

# Tami's Tower

Let's Think About Engineering

Lesson Guide Booklet



Smithsonian  
Science Education Center



**Lesson: Tami’s Tower: Let’s Think About Engineering**

	<b>Student Objectives</b>	<b>Disciplinary Core Ideas</b>	<b>Science and Engineering Practices</b>	<b>Crosscutting Concepts</b>
<p><b>Engage</b> <b>Explore</b> <b>Explain</b> <b>Extend</b> <b>Evaluate</b></p> <p><b>Class periods: 1</b></p> <p><b>Preparation time:</b> 20 minutes</p> <p><b>Vocabulary:</b> balance sturdy shake rectangle triangle square half-circle</p>	<p>Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.</p> <p>Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.</p>	<p>A great variety of objects can be built up from a small set of pieces. (2-PS1-3)</p> <p>Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)</p>	<p><b>Developing and Using Models</b></p> <p>Constructing Explanations and Designing Solutions</p> <p>Analyzing and Interpreting Data</p>	<p><b>Structure and Function</b></p> <p>Cause and Effect</p>

- Science and Engineering Practices and Crosscutting Concepts that are assessed in the lesson are in bold.

# TAMI'S TOWER: LET'S THINK ABOUT ENGINEERING

## Introduction

The Tami's Tower: Let's Think About Engineering lesson plan explores concepts relating to solving problems utilizing engineering design. Students will construct structures out of a variety of block pieces. At the end of this lesson students will make conclusions about how pieces can be used to create a variety of structures; design in such a way to overcome challenges.

Vocabulary Words: Balance, Sturdy, Shake, Rectangle, Triangle, Square, Half-Circle, Polygon

Materials: Digital devices for each student able to play Tami's Tower: Let's Think About Engineering, Tami's Tower worksheets, pictures of real world buildings and scissors

## Engagement

Teacher will share the following passage with students

Tami, a golden lion tamarin is very hungry. She needs your help to reach the fruit. Cut out the shapes and Tami on your worksheet. Use the shapes to build a tower for Tami to climb. Place the first shape on the light green square on the ground. Build a tower and place Tami on top. Try to have Tami touch the red fruit.

1. Give students the Tami's Tower worksheet. Students will need scissors to cut out shapes in the Engage section.
2. Students will build towers using the cut-out shapes, to reach the fruit line.
3. Once students have reached the goal using all the shapes. Students will attempt to reach the goal line only using rectangles and then only using squares (and triangles).
4. Ask the following questions:

Which of three towers is sturdy?

Which of the three towers is tall? line?

Did you have to turn any shapes to make it to the line?

## Exploration

1. Give students the Tami's Tower Explore and Extend worksheet and set up them up with a device that can play Tami's Tower.
2. Students will play up through the first five levels of Tami's Tower. As students play Tami's Tower, they will learn how to develop and identify sturdy structures.
3. After Level 5, students will complete the Explore section on the worksheet. In the activity, students will circle the sturdy tower.

## Explain

1. Collect students together for a whole-class discussion.
2. Ask the following questions:

As you played your game did your towers look different from other students?

Did they look the same?

Can the same shapes make different towers?

What are some ways to make a sturdy tower?

What happens in the game if your tower is not sturdy?
3. In this discussion the teacher will clarify that the same shapes can be used to make many different types of towers. Sturdy towers are usually wide while towers that fall are usually skinny and tall.

## Extend

1. Students will return to their digital devices to finish their playthrough of Tami's Tower. If students finish the game they can continue their experience by playing in the sandbox mode. Make sure to see the Summary Screen at the end of the student's playthrough to assess the student's metacognitive responses to their engineering challenges.
2. After a set time established by the teacher, students will complete the Extend section of their worksheet.

3. Teacher will hand out building pictures to students (See page 8).
4. Students will look at one building picture. They will replicate the building through sketching the shapes found in the Tami's Towergame.

## Evaluation

1. Students will share their drawings of strong towers with the class.
2. Ask the following questions:
  - Why are these sturdy towers?
  - How many shapes were used to make your towers?
  - What would happen if you took away one block from the tower?
  - The tower base?
  - The tower top?
3. Students will hand in their worksheets to the teacher for assessment. See rubric on next page.

