



## Jungle Survival

### Lesson Overview

In this project-based activity, students will participate in a scenario where they will be survivalists on a reality television show in Papa New Guinea. Their goal will be to design, build, and test a jungle shelter based on preset criteria and constraints in order to survive.

### Lesson Objectives

Students will be able to:

- Brainstorm ideas collaboratively in a small group.
- Work collaboratively in a small group to design solutions while considering criteria and constraints.
- Create a model of a developing solution through sketching.
- Build a prototype that can be tested.
- Gather and analyze feedback to make improvements to their design.

### Materials

- Building supplies (recycled materials, cardboard, paper, tape, index cards, rubber bands, etc.)

### Learning Plan

#### Classroom Lesson:

##### Warm-Up (5 minutes)

Your students will be completing an engineering task in the role of a survivalist on a television reality show in Papua New Guinea with limited access to fresh water, food, and shelter. Ask your students what types of things they would need to take into consideration when constructing a shelter in the jungle. Record their responses to prompt discussion in their groups later.

Separate your students into groups of approximately 4-5 students each. Do not distribute any of the materials. After each round of instructions, allow some time for the groups to brainstorm solutions. Give them a simple orientation to their mission (note that this text appears in the PowerPoint):

#### Virtual considerations:

##### Items

Students do a scavenger hunt to find materials they can use. Teacher also provides suggestions.

Tell students of the constraints or have students brainstorm constraints, given the materials they found at home.

##### Build

*You have been transported to Papua New Guinea, an island off the coast of Australia. The island is hot and humid and experiences a great deal of rainfall during monsoon season. This makes shelter a top priority especially for your class. You will be transported to the southern coast of the island and will be separated into groups. The groups will compete for survival here on the island to win the competition.*

### **Planning and Design (20 minutes)**

Have the students break into their inventor teams and give the teams time to think about and discuss the points brought up in the warm-up.

You will need to outline the specific task that the class needs to complete. They will have 40 minutes to build a shelter that is freestanding and can bear weight in the form of marbles. The shelter must stand at least an inch off the ground and must only use the materials that are provided (from the jungle, of course). Students will be given 30 toothpicks, 5 rubber bands, 1 foot of tape, 3 pieces of cardstock, and 1 pair of scissors.

Show the materials to the class but wait 15 minutes while each group generates ideas before giving them their allotments. The steps in this activity correspond to the steps in the engineering cycle. At first, they are presented with the problem; during this time allotment, they are imagining and planning their solutions.

### **Construction (40 minutes)**

Once students have settled on a plan, have each group send up a student to gather their resources. They may begin building their shelter. Provide little assistance to the groups other than answering questions.

### **Testing (10 minutes)**

One by one, circulate to each of the groups making sure that their structures can hold at least 5 marbles and that it stands at least one inch off the ground.

### **Improving (10 minutes)**

Each group needs to select another group with which to align themselves. (If there are an odd number of groups, you may have a three-way alliance among three different groups.) Using the same resources as before, the groups have to make changes to the other group's design. This is the "improve" portion of the engineering cycle. These modifications to the original design should be done on paper so the original remains intact for now.

### **Second Test (25 minutes +, depending on iterations)**

Groups should return to their original shelter. Give groups time to analyze and discuss the proposed changes and ask their partnered group questions as needed. Instruct groups to improve their shelters how they see fit in preparation for re-testing. The goal is for those that failed to support 5 marbles to do so now. For those that supported 5 marbles during the first round of testing, their goal is to support as many as possible. Budget approximately 15 minutes for discussion and building.

Students build at home. Brainstorm what materials students can find in their homes to build.

Students test 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.

### **Discussions**

Host whole class discussions on an online meeting platform where students show off their designs.

Students present their PPTs of ideas. Students gallery walk through PPTs that contain pictures or descriptions of the shelters and building process.

Depending on time and teacher discretion, more than one round of modifications can be made in 15-minute increments now that they understand the process. The goal should be improving the shelters such that they can hold the most weight possible. Go around to each of the groups, one at a time, to test the weight that they hold in marbles. Begin by placing one marble on the weight-bearing part of the shelter. Continue adding one marble at equivalent increments until the shelter begins to look unstable. Add marbles at a slower pace at this point until the shelter collapses. Complete this measurement for each group. The group whose structure holds the most marbles will win the competition. Depending on teacher discretion, there may or may not be an award associated with the victory.

**Closure/Exit (5 minutes)**

Review the engineering cycle that your students learned in a previous lesson. Go through each of the five parts (ask, imagine, plan, create, and improve) and relate them to the tasks they had to complete in teams.

## Assessments

- Class and group discussions
- Student worksheet
- Project evaluation checklist
- Self-Assessment
- Lesson rubric

## Content Standards

### Next Generation Science Standards:

#### NGSS.3-5-ETS1-1

Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

#### NGSS.3-5-ETS1-2.

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

#### NGSS.3-5-ETS1-3.

Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

#### NGSS.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.

#### NGSS.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.

#### NGSS.MS-ETS1-4.

Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

#### Science and Engineering Practice 1

Asking questions and defining problems.

#### Science and Engineering Practice 2:

Developing and using models

#### Science and Engineering Practice 3:

Planning and carrying out investigations

#### Science and Engineering Practice 4:

Analyzing and interpreting data

Science and Engineering Practice 6:

Constructing explanations (for science) and designing solutions (for engineering)

Science and Engineering Practice 8

Obtaining, evaluating, and communicating information.

**Common Core ELA Standards:**

CCSS.ELA-Literacy.SL.3.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.3.4

Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

CCSS.ELA-Literacy.SL.4.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.4.4

Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

CCSS.ELA-Literacy.SL.5.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.5.4

Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

CCSS.ELA-Literacy.SL.6.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics and texts, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.7.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics and texts, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.8.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.L.3.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

CCSS.ELA-Literacy.L.4.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

CCSS.ELA-Literacy.L.5.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

CCSS.ELA-Literacy.L.6.1

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CCSS.ELA-Literacy.L.7.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

CCSS.ELA-Literacy.L.8.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

CCSS.ELA-Literacy.W.3.2

Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

CCSS.ELA-Literacy.W.3.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

CCSS.ELA-Literacy.W.4.2

Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

CCSS.ELA-Literacy.W.4.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

CCSS.ELA-Literacy.W.5.2

Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

CCSS.ELA-Literacy.W.5.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

CCSS.ELA-Literacy.WHST.6-8.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

**Common Core Math Standards:**

CCSS.MATH.PRACTICE.MP1:

Make sense of problems and persevere in solving them.

CCSS.MATH.PRACTICE.MP2:

Reason abstractly and quantitatively.

CCSS.MATH.PRACTICE.MP5:

Use appropriate tools strategically.