

Bug on the Run Design Challenge

Help a Hexbug get to the Zoo

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Tennessee 4-H Youth Development

Bug on the Run Design Challenge

Help a Hexbug Get to the Zoo!

Skill Level

Beginner-Advanced

Learner Outcomes

The learner will be able to:

- Articulate the general needs of organisms in their habitats

Educational Standard(s) Supported

ETS1 (any grade level)

3.LS4.C

Success Indicator

Learners will be successful if they:

- Design a maze that meets the challenge requirements

Time Needed

30–40 minutes

Materials List

Hexbug nano robots (at least one per group)

Poster board

Tape

Scissors

Markers

Variety of construction/craft materials: wood craft sticks, pipe cleaners, straws, pompoms, cotton balls, toilet paper tubes, chopsticks, disposable dinnerware, Lego or other building toys

Introduction to Content

In this lesson, students will participate in a design challenge where they have to build a maze for Hexbug micro robots, providing elements of habitat along the way.

Introduction to Methodology

Hexbug brand toy bugs are small micro robots that move a lot like real insects. In this challenge, students will be divided into teams and given the challenge parameters.

Students will have time to build a design, test their design and adjust their design.

Authors

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Terms and Concepts Introduction

All organisms have some basic things they need from their environment: food, water, and shelter.

Setting the Stage and Opening Questions

Ask, “What are the basic necessities for life?”

Answers should include food, water, shelter

Ask, “Insects require the same basic necessities, but are there other things that could help with their survival?”

Answers could include camouflage, space to move, habitat, etc.

Set the stage: A rare insect was discovered in Crockett County and because it is so rare, it cannot be harmed in any way. All efforts are being made to protect the insect and provide for its basic needs of food, shelter and water. The ultimate goal is to move the rare insect to a local zoo, where it can survive. Until then, we need your help! Your challenge today includes the following:

- Get your bug from start to finish using a maze
- Your maze must cover the majority of your poster board
- Your bug must have access to shelter, food and water
- Your bug must climb over something
- Your bug must travel from start to finish without stopping
- Your bug cannot be touched once it starts the maze
- You can only use the supplies provided

Experience

1. Divide students into teams of 3-4. Provide each team with a list of the challenge rules (see appendix), a piece of poster board, tape, scissors and markers.
2. Have students work as a team to plan their design. Then instruct them to select five additional construction materials to use
3. Give students 20 minutes to build their design. Have students test their design, then give them five additional minutes to adjust their designs and retest.
4. Successful designs will be those that meet all the challenge requirements.

Share

Was your Hexbug able to safely reach food, water and shelter? How would this affect an insect’s survival in reality?

Share your drafted designs with the group. Which design(s) was the most successful? Least successful? Why?

Process

How would you adjust your design if given more time? Remember that engineers continuously design, test, re-design and re-test over and over again to optimize, so they don’t expect to get it perfect the first time!

Generalize

Can you think of situations where we need to provide food, water and/or shelter for endangered animals?

Apply

What are some ways we can improve the habitat for animals in our backyard or school yard?

Tips for Engagement

Show the youth Episode 1 of Planet Hexbug on YouTube. Scan the QR code using a smart device.



Have students time their insects through the maze to add a quantitative component to assist in a mathematics lecture.

Have students write a narrative essay about a day in the life of their Hexbug when in ELA.

Life Skill(s)

Hands: Demonstrate the characteristics of leadership, citizenship, and teamwork.

Head, Thinking: Learn to form ideas, make decisions, and think critically.

Head, Managing: Wisely use resources to achieve a purpose.

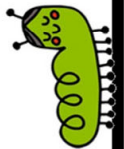
Hands, Working: Use skill, effort, or ability to accomplish a goal.

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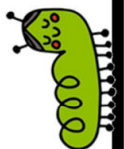


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Supplemental Information

Educational Standards Met

ETS1: Engineering Design

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

3.LS4.C Adaptation: For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.