PLOT SUMMARY:

This is the traditional tale of "Jack and the Beanstalk," told from the giant's point of view.

BEANSTALK TOWER CHALLENGE:

Problem What problem will you solve?	Challenge What will you do?	Criteria What should the solution do to be successful?	Constraints What are the limits?
The giant needs to get back up to his home.	Build a "beanstalk" tower that can hold weight at the top.	• The tower should be at least one foot tall. • The tower should hold a weight at the top. • A successful tower should stand for at least as long as it takes to measure it and write down its height.	• Use only the materials given. • The tower cannot be attached to the ground or anything else. It must be freestanding.

OTHER POSSIBLE PROBLEMS AND CHALLENGES:

Students can use the *Universal Challenge Pages* (pages 104–107) to create solutions to any of the problems below or problems they identify themselves.

Problem	The giant needs a way to keep track of his coins so he doesn't have to count them every day.
Possible Challenge	• Engineer a money-storage device that counts coins or sorts them in a way that makes the number of coins easy to see.

Problem	The giant needs to safeguard his harp and golden goose.
Possible Challenges	• Engineer an alarm system. • Design a trap to catch Jack. • Build something to safeguard the giant's possessions.

Problem	The giant wants to catch Jack to talk to him.
Possible Challenge	• Engineer a device the giant can use to safely catch Jack.

MATERIALS:

Required: near-identical spherical objects (one per team) to use as model "giants," such as tennis balls, apples, or hard-boiled eggs (the heavier the objects, the more difficult this challenge will be); yardsticks or tape measures

Suggested: structural materials such as craft sticks, straws, paper or index cards, paper or plastic cups; connecting materials such as tape, glue, string, pipe cleaners, play clay

PREPARATION:

The difficulty of this challenge will depend on the materials available and will result in different-sized towers. Students may build towers much taller than you expect, so consider having them build on the ground so they can reach the top of their tower without having to climb on furniture.

LESSON PLAN:

1. Have students read the passage and discuss the problems they identified. Use these questions as prompts:
   - Do you recognize this story? What versions have you heard before?
   - What problems did the giant have? Did he solve any of them? How?
   - Can you think of solutions to the giant's problems?
2. Introduce the Beanstalk Tower Challenge by reading through the challenge pages together. Show students the available materials and review the criteria and constraints. Show students the model "giant" they will need to support at the top of their tower.
3. Give students time to prepare, brainstorm, plan, and build their towers. Circulate to observe and answer questions as students work on their solutions. Remind them to use the challenge pages to guide them as they work through the engineering design process. When they are ready for testing, observe and, if needed, help students measure their towers. They will need to be careful not to knock them down!
4. Have students share their solutions with the class and get feedback from peers, then revise their designs and test again.
5. When students have completed the challenge, have them demonstrate and explain their beanstalk towers to the class. Then have them fill out the reflection page.
6. If time, allow students to choose their own problem and testing setup and use the *Universal Challenge Pages* (pages 104–107) to complete their challenge.

NAME: _____ DATE: _____

Directions: Read the passage and underline the problems the characters have to face. Write and/or sketch your ideas for solutions in the margins.

FEE FI FO FUM

It all started with some missing coins. Every afternoon, I sit in my treasure room and count my gold coins. One day, I came up one coin short. At first, I thought I miscounted, so I counted again. I wondered if I was getting forgetful. Maybe I dropped it without noticing. But the next day, another coin went missing. Something strange was going on.

When I get up in the morning, I always look forward to breakfast. I make a big omelet with golden eggs from my special goose. The gold really adds to the flavor! One morning, I went to get an egg from the nest, but the goose wasn't there. I figured she had flown south for the winter. Since the loss of my goose, I only eat toast for breakfast.

The worst thing that happened was that my magic harp disappeared. This was a problem! Every night, my harp sings a beautiful melody to put me to sleep. Without its soothing song, I haven't been able to sleep for days.

This morning, as I was sleepily chewing my toast, I smelled an awful smell. I sniffed the air. I looked around, but I didn't see anything out of the ordinary. Still, that bad odor seemed to be everywhere.

As I took a sip of my coffee, out of the corner of my eye, I saw something move on the kitchen counter. I quietly tiptoed over and peeked behind the toaster. I was shocked! I found a little man, and boy was he smelly. He definitely hadn't had a shower in a while.

I exclaimed:

Fee fi fo fum,
Where on Earth did you come from?
Are you the one who stole my stuff?
Now I found you, sure enough!

NAME: _____ DATE: _____

FEE FI FO FUM

The miniature man took off. Across the kitchen counter and around the sink he ran. He shimmied down the dishtowel and jumped to the floor. By the time I had recovered my wits, he was out the front door.

