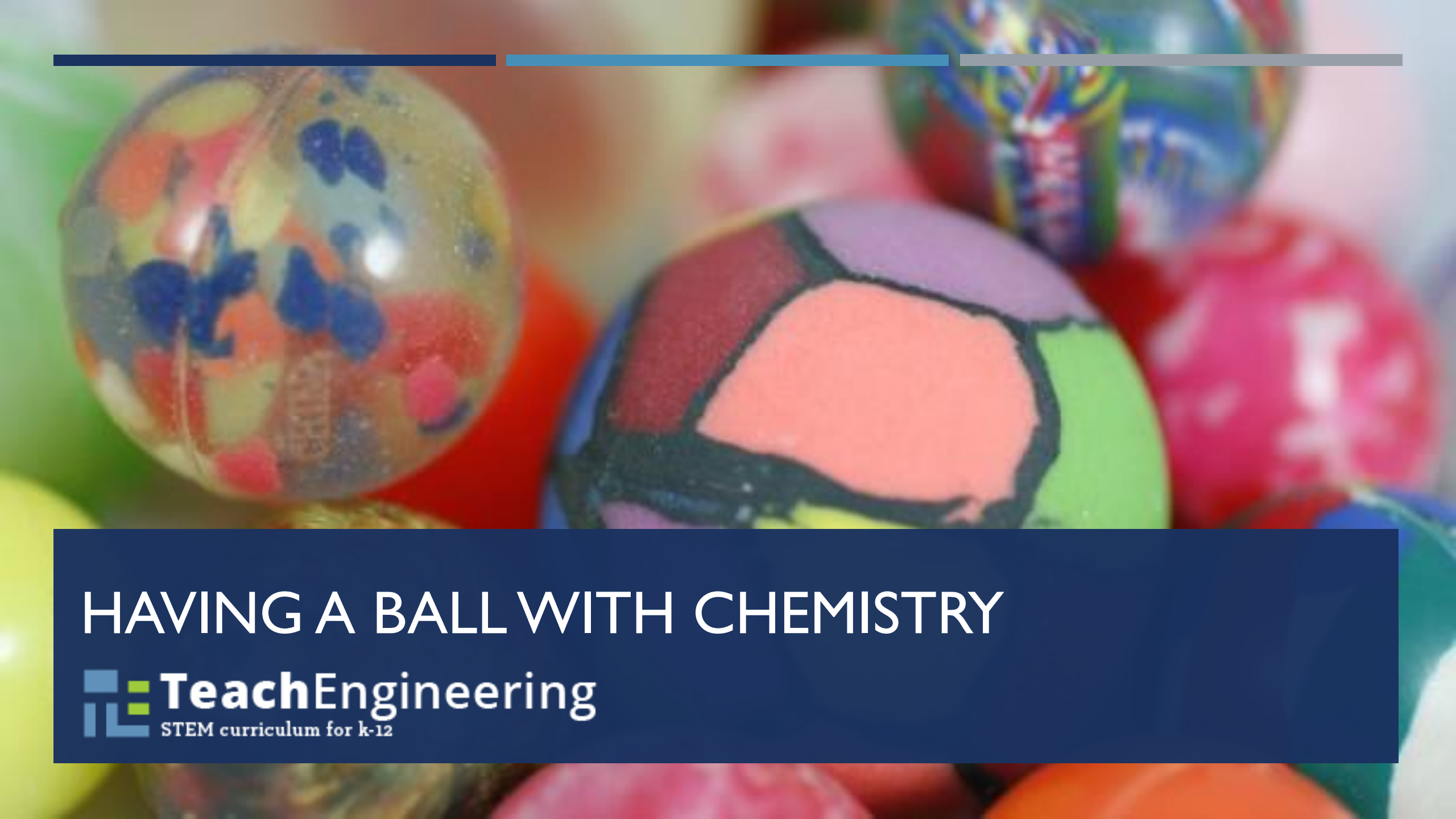

HAVING A BALL WITH CHEMISTRY

TeachEngineering
STEM curriculum for k-12

REAL TOY COMPANY

- The Precision Plastic Ball Company Ltd
  - https://www.youtube.com/watch?v=4h6m_wrOpm4

KICKOFF

- Companies are in constant competition to create the best products possible, whether it's food, cars, video games, or even toys.

- Toy companies want products that are cheap to make but are worthwhile to sell. For our class, we will take on the role of engineers for the [*insert your own toy company name*]. This brand-new company wants materials and chemical engineers to design a new bouncy ball that they can produce at the lowest cost possible.

THE CHALLENGE!

- Create the bounciest ball out of a select number of materials.
- Work with one other team member to create your product.
- Use as much or as little of any product possible, but keep in mind that you must create the most cost-effective product.
- Once you create your product, measure the width of your ball and how far your ball bounces.

MATERIALS

- cornstarch
- salt
- sugar
- borax
- glue
- water (at room temperature)
- hot plate
- wooden sticks (to stir)

OBSERVE

- Observe the materials available to you. Ask yourself: *What reagents (solids or liquids) can I combine to make my bouncy ball?* You can look at the physical properties of the materials.

KEEP UP WITH THE COSTS!

Supplies Used	Amount	Cost	Total Cost
water		$0.30 / tablespoon	
glue stick		$1.00 / stick	
cornstarch		$0.20 / tablespoon	
Elmer's glue		$0.40 / tablespoon	
baking soda		$0.25 / teaspoon	
salt		$0.10 / teaspoon	
sugar		$0.20 / teaspoon	
borax		$0.15 / teaspoon	
yellow wood glue		$0.50 / teaspoon	
Total			

MAKER TIME - BRAINSTORM

- Divide into pairs.
- Brainstorm ideas on how to create your prototype.
- Look at materials and touch, if desired, but do not start yet.
- Sketch out a detailed plan with quantities.
  - For example: "We will combine one tablespoon of borax and one tablespoon of glue".
- Show your instructor your plan and begin synthesizing.

MAKER TIME - SYNTHESIZING

- Start synthesizing your ball.
- If you succeed, proceed in your lab.

- If you fail…that's ok!
  - Modify your procedures.
  - Make sure to write down exactly what you changed.