



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



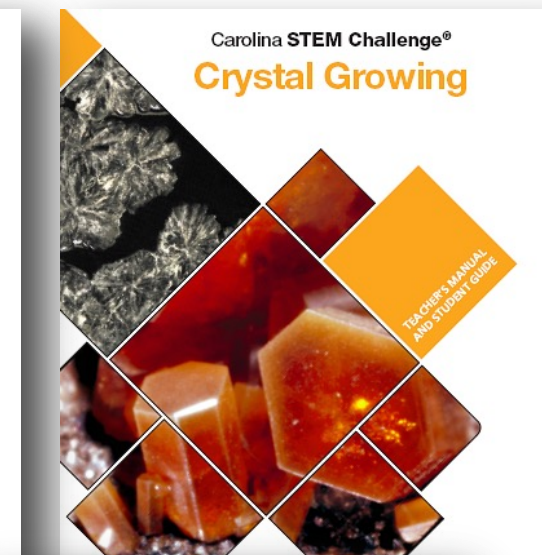
Workshop Overview

Carolina STEM Challenge® Subject Areas

- Physical Science
- Emerging Energies
- Life Science
- Chemistry

Today's Challenges

- Chemical Reaction Rockets
- Balloon Race Cars



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



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



Building Toward 3-Dimensional Learning

Chemical Reaction Rockets

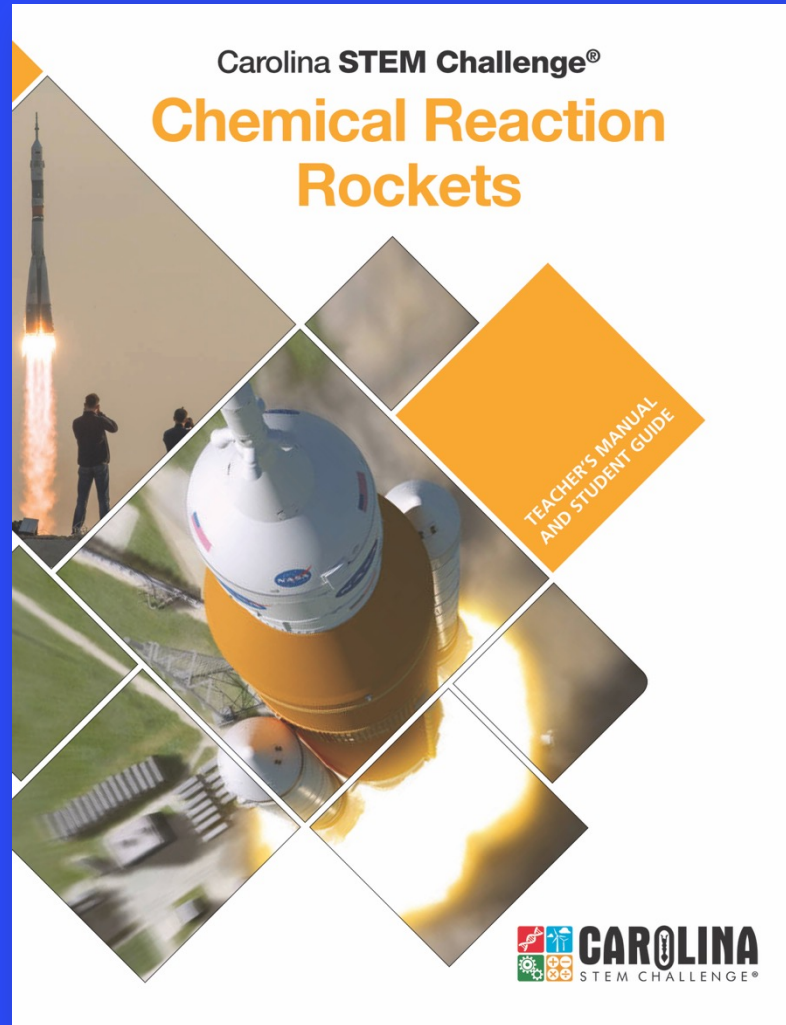
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and using models ▪ Develop a model to describe unobservable mechanisms.	PS1.B: Chemical reactions ▪ Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.	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.¹

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1. NGSS Lead States, Next Generation Science Standards: For States, By States (Washington, DC: The National Academies Press, 2013), retrieved from www.nextgenscience.org or ngss.nsta.org



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 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.