I chased him across the front garden and out the gate. He sure was fast for a teeny guy! I guess he thought I wanted to hurt him, but I only wanted to ask him to bring back my stuff.

Ahead, I saw a strange-looking plant. The mini man scrambled onto it and disappeared. When I got closer, I could see that this was just the tip of an incredibly tall beanstalk. Because I was so bewildered by these strange circumstances, I made a poor decision. I decided to climb down the beanstalk after the little man. That was not a good idea.

I am a fairly big guy, and the beanstalk was just not strong enough to hold me. It started to sway back and forth as I held on for dear life. I could hear it creaking and cracking. Then, whoa! The whole thing toppled over and down I fell. The last thing I remember is the little man yelling, "Look out!"

So now I'm stuck here in this land full of tiny people. My head hurts and I skinned my knee. Jack apologized for stealing my things, and he and his mother are doing their best to make me feel welcome. But the food here is just so small; I'm hungry all the time. I have to sleep on the ground because I don't fit in any of the beds. At least I have my magic harp to sing me to sleep.

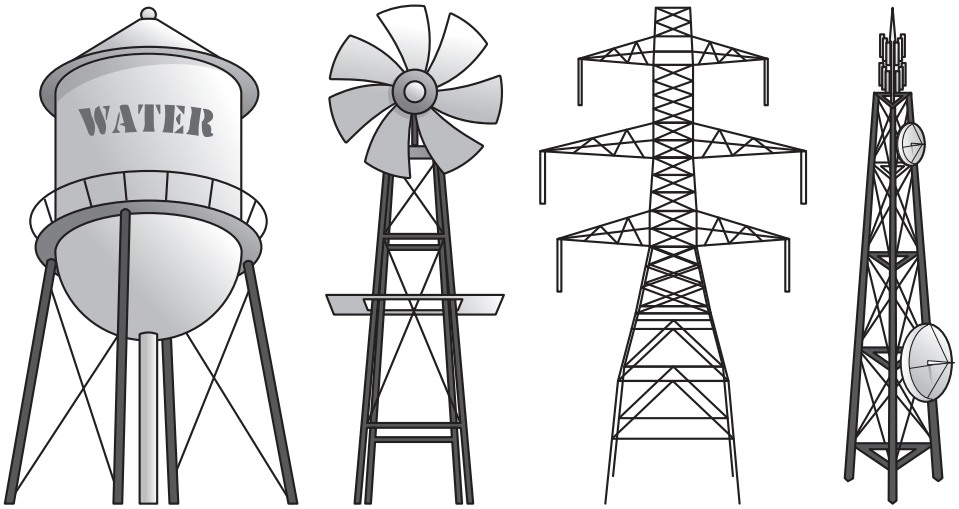
BEANSTALK TOWER CHALLENGE

NAME: _____ DATE: _____

STEP 1: PREPARE FOR THE CHALLENGE

Problem What problem will you solve?	Challenge What will you do?	Criteria What should the solution do to be successful?	Constraints What are the limits?
The giant needs to get back up to his home.	Build a "beanstalk" tower that can hold weight at the top.	• The tower should be at least one foot tall. • The tower should hold a weight at the top. • A successful tower should stand for at least as long as it takes to measure it and write down its height.	• Use only the materials given. • The tower cannot be attached to the ground or anything else. It must be freestanding.

A **tower** is a structure that is taller than it is wide. Here are some real-world examples of towers.



What do the examples have in common? What do you see that you might be able to use in your tower design?

_____

_____

_____

NAME: _____ DATE: _____

STEP 2: BRAINSTORM, PLAN, AND BUILD

1. Brainstorm design ideas for towers you can build that will meet the criteria and constraints. Remember, your tower must hold the "giant" at the top. Sketch and write at least three ideas on the back of this page.

2. Think about which design might perform best in testing. Draw a star by the design you will build. Why did you choose this idea?

_____

_____

_____

3. Draw a diagram of your design here. Label all of the materials.

4. Describe how your tower will hold up the weight of the "giant."

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

5. Build your beanstalk tower!

NAME: _____ DATE: _____

STEP 3: TEST, IMPROVE, AND SHARE

1. Place the "giant" at the top of your tower. Did it stay up? If not, how could you improve your design so it stays up with the "giant" in place?

2. Once your tower stays up with the "giant" in place, measure the height of your tower. How could you improve your design to make it taller?

3. Share your tower with classmates. How can you use their ideas to make it better?

4. Keep testing and improving until your tower is as tall as it can be with the "giant" on top!

NAME: _____ DATE: _____

STEP 4: REFLECT

1. How does your tower hold up the weight of the "giant"?

2. How did you improve your design?

3. What was the hardest part about this challenge?

4. What have you learned from this challenge?