Jungle Survival

Invention Step: Designing, Building, Testing
Grade Level: 3-5
Base Lesson Time: 70 minutes

Driving Question

How do inventors identify criteria and constraints, create a prototype, test to gather data and redesign the prototype?

Learning Objectives

Students Will Be Able To:

- Work collaboratively to design solutions within specific criteria and constraints.
- Create a model and build a prototype that can be tested.
- Test the prototype.
- Analyze feedback data to make necessary improvements.

Why This Matters

This project-based activity will help students understand steps of the invention process. Working through the designing, building and testing phases at once will provide a deep dive into these complex steps. Using a fun, fictional scenario will help students explore criteria and constraints in a low-risk experience.

Standards

Next Generation Science Standards:

- 3-5-ETS1-1 Engineering Design
- 3-5-ETS1-2 Engineering Design
- 3-5-ETS1-3 Engineering Design

Common Core ELA Standards:

- CCSS.ELA-LITERACY.SL.3.1; 4.1; 5.1

Materials

Each working group will need:

- 30 toothpicks
- 5 rubber bands
- 1 foot of tape
- 3 pieces of cardstock
- 1 pair of scissors
- 5 marbles

Prep Activity

Learning that they woke up in a jungle this morning, students will brainstorm possible environmental conditions and needs.

Core Activity

Given a specific set of materials, students will design, build and test a shelter that will support marbles. The Building a Shelter worksheet will guide their work.

Post Activity

Students and teachers will engage in a debriefing of the activity.

Homeschoolers or Virtual Learners

Working in education pods or virtual breakout rooms, students could build their own shelters, then share and revise in groups.

Model i Connectors

If using The Henry Ford's Model i Innovation Learning Framework, the activities in this lesson connect to the following Habits and Actions: Collaborate, Take Risks, Learn from Failure, Design, Optimize, Implement

Model i Connectors

Throughout this lesson, there will be opportunities to practice and develop Model i's Habits of an Innovator and Actions of Innovation. Listed below are the Habits and Actions that students will develop and practice for this lesson.

Developing Habits of an Innovator

Collaborate

Share what we know. Respect what others bring.

Take Risks

Think BIG. Embrace uncertainty.

Learn from Failure

Be resilient. Use feedback to make improvements.

Practicing Actions of Innovation

Design

Brainstorm solutions and create a prototype for testing that solution.

Optimize

Use feedback to improve the design through iteration.

Implement

Take prototype to market, seek new insight and re-enter the cycle.

Prep Activity

Invention Step: Designing, Building, Testing
Grade Level: 3-5
Prep Activity Time: 10 minutes

Brainstorm Needs

Tell students that they woke up this morning in the jungle. They have no idea how they got there or why.

Ask students to imagine what the environment is like. Write their answers where everyone can see them.

> Possible answers:
> Hot, humid, mosquitos or other bugs, green trees, dirt ground, snakes and/or other animals, rainfall, lots of sunshine, etc.

Now that they have painted a picture of their environment, ask students to brainstorm a list of their needs.

> Possible answers:
> Shelter, food, water, clothing, etc.

Tell students that it is monsoon season and that shelter will be their most important need to meet first.

Adjustments for Virtual Learning

- This can be led through a class discussion forum with student comments in the chat.

Core Activity

Invention Step: Designing, Building, Testing Grade Level: 3-5
Core Activity Time: 55 minutes

Jungle Survival

10 minutes
Break students into teams of 4-5 students.

Explain the meaning of “criteria and constraints.” Criteria help us know the requirements of a design or if it is successful. Constraints are the limitations of the design.

In this scenario, the criteria will be designing and building a successful shelter that can support the weight of at least five marbles. The constraints are that it must be freestanding and must be made only from the materials provided.

Give each student a copy of the Building a Shelter worksheet. Review the criteria and constraints that students must meet to build a successful shelter.

Distribute materials to each group.

- 30 toothpicks
- 5 rubber bands
- 1 foot of tape
- 3 pieces of cardstock
- 1 pair of scissors
- 5 marbles

10 minutes
Give students 10 minutes to draw their design on the worksheet.

15 minutes
Once students have their design, give students 10 minutes to build and test it.

20 minutes
If the structure is successful on the first try, students should attempt to design and build a structure that could hold more marbles, one marble at a time.

If the structure failed, students should collaborate to identify weaknesses. They should redesign their shelter on the worksheet, build and test it.

Adjustments for Virtual Learning

- Students building at home: Brainstorm what materials students can find in their homes to build.
- Students testing at home: Discuss what objects could be used to test the shelters, and the fairness of testing if everyone is using different objects.
- Have students build together on an online building platform.
- Students can show off their shelters on camera or take a picture of their designs to show the teacher/class.

Post Activity

Invention Step: Designing, Building, Testing Grade Level: 3-5
Post Activity Time: 5 minutes

Class Discussion

After students have cleaned up their materials, gather the class for a debriefing. Allow students to share their thoughts on the process. What worked for their group and what didn't work? Remember, this is also a good time to discuss softs skills or the Habits of Innovators, like being empathetic and collaborating.

Name_____

Building a Shelter

Situation

You and your classmates woke up in the jungle with no food, water or shelter. Your first challenge will be building a shelter for your group.

Goal

The structure needs to be able to follow all of the rules and hold at least five marbles.

Rules

1. Your structure must be freestanding, meaning it cannot use any outside structures for support (including hands and feet), and must be able to hold itself up.

2. You can only use the materials you are given.

Materials

- 30 toothpicks
- 5 rubber bands
- 1 foot of tape
- 3 pieces of cardstock
- 1 pair of scissors
- 5 marbles

First Design of Our Structure:

Name _____

Building a Shelter

Could you change something on your design? If yes, what?

Second Design of Our Structure: