CONTENT CONNECTIONS

Hello!

Whether you are a parent, guardian, teacher, or mentor, the LRC-Staff thanks you for choosing this Content Connections activity to assist with your educational needs. Please know that all activities in this series are aligned to both the New Jersey Learning Standards (NJLS) and High-Leverage Practices (HLPs) in Special Education and include the grade level and student objectives on the Activity Plan below. Please note that modifications to the activity may be needed to increase student engagement based on need and/or grade level.

In this activity, **Balloon Rockets**, students will explore the concept of Motion and Stability, Forces and Interactions (Next Generation Science Standards) by building an air powered balloon rocket to examine forces such as thrust, gravity, and friction to estimate their effects on the distance a balloon will travel along a string. The prior knowledge necessary to increase student success with this activity includes the ability to design an experiment and observe outcomes, measuring with a tape measure, and a basic understanding of the word "force". The setup for this activity should take approximately 15 minