

# Rocket Activities

There are few classroom topics that generate as much excitement as rockets. The scientific, technological, engineering, and mathematical (STEM) foundations of rocketry provide exciting classroom opportunities for authentic hands-on, minds-on experimentation. The activities and demonstrations that follow are suitable for students at many grade levels.

For the most part, material and tool requirements are simple, but a few of the bigger projects require launch platforms that need to be constructed or purchased in advance. Although purchasing platforms from school science catalogs and specialty companies is an option, constructing your own is a learning process in which you can involve your students. Minimal proficiency with tools (saw, screw driver) is required. Detailed instructions (with lots of illustrations!) are provided.

As you review the activities you will notice that each supports state and national educational standards for science, technology, and mathematics. A matrix identifying specific national standards and recommended grade levels follow on the next two pages. You may “cherry-pick” activities, but linking several or using all of the activities will provide your students with a memorable and beneficial STEM unit and turn your students into “rocket scientists.” *You Are Go For Launch!*

## **A Note about Measurement**

Where possible, all measurements used in the activities are metric. However, English units are often employed when constructing devices because most materials and parts are sized with English measures.

# National Curriculum Standards

The rocket activities in this guide support national curriculum standards (current at the time of its writing) for science, mathematics, and technology. The standards identified for each activity are based on science standards developed by the National Research Council and the mathematics standards developed by the National Council of Teachers of Mathematics. While not practical to identify individual standards by state, national standards provide a guide for selecting activities that meet local needs.

## National Science Education Standards

K-12

### National Research Council

- Evidence, models, and explanation
- Change, constancy, and measurement
- Abilities necessary to do scientific inquiry
- Position and motion of objects
- Motions and forces
- Properties of objects and materials
- Abilities of technologic design
- Understanding about science and technology
- Risks and benefits
- Science and technology in local challenges

### Rocket Activities

	Unifying Concepts and Processes		Science as Inquiry	Physical Science	Science and Technology
Pop Can "Hero Engine"		✓	✓	✓	✓
3...2...1...PUFF!	✓		✓	✓	✓
Heavy Lifting			✓	✓	✓
Newton Car	✓	✓	✓	✓	✓
Rocket Races		✓	✓	✓	✓
Pop! Rocket Launcher				✓	✓
Pop! Rockets	✓	✓	✓	✓	✓
Foam Rocket	✓	✓	✓	✓	✓
Launch Altitude Tracker				✓	✓
Water Rocket Launcher				✓	✓
Water Rocket Construction				✓	✓
Project X-51	✓	✓	✓	✓	✓

# Principles and Standards for School Mathematics

Pre K-12

National Council of Teachers and Mathematics

		Number and Operations	Algebra	Geometry	Measurement	Data Analysis and Probability	Problem Solving	Reasoning and Proof	Communication	Connections	Representation
Pop Can "Hero Engine"	<b>Content Standards</b>	✓	✓			✓		✓	✓	✓	✓
3...2...1...PUFF!		✓		✓	✓	✓			✓	✓	
Heavy Lifting		✓				✓	✓	✓	✓	✓	✓
Newton Car		✓			✓	✓	✓	✓	✓	✓	✓
Rocket Races		✓		✓	✓	✓	✓	✓	✓	✓	✓
Pop! Rocket Launcher					✓			✓			
Pop! Rockets		✓		✓	✓	✓	✓	✓	✓	✓	✓
Foam Rocket		✓	✓	✓	✓	✓		✓	✓	✓	✓
Launch Altitude Tracker		✓		✓	✓	✓	✓	✓	✓	✓	✓
Water Rocket Launcher					✓				✓		
Water Rocket Construction				✓	✓				✓		
Project X-51	<b>Process Standards</b>	✓		✓	✓	✓	✓	✓	✓	✓	✓

# Suggested Grade Levels

The matrix below displays suggested grade levels for the activities in this guide. Each activity is appropriate for a wide range of student abilities. Although grade levels are suggested, small modifications will enable activities to be used successfully with other grade levels. One area of potential adjustment are the student pages. The reading level and vocabulary on these pages may be below or above your students' abilities. Many of the activities contain tips, suggestions, and extensions that will assist you in preparing the lesson for the appropriate audience.

## Suggested Grade Levels

### Rocket Activities

	K	1	2	3	4	5	6	7	8	9	10	11	12
Pop Can "Hero Engine"	✓	✓	✓	✓	✓	✓	✓	✓	✓				
3...2...1...PUFF!	✓	✓	✓	✓	✓	✓	✓	✓	✓				
Heavy Lifting	✓	✓	✓	✓	✓	✓	✓	✓	✓				
Newton Car				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rocket Races				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pop! Rockets Launcher	✓	✓	✓	✓	✓	✓	✓						
Pop! Rockets	✓	✓	✓	✓	✓	✓	✓						
Foam Rocket					✓	✓	✓	✓	✓	✓	✓	✓	✓
Launch Altitude Tracker					✓	✓	✓	✓	✓	✓	✓	✓	✓
Water Rocket Launcher					✓	✓	✓	✓	✓	✓	✓	✓	✓
Water Rocket Construction					✓	✓	✓	✓	✓	✓	✓	✓	✓
Project X-51					✓	✓	✓	✓	✓	✓			