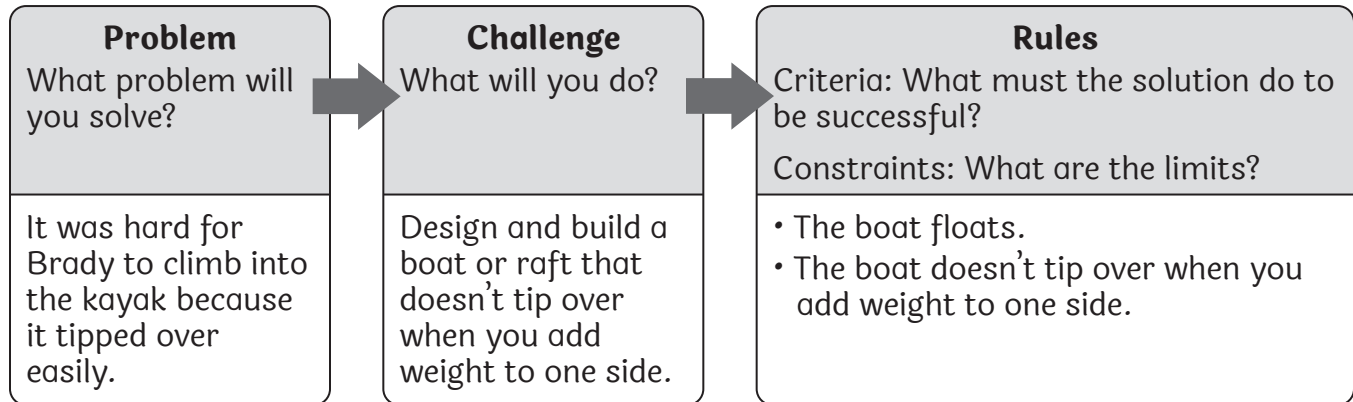


PLOT SUMMARY:

Brady and his family take a trip to the lake where they fish, swim, kayak, and eat a picnic lunch.

NO-TIP BOAT CHALLENGE:



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	Brady's family had to make a few trips to carry all their gear from the car to the beach.
Possible Challenge	<ul style="list-style-type: none"> • Engineer a way to carry all the gear in one trip.
Problem	Brady doesn't have a fishing pole.
Possible Challenge	<ul style="list-style-type: none"> • Design and build a fishing pole for Brady.
Problem	Brady's paddle floated away.
Possible Challenge	<ul style="list-style-type: none"> • Engineer a way for Brady to keep his paddle close, even if he lets go of it.
Problem	Brady's ice pops melted.
Possible Challenge	<ul style="list-style-type: none"> • Engineer a way to keep the ice pops frozen.

MATERIALS:

Required: small items to use as weights such as blocks or erasers, one identical item per group; plastic tubs with a few inches of water for testing

Suggested: structural materials that are buoyant and waterproof, such as craft foam, craft sticks, paper clips, straws, plastic or paper cups, plastic food containers, foil, plastic wrap; structural materials that are not buoyant, such as coins, keys, marbles; connecting materials such as pipe cleaners, rubber bands, tape

LESSON PLAN:

1. Have students read the passage and discuss the problems they identified. Use these questions as prompts:
 - Have you ever been to a lake or river or to the ocean? What did you do there?
 - What problems do Brady and his family have in this story?
 - Can you think of some solutions to these problems?
2. Introduce the No-Tip Boat Challenge to students by reading Step 1 (page 21) 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 rafts and boats that could help them in this challenge. You may want to build students' knowledge by showing them pictures or a video of kayaks if they have not seen one before. Ask them to think about why a kayak is easy to tip over. On what part of the kayak do they think Brady was trying to climb in? Is it easier to tip it on its sides or at its nose? Let students know that their boat can be any shape. Have them discuss the challenge and write or draw about their prior knowledge in the "What do we know about this?" section of Step 1 (page 21).
4. Give each group of students a weight (see *Required Materials* above for suggestions). You can differentiate by providing lighter weights, which make the challenge a bit easier, or heavier weights to make it more difficult. Show students the tubs of water and tell them that they will test their boat by placing it in the water and then carefully placing the weight on one side of it. Their boat should not tip over when the weight is added. To further differentiate this challenge, you can set the criteria so that the boat is allowed to tip a little bit but not flip over (easier) or that the boat cannot tip at all (harder).
5. Show students the available materials. As you hold up each material, prompt students to think about whether it will float or sink and how they could use it. You may want to let students place each material in the water to see if it sinks or floats. Give students a copy of Step 2 (page 22). Have them discuss their plan and then write or draw the materials they will use and what their boat will look like. Then give them access to the materials.

LESSON PLAN:

6. Give students time to build their boats. Circulate to observe and answer questions as students work on their solutions. When a team thinks their boat is ready, give them a copy of Step 3 (page 23). Have them test their boat by placing it in the water and, if it floats, placing their weight on one side. Then they should record their results and how they will improve their boat.
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.
8. When students have completed the challenge, have them explain their boats to the class and demonstrate by placing their boat in the water and putting their weight on it. Then have them fill out Step 4 (page 24).
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 characters have to face. Write and/or sketch your ideas for solutions in the margins.

