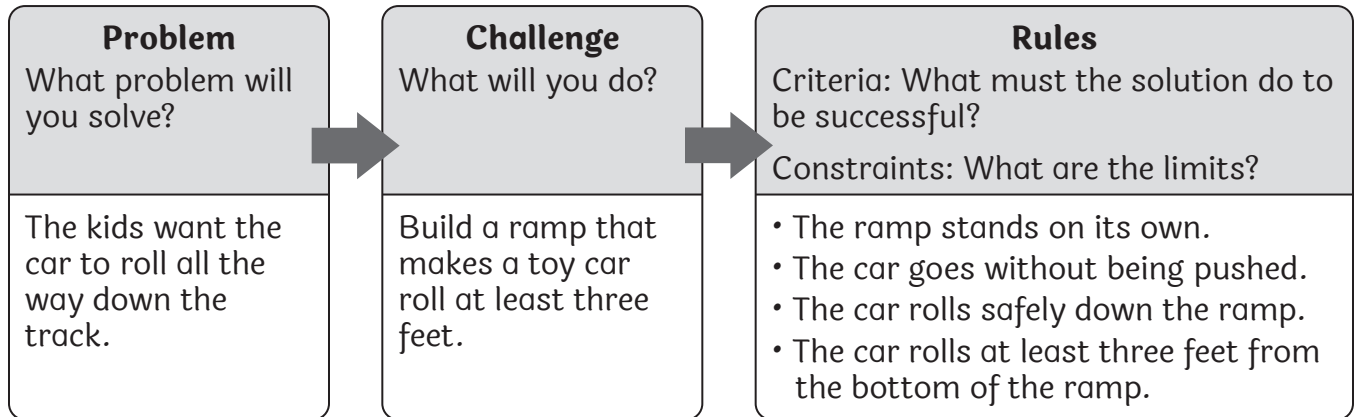


PLOT SUMMARY:

Jada and Tariq's older sister won't let them play with her toy car track, so they make their own. They experiment with a ramp to make their cars roll farther. They figure out how to keep the cars from rolling off the track, and they build a jump.

RAMP CHAMPS 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	The kids need to keep the cars from rolling off the track.
Possible Challenge	<ul style="list-style-type: none"> • Design and build a track that keeps the cars from rolling off.
Problem	The kids want to make cars jump.
Possible Challenge	<ul style="list-style-type: none"> • Engineer a ramp to make cars jump as high as possible.
Problem	The kids want to build a bridge for the cars to roll over.
Possible Challenge	<ul style="list-style-type: none"> • Design and build a track with a bridge.
Problem	The kids want to build more fun ways to play with cars.
Possible Challenge	<ul style="list-style-type: none"> • Design and build more items, such as a parking lot, garage, car wash, or street signs.

MATERIALS:

Required: near-identical toy cars, one per group; measuring tapes

Suggested: materials to create ramps such as cardboard, cardstock, index cards, wood; materials to prop up ramps such as cardboard tubes, boxes, craft sticks, plastic or paper cups, plastic food containers, water bottles; connecting materials such as tape, glue, and staplers; if desired, reusable materials such as books, gameboards, blocks (Note: Tell students that they cannot alter or stick anything to these items.)

PREPARATION:

Designate a testing space, preferably on a smooth surface such as a long table (at least 3 1/2 feet long) or a tile or concrete floor. The tests can be done on non-shag carpet, but keep in mind that it will be more difficult for students to get the cars to roll at least three feet. Test the toy cars to ensure that they all roll smoothly.

LESSON PLAN:

1. Have students read the passage and discuss the problems they identified. Use these questions as prompts:
 - Have you ever played with toy cars? What is your favorite way to play with them?
 - What problems do Jada and Tariq solve in this story?
 - Can you think of some other solutions to these problems?
2. Introduce the Ramp Champs Challenge to students by reading Step 1 (page 48) together. You may want to write the rules for the challenge on the board or a chart. Talk about what it means that the ramp “stands on its own.” (Ramps should not lean against or be attached to a wall or furniture.) Students will need to engineer a way to hold up one end of their ramp. You may want to review the term “at least,” so that students understand that their car can roll farther than three feet.
3. Ask students to think about what they know about toy cars and about ramps that could help them in this challenge. 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 48).
4. Show students the available materials. As you hold up each material, prompt students to think about how they could use it. Give students a copy of Step 2 (page 49). Have them discuss their plan and then write or draw the materials they will use and what their ramp will look like. Then give them access to the materials.
5. Give students time to build their ramps. Circulate to observe and answer questions as students work on their solutions.
6. When a team thinks their ramp is ready, give them a toy car and a copy of Step 3 (page 50). Tell students that they will need to test their ramp in the same way each time so that they can be sure that the changes they made to the ramp are what made the car roll farther. Demonstrate how to let a car go without pushing it: place one finger on the top of the car to hold it in place at the top of the ramp, then lift up your finger to let the car go.

LESSON PLAN:

7. Have students test their ramp by letting a car roll down and measuring how far from the bottom of the ramp that it comes to a stop. If necessary, review or demonstrate how to measure the distance from the bottom of the ramp to the stopped car, using a measuring tape. Students should record their results and how they will improve their ramp. Students may encounter problems such as the car rolling off the side of the ramp, the car smashing into the ground if the ramp is too steep, or the car not rolling far enough. Encourage them to solve these problems themselves! If teams quickly achieve a three-foot distance, challenge them to see how much farther they can get their car to roll.
8. 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.
9. When students have completed the challenge, have them explain their ramps to the class and demonstrate by rolling a car down their ramp. Then have them fill out Step 4 (page 51).
10. If desired, have a contest to see which ramp makes a car roll the farthest. Be sure to use the same car and place each ramp in the same place for all tests. This will ensure that the ramp itself is the only thing that changes.
11. You can extend this challenge by having students test different materials for the surface of their ramps. Try smooth materials such as foil and wax paper, rough materials such as sandpaper, bumpy materials such as bubble wrap, and soft materials such as felt and fabric.
12. 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.

TOY CAR TRACK

“But why?” asked Jada.

“We want to play, too!” said Tariq.

Their older sister shook her head. “No. I don’t want you to mess up the track. You might crash the cars,” she said.

Tariq and Jada walked away. They were sad. They really wanted to play with the toy car track.

“I know!” said Jada. “Let’s build our own track!”

“We have some old cars in the toy box,” said Tariq.

They ran to the toy box. They dug through all the toys. They found five cars.

“What will we use to build our track?” asked Tariq.

They looked around. Jada grabbed some books. She stacked up four books. Then she laid one end of a big book against the top of the stack. The other end was on the ground. She put a car at the top of the ramp. She let it go. It rolled down and stopped at the bottom.

They asked Mama for some empty boxes. She gave them a cereal box and some plastic tubs. Tariq cut the cereal box into strips. He taped them together at the ends. It made a long track! They put the track at the bottom of the ramp. They let a car go down the ramp and it rolled about halfway down the track.

“How can we make it go farther?” asked Tariq.

Jada put another book on the stack. It made the

NAME: _____

DATE: _____

TOY CAR TRACK

top of the ramp higher. They let a car roll down. It went farther, but it went off the side of the track.

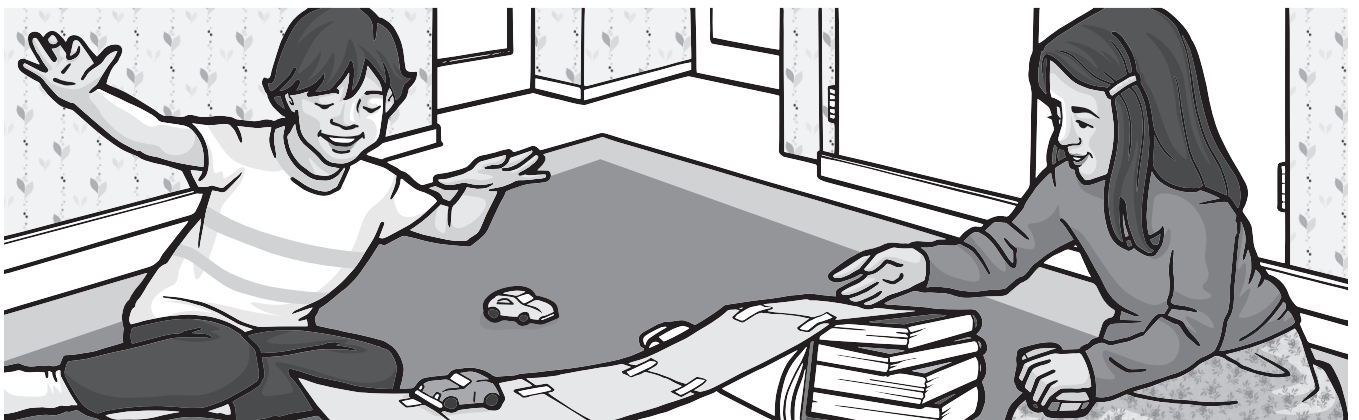
Tariq laid books down on each side of the track. They tried again. The books kept the car on the track. It went almost all the way to the end. Jada made the ramp higher by adding another book. This time, the car went all the way down the track. They took turns letting cars go from the top of the ramp. It was so fun!

Jada made another ramp. It wasn't very tall. She put it at the end of the track. When the car rolled up the ramp, it jumped off! They had fun making the cars jump off the ramp and crash.

"Let's make more stuff for the cars," said Jada. She put one of the plastic tubs upside down. She slid it under part of the track. It made a bridge. They had to try the ramp at different heights to make the car roll safely over the bridge.

The kids made a parking lot and a car wash. Jada made a stop sign. Tariq made a traffic light. They built a gas station.

Jada and Tariq had so much fun playing with the cars. Mama said they could keep their track up and play with it again tomorrow.



NAME: _____

DATE: _____

STEP 1: PREPARE FOR THE CHALLENGE

What will we do?

We will make a ramp for a toy car to roll down.

What are the rules?

- The ramp stands on its own.
- The car goes without being pushed.
- The car rolls safely down the ramp.
- The car rolls at least three feet from the bottom of the ramp.

How will we know it works?

We will know our ramp works when a car rolls safely down it and travels at least three feet without being pushed.

What do we know about this?

NAME: _____

DATE: _____

STEP 2: BRAINSTORM, PLAN, AND BUILD

What materials will we use to build our ramp?

What will our ramp look like?

NAME: _____

DATE: _____

STEP 3: TEST, IMPROVE, AND SHARE

We tested our ramp. This is what happened:

How can we make our ramp better?

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

NAME: _____

DATE: _____

STEP 4: REFLECT

Did our ramp stand on its own? Yes No

Did we let our car go without pushing it? Yes No

Did our car roll safely down the ramp? Yes No

Did our car roll at least three feet from the bottom of the ramp? Yes No

How far did our car roll? _____

This part was easy:

This part was hard:

I learned this:

