the Results of Experiments	73

Module 4: Science, Applied Science, and Technology

Introduction 83
 The Distinction Between Science, Applied Science, and Technology83
 Simple Machines 86
 The Lever 87
 Experiment 4.1: The Lever 87
 The Wheel and Axle 93
 The Pulley 95
 Experiment 4.2: A Simulation of A Series of Pulleys 96
 The Inclined Plane 99
 The Wedge 100
 The Screw 102

Module 5: The History of Life: Archaeology, Geology, and Paleontology

Introduction 111
 How Do We Learn About The History of Life? 111
 Archaeology and History 112
 The Internal Test 116
 The External Test 119
 The Bibliographic Test 123
 Archaeology in the Absence of Historical Documents 124
 Relative Dating and the Principle of Superposition 129
 What Do We Know About Human History? 130

Module #6: Foundations of Geology

Introduction 137
 Soil, Rocks and Minerals..... 138
 Experiment 6.1: The Difference Between Rocks and Minerals140
 Strata in Sedimentary Rock 142
 Experiment 6.2: Separation of Sedimentation 143
 Weathering of Rocks145
 Experiment 6.3: Physical Weathering146
 Experiment 6.4: Chemical Weathering 147
 Erosion 149
 Experiment 6.5: Erosion 149
 Bringing It All Together: The Basic Structure of the Grand Canyon 154

Module #7: The Fossil Record

Introduction	161
The Making of Fossils Part 1: Casts and Molds	161
Experiment 7.1: Making a Fossil Cast	162
The Making of Fossils Part 2: Petrification	164
The Making of Fossils Part 3: Carbonate Residues and Impressions	165
The Making of Fossils Part 4: Avoiding Decomposition	167
Experiment 7.2: Sinking in Ice	168
Three General Features of the Fossil Record	170
A Fourth General Feature of the Fossil Record	173
Geology and Paleontology from the Uniformitarian Viewpoint	176
Geology and Paleontology from the Catastrophist Viewpoint	179
Which View is Correct?	182

Module #8: Uniformitarianism and Catastrophism

Introduction	189
Uniformitarianism and the Geological Record	189
Experiment 8.1: A Simulation of Using Index Fossils	190
Uniformitarianism and Evolution	195
Catastrophism and the Geological Record	197
Catastrophism and the Fossil Record	202
Uniformitarianism or Catastrophism: Which is Better?	206
Evolution: Another Weakness of Uniformitarianism	210

Module #9: What is Life?

Introduction	217
DNA and Life	217
The Structure of DNA	220
Experiment 9.1: Building a Model of DNA	221
Energy and Life	225
Experiment 9.2: Finding Food in Plants	225
Experiment 9.3: A Simple Biosphere	227
Sensing and Responding to Change	229
Experiment 9.4: Sensing and Responding to Change	230
Reproduction and Life	231
Experiment 9.5: Fruit Fly Reproduction	232
The Cell - Life's Smallest Unit	235

Module #10: Classifying Life

Experiment 10.1: Factors that Affect Bacterial Growth (Part 1)	243
Introduction	244
The Five-Kingdom System	245
Kingdom Monera	247
Experiment 10.1: Factors that Affect Bacterial Growth (Part 2)	249
Kingdom Protista	252
Kingdom Fungi	255
Experiment 10.2: Yeast is a Decomposer	258
Kingdom Plantae	259
Experiment 10.3: Vegetative Reproduction	259
Experiment 10.4: Turgor Pressure	261
Kingdom Animalia	262

Module #11: The Human Body: Fearfully and Wonderfully Made

Introduction	267
The Superstructure of the Human Body.....	267
Bones and the Human Skeleton	269
Experiment 11.1: Minerals in Bone	269
Skeletons in Other Organisms	273
Skeletal Muscles	275
Smooth Muscle and the Cardiac Muscle	281
Muscles and Movement in Other Organisms	282
Experiment 11.2: Phototropism and Gravitropism in Plants	283
Skin	284
Experiment 11.3: Skin Color	288
Skin in Other Organisms	289
Summary	289

Module #12: Energy and Life

Introduction	295
Life's Energy Cycle	295
How Do Organisms Get Energy From Food?	298
Experiment 12.1: What Combustion Needs	298
Experiment 12.2: What Combustion Makes	300
What Actually Gets Burned For Energy?	303
Energy Use in the Body	308
Experiment 12.3: Body Temperature	309
Calories and Food	311
Metabolic Rates Throughout Creation	313
How Combustion Works in Living Organisms	314

Module #13: The Human Digestive System

Introduction	321
The Process of Digestion	321
Experiment 13.1: Seeing a Part of the Digestive Process	321
The Human Digestive System	323
The Mouth, Pharynx, and Esophagus	326
The Stomach and Intestines	329
Experiment 13.2: Stomach Acid and Antacids	330
The Liver, Pancreas, and Gall Bladder	335
Experiment 13.3: The Effect of Sodium Bicarbonate on Stomach Acid	337
The Micronutrients	338

Module #14: The Human Respiratory and Circulatory Systems

Introduction	345
The Human Circulatory System	345
The Heart and Blood Flow	348
Experiment 14.1: Your Own Cardiac Cycle	352
The Components of Blood	354
Lungs and Blood Oxygenation	356
Experiment 14.2: Measuring the Capacity of Your Lungs	358
The Respiratory System	360
Experiment 14.3: A Model of Your Lungs	361
Experiment 14.4: A Model of Your Vocal Cords	362
Circulation and Respiration Throughout Creation	363
Experiment 14.5: Xylem	364

Module #15: The Human Lymphatic, Endocrine, and Urinary Systems

Introduction	369
The Lymphatic System	369
Lymph Nodes	372
Tears	375
Experiment 15.1: Working Your Lacrimal Glands Too Hard	376
The Urinary System	378
Experiment 15.2: A Model of Kidney Function	379
The Endocrine System	382

Module #16: The Human Nervous System

Introduction	387
Neurons: The Basic Unit of the Nervous System	389
The Basic Layout of the Human Nervous System	393
Our “Split” Brains	397
Experiment 16.1: Determining a Person’s Dominant Side	397
The Brain and Blood	400
The Peripheral Nervous System (PNS)	402
Experiment 16.2: The Pupil of the Eye	403
The Human Sense of Taste	405
Experiment 16.3: Mapping Your Taste Buds	406
The Human Sense of Smell	408
Experiment 16.4: The Sense of Smell and the Sense of Taste	408
The Human Sense of Vision	410
Experiment 16.5: The Human Blind Spot	412
The Human Sense of Touch	415
Experiment 16.6: The Variation in Touch Sensitivity	416
The Human Sense of Hearing	417
Do We Really Use Only 10% of our Brain?	418
Summing it All Up	419