CHALLENGE 1
CONFETTI LAUNCHER

SHOW KIDS THE RELATED TV EPISODE

Photo: Mika Tomczak

The perfect pancake? In the "Batter Up" episode, watch the Design Squad *teams seek the right "ingredients" for a machine to cook, flip, and serve up delicious flapjacks at the flick of a switch. Watch the "Batter Up" episode online at* **pbs.org/designsquad.**

Creativity and flexible thinking are useful in every phase of the invention process.

The invention challenge
Invent a device that launches a spoonful of confetti into the air. The bigger the cloud, the better.

In this challenge, kids: (1) play a creative-thinking game; (2) discuss the need for a confetti launcher; (3) brainstorm ways to launch confetti; (4) follow the design process to build a working prototype.

1 Prepare ahead of time

- Read the leader notes and the challenge sheet.
- Set up a testing zone—a large (e.g., 10x10 or 10x14-foot) tarp on the floor with an "X" taped in the center. Also have brooms and dustpans on hand.
- Gather the materials (per pair):
  - paper confetti
  - 1 straw
  - 2 sheets of cardboard (approx. 8.5 x 11 in.)
  - duct tape
  - 1 wooden spool
  - 4 paint stirrers
  - 4 rubber bands
  - 2 8-oz. paper cups
  - 2 4-oz. paper cups
  - string

2 Warm up: Play a game to promote creative thinking (10 minutes)

Making imaginative connections is useful in the invention process. Today's game uses associations to help kids practice flexible, creative thinking. The game will also help kids focus on items that can be launched.

To play, say aloud the words: *rocket, water balloon, ship, shot put, new business, javelin, torpedo, and satellite.* Pause briefly between each word. Ask kids to guess what these things have in common. (They're all *Things That Are Launched*.) The first kid to name the category runs the second round. Whisper the new mystery category to your winner—*Things at a Party*. Ask him or her to think up things at a party and say them aloud. The first kid to name the category wins and runs the final round, using the category *Things That Come in Small Pieces*. Play as in Rounds 1 and 2. Finally, tell the group the name of an item that fits all three categories—*confetti!*

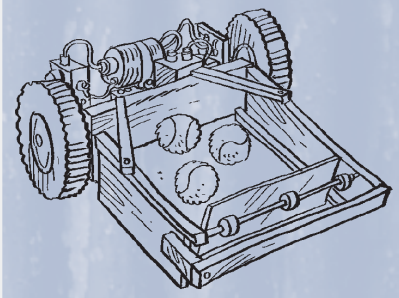
3 Introduce the challenge (5 minutes)

To grab kids' attention, read the following story.

People getting covered in litter and loving it? A huge mess and no one cares? What's going on? It's confetti. People love huge clouds of the stuff! And inventors have figured out ingenious ways to launch tons of confetti at events, such as parades, sports games, and circuses. They've used things like cannons, giant fans, and spring-loaded launchers. Why? Celebrating is important to people, and confetti makes an occasion or event more fun and exciting. Inventors are always looking for ways to improve things or meet people's needs. A big burst of those little bits of paper makes almost anyone smile. The most confetti ever launched at a single event was at a New York City parade—11 million pounds (equal to the combined weight of 110,000, 100-pound kids)! That's a lot of smiles!

LEMELSON-MIT InvenTeams

SHOW KIDS A RELATED INVENTEAM PROJECT



To help people improve their tennis game, the Essex High School InvenTeam invented a robotic tennis ball retriever. It collects the loose balls and drops them into a base station, which serves them up to the player. Check out this project and others at **web.mit.edu/inventeams.**

4 Brainstorm design ideas (10 minutes)

To help kids brainstorm, show them the materials, discuss the questions below, and have them sketch some design ideas.

- What are some things that make a cloud of confetti impressive? *(When the cloud is large, falls slowly, lasts a long time, includes a noisemaker, or has special shapes, such as little hearts for Valentine's Day)*
- Name some devices that launch objects into the air. *(Catapults, slingshots, squirt guns, fertilizer or seed spreaders, water balloon launchers, sprinklers, trampolines, etc.)*
- How do these devices develop the force they need to launch things? *(Objects can be blasted or thrown into the air using water pressure, air pressure, springs, elastic bands, static electricity, levers, electric or fuel-operated motors, etc.)*
- Look at the materials. What can you use to launch confetti into the air? *(Slingshots made from rubber bands and paper cups; catapults made from paint stirrers and rubber bands; and levers used like a seesaw made from paint stirrers and wooden spools)*

During testing, we ended up with a variety of designs, such as catapults and slingshots. These pictures show several possible solutions. But don't show them to kids—they're likely to copy the ideas they see in the pictures.

5 Build, test, and redesign (25 minutes)

In our testing sessions, kids had a blast launching confetti. The laughter and excitement was contagious. Our sessions also yielded a few dos and don'ts:

- **Avoid using balloons**—In our testing, some kids couldn't resist popping the balloons to scare their friends. Others just filled balloons with confetti and said they were done. Also, balloons aren't good launchers. The confetti only comes out when you point the balloon's opening down. And then the confetti falls to the floor without making much of a cloud.
- **Avoid metallic confetti**—This shiny material sticks to everything. Use paper confetti, instead, to make cleanup easy.
- **One teaspoon of confetti per launch is plenty**—It produces a satisfying burst but not an unmanageable mess.
- **Define a testing zone**—Have kids launch confetti only when standing on the "X" in the middle of the tarp, even if it means waiting in line. Our tarp was 10x14 feet. A big tarp and clear ground rules will facilitate cleanup.

CHALLENGE THE STEREOTYPE

Tell kids that inventors and engineers get involved in all sorts of fun, interesting projects that make people's lives more enjoyable. For example, point out that celebrating is important to people, and engineers and inventors have figured out many ways to launch confetti to make events more fun and exciting. Also show kids videos in which young engineers describe how engineering lets them lead interesting, exciting lives and do cool things. See them online at:

- **pbs.org/designsquad/profiles**
- **web.mit.edu/inventeams/videos.html**

To learn about an idea's strengths and weaknesses, inventors build a series of early designs called prototypes.

6 **Discuss what happened** (10 minutes)

To learn about an idea's strengths and weaknesses, inventors build a series of early designs called *prototypes*. Ask kids to present, compare, and discuss the prototypes they built today.

- Who might use a confetti launcher? *(Moviemakers; people running theaters, arenas, and circuses; and people at parties, parades, sports events, and weddings)*
- How does your launcher develop enough force to launch confetti? *(It stores energy [potential energy], which, when released [kinetic energy], sets the confetti in motion. The force can come from things like stretched rubber bands that get released or from hitting the end of a lever, set up like a seesaw.)*
- Which design launched the biggest cloud of confetti? How did that design generate its force?
- How could you change your launcher's design to launch confetti made from something other than paper bits? For example, streamers, corkscrew confetti that twirls down like a helicopter, mini-parachutes, fake money, dried flower petals, fake snow, and foam peanuts.

TINKER SOME MORE

As you've just discovered, launched confetti is messy. Brainstorm a list of clean-up machines or have kids imagine a vehicle dedicated to confetti collection.

- What are some ways to pick up huge amounts of paper bits at large events, like a championship sporting event, convention, or a ticker-tape parade?
- How could a collection vehicle use plows, vacuums, fans, leaf blowers, or balloons charged with static electricity?
- Test to see if rakes or brooms work better. (*The Department of Sanitation, New York City uses mechanical brooms and handheld rakes.)*