GARDEN: TEACHER GUIDE

Subject: Life Science, Mathematics
Grade Level: Middle School
Last Updated: November 6, 2008

Case Summary

Sam becomes very interested in botany after visiting with his aunt, a botanist. However, a science experiment gone wrong lands Sam in the Emergency Department. Can Sam use his mistake to teach others the importance of learning about plants?

Credits

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Learning Objectives

At the end of the case students will be able to:

1. Identify plants commonly used for medicinal purposes.
2. Identify the environment and habitat needed for specific plants to grow.
3. Design a garden and a landscape plan.
4. Calculate the circular area that a plant will occupy.

Georgia Performance Standards

S7CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters. (NSES Content Standard A)

　　b. Understand that different models (such as physical replicas, pictures, and analogies) can be used to represent the same thing.

S7CS6. Students will communicate scientific ideas and activities clearly. (NSES Content Standard A)

　　b. Write for scientific purposes incorporating data from circle, bar and line graphs, two way data tables, diagrams, and symbols.

　　c. Organize scientific information using appropriate simple tables, charts, and graphs, and identify relationships they reveal.

S7CS9. Students will investigate the features of the process of scientific inquiry.

　　f. Scientists use technology and mathematics to enhance the process of scientific inquiry.

S7CS10. Students will enhance reading in all curriculum areas by:

　　a. Reading in All Curriculum Areas
　　• Read technical texts related to various subject areas
　　c. Building vocabulary knowledge
　　• Demonstrate an understanding of contextual vocabulary in various subjects.
　　• Use content vocabulary in writing and speaking.
　　• Explore understanding of new words found in subject area texts.

　　　d. Establishing context
　　　• Explore life experiences related to subject area content.
S7L1. Students will investigate the diversity of living organisms and how they can be
　　　compared scientifically. (NSES Content Standard C)
S7L4. Students will examine the dependence of organisms on one another and their
　　　environments. (NSES Content Standard C)
　　　c. Recognize that changes in environmental conditions can affect the survival of both
　　　individuals and entire species.
M6M2. Students will use appropriate units of measure for finding length, perimeter, area and
　　　volume and will express each quantity using the appropriate unit.
　　　a. Measure length to the nearest half, fourth, eighth and sixteenth of an inch.
　　　b. Select and use units of appropriate size and type to measure length, perimeter, area and
　　　volume.
　　　c. Compare and contrast units of measure for perimeter, area, and volume.
M6G1. Students will further develop their understanding of plane figures.
　　　a. Determine and use lines of symmetry.
　　　b. Investigate rotational symmetry, including degree of rotation.
　　　c. Use the concepts of ratio, proportion and scale factor to demonstrate the relationships
　　　between similar plane figures.
　　　d. Interpret and sketch simple scale drawings.
　　　e. Solve problems involving scale drawings.
M7G1. Students will construct plane figures that meet given conditions.
　　　a. Perform basic constructions using both compass and straight edge, and appropriate
　　　technology. Constructions should include copying a segment; copying an angle; bisecting a
　　　segment; bisecting an angle; constructing perpendicular lines, including the perpendicular
　　　bisector of a line segment; and constructing a line parallel to a given line through a point not
　　　on the line.
　　　b. Recognize that many constructions are based on the creation of congruent triangles.
M7G3. Students will use the properties of similarity and apply these concepts to geometric
　　　figures.
　　　a. Understand the meaning of similarity, visually compare geometric figures for similarity,
　　　and describe similarities by listing corresponding parts.
　　　b. Understand the relationships among scale factors, length ratios, and area ratios between
　　　similar figures. Use scale factors, length ratios, and area ratios to determine side lengths and
　　　areas of similar geometric figures.
　　　c. Understand congruence of geometric figures as a special case of similarity: The figures
　　　have the same size and shape.
M8P1. Students will solve problems (using appropriate technology).
　　　a. Build new mathematical knowledge through problem solving.
　　　b. Solve problems that arise in mathematics and in other contexts.
　　　c. Apply and adapt a variety of appropriate strategies to solve problems.
　　　d. Monitor and reflect on the process of mathematical problem solving.
M8P2. Students will reason and evaluate mathematical arguments.
　　　a. Recognize reasoning and proof as fundamental aspects of mathematics.
　　　b. Make and investigate mathematical conjectures.
　　　c. Develop and evaluate mathematical arguments and proofs.
　　　d. Select and use various types of reasoning and methods of proof.

M8P3. Students will communicate mathematically.
    a. Organize and consolidate their mathematical thinking through communication.
    b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
    c. Analyze and evaluate the mathematical thinking and strategies of others.
    d. Use the language of mathematics to express mathematical ideas precisely.
M8P4. Students will make connections among mathematical ideas and to other disciplines.
    a. Recognize and use connections among mathematical ideas.
    b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
    c. Recognize and apply mathematics in contexts outside of mathematics.
M8P5. Students will represent mathematics in multiple ways.
    a. Create and use representations to organize, record, and communicate mathematical ideas.
    b. Select, apply, and translate among mathematical representations to solve problems.
    c. Use representations to model and interpret physical, social, and mathematical phenomena.

Assessment

Students are to design a medicinal plant garden for their school. When choosing the plants to use, students should keep in mind which plants will grow in your area. If a space is available at your school, students can actually create a medicinal plant garden. If not, students can be instructed to create a poster, brochure, or pamphlet that expresses the details of the medicinal garden. Details on the assignment are included in the ***Student Materials***.

Implementation Strategy

This case can be implemented in three 90-minute class periods. More time may be needed if the students are planting their own gardens or need more time for assignments. A sample implementation schedule is given below:

<u>Day 1</u>

Read Scene 1	10 min
Data, Questions, Learning Issues (whole class)	15 min
Research in computer lab	15 min
Read Scene 2	10 min
Data, Questions, Learning Issues (whole class)	15 min
Group discussion	20 min

<u>Day 2</u>

Read Scene 3	10 min
Data, Questions, Learning Issues (whole class)	15 min
Read Scene 4	10 min
Data, Questions, Learning Issues (whole class)	15 min
Read Scene 5	10 min
Data, Questions, Learning Issues (whole class)	15 min
Hand out assignment	
Class discussion	15 min

<u>Day 3</u>
Group work on assignment/research

<u>Day 4+</u>
As needed for group work on assignment

Resources

National Gardening Association. (2007). Kidsgardening.org. Retrieved November 5, 2008 from http://www.kidsgardening.com/

Center For New Crops and Plants. (2000). A guide to medicinal and aromatic plants. Retrieved November 5, 2008 from http://www.hort.purdue.edu/newcrop/med-aro/default.html

Medicinal Plant Working Group. (2007). Green medicine. Retrieved November 5, 2008 from http://www.nps.gov/plants/medicinal/

American Botanical Council. (2007). American Botanical Council, your reliable source for herbal medicine information. Retrieved November 5, 2008 from http://www.herbalgram.org/

American Herbal Pharmacopoeia. (2006). Retrieved November 5, 2008 from http://www.herbal-ahp.org/

Duke, J. (n.d.) Dr. Duke's phytochemical and ethnobotanical databases. Retrieved November 5, 2008 from http://www.ars-grin.gov/duke/

Arctic Research Consortium. (2007). Digital library for earth system education. Retrieved November 5, 2008 from http://www.dlese.org

Michael Serra. <u>Discovering Geometry, an Inductive Approach.</u> 1997. Key Curriculum Press. Emeryville, California.