



Burrow Builders: Designing Safe Animal Habitats

Pet: <i>Hamster</i>	Class: <i>grades 3-5</i>
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Brief Overview: Students explore the needs of animals in their habitats and apply the engineering design process to create a safe and functional burrow system for a small animal using Burrow Bricks . Students will design, build, test, and improve their structures while considering criteria such as safety, shelter, and movement pathways. This hands-on STEM activity promotes problem-solving, creativity, and understanding of animal survival.	Lesson Breakdown Lesson 1: Introduction to Animal Needs & Habitats Lesson 2: Designing and Building Burrows Lesson 3: Testing, Evaluating, and Improving Designs
Essential Question: How can we design a habitat that helps an animal survive and stay safe?	

Subjects Science ELA Math STEM	Stem Connections Science: Animal needs, habitats, survival Technology: Optional digital design or reflection tools Engineering: Design, build, test, and improve a burrow system Math: Measuring, counting materials, comparing results
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Performance Expectations/ Standards:

NGSS

- **3-LS4-3:** Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all
- **3-5-ETS1-1:** Define a simple design problem reflecting a need or want
- **3-5-ETS1-2:** Generate and compare multiple possible solutions

I CAN statements

- I can explain what animals need to survive in a habitat
- I can design and build a burrow for an animal
- I can test my design and identify ways to improve it
- I can explain how my structure helps an animal stay safe

Materials

- [Burrow Bricks](#)
- Hamster
- Marble or toy hamster (for testing)
- Rulers or measuring tools
- Paper and pencils
- Student recording sheet

Teacher Background

Burrowing animals, such as hamsters, rely on underground tunnels and chambers for safety, shelter, food storage, and movement. The structure of a burrow directly impacts an animal's survival by protecting it from predators and environmental conditions.

Burrow Bricks are designed to allow students to construct customizable habitats, including hides, mazes, and tunnels, making them ideal for modeling real-world animal environments and exploring engineering design concepts.

This lesson integrates life science and engineering by asking students to design a solution that meets the needs of a living organism.

Lesson 1: Introduction to Animal Needs & Habitats

Time	Materials	Activity
10 min	Images/videos of hamsters	Engage: Show 2-3 images/videos of hamsters in different environments (safe burrow vs open space). Ask: “ <i>Which hamster is safer? Why?</i> ” Students turn and task, then share out. Teacher records at least 5 student ideas (e.g., hiding, protection, warmth).
15 min	Chart paper	Explore/Explain: Create a class anchor chart titled “ <i>What Animals Need to Survive</i> ”. Guide students to include at least 4 categories: food, water, shelter, and space. Introduce the term <i>burrow</i> and explain its purpose using visuals.
15 min	Paper/pencils	Apply (Design Introduction): Students sketch an initial burrow design that includes: 1 entrance, 1 tunnel, and 1 hiding space. Require students to label at least 3 features and write 2 sentences explaining how their design helps the animal survive.

Lesson 2: Designing and Building Burrows

Time	Materials	Activity
10 min	Burrow Bricks	Introduce Design Challenge: Present criteria and constraints: 1. Must include a shelter area, 2. Must allow movement through at least one tunnel, 3. Must remain stable when lightly touched. Optional constraint: limit number of pieces (e.g., 20-30 bricks). Students restate the criteria in their own words.
25 min	Burrow Bricks	Build Phase: Students work in groups of 2-3 to construct their burrow. Teacher circulates and prompts: “ <i>How does this protect the animal?</i> ” and “ <i>What happens if the structure is bumped?</i> ” Students must make at least 1 improvement during building based on the discussion.
10 min	Recording Sheet	Document Design: Students draw their final structure and write 3-4 sentences explaining how their burrow meets each design requirement (shelter, movement, stability).

Lesson 3: Testing, Evaluating, and Improving

Time	Materials	Activity
15 min	Marble/toy hamster	Test Phase: Groups test their burrow using a marble. Students complete 3 tests: 1. Movement Test (does your marble pass through?), 2. Stability Test (light tap test), 3. Protection Test (is there a fully covered space?). Students record yes/no + 1 observation per test.
10 min	Recording sheet	Analyze Results: Students identify at least 2 strengths and 2 weaknesses of their design. Teacher models how to turn observations into improvements.
15 min	Burrow Bricks	Redesign: Students must make at least 2 changes to improve their structure (e.g., add support, widen the tunnel).
5 min	Class discussion	Share & Reflect: Each group shares one successful feature and one improvement. Class connects designs back to survival (e.g., protection from predators).

Differentiation

For students who need additional support:

- Provide a simple template or labeled diagram of a burrow
- Limit design requirements to 1-2 features (e.g., shelter + tunnel)
- Build as a whole class or in guided small groups
- Provide sentence starters for explanations

For students who need additional challenges:

- Add constraints (limited number of bricks, time limit)
- Require multiple chambers (sleeping, storage, etc.)
- Ask students to compare two design solutions and justify which is better
- Incorporate data collection (e.g., time for hamster to travel through)

Assessment				
Category	Criteria (4 points)	Criteria (3 points)	Criteria (2 points)	Criteria (1 point)
Understanding of Animal Needs	Clearly explains how the burrow supports survival with 3 or more accurate examples (e.g., shelter, movement, protection)	Explains survival with 2 accurate examples	Explains survival with 1 example OR partially accurate ideas	Provides no clear or accurate connection to survival
Design & Construction	Structure includes all 3 required features (shelter, tunnel, stability) and is fully functional	Includes 2 required features OR minor flaws in function	Includes 1 required feature OR major structural issues	Includes 0 features OR structure does not function
Testing & Data Collection	Completes all 3 tests and records clear observations (1+ per test)	Completes 2 tests with partial observations	Completes 1 test OR minimal observations	Completes no tests or records no data
Improvement & Redesign	Makes 2 or more meaningful improvements based on test results and explains changes	Makes 1 improvement with some explanation	Makes 1 unclear or unrelated change	Makes no improvements
Communication & Explanation	Provides 4+ complete sentences with clear reasoning and vocabulary (e.g., shelter, stability)	Provides 3 sentences with mostly clear explanations	Provides 1-2 sentences with limited clarity	Provides no written explanation or unclear response

Extension

- Research real burrowing animals and compare their habitats
- Create a digital model of a burrow design
- Write a short explanation describing how the burrow supports survival