## Evaluation Rubric

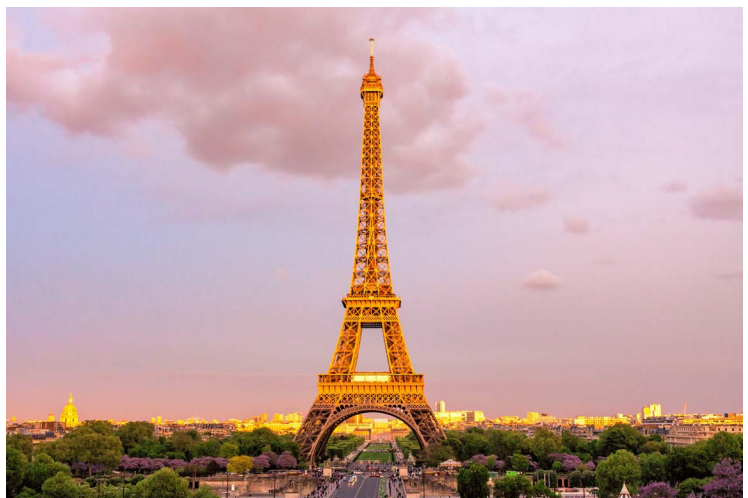
Tami's Tower: Let's Think About Engineering		
Concepts and Practices	Indicators of Success	Indicators of Difficulty
Because there is always more than one possible solution to a problem, it is useful to compare and test designs.	<input type="checkbox"/> Students iterate model designs as needed to solve a given problem.	<input type="checkbox"/> Students cannot iterate model designs to solve a given problem.
A great variety of objects can be built up from a small set of pieces.	<input type="checkbox"/> Students master the ability to develop multiple types of structures, using the same group of shapes, to solve a problem.	<input type="checkbox"/> Students cannot develop multiple structures from using the same group of shapes.
Developing and Using Models	<input type="checkbox"/> Students are able to assess the qualities of their models (tall vs. sturdy) and how to adjust models to solve a given problem.	<input type="checkbox"/> Students are not able to assess the qualities of their models nor are they able to improve them to solve a given problem.
Structure and Function	<input type="checkbox"/> Students consider how the shape of each block contributes to its function in the overall tower.  <input type="checkbox"/> Students are accurate in their prediction of the stability of their model as seen in the end game, summary screen.	<input type="checkbox"/> Students are unable to consider how the shape of each block contributes to its function in the overall tower.  <input type="checkbox"/> Students are accurate in their prediction of the stability of their model as seen in the end game, summary screen.



