Rainbow Flowers

Category: Biology

Type: Make & Take

Rough Parts List:

	White flowers
3-6	Different colors of food dye (at least red, blue, and yellow)
3-6	Jars or cups

Tools List:

Knife

Video: www.youtube.com/user/OaklandCSW

Blog Link: www.oaklanddiscovery.blogspot.com

How To:

Carnations are used here, but any white flower will work.

Fill the jars with water.
One jar, or cup, is needed for each color.

Add dye to each jar. 20-30 drops of dye per jar will ensure colorful flowers.

Stir the dye and make sure that is it completely disolved.

Cut each flower stem at an angle with a knife.

Place the flowers in the different jars.
Keep an eye on the flowers.
These are the flowers after one hour.

These are the flowers after 3 hours.
Be patient. It takes about a day to get really vibrant flower colors.

Once the flowers are bright and colorful, take them out of the jars and put them on display!

Fine Points:

→ Use the freshest flowers available; they will soak up more water and color more quickly.
→ White carnations, daisies, and roses work very well and create vibrant colors, but any white flower will do. Search the backyard for trees or plants with white flowers.
→ Flowers that are colors other than white will still soak up the dye; the dye and natural flower color will "blend" creating an interesting and unique color!
→ Any color can be created from the primary colors red, blue, and yellow. Try mixing red and blue for purple, red and yellow for orange, and yellow and blue for green.
→ To speed up the process, cut stems short and use warm water.
→ To get a two-colored flower, you can try splitting the stem and putting each side in a different jar. See focus question below.

Concepts Involved:

- Vascular plants have special tissues that transport water and minerals throughout the plant.
- Xylem and phloem make up the transportation system of vascular plants. Water moves up through the plant's vascular system through capillary action and other processes.

Focus Questions:

1. How do you think the dye ends up in the flower petals?
2. Why is the flower stem cut at an angle? Do you think this helps the flower absorb more water? What simple experiment could you do to find out the effect of the angle of the cut?
3. What colors would the flowers be if you moved them around to different jars of dye? Do you think the colors would blend or remain distinct?
4. What would happen if the stems were split in half lengthwise, with each half going into a different color of dye? Try it and find out!

Elaboration:

Most of the plants we see everyday are called vascular plants. Trees, ferns, grasses, and flowers are all vascular plants. These plants have special tissues that circulate water, minerals, and nutrients around the plant. Water and minerals are first absorbed from the soil by the plant's roots, which are then moved around by xylem. Xylem and phloem are the two types of transport tissues. Xylem form long tube-like vessels that help move water around the plant, while phloem carry the sugars made from photosynthesis. Both xylem and phloem also help support the plant and give it structure.

Several processes are involved in pushing the water and nutrients against gravity and up through the plant's vascular system. Three are as follows:

- Capillary action, the attraction between a liquid and the tube it is in. This is the force that pushes a liquid up a wick or a cloth with one end stuck in the water.
- Transpirational pull: Water in a plant's leaves and other surfaces evaporates into the atmosphere. This leaves a small pressure difference at the surface which gives a little pull to the top of the vascular system.
- Root pressure: Osmosis is the process of a liquid or gas moving through a membrane, such as a cell membrane, because one side has a higher concentration of solute. Liquid moves into the roots of a plant through osmosis and this gives a little push to the bottom of the vascular system.

With these processes, water and nutrients can be pushed up more than 100 meters in redwood trees!

By cutting the flower stems at an angle, more of the xylem is exposed to the dye, coloring the flowers more quickly. The dyed water travels through the xylem to all parts of the plant. The thin, white petals allow the dye to be seen very easily. Celery stalks have very visible xylem; it's that stringy fiber that makes it hard to chew sometimes. Try soaking a celery stalk in dye and slicing it in half. The individual xylem vessels will be easy to see. The celery leaves will also end up colorful like the flower petals!

Links to k-12 CA Content Standards:

Grades k-8 Standard Set Investigation and Experimentation

Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other strands, students should develop their own questions and perform investigations.

Grades k-12 Mathematical Reasoning:

1.0 Students make decisions about how to approach problems:
1.1 Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.
1.2 Determine when and how to break a problem into simpler parts.

2.0 Students use strategies, skills, and concepts in finding solutions:
2.1 Use estimation to verify the reasonableness of calculated results.
2.2 Apply strategies and results from simpler problems to more complex problems.
2.3 Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
2.5 Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.

3.0 Students move beyond a particular problem by generalizing to other situations:
3.1 Evaluate the reasonableness of the solution in the context of the original situation.
3.2 Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems.
3.3 Develop generalizations of the results obtained and apply them in other circumstances.

Grade 1 Standard Set 2. Life Sciences:

2.b Students know both plants and animals need water, animals need food, and plants need light.
2.e Students know roots are associated with the intake of water and soil nutrients and green leaves are associated with making food form sunlight.

Grade 5 Standard Set 2. Life Sciences:

2.e Students know how sugar, water, and minerals are transported in a vascular plant.

Grade 7 Standard Set 5. Life Sciences: Structure and Function in Living Systems:

5.a Students know plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.