

Name _____ Due Date: _____ Date Submitted: _____

Worksheet 1: The Four Question Strategy “Brainstorming”

Directions: Complete the information below.

Science project test subject: Plants (ex. Seeds, pond water, mosquitoes, etc.)

1. What are 12 materials or things you need that are readily available for conducting experiments on Plants?
(Write test subject here)

seeds	water	plant food	ruler
pots	light	space	gloves
Dirt/soil	shovel	rocks/gravel	measuring cups

2. List 3 possible ways that Plants can respond/change, act or work.
(Write test subject here)

Grow/sprout	Change color	Wilt or shrivel
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3. Pick three of the main materials that you listed above in question 1 and list how they can be changed to affect the response of Plants.
(Write test subject here)

seeds	water	dirt
Age, direction, temperature, amount	Amount, type, temperature, substances dissolved in it	Amount, type, temperature, size of particle

4. How can you measure the subject's response to the changes listed in #2? (A minimum of three ways is required)

Grow/Sprout- measure height, circumference of stem, number of leaves, number of flowers, days to sprout number of plants that sprout, root growth

Change color- compare how many days it takes the plant to change color and record the number of different colors

Wilt or shrivel- time it take the plant to wilt , number of leaves that wilt, location of leaves that wilt, amount of the plant that wilts

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Worksheet 2: The Four Question Strategy Creating a Project Question

Directions: to create a Problem/ Question to investigate, refer back to worksheet 1. Select an item from your answers listed for #3, and relate it to a possible response from an answer in #4.

Use this format to help:

What affect does _____ (fill in a choice from question #3) have on _____ (fill in a choice from #4)?

Note: You are not trying to answer a question you are only making up questions.

What affect does the age of seeds have on the time to sprout ?

What affect does the location of seeds have on the amount sprouting ?

What affect does the amount of water have on the amount of fruit ?

What affect does the type of water have on the plant's color ?

What affect does the type of soil have on root growth ?

Which question/problem from above is the most feasible? Why? What affect does the type of water have on the plant's color? I can get different types of water easily or I can just add food coloring to water.

Which question/problem from above is the most interesting? Why? What affect does the type of soil have on root growth? You can see how tall a plant gets, but you can't see how the roots are affected by the soil.

Which question/problem are you going to choose to investigate? Write it down again.

My Problem Question is:

What affect does the type of soil have on root growth?

Approval of Teacher: _____ Date: _____

Approval of Parent: _____ Date: _____

Resources

"ROOTING INTO INQUIRY: Student-Designed Projects, the Four Question Strategy." *Coastal Roots*. Louisiana Marine Education Resources, n.d. Web. 30 July 2012. <http://lamer.lsu.edu/pdfs/CR_RootingIntoInquiry.pdf>. Bryan, Leslee. "Windmill Problem Worksheet" September 2010. July 30, 2012.

Worksheet 3: Identifying the Variables, Control & Constants

Title (Problem/Question): What affect does the type of soil have on root growth?

1. Identifying Variables: Complete the chart below

Independent Variable: <u>the type of soil</u> (Remember, the independent variable is the "If" part of the hypothesis and is the subject of your experiment)					
Levels of the <u>Independent Variable</u> (Be sure to include units of Measure ex. Grams, parts per thousand, liters, etc.)					
Control Group	Experimental Groups				
	Level 1	Level 2	Level 3	Level 4	Level 5
Soil with nothing added	Soil with 15 cubic cm of sand	Soil with 15 cubic cm of clay	Soil with 15 cubic cm of loam		

2. What is the dependent variable in your experiment? (What will change as a result of your experiment? What change in the experimental groups are you measuring?)

Length of the main taproot

3. What tools do you need to use to measure your dependent variable? (Stopwatch, meter stick, thermometer, etc.)

Meter stick

4. What units will you be using to measure the dependent variable? (Meters, liter, grams, etc.)

centimeters

5. List all the variables in your experiment that need to be controlled or kept constant.

Type of plant	Amount and type of water	Time watered	Time the plant grows
Amount of sand, loam, clay	Location planted	Amount of sunlight	Measuring of the root
Type of pots	Amount and type of potting soil	Age of plant	Amount of plant food