

Name

Date

Period

HBIO: The Scientific Method

<p style="text-align: center;">CLASS SCENARIO</p> <p>Biology students from Penn State wanted to find out which plant required more water, an annual or a perennial flower. They decided to use a dandelion as the annual and a rose as the perennial. In three separate containers they placed equal amounts of water. In the first two containers they placed the dandelion and the rose, and included the root systems, stems, and leaves, leaving the third container without a plant. Before placing the plants in the containers they cut the stems at an angle. They then placed all the containers in the sunlight. After two days they recorded the amount of water remaining.</p>	<p>Hypothesis If the plant is a perennial, then it will soak up more water.</p> <p>Independent Variable Type of plant</p> <p>Dependent Variable Amount of water remaining</p> <p>Experimental Group Annual & Perennial</p> <p>Control Group No plant</p> <p>Controlled Variables Amount of water, sunlight, cut of stem</p>
<p style="text-align: center;">SCENARIO 1</p> <p>Marine biologists from the University of Miami wanted to see if fish could "learn" by association. They set up three identical ten-gallon aquariums. The walls and tops were covered with black construction paper to prevent light from entering. Ten feeder guppies were added to each aquarium as test subjects. A small corner of each aquarium was left open, and a small reading light was placed over it. Each day, the light was turned on over the aquarium, and thirty seconds later, a small amount of food was added to two of the aquariums. No food was added after the light in the third aquarium. Every five days for twenty days, the number of fish that came to the light before the food was offered was recorded.</p>	<p>Hypothesis If a light is shined on the fish tank, then the fish will 'learn' food is coming when the light is turned on.</p> <p>Independent Variable Presence/absence of light</p> <p>Dependent Variable # of fish coming to light BEFORE the food</p> <p>Experimental Group fish receiving light with food</p> <p>Control Group fish not receiving food</p> <p>Controlled Variables light, type of fish, set-ups</p>

<p style="text-align: center;">SCENARIO 2</p> <p>Scientists from DuPont wanted to find out if certain factory by-products were acids or bases. They tested dioxin dichlorobenzene, chloroaniline, and water. They placed two tablespoons of each liquid into separate beakers. Then they took three strips of red Litmus paper and dipped one into each beaker then laid them out to dry. When they dried, they then recorded the color of the paper and whether it was an acid or a base. A positive base test is blue, a positive acid test is red, and in a neutral test the paper does not change.</p>	<p>Hypothesis If dioxin dichlorobenzene is put on litmus paper, then the litmus paper will turn blue indicating it is a base.</p> <p>Independent Variable Different types of liquids</p> <p>Dependent Variable pH (color of litmus paper)</p> <p>Experimental Group dioxin dichlorobenzene & chloroaniline</p> <p>Control Group water</p> <p>Controlled Variables type of paper, amount of liquid</p>
<p style="text-align: center;">SCENARIO 3</p> <p>After learning about recycling, members of Dr. Farina's biology class investigated the effect of various recycled products on plant growth. Because composition is necessary for release of nutrients, one lab group compared the effect of different-aged grass compost on bean plants. Three flats of bean plants (25 plants/flat) were grown for 5 days. The plants were then fertilized as follows: (a) Flat A: 450 g of 3-month-old compost, (b) Flat B: 450 g of 6 month-old compost, and (c) Flat C: 0 g compost. The plants received the same amount of sunlight and water each day. At the end of 30 days the group recorded the height of the plants (cm).</p>	<p>Hypothesis If older compost is added to the bean plants, then the plants will grow taller.</p> <p>Independent Variable (amount) and age of compost</p> <p>Dependent Variable height of plant</p> <p>Experimental Group flat A (3 month) and B (6 month)</p> <p>Control Group flat C (no compost)</p> <p>Controlled Variables amount of sunlight and water</p>

<p style="text-align: center;">SCENARIO 4</p> <p>New York state government researchers wanted to find out if the color of food would affect kindergarten children's lunch selections. They put food coloring into 5 identical bowls of mashed potatoes. The colors were plain, red, green, yellow, and blue. Each child chose a scoop of potatoes of the color of their choice. The researchers did this experiment using 100 students. They recorded the number of students that chose each color.</p>	<p>Hypothesis If food is colored, then more students will eat it.</p> <p>Independent Variable color of food</p> <p>Dependent Variable # of students choosing color</p> <p>Experimental Group red, green, yellow, blue</p> <p>Control Group plain color</p> <p>Controlled Variables bowls, type of food, age of children</p>
<p style="text-align: center;">SCENARIO 5</p> <p>Physicians from Thomas Jefferson University Hospital wanted to test the effect of a new drug on patients with lung cancer. They measured the size of the patients' tumors before the study. They then administered the new drug to 50 patients with stage 3 lung cancer. They gave a sugar pill, or placebo, to another group of 50 patients with the same type of lung cancer. They did not administer any other kind of treatment during this time period. After four weeks, they again measured the size of the tumors and noted any changes.</p>	<p>Hypothesis If patients receive the drug, then the tumor will shrink.</p> <p>Independent Variable drug</p> <p>Dependent Variable size of tumor</p> <p>Experimental Group people receiving new drug</p> <p>Control Group people receiving placebo</p> <p>Controlled Variables stage of cancer, type of cancer</p>

<p style="text-align: center;">SCENARIO 6</p> <p>A shopping mall wanted to determine whether the more expensive "Tough Stuff" floor wax was better than the cheaper "Steel Seal" floor wax at protecting its floor tiles against scratches. One liter of each brand of floor wax was applied to each of 5 test sections of the main hall of the mall. The test sections were all the same size and were covered with the same kind of tiles. Five other test sections received no wax. After 3 weeks, the number of scratches in each of the test sections was counted.</p>	<p>Hypothesis If tough stuff is applied, then there will be less scratches .</p> <p>Independent Variable type of wax</p> <p>Dependent Variable # of scratches</p> <p>Experimental Group tough stuff, & steel seal</p> <p>Control Group no wax</p> <p>Controlled Variables size, tiles</p>
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