

## Activity 1.2 Build a Beanstalk Teacher Notes

### Introduction

In this activity students will listen to the familiar story of *Jack and the Beanstalk* and retell key parts of the story as a group. The teacher will document the retelling of the story with chart paper and markers.

As part of an introduction to the design process, the students will model a beanstalk using pipe cleaners with a goal of creating the tallest model possible. Students will compare the height of the beanstalk models and then test the strength of the model by adding a mass in the form of a golden egg to the top.

The following Key Terms will be reviewed throughout the activity: **structure** and **function**. The term **Design Process** will be introduced to students as a step-by-step way to solve problems. Students will also be introduced to the term **evaluate** as a procedure to test a model to see how it works.

### Equipment

- Chart paper
- Markers
- Pipe cleaners, 10 per student
- Gold egg shakers
- *Jack and the Beanstalk*, by Debbie Pullinger
- *Jack and the Beanstalk* audio CD and sequencing cards
- Launch Log for each student
- iPad® tablet
- Tablet application
  - Autodesk® SketchBook® Express

### Procedure

#### Part 1 – Read and Reflect

1. The teacher reads the story of *Jack and the Beanstalk* aloud for the students or plays the audio CD of the story. The story audio time is 7:31. The song version is 6:30. The teacher may choose to use the tablet document viewer to project an image of the book while reading or playing the CD version of the story.
2. Students discuss in small groups or as a class the function of the beanstalk. The students will consider the question “What did Jack use the beanstalk for?”
3. The students then consider and discuss the structure (or shape) of the beanstalk that makes it work for the intended function of allowing Jack to climb up to the giant’s castle.

4. The students draw Jack’s beanstalk in the first space on the Activity 1.2 Build a Beanstalk page in their Launch Logs.
5. **Note:** As an alternative to drawing the beanstalks in the Launch Logs, the students may use the tablet sketching app, SketchBook Express by Autodesk.

## Part 2 – Build and Test

6. Explain that students will use the same steps engineers use to design new items and improve existing items.
7. The first step in the process is **Ask**.
  - a. Guide a discussion where students **ask** questions to gather information that will help them define the problem.
  - b. With support and guidance, the students will define the problem – that they need to build the tallest beanstalk possible.
  - c. Document the discussion under the heading of “Ask” on a piece of chart paper as part of an interactive class engineering notebook. This may also be completed using a tablet application or other digital method as determined by the instructor.
8. The second step engineers and designers follow is **Explore**.
  - a. Allow students to **explore** ideas by talking in small groups or as a class about possible ideas for their beanstalks.
  - b. Using the Launch Log as a guide, have students sketch ideas for their beanstalk design using pencils, crayons, or colored pencils in the second box of Activity 1.2 Build a Beanstalk or on SketchBook Express.
  - c. Allow students to see the available materials; each student will receive 10 pipe cleaners.
9. The third step in the design process is **Model**.
  - a. Ask the students to circle their best design if they drew more than one idea.
  - b. The teacher facilitates the creation of the beanstalks.
  - c. Document some of the models under the heading “Model” on the flip chart by either printing photographs of the beanstalks in progress or finished. You may also choose to include sketches of the students’ beanstalk designs.
10. The fourth step in the design process is **Evaluate**.
  - a. Students compare the height of their beanstalks with others in the class. The beanstalk should stand on its own without support.
  - b. The teacher then leads a discussion on the features, strengths, and weaknesses of the different beanstalk designs. The teacher documents key insights under the “Evaluate” heading in the interactive engineering notebook.

11. (Optional) Student work may be photographed and/or displayed. Beanstalks will be modified in Part 3 if completing the Egg Challenge.

### **Part 3 – Egg Challenge (Optional)**

12. Remind students that in order for the beanstalk to function to allow Jack to climb up and down, it needs to be tall and strong.
13. To test the strength of the beanstalks, the students will work in pairs or small groups to modify their design to hold a golden egg. In the story the goose lays the egg after Jack is safely on the ground. Explain how the egg is used to test the strength of their design.
14. The teacher leads a discussion on the importance of a wide base to support a tall structure and shows examples of student beanstalks from Part 2 that included a wide base. The wide base may be compared to the capital letter A, which is wider at the bottom than the top.
15. The students draw a picture of what the modified beanstalk will look like in their Launch Logs on an untitled page or on SketchBook Express.
16. The teacher facilitates the modifications of the beanstalks to hold the golden eggs. The students compare the height of the beanstalk with and without the egg. They should observe that the beanstalk with the egg is typically shorter and has a wider base. With guidance and support, they observe that the design structure had to be changed because the function of the design changed to include the egg.
17. (Optional) Student work may be photographed and/or displayed.

### **Conclusion Questions for Discussion**

Note: The conclusion questions may be for discussion and can be documented as a whole class.

1. What is the function of the beanstalk?
2. What is the structure of the beanstalk?