



WHAT GOES DOWN MUST COME UP

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Lesson Summary for Grade 3

Students explore the capillary action of plants. Cross-curricular links are provided for language arts, social studies, mathematics, and art.

Science Activity 1: Magic Worms

Students discover what makes paper “grow” when water is dropped on it.

Source: Sarquis, J.L.; Sarquis, M.; Williams, J.P. *Teaching Chemistry with TOYS*; McGraw-Hill: New York, 1995; pp 75–82. (ISBN 0-07-064722-4)

Key Science Topics:

- absorption
- capillary action

Key Process Skills:

- observing
- measuring
- hypothesizing

Ohio State Science Standards Instructional Strands:

Inquiry:

- The learner will speculate on commonly held assumptions about events and phenomena in their world.
- The learner will observe events and phenomena of varying duration and report occurrences accurately and ethically.
- The learner will explain and discuss various influences affecting observations and interpretations.
- The learner will seek evidence to support ideas by asking “How does it work?” “How do we know?” and “Why?”
- The learner will use observed qualitative and quantitative attributes to describe phenomena.
- The learner will take responsibility for the care of supplies and equipment used in explorations.

Knowledge:

- The learner will explore the capacity of some objects and organisms to influence other objects and organisms.
- The learner will explore the estimations of observable time.

Conditions:

- The learner will be expressing ideas and observations made in other settings in small- and large-group settings.

- The learner will be using mathematics and language arts as tools to build models and express ideas.
- The learner will be participating in individual and group design of explorations.

Applications:

- The learner will be obtaining information from the environment.

Science Activity 2: Blooming Flowers

Students observe how paper reacts as it absorbs water.

Source: Sarquis, M.; Hogue, L. *Classroom Science from A to Z: 26 Complete Classroom Lessons*; Terrific Science: Middletown, Ohio, 2000; pp 76-77. (ISBN 1-883822-22-X)

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Science Activity 3: Crystals from Solutions

Students use a variety of saturated solutions to grow crystals, including Magic Trees.

Source: Sarquis, J.; Hogue, L.; Sarquis, M.; Woodward, L. *Investigating Solids, Liquids, and Gases with TOYS*; McGraw-Hill: New York, 1997; pp 141–148. (ISBN 0-07-048235-7)

Key Science Topics:

- capillary action
- crystals
- saturated solutions
- solids

Key Process Skills:

- predicting
- comparing/contrasting

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Science Activity 4: Inky Elevator

Family teams learn how to use chromatography to separate colored pigments in marker ink.

Source: Sarquis, M.; Hogue, L. *Science Night Family Fun from A to Z*; Terrific Science Press: Middletown, OH, 2000; pp 115–124. (ISBN 188382221-1)

Key Science Topics:

- chromatography
- capillary action

Key Process Skills:

- observation
- hypothesizing
- discussion

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Science Activity 5: Frisky Fish

Family teams investigate the reasons these fish curl up.

Source: Sarquis, M.; Hogue, L. *Science Night Family Fun from A to Z*; Terrific Science Press: Middletown, OH, 2000; pp 81–90. (ISBN 188382221-1)

Key Science Topics:

- absorption
- evaporation
- capillary action

Key Process Skills:

- observation
- hypothesizing
- inquiring
- discussion

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Science Activity 6: Spring Into Capillary Action

Students observe capillary action using celery and food color.

Source: Sarquis, M. and Woodward, L. *Science Projects for Holidays Throughout the Year*; McGraw-Hill: New York, 1999; pp 77–89. (ISBN 0070647585)

Key Science Topics:

- capillary action

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Possible Playout of Lesson:

Ask students how plants get water. List student ideas on the board. Begin the science activities by placing a piece of celery stalk (with leaves) in some colored water. Have students predict what will happen. Direct students to observe the celery during the day's activities and be prepared to discuss what happened at the end of the day.

