

# Carolina Biological Supply Company

***Engineer Physical Science  
Excitement in Your  
Classroom with a  
Carolina STEM  
Challenge®***



**#carolinaNSTA**

**CAROLINA®**  
[www.carolina.com](http://www.carolina.com)



**Patti Kopkau**  
**Retired**

- **30+ years teaching experience (Middle & High School)**
- **Enjoys a good science pun**
- **Carolina Consultant for 20 years**

# Workshop Overview

## Carolina STEM Challenge® Subject Areas

- ***Physical Science***
- ***Emerging Energies***
- ***Life Science***
- ***Chemistry***

## Today's Challenges

- ***Chemical Rockets***
- ***Balloon Race Cars***



# Learning Context



- **Elementary School**

- General science and inquiry

- **Middle School**

- **Physical Sciences:** Energy transformations, forces and motion, and mathematical models

- **High School**

- **Physical Science:** Energy transformations, Newton's laws, forces, and mathematical models
- **Physics:** Energy transformations, Newton's laws, forces, and mathematical models
- **Earth and Space Sciences:** Power generation, alternative energies

- **Science Competitions**

- Science fairs
- Science Olympiad
- Science and engineering competitions and projects

# Carolina STEM Challenge® Kits

- Warm-ups and demonstrations
- Science content (teachers and students)
- 3-Dimensional Learning
- Notebooking and differentiated instruction
- Grading and scoring rubrics
- Real-world connections
- Extensions (literacy and STEM activities)



Designed with ease of use in mind, Carolina STEM Challenge® kits have the materials and information needed for classroom success!

# Workshop Rules

## Safety

- **PPE**
- **Latex**

## Liquids and Rocket Spray

- **Clear tabletops**
- **Stow electronic devices**

## Stations

- **Find a partner**
- **Share tool kits**
- **Keep your work space clean**



**HAVE FUN!**

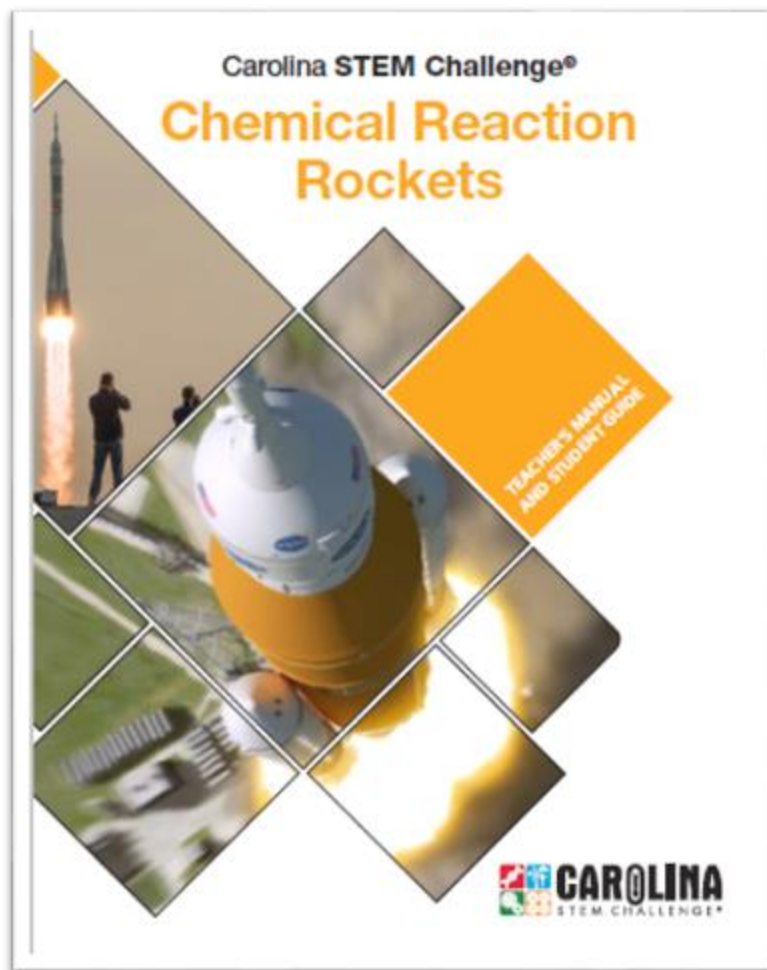
# Building Toward 3-Dimensional Learning

## *Chemical Reaction Rockets*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<ul style="list-style-type: none"><li>Developing and using models: Develop a model to describe unobservable mechanisms.</li></ul>	<p><b>PS1.B:</b> Chemical reactions: Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.</p>	<ul style="list-style-type: none"><li>Systems and system models: Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.</li></ul>



# *Chemical Reaction Rockets*





# Activities Overview

## Chemical Reaction Rockets

### Activity:

Optimize the rocket design and chemical reaction of the "rocket fuel"

### Challenge:

Highest launch with a payload

**SEPs:** Asking questions, planning & carrying out investigations, analyzing and interpreting data, engaging in argument from evidence

# Rocket Test Procedures

1. Observe all safety protocols: Wear PPE, and keep rockets pointed away from people at all times.
2. One team member approaches the launch site with rocket pointed down and uncapped.
3. At the test site, you will receive your "launch training."
4. Once the rocket is set to launch, **step back**, and wait for the rocket to ascend.
5. Use the stopwatch to measure the time of descent between the rocket's highest altitude and its landing on the floor.

**In case of a FAILURE TO LAUNCH, a Carolina representative will disengage the rocket and return it to you.**

# Building Toward 3-Dimensional Learning

## *Balloon Race Cars*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<ul style="list-style-type: none"><li>• Developing and using models</li><li>• Planning and carrying out investigations</li><li>• Analyzing and interpreting data</li></ul>	<p><b>PS 2A:</b> Forces and motion: The motion of an object is determined by the sum of the forces acting on it.</p> <p><b>PS 3C:</b> When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object.</p>	<ul style="list-style-type: none"><li>• Cause and effect: Mechanism and explanation</li><li>• Scale, proportion, and quantity</li><li>• Energy and matter: Flows, cycles, and conservation</li></ul>



[NEW Carolina STEM Challenge® Kits](http://www.carolina.com)

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# Balloon Race Cars



# Activities Overview

## Balloon Race Cars

### **Activity:**

Build a balloon-powered race car

### **Challenge:**

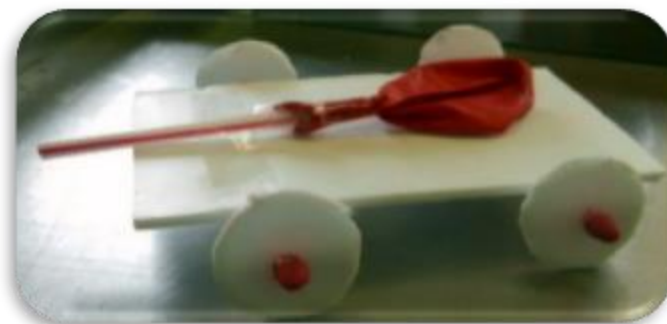
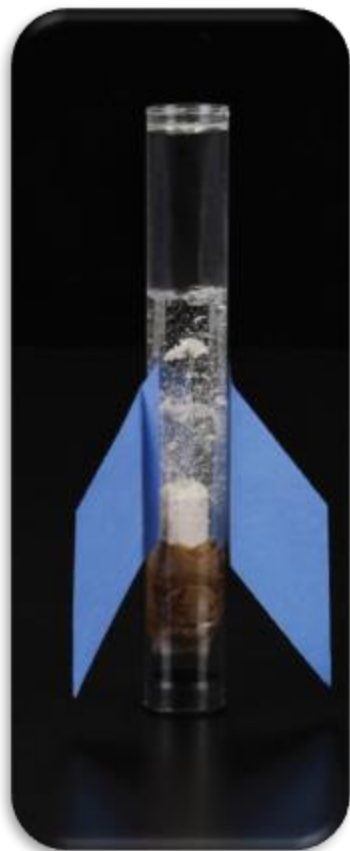
Go the farthest distance

**SEPs:** Asking questions, planning & carrying out investigations, analyzing and interpreting data, engaging in argument from evidence

# Workshop Summary

## What did you learn?

- *Chemical Rockets*
- *Balloon Race Cars*

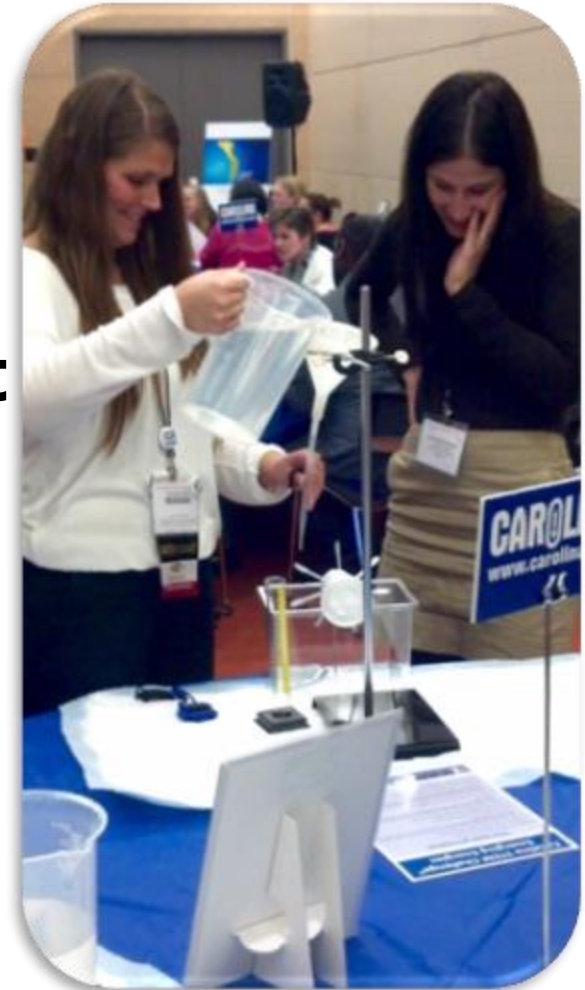


**Newton's Laws, Gas Laws, Stoichiometry, Chemical Reactions**

**Newton's Laws, Force, Motion, Friction, Speed, Acceleration**

# Carolina STEM Challenge®

- ✓ **Easy to integrate**
- ✓ **High student engagement**
- ✓ **Engineering and STEM concepts**
- ✓ **Excite with real-world scenarios**





## PHYSICAL SCIENCE

Balloon Race Cars

Boats & Buoyancy

Build It Write

Cartesian Divers

Egg Drop

Motors

Mousetrap Cars

Paint Stirrer Catapult

Projectile Launcher

Roller Coasters

Sound Off

Balloon Rockets

Structures

Keep It Hot

Bubbles

Trebuchets

Take Flight

## LIFE SCIENCE

Circulatory System

How to Train Your Isopod

Hydroponics

How to Train a Plant

3-D Art and Human Vision

## EMERGING ENERGIES

Battery Dilemma

Biofuels

Geothermal

Hydroelectric Power

Passive Solar Design

Solar Car Design

Wind Farm

Solar Water Distillation

Emerging Energies Set

## CHEMISTRY

Make It Bounce

Separation of a Mixture

Chemical Reaction  
Rockets

Crystal Growing

**Join us on social media to stay up to date  
with new kits and free lessons!**



**@CarolinaBiological**



**@CarolinaBio**

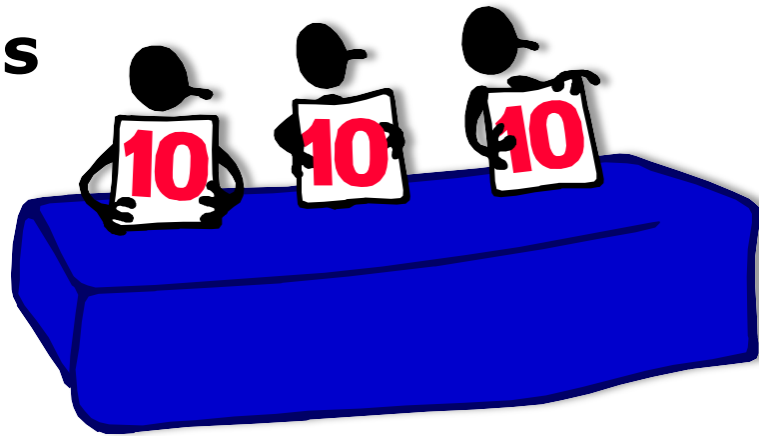


**@carolinabiologicalsupplyco**



# Evaluations: Share Your Thoughts!

**We are striving to  
make our workshops  
great!**



**Please evaluate this session and presenter  
on a scale from 0 to 10. (10 = best)**

# Please help us reset the room by gathering your belongings and exiting between sessions.

## THANK YOU!



Carolina\_Workshop\_Materials

**And remember:  
You can access all  
Carolina workshop  
materials later.**

