

## Topic Selection Worksheet

Name: \_\_\_\_\_

Grade: \_\_\_\_\_

Class: \_\_\_\_\_ ( 9<sup>th</sup> – 12<sup>th</sup> only)

Each student going into 5<sup>th</sup> through 12<sup>th</sup> grade, who is in a science class, will choose three options for their upcoming science experiment. The student will need to choose their topics over the summer and it will be due on the first day of class. This year, each student will pick three topics in the area in which they will be studying during the 2011 – 2012 school year. **It will be worth a quiz grade on the first day of school.**

The following are categories in which each grade will choose their topic from:

- 5<sup>th</sup> – 6<sup>th</sup> grade: general science – weather, erosions, plants, electricity magnetism, motion, stars & solar system, and heredity
- 7<sup>th</sup> – 8<sup>th</sup> grade: Earth and Space science – this includes biology, geology, astronomy, and chemistry
- Biology (9<sup>th</sup>) – study of living matter – plants, animals, microorganism.... ect
- Physical Science (10<sup>th</sup>) – Chemistry, Physics, and Engineering projects only
- Chemistry (11<sup>th</sup>/12<sup>th</sup>) – Chemistry experiments and Engineering projects only
- Physics (11<sup>th</sup>/12<sup>th</sup>) – Physics experiments and Engineering projects only

To make this process easier, first choose a problem in which you would like to solve. You may want to go online and search for experiments. However, do not think you need to follow the experiment exactly as it is written on-line. You may change it to whatever you need. A younger student may pick an experiment that is designed for an older student. However, an older student can not pick an experiment designed for a younger student. Please remember, you only need to choose the three topic options, you do not need to do the experiment over the summer.

Here are some examples.

### **5<sup>th</sup>/6<sup>th</sup> grade: Growing a Soil Menagerie**

Everything on our planet is linked by a giant recycling system called the *biogeochemical cycle*. Learn how our planet recycles and reuses everything we need to support life by

making a miniature biosphere. Which nutrients will be important for your miniature life-support system?

### **7<sup>th</sup>/8<sup>th</sup> grade: Make Your Own Psychrometer**

The goal of this project is to build and use a *psychrometer*, a simple instrument for measuring the relative humidity of the air. You can check with online psychrometer.

### **Biology:**

#### **Can Garlic Prevent Crown Gall?**

Crown gall is a plant disease caused by the soil bacterium *Agrobacterium tumefaciens*. This project uses tomato plants to investigate whether garlic extract can prevent crown gall infection.

#### **Extracting Onion DNA**

In this project, you'll learn how to isolate DNA from onion cells, separating it from other cellular components in a manner that still preserves its structure and sequence. In the end, you'll have enough DNA to see with the unaided eye, and you'll be able to spool it to demonstrate its strand-like structure.

### **Chemistry:**

#### **Rusting Out: How Acids Affect the Rate of Corrosion**

Have you ever left your bike outside in the rain? If so, you might have discovered unpleasant surprises afterwards—reddish-brown patches, known as *rust*, and your wheels, brakes, and gears might have stopped working so smoothly. In this chemistry science fair project, you'll learn why rust, a type of corrosion, is a serious problem. You will use Sulfuric acid of different concentration and test the relative strengths to see how it affects the one particular metal.

#### **Enzyme-Catalyzed Reactions -- What Affects Their Rates?**

Enzymes speed up chemical reactions by factors of at least a million. Now that's acceleration! This project investigates some of the factors that affect how fast enzymatic reactions occur.

### **Physics:**

#### **Roller Coaster Marbles: How Much Height to Loop the Loop?**

This is a really fun project even if you don't like going on roller coasters yourself. You'll build a roller coaster track for marbles using foam pipe insulation and masking tape, and see how much of an initial drop is required to get the marble to "loop the loop." It's a great way to learn about how stored energy (potential energy) is converted into the energy of motion (kinetic energy).

#### **Come One, Come All! Explore the Effect of Light on the Speed of the Amazing**

**Rotating Radiometer!** Radiometers are fun-to-watch novelty items, but they also have a distinguished scientific history, having been studied by James Clerk Maxwell and Albert Einstein. A radiometer has a set of four vanes (like small sails) connected to a spindle that is free to rotate. When the radiometer is placed in bright light, the vanes and spindle

start to spin. It looks like a magic trick, but there is a scientific explanation for this weird behavior. In this science fair project, you will experiment with this simple, but fascinating, apparatus and determine how the speed of rotation of the radiometer's vanes varies with the amount of light striking them.

**Engineering project:**

**Strength of Different Construction Materials** There are many types of construction materials used for wood-frame houses. Compare the different uses for and strengths of different building materials, e.g.: particle board, plywood, pine, oriented strand board (OSB), and drywall (gypsum board, SheetRock). The Science Buddies Materials Science Resource [Stress, Strength and Strain](#) will be helpful for learning about different ways to measure material strength. You should be sure to use the same cross-sectional area of each material in order to make fair comparisons. (Hess, 2006)

**How Much Can Plug-in Hybrid Vehicles Reduce Greenhouse Gas Emissions?** Are you concerned about global warming and greenhouse gases? Here's a project that shows how hybrid electric and plug-in hybrid electric vehicles can reduce greenhouse gas emissions. Compare your own car's greenhouse gas emissions to hybrid cars using online data from PG&E and Google.org's RechargeIT project.

**The Chills and Thrills of Roller-Coaster Hills** Do you *love* roller coasters and other kinds of exciting rides? Are you a thrill-seeker? Well, this is the science fair project for you! What makes a ride so thrilling that people want to ride it over and over again even though it scares them? Is it the speed, the twists and turns, the vertical drops? In this science fair project, you will build and use an accelerometer to figure out what makes a roller-coaster ride worth standing in line for. Oh, and if Mom and Dad ask what an amusement park visit has to do with school, let them know that it's all because you love science!

**It will be worth a quiz grade on the first day of school.**

Choice 1: \_\_\_\_\_

Choice 2: \_\_\_\_\_

Choice 3: \_\_\_\_\_

Student's Signature: \_\_\_\_\_

Parent's Signature: \_\_\_\_\_