Using the "Magic Worms" Science Activity, have students work in small groups of four or five to compare absorption of strips of different types of paper as well as a sponge. Continue with the "Magic Worms" straw activity on page 81. Provide each student team with a centimeter ruler and have the students record the measurement of the "Magic Worm" on step 3 before adding water, and then record the measurement on step 5 after adding water. Challenge students to create a bar graph to record their measurements. When the activity is completed, have each team record their "Magic Worm" measurements on the board. Discuss the reasons for the change in measurements. Have the students paste their bar graph into their science journals. Explain that when water comes in contact with a porous surface such as the straw paper, it tends to be absorbed or soaked up into the pores of the material. The attraction that water has to the porous material is greater than the downward force of gravity. This is similar to the way water from the soil travels into the roots and up through the stem of a plant. Have students write in their science journal below the bar graph why the "worm" grew.

Lead students through the "Blooming Flowers" Science Activity. Have students trace the flower pattern on newsprint and follow the directions for making the blooming flowers. While students are working on the flower activity independently, have small groups construct the Homemade Magic Trees (one per team) as detailed on page 145 of "Crystals from Solutions" with adult assistance. After all the Magic Trees are constructed, have students write in their science journal what predictions they have for the trees.

Explain to students that we now want to explore further how water moves up through a porous surface. Lead the students through the activities detailed in "Inky Elevators." For safety reasons, use a paper hole punch ahead of time to put the hole in the paper towel strips instead of having the students use a sharp pencil to make the holes. Suspend the paper towels with the straw from the "Magic Worm" activity. Have students record the results of their chromatography activities in their science journals. Discuss how the colors in the markers helped us to observe how the water traveled upwards. When dry, have the students staple the paper towel strips together in book form. Send the strip book home as homework instructing each student to explain the activity and results to their parents.

(Students are to bring the strip book back signed by an adult in their home. The completed strip book can be stapled into their science journal with a statement explaining the activity.)

Observe the Magic Trees as a class. Note any changes that have occurred. Ask students to explain what is happening to the Magic Trees. Explain what was in the crystal solution and how evaporation is causing the salts to be left behind. Continue the discussion of the trees over the next few days. Students can record their observations and a statement about what they observe in their science journals. End the lesson by returning to the day's beginning activity with the celery stalk. Discuss observations.

Language Arts Activity 1

Given a reading selection, students: discuss the story; analyze characters; discuss literature related to other disciplines; and write about the story.

Introduce Johnny Appleseed by brainstorming a list of the needs of the pioneer families in early Ohio. Discuss how apples played a part in their everyday life. Introduce the vocabulary for *Johnny Appleseed* by Stephen Kellogg. Write the following three questions on the board:

- What kind of a person was John Chapman?
- How did he affect the lives of the pioneers?
- How were apples important in the daily lives of the pioneers?

Use these questions to set the purpose for reading and have the students read the story silently. Have students choose one question and write a paragraph in their writing journals detailing the answer. Then read the story orally and discuss the questions as relevant information is heard, listing students' answers under each question on the board.

Language Arts Activity 2

Students write diary entries as Johnny Appleseed.

Use reference materials to answer questions relating to Johnny Appleseed and apple production. Then invite students to write diary entries for Johnny Appleseed. They can also complete a tree simile book.

Social Studies Activity

Students explain major reasons for people coming to Ohio; identify Ohioans who have made contributions in science, arts, government, sports, and other areas; and analyze and evaluate pioneer living.

Students discuss the importance of apples to the early Ohio settlers and discuss how John Chapman (Johnny Appleseed) influenced the lives of the Ohio settlers.

Mathematics Activity

Students choose an appropriate unit of measure for length and explore bar graphs (scaled by one) by making identifications, comparisons, and predictions.

Students measure straw paper "worms" in the "Magic Worms" Science Activity before

adding water and after adding drops of water one at a time. Students make a bar graph to organize the measurements of the straw paper “worms.”

Art Activity

Students create coffee filter butterflies.

The student use chromatography, like in the “Inky Ladder” Science Activity to create coffee filter “butterflies.”

References

Kellogg, S. “Johnny Appleseed,” *Treasury of Literature*; Harcourt: Orlando, FL, 1995; pp 39–52.

“Thirsty Plants,” *Project WET: Activity and Curriculum Guide*; Watercourse: Bozeman, MT, 1995; pp 116–121.

“Water Moves Up Stems,” *Best of Frank Schaffer’s Schooldays: Reproducible Teaching Units*; Frank Schaffer: Palos Verdes Estates, CA, 1987.