

Activity 2.1**Design Detective**

After studying about recycling, members of John's biology class investigated the effect of various recycled products on plant growth. John's lab group compared the effect of different aged grass compost on bean plants. Because decomposition is necessary for release of nutrients, the group hypothesized that older grass compost would produce taller 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 three-month-old compost, (b) Flat B: 450 g of six-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).

In chemistry class, Allen determined the effectiveness of various metals in releasing hydrogen gas from hydrochloric acid. Several weeks later, Allen read that a utilities company was burying lead next to iron pipes to prevent rusting. Allen hypothesized that less rusting would occur with the more active metals. He placed the following into separate beakers of water: (a) 1 iron nail, (b) 1 iron nail wrapped with an aluminum strip, (c) 1 iron nail wrapped with a magnesium strip, (d) 1 iron nail wrapped with a lead strip. He used the same amount of water, equal amounts (mass) of the metals, and the same type of iron nails. At the end of 5 days, he rated the amount of rusting as small, moderate, or large. He also recorded the color of the water.

JoAnna read that certain perfume esters would agitate bees. Because perfume formulas are secret, she decided to determine if the unknown ester X was present in four different perfumes by observing the bees' behavior. She placed a saucer containing 10 ml of the first perfume 3 m from the hive. She recorded the time required for the bees to emerge and made observations on their behavior. After a 30-minute recovery period, she tested the second, third, and fourth perfumes. All experiments were conducted on the same day when the weather conditions were similar, e.g., air, temperature, and wind.

Susan observed that different kinds and amounts of fossils were present in a cliff behind her house. She wondered why changes in fossil content occurred from the top to the bottom of the bank. She marked the bank at five positions: 5, 10, 15, 20, and 25 m from the surface. She removed 1 bucket of soil from each of the positions and determined the kind and number of fossils in each sample.

Jackie read that *Aloe vera* promoted healing of burned tissue. She decided to investigate the effect of varying amounts of *Aloe vera* on the regeneration of planaria. She bisected the planaria to obtain 10 parts (5 heads and 5 tails) for each experimental group. She applied concentrations of 0%, 10%, 20%, and 30% *Aloe vera* to the groups. Fifteen ml of *Aloe vera* solutions were applied. All planaria were maintained in a growth chamber with identical food, temperature, and humidity. On Day 15, Jackie observed the regeneration of the planaria parts and categorized development as full, partial, or none.

Scenario 1
Compost & Bean Plants

Scenario 2
Metals & Rusting Iron

Scenario 3
Perfumes & Bees' Behavior

Scenario 4
Fossils & Cliff Depth

Scenario 5
***Aloe vera* & Planaria**