House  
Scott Webb/Pexels



Apartment Building  
Juhasz Imre/Pexels



Eiffel Tower  
Eugene Dorosh/Pexels





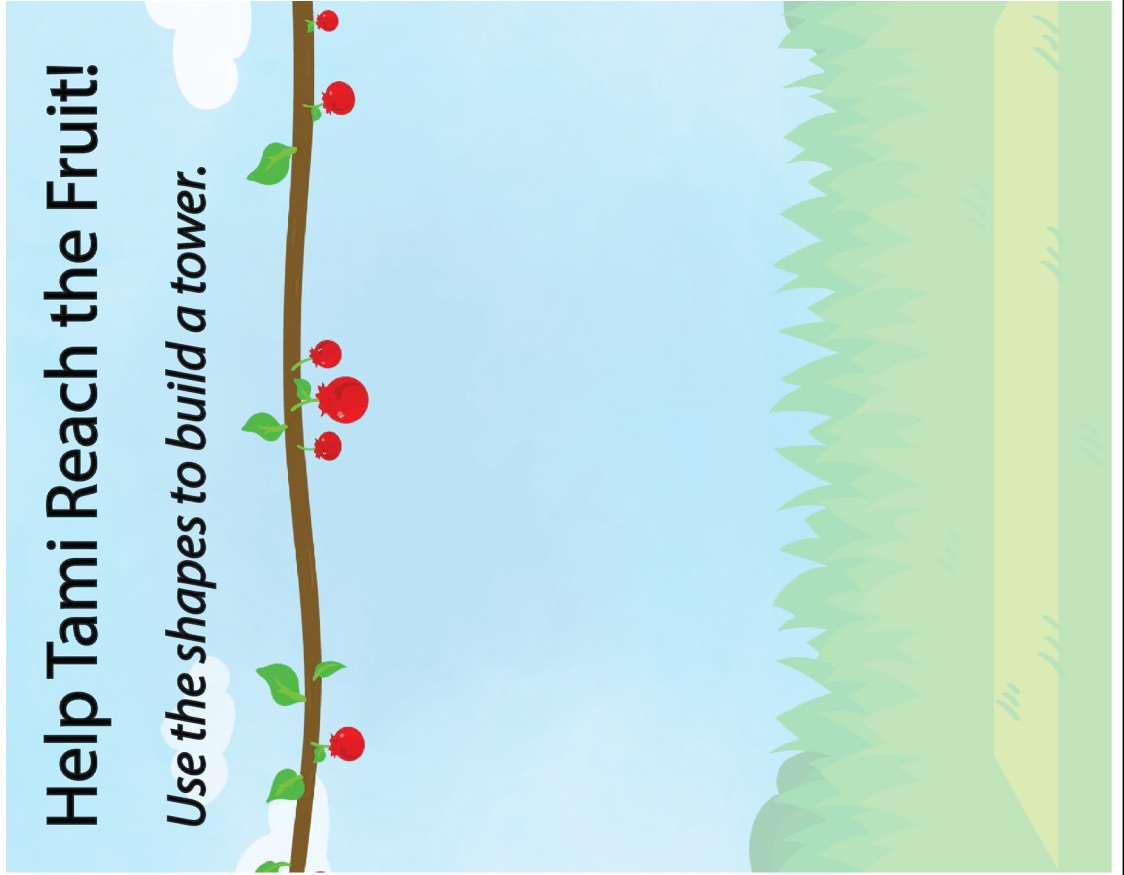
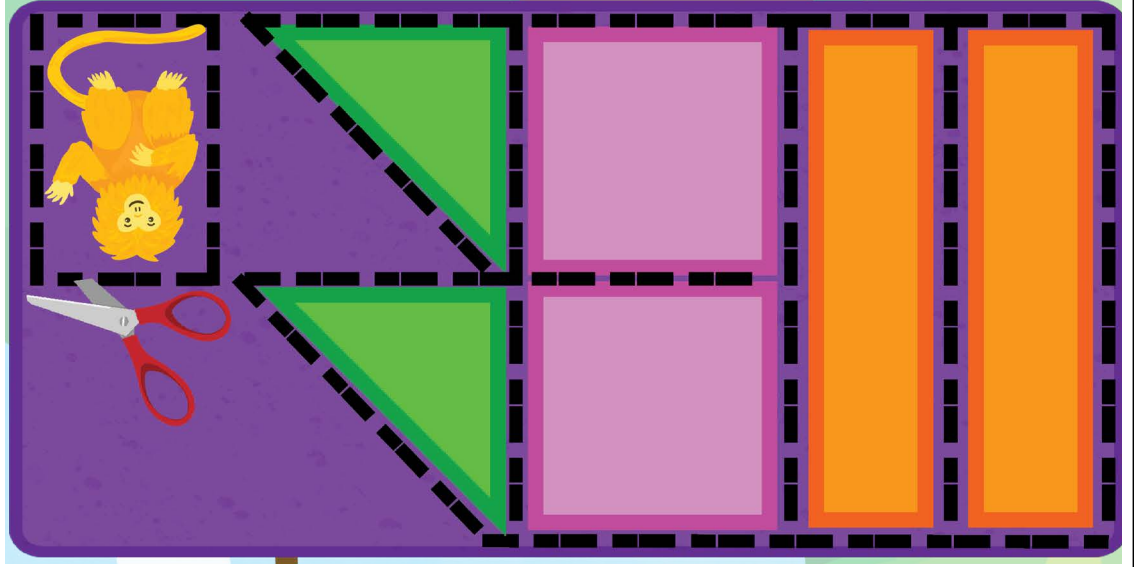
# Tami's Tower: Let's Think About Engineering Worksheet A

Name \_\_\_\_\_

Engage

Help Tami Reach the Fruit!

