What can youth learn by launching a 2-liter bottle rocket? Find out with *Rockets Away!* part of the Science Alive 4-H School Enrichment series from Ohio State University Extension, 4-H Youth Development. *Rockets Away!* Challenges youth to use science, technology, engineering, and math (STEM) skills to investigate forces and motion. Whether launching paper rockets or pressurized 2-liter plastic bottles, these action-packed activities pique curiosity, encourage collaboration and communication, and provide young scientists with unforgettable experiences.

The personal *Rockets Away! Logbooks* are meant to be used by your classroom students to record data and observations as they explore the science of forces and motion. In the accompanying *Rockets Away! Teacher Guide*, you’ll find hands-on, standards-based inquiry lessons that ignite interest, develop understanding, and build skills in science, engineering, math, and technology.

Look for more about *Rockets Away!* and 4-H Science Alive online at [www.ohio4h.org/rocketsaway](http://www.ohio4h.org/rocketsaway)

If you are an Ohio resident and want to order the Rockets Away! teacher guide or reorder a set of the Rockets Away! Logbook, please contact your local county Extension office. Out-of-state residents can order online at [http://estore.ose-extension.org](http://estore.ose-extension.org).

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For Deaf and Hard of Hearing, please contact Ohio State University Extension using your preferred communication (e-mail, relay services, or video relay services). Phone 1-800-750-0750 between 8 a.m. and 5 p.m. EST Monday through Friday. Inform the operator to dial 614-292-6181.
### Ohio Science Academic Content Standards

#### Science Inquiry and Application

**Grades PreK-4**
- Observe and ask questions about the natural environment.
- Plan and conduct simple investigations.
- Employ simple equipment and tools to gather data and extend the senses.
- Use appropriate mathematics with data to construct reasonable explanations.
- Communicate about observations, investigations and explanations.

**Grades 5-8**
- Identify questions that can be answered through scientific investigations.
- Use appropriate mathematics, tools, and techniques to gather data and information
- Analyze and interpret data.
- Develop descriptions, models, explanations and predictions.
- Think critically and logically to connect evidence and explanations.
- Recognize and analyze alternative explanations and predictions.
- Communicate scientific procedures and explanations.

#### Strand: Physical Science

**Grade 2 Topic: Changes in Motion**
- Forces change the motion of an object.
  - Motion can increase, change direction or stop depending on the force applied.
  - The change in motion of an object is related to the size of the force.

**Grade 5 Topic: Light, Sound and Motion**
- The amount of change in movement of an object is based on the weight of the object and the amount of force exerted.
  - Movement can be measured by speed. The speed of an object is calculated by determining the distance (d) traveled in a period of time (t).
  - Earth pulls down on all objects with gravitational force. Weight is a measure of the gravitational force between an object and the Earth.
  - Any change in speed or direction of an object requires a force and is affected by the mass (or “weight”) of the object and amount of force applied.

### Ohio Common Core Standards in Mathematics

#### Measurement and Data
- Measure and estimate lengths in standard units. (Grade 2)
- Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. (Grade 3)
- Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. (Grade 4)
- Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.
- Represent and interpret data (Grades 2-5)

#### Operations and Algebraic Thinking
- Represent and solve problems involving multiplication and division. (Grade 3)
- Use the four operations with whole numbers to solve problems. (Grade 4)
- Generate and analyze patterns (Grade 4)
- Write and interpret numerical expressions. (Grade 5)
- Analyze patterns and relationships (Grade 5)

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The educational standards cited here are from the Ohio Department of Education *Ohio Revised Science Standards and Model Curriculum, Grades PreK through Eight*, March 2011, available online in their entirety at [www.ode.state.oh.us](http://www.ode.state.oh.us).