Do Plants Make a Difference?

Fourth Grade
Activity: 10
Time: 2 Class Periods

General Description

Students collect and record temperature data around school yard and around homes to see whether plants make a difference in air temperature. Students explore ways in which landscaping can help reduce the amount of energy used to heat and cool a building.

Objectives

Students collect and analyze temperature data related to landscape around a building.
Students will research use of landscape to reduce the amount of energy used for heating and cooling.

Arizona State Standards

SC04 S1C2 PO1 Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, and organisms) in all science inquiry
SC04 S1C2 PO2 Plan a simple investigation that identifies the variables to be controlled
SC04 S1C2 PO3 Conduct controlled investigations (e.g., related to erosion, plant life cycles, weather, magnetism) in life, physical, and Earth and space sciences
SC04 S1C2 PO4 Measure using appropriate tools (e.g., ruler, scale, balance) and units of measure (i.e., metric, U.S. customary)
SC04 S1C2 PO5 Record data in an organized and appropriate format (e.g., t-chart, table, list, written log)
SC04 S1C3 PO1 Analyze data obtained in a scientific investigation to identify trends
SC04 S1C3 PO2 Formulate conclusions based upon identified trends in data
SC04 S1C4 PO1 Communicate verbally or in writing the results of an inquiry
SC04 S1C4 PO2 Choose an appropriate graphic representation for collected data:

- bar graph
- line graph
- Venn diagram
- model

SC04 S1C4 PO3 Communicate with other groups or individuals to compare the results of a common investigation
SC04 S4C3 PO4 Describe ways in which resources can be conserved (e.g., by reducing, reusing, recycling, finding substitutes)

W04 S1C1 PO1 Generate ideas through a variety of activities (e.g. brainstorming, graphic organizers, drawing, writer's notebook, group discussion, printed material)
W04 S3C2 PO1 Record information (e.g. observation, notes, lists, charts, map labels, and legends) related to the topic
W04 S3C4 PO1 Write persuasive text (e.g. advertisements, paragraph) that attempts to influence the reader

M04 S2C1 PO3 Interpret graphical representations and data displays including single-bar/circle graphs, two-set Venn diagrams, and line graphs that display continuous data
M04 S4C4 PO1 Identify the appropriate measure of accuracy for the area of an object (e.g., sq. feet or sq. miles)
M04 S4C4 PO3 Select an appropriate tool to use in a particular measurement situation.

LS E1 Prepare and deliver an organized speech and effectively convey the message through verbal and nonverbal communications with a specific audience
LS E2 Prepare and deliver an oral report in a content area and effectively convey the information through verbal and nonverbal communications with a specific audience
LS E3 Interpret and respond to questions and evaluate responses both as interviewer and interviewee

Teacher Information

Plants can help moderate temperature extremes of buildings and absorb heat while reflecting the rays of the sun. Strategically planting trees and shrubs can help reduce energy costs. Familiarize yourself with APS. "Planting Trees" Fact Sheet, Activity Card 4-10. Contact a landscape architect, a representative from the APS Environmental Showcase Home, a climate control expert, a representative from the Desert Botanical Gardens or others to come to speak to your students about their job.

Materials

Thermometers
Graph paper
Paper to create a map or mural
Activity Card 4-10

Procedures/Exploration

1. Students will predict if the air temperature is the same all around us, inside and out. Why might there be a difference?
2. Have the students' brainstorm how they could find out.
3. Create a data sheet and collect temperatures from recorded spots around the school.
4. Have the students share and graph the information and create a map or mural of recordings.
5. Have students plan to duplicate the activity at their home, making sure they all gather data the same night
6. Bring the information back to share with the class the next day.
7. Share the APS fact sheet "Tree Planting" Activity Card 4-10, with students; or have an outside presenter speak to the students.
8. Have the students research which plants are best for the Arizona climate and why?
9. Which plants are best to help reduce energy costs, how do the plants accomplish this. Present to the information to the class or to the principal.

Tree Planting Fact Sheet

Fourth Grade
Activity: 10
Activity Card: 4-10

Student's Name: **Date:**

- Trees help cool the earth and reduce carbon dioxide. A mature tree can absorb up to 16 pounds of carbon per year.
- Trees planted around your house help moderate the extremes in temperature around your home, therefore helping to reduce the cooling requirements of your air conditioning equipment.
- Low-water use desert shrubs and ground covers can also help reduce the cooling requirements of your home by absorbing the heat and reflecting the rays of the sun.
- Hot west walls can be cooled by appropriately placed trees or a trellis. Trees with dense crowns, broad spreading trees or full trellis vines can be the most effective in reducing the heat impact on the west side of your home. The south side can also benefit from the shade provided by an African sumac (evergreen), a mesquite or a Palo Verde (deciduous, loose leaves).
- Trees and bushes planted to shade patios and driveways can significantly reduce the amount of heat radiating through patio doors and windows.
- Shrubs and ground covers planted close to the house will trap static air between the foliage and the wall, creating an insulating space for year-round energy savings.
- The south side of your house will benefit from deciduous trees planted there. They will prevent the harsh impact of summer sun on the walls, windows and roof. In the winter, they will drop their leaves, allowing the sun to provide radiant heating during the cooler months.
- The east wall will benefit from deciduous trees as well, allowing the warmth of the early morning sun to warm the home in the winter, but protecting from the sun's impact in the summer.
- The northern side and corners of your home will benefit from evergreens planted there. These can act as a break to the cold winter winds and thus reduce the heating load on your heat pump. Some of the best species of dense branching conifers are Arizona cypress and Australian pine.
- Drought-tolerant trees are best choices for Arizona as they are both suitable for the climate and use only minimal water.
- When planting trees or large shrubs (such as oleanders), you should consider any above-ground or below-ground obstructions or obstacles which may be damaged by the long-term growth of the trees. Consider overhead wires, underground utilities, walls, patios and even your home's foundation which may be damaged by the tree's branches or roots.
- Before landscaping your yard, contact Blue Stake at 263-1100 (in Maricopa County), or 1-800-STAKE IT. This free service will mark your underground utility lines so you won't accidentally dig into the lines.
- Some trees which are most appropriate for planting near power lines in the arid southwest are: Texas Ebony, Chilean Mesquite, Shoestring Acacia, Southwestern Sweet Acacia, Texas Mountain Laurel, Palo Brea and Foothills Palo Verde. Trees which are suitable for planting in the cooler high country (above 4500 feet) are Arizona White Oak, Salt Cedar and Gambel Oak. All of these trees are low water use, hardy and provide a variety of shading/screening, flowers, wildlife habitats and decorative qualities.

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