*Use the shapes to build a tower.*



# Tami's Tower: Let's Think About Engineering Worksheet B

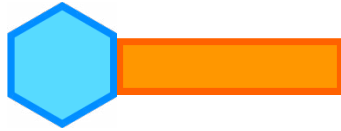
Name \_\_\_\_\_

Explore

Which is Sturdy?

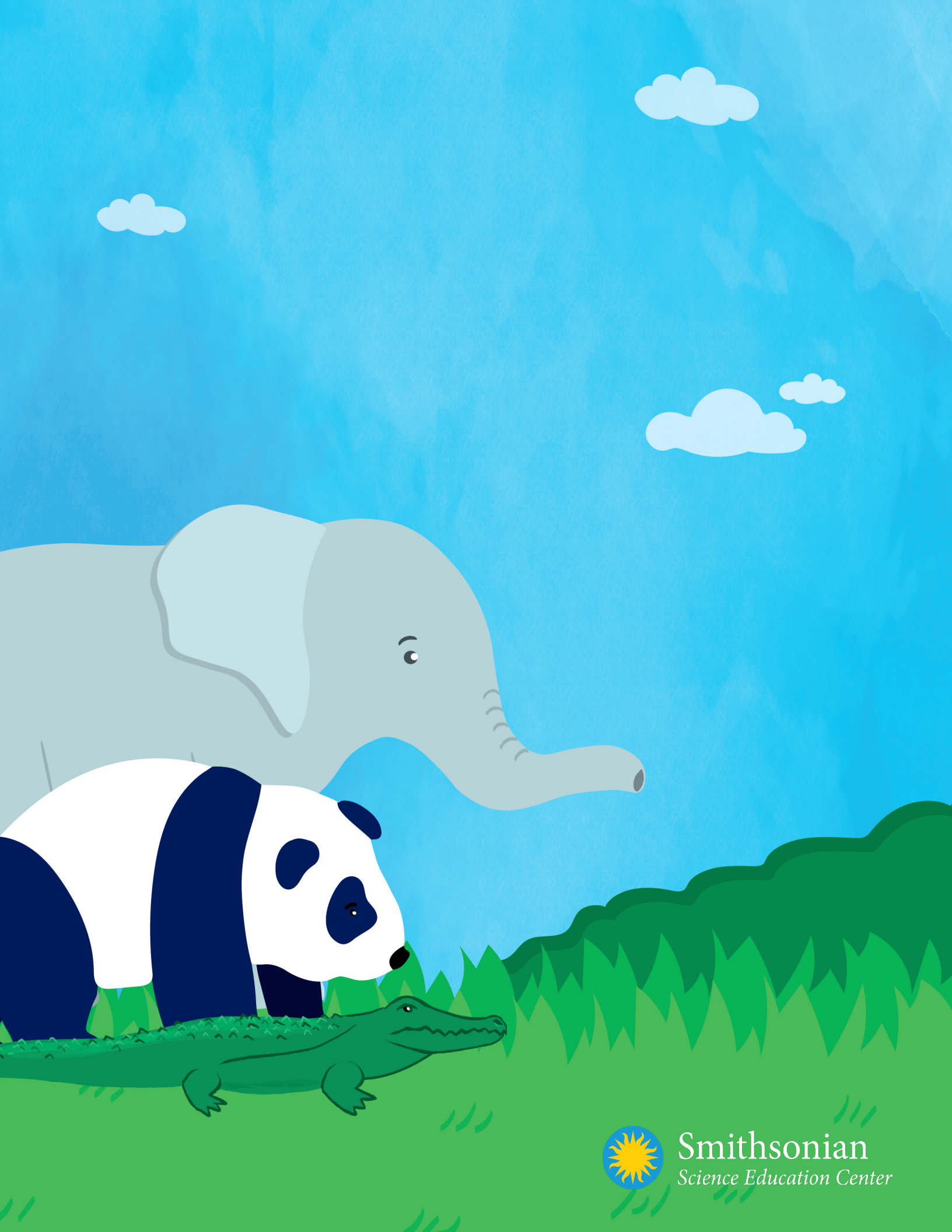


Or



Extend

Draw a Building Using Shapes



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