

BRINGING DESIGN IDEAS TO LIFE

Students take design ideas inspired by their Design by Nature program and engineer models of a sustainable desert home.

OBJECTIVES

Students will be able to:

- Create models that represent design ideas.
- Describe desert plant and animal adaptations for keeping cool or saving water.
- Explain how analogous features on their models reflect these adaptations.

MATERIALS

- Clean recyclable items (i.e. plastic bottles, yogurt containers, cardboard, and paper tubes.)

ARIZONA SCIENCE STANDARDS

Gr. 4: S - 3, C - 2, P.O. 3, S - 4, C - 3, P.O. 4, S - 4, C - 4, P.O. 2

Gr. 5: S - 3, C - 2, P.O. 2

Gr. 6: S - 3, C - 2, P.O. 3

Gr. 8: S - 3, C - 2, P.O. 3, S - 4, C - 4, P.O. 1

HS: S - 3, C - 1, P.O. 5, S - 3, C - 2, P.O. 3

INTRODUCTION

In the Design by Nature program, students visit activity stations where they experiment with models and materials that illustrate plant and animal adaptations for saving water and keeping cool. They are presented with a design challenge: use these adaptations to design a desert home that uses water and energy efficiently. Back at school they will take these ideas and elaborate on them by creating three dimensional models and a brief report to explain their design. Note: Students will build their models with an assortment of recyclable materials. As you begin your Design by Nature unit, invite the students to bring in a variety of unique shapes and materials for their group projects so you will have them on hand for the post-program activity.

DOING THE ACTIVITY

1. Review what the students learned in their Design by Nature program. What are some ways that animals keep cool? (burrow underground, use body coverings to block or absorb heat as needed, use low-pressure generating shapes to create airflow, reflective coloration, etc.) How do desert plants store and collect water? (water storing tissues, shade-producing pleats and spines, water-channeling structures that capture rainfall for best storage, etc.) How might we use these adaptations to build a desert home that is sustainable?
2. Explain that they will be working together to build models of the design ideas they generated in their program. The models will not have to *do* what

they represent, just show it. You may want to show them real-life examples of architecture that has used some of these ideas, such as a house that collects and stores rainwater like a succulent: <http://www.evolo.us/architecture/succulent-house-collects-rainwater-through-use-of-biomimicry-murmur/> or a building that uses shades like cactus spines: <http://www.jetsongreen.com/2009/03/biomimicry-inspired-cactus-tower-by-aesthetics-architects.html>. Older students should consider types of building materials and renewable vs. non-renewable forms of energy as part of their design.

3. In addition to the models, each group will write a brief report of what the design represents: how each feature saves, stores, and/or collects water and keeps the structure cool with little energy input. How do their designs use nature's inspiration and protect the environment? Have older students evaluate and defend the impacts sustainable technologies like their design ideas might have on environmental quality.
4. Divide the students into small groups.
5. Distribute recyclable materials evenly among the groups.
6. Have them build their models and write their reports, then present each group's project to the class.

Extension: Share your students' ideas with us! Submit your students' photos, drawings, and/or a copy of their report to the Conservation Education and Science Department at the Desert Museum at education@desertmuseum.org.