Building Toward 3-Dimensional Learning

Balloon Race Cars

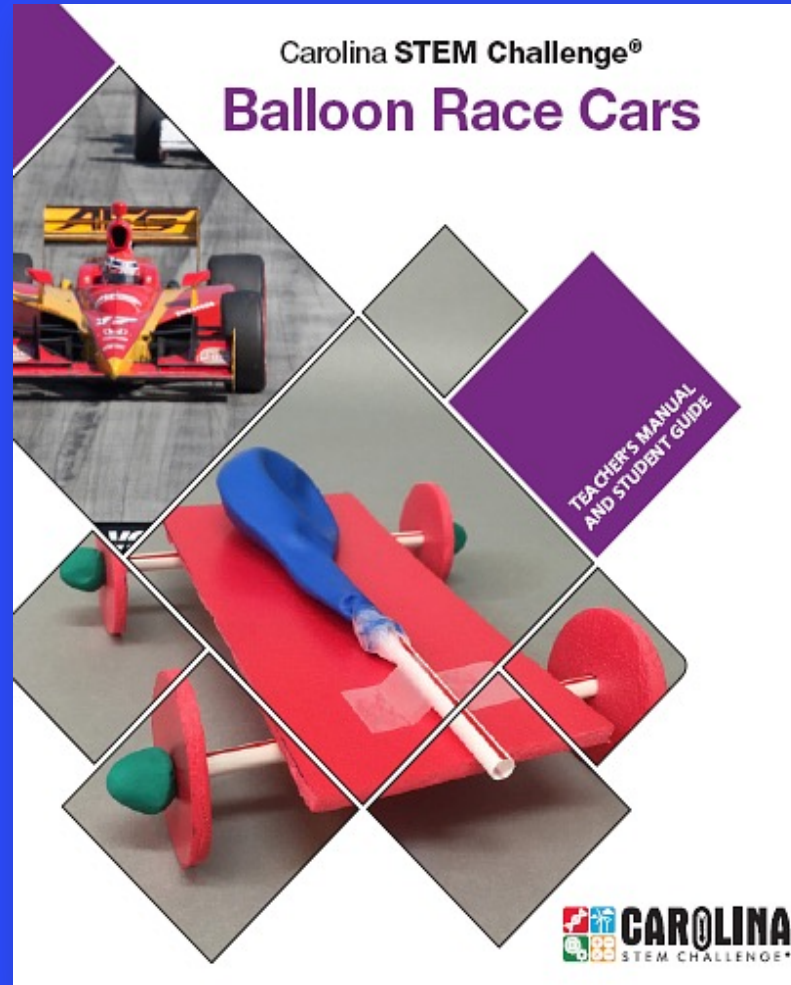
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
▪ Developing and using models ▪ Planning and carrying out investigations ▪ Analyzing and interpreting data	PS 2A: Forces and motion The motion of an object is determined by the sum of the forces acting on it. PS 3C: When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object.	▪ Cause and effect: Mechanism and explanation ▪ Scale, proportion, and quantity ▪ Energy and matter: Flows, cycles, and conservation¹

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1. NGSS Lead States, Next Generation Science Standards: For States, By States (Washington, DC: The National Academies Press, 2013), retrieved from www.nextgenscience.org or ngss.nsta.org



Balloon Race Cars



Activities Overview

Balloon Race Cars

Activity:

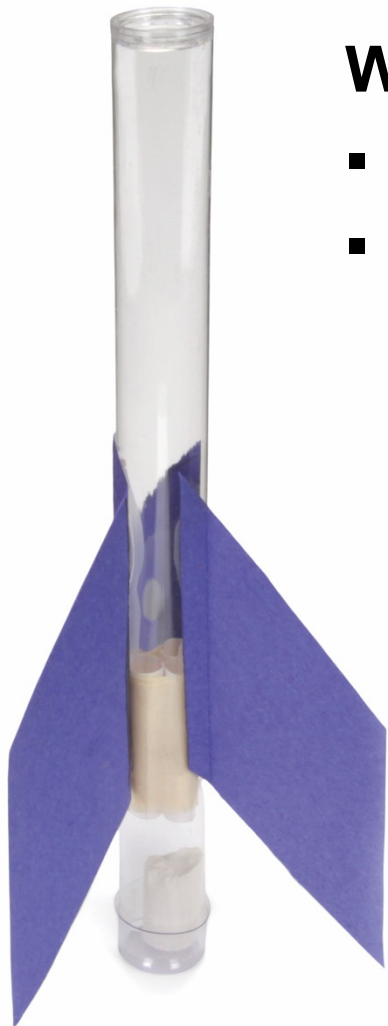
Build a balloon-powered race car

Challenge:

Go the farthest distance

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

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





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

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your
students
today!**

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