PLOT SUMMARY:

Mayor Lofty of the town of Skyward wants to build a tower. She wants her town's tower to be the tallest and best of all the towers in all the towns.

TALLEST TOWER CHALLENGE:

Problem	Challenge	Rules
What problem will you solve?	What will you do?	Criteria: What must the solution do to be successful? Constraints: What are the limits?
Mayor Lofty wants to build the tallest tower.	Build the tallest possible tower using just two materials.	• The tower is **at least** one foot tall. • The tower stands long enough to measure it.

OTHER POSSIBLE PROBLEMS AND CHALLENGES:

Students can use the *Universal Challenge Pages* (pages 106–109) to create solutions to any of the problems below or problems they identify themselves.

Problem	Mayor Lofty wants to build a tower with heavy things at the top (clock, bell, etc.)
Possible Challenge	• Engineer a tower that can hold a weight at the top.

Problem	Mayor Lofty wants to put a wind turbine on her tower.
Possible Challenges	• Engineer a working pinwheel or windmill. • Design and build a tower with a working pinwheel at the top.

Problem	Mayor Lofty wants to send messages using a light on top of her tower.
Possible Challenge	• Create a way to send messages with a light.

MATERIALS:

Required: measuring tapes

Suggested: For this challenge, offer only **two** materials—one structural and one connecting. For example, you could offer straws and play clay, craft sticks and pipe cleaners, or paper cups and tape. Possible structural materials are craft sticks, toothpicks, straws, index cards, playing cards, paper or plastic cups; connecting materials can be tape, pipe cleaners, string, play clay, marshmallows. The difficulty of this challenge will depend on the materials available.

PREPARATION:

Depending on the materials available, students may build towers much taller than you expect! Consider having students 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:
   - Have you ever seen a very tall tower? What did it look like? What was it for?
   - What problems do you think Mayor Lofty will have to solve to build her tower?
   - Can you think of some solutions to these problems?
2. Introduce the Tallest Tower Challenge to students by reading Step 1 (page 57) together. You may want to write the rules for the challenge on the board or a chart.
3. Ask students to think about what they know about towers that could help them in this challenge. You may want to build students' knowledge by showing them pictures of different kinds of towers, such as water towers, fire towers, utility line towers, cell towers, castle towers, and famous landmark towers like the Eiffel Tower and the Leaning Tower of Pisa. Prompt students to analyze the towers. Ask, "Are these towers bigger at the bottom or at the top?" and "What shapes do you see in these towers?" Have students discuss the challenge and write or draw about their prior knowledge in the "What do we know about this?" section of Step 1 (page 57).
4. Tell students that for this challenge, they can only use two materials. Hold up the materials and prompt students to think about how they could use them. Give students a copy of Step 2 (page 58). Have them discuss their plan and then write or draw the materials they will use and what their tower will look like. Then give them access to the materials.
5. You may want to have a conversation about what to do when a tower falls. Remind students that when engineers are building and testing, things don't always go the way they planned. Is it okay for their towers to fall down? Of course! Their towers will probably fall down many times. They just need to think about what went wrong and try another idea to make their towers better. You may also need to demonstrate and have students practice how to use a measuring tape carefully so they don't knock over their towers while measuring!

LESSON PLAN:

6. Give students time to build their towers. If possible, take photos or have students take photos of the towers. Circulate to observe and answer questions as students work on their solutions. When a team thinks their tower is ready, give them a copy of Step 3 (page 59) and a measuring tape. Have them measure their tower and record their results, then write how they will improve their tower.
7. Have students share their solutions with the class and get feedback from peers, then revise their designs and test again. Have them repeat the test-and-improve cycle until they are satisfied with their results. If desired, have a contest to see who can build the tallest tower.
8. When students have completed the challenge, have them explain their towers to the class. Then have students fill out Step 4 (page 60).
9. If time, allow students to choose their own problem and testing setup and use the *Universal Challenge Pages* (pages 106–109) to complete their challenge.

NAME: _____ DATE: _____

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

MAYOR LOFTY'S TOWER

Angela Lofty is the mayor of the town of Skyward. Mayor Lofty wants to build a tower. Lots of other towns have towers. She thinks her town should have one, too. But what kind of tower should she build?

The town of Winding has a clock tower. It is nice for the people to look up and see what time it is. Mayor Lofty wants Skyward's tower to have a clock. It will have a huge, beautiful clock face with golden hands on it. To make it even better, the clock will play a song every hour.

The town of Ember has a fire lookout tower. The town's fire chief can see the whole town from the top. He can watch for fires and call his firefighters. They can put the fires out right away. Mayor Lofty wants Skyward's tower to also be a fire lookout. It will have a bell. The firefighters can ring the bell when they see a fire. The tower will have hoses at the top. Firefighters can spray water from the tower. They can reach almost the whole town with water!

The town of Driftwood is next to the ocean. It has a lighthouse tower with a very bright light at the top. The bright light can be seen by ships. It tells them where the rocks are so they don't crash. Mayor Lofty wants Skyward's tower to be a lighthouse, too. It will have a very bright light. But her town is not near the ocean. The light in her tower will be used to send messages. She can flash the light in patterns. She can send messages all over town.

NAME: _____ DATE: _____

MAYOR LOFTY'S TOWER

Mayor Lofty has more ideas to make Skyward's tower the best. She will put a telescope at the very top of the tower. Scientists can look at planets. They can look at stars.

Skyward's tower will have wind turbines on it. The wind will turn the blades. This will make electricity. All the people in the town can use the electricity.

Skyward's tower will be fun, too. Mayor Lofty will build a slide. It will start at the top and wind around the tower. People can slide all the way to the ground.

Mayor Lofty wants her tower to be taller than any other tower. Her tower will be the best! Do you think Mayor Lofty can build a tower that does all of these things?

NAME: _____ DATE: _____

STEP 1: PREPARE FOR THE CHALLENGE

What will we do?	What are the rules?	How will we know it works?
We will build the tallest possible tower using just two materials.	• The tower is **at least** one foot tall. • The tower stands long enough to measure it.	We will know our tower works when it is at least one foot tall and it stands long enough to measure it.

What do we know about this?

NAME: _____ DATE: _____

STEP 2: BRAINSTORM, PLAN, AND BUILD

What two materials will we use to build our tower?

What will our tower look like?

NAME: _____ DATE: _____

STEP 3: TEST, IMPROVE, AND SHARE

How tall is our tower? _____

We tested our tower. This is what happened:

_____

_____

_____

_____

How can we make our tower better?

_____

_____

_____

_____

_____

Share the tower with the class. Make the tower better until it meets all the rules!

NAME: _____ DATE: _____

STEP 4: REFLECT

Was our tower at least one foot tall? Yes No

Did our tower stay up long enough to measure it? Yes No

How tall was our tallest tower? _____

This part was easy:

_____

_____

This part was hard:

_____

_____

I learned this:

_____

_____

_____

_____