A DAY AT THE LAKE

Brady was very excited. His family was going to the lake! They hadn't been to the lake since last summer. Brady's family packed a picnic lunch. His dad made sandwiches for everyone. His uncle packed the cooler with the sandwiches, drinks, and some chips. Brady put in some frozen ice pops. He loved ice pops.

It was a long drive to the lake. When they arrived, everyone helped carry the gear down to the beach. They had towels, folding chairs, a cooler, fishing poles, and two kayaks. They had to make a few trips to move everything.

Brady's dad and cousins wanted to fish. They put bait on their hooks. They took the fishing poles farther down the shore, away from the swimming area. Brady didn't have a fishing pole. He decided to go swimming instead.

Brady's aunt helped him put on plenty of sunscreen and a life jacket. Then he ran for the water! When his feet hit the water, he sucked in his breath. That water was cold! Brrrr! Brady went in up to his knees and stood still for a few minutes. He got used to the cold. Then he waded out until the water was up to his waist. After a few minutes, his legs were so cold that they felt like ice pops! He ran out of the water and warmed up on the shore.

Brady wanted to paddle in a kayak. He asked his older cousin Mara to go with him. They pushed the kayaks into shallow water. Brady tried to climb into his kayak. It was hard to climb in without tipping

NAME: _____

DATE: _____

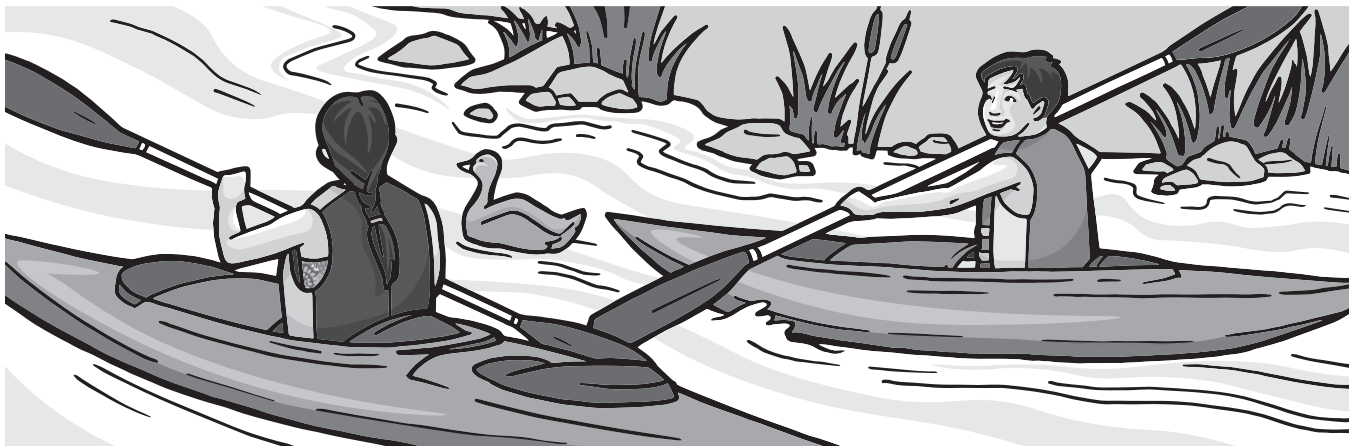
A DAY AT THE LAKE

over! Brady tried a few times, but the kayak kept tipping. He asked his cousin to hold it still while he climbed in.

They started to paddle toward the middle of the lake. The sun felt hot. Brady used his paddle to splash Mara. She splashed him back. Soon they were in a water fight! They were both getting soaked. The cold water felt good. Brady lost his grip on his paddle. Oh, no! The paddle floated farther and farther away. Mara paddled after it. She caught it and gave it back to Brady. They were both wet and tired. They paddled slowly back to the beach.

When they got back to the beach, it was time for lunch. Brady's uncle handed out sandwiches and chips to everyone. Brady was so hungry! When he finished his sandwich, he asked for an ice pop. Oh, no! The ice pops were melting. Brady slurped melted ice pop out of the wrapper. It tasted good, but it wasn't as good as a frozen ice pop.

Soon the sun was getting low in the sky. It was time to head home. Everyone helped carry all of the gear back to the car. Brady was tired from so much fun. He fell asleep on the car ride home.



NAME: _____

DATE: _____

STEP 1: PREPARE FOR THE CHALLENGE

What will we do?

We will make a boat that does not tip over.

What are the rules?

- The boat floats.
- The boat does not tip over when we add the weight to one side.

How will we know it works?

We will know our boat works when we put it in the water and it floats. When we add the weight, our boat will not tip over.

What do we know about this?

NAME: _____

DATE: _____

STEP 2: BRAINSTORM, PLAN, AND BUILD

Choose materials. Think about whether each material will float or sink. What materials will we use to make our boat?

What will our boat look like?

NAME: _____

DATE: _____

STEP 3: TEST, IMPROVE, AND SHARE

We tested our boat. This is what happened:

How can we make our boat better?

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

NAME: _____

DATE: _____

STEP 4: REFLECT

Did our boat float?

Yes

No

Did our boat tip over when we added the weight to one side?

Yes

No

This part was easy:

This part was hard:

I learned this:
