CAROLINA
UNLEASH LEARNING™



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

EDUCATORS PICK
BEST OF STEM®
WINNER 2025

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Workshop Overview

Carolina STEM Challenge® Subject Areas

- Physical Science
- Emerging Energies
- Life Science
- Chemistry

Today's Challenges

- Chemical Reaction Rockets
- Balloon Race Cars



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Learning Context



Elementary School

- General science and inquiry

Middle School

- **Physical Science:** 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

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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!

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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



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Building Toward TEKS Science Concepts

Chemical Reaction Rockets

This activity aligns with the following TEKS science standards:

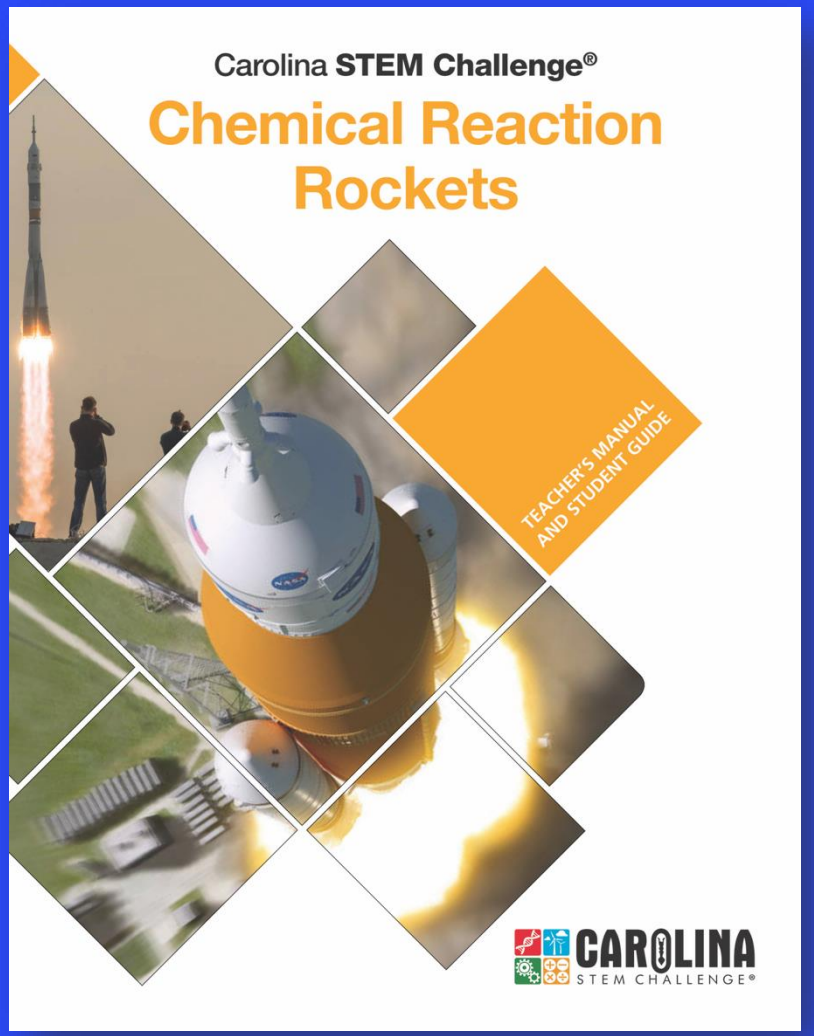
- **IPC.7.F:** Plan and conduct an investigation to provide evidence that the rate of reaction or dissolving is affected by multiple factors such as particle size, stirring, temperature, and concentration.
- **IPC.8.A:** Investigate how changes in properties are indicative of chemical reactions such as hydrochloric acid with a metal, oxidation of metal, combustion, and neutralizing an acid with a base.
- **C.9:** The student understands how matter is accounted for in chemical reactions.

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Chemical Reaction Rockets



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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 and 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.

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Building Toward TEKS Science Concepts

Balloon Race Cars

This activity aligns with the following TEKS science standards:

- **IPC.5:** The student knows the relationship between force and motion in everyday life.
- **P.5.A:** Analyze different types of motion by generating and interpreting position versus time, velocity versus time, and acceleration versus time using hand graphing and real-time technology such as motion detectors, photogates, or digital applications.
- **P.5.C:** Describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, velocity, frames of reference, and acceleration.
- **P.7.C:** Apply the concept of conservation of energy using the work-energy theorem, energy diagrams, and energy transformation equations, including transformations between kinetic, potential, and thermal energy.
- **P.7.D:** Calculate and describe the impulse and momentum of objects in physical systems such as automobile safety features, athletics, and rockets.

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Balloon Race Cars



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Activities Overview

Balloon Race Cars

Activity:
Build a balloon-powered race car

Challenge:
Go the farthest distance

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

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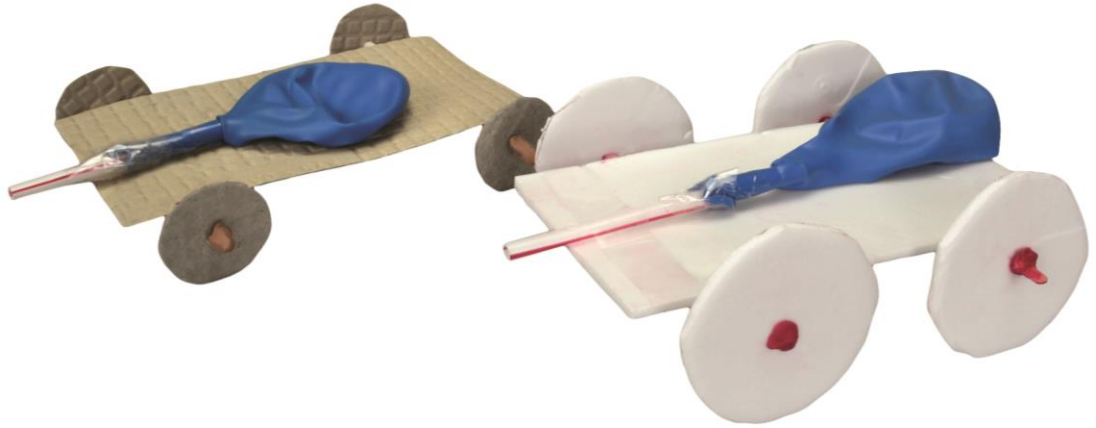
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Workshop Summary



What did you learn?

- Chemical Rockets
- Balloon Race Cars



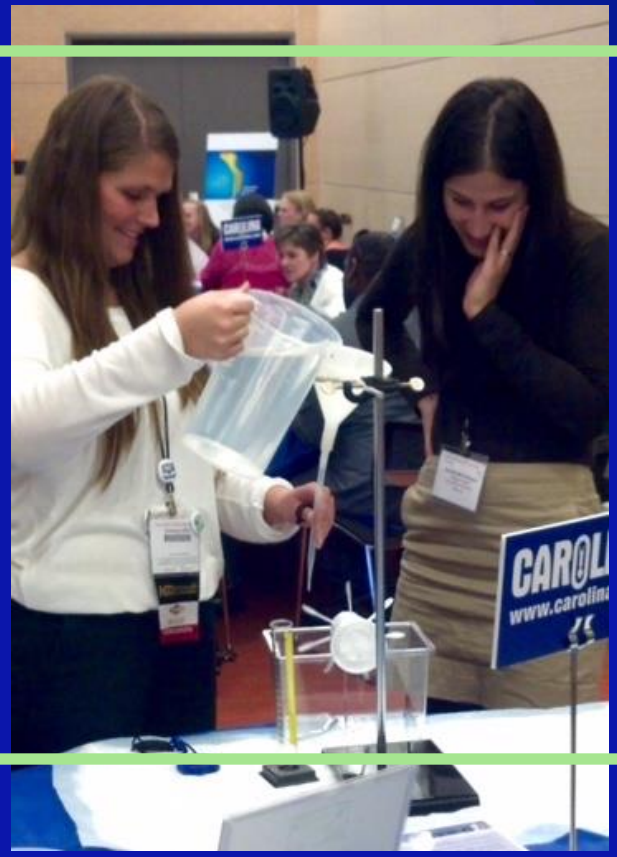
Newton’s Laws, Gas Laws, Stoichiometry, Chemical Reactions

Newton’s Laws, Force, Motion, Friction, Speed, Acceleration

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Carolina STEM Challenge®

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



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CAROLINA STEM CHALLENGE®

Engineer. Engage. Excite.

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
- Wave Machine
- Physical Science Set

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

LIFE SCIENCE

- Circulatory System
- How to Train Your Isopod
- Hydroponics
- How to Train a Plant
- 3-D Art and Human Vision

Engage your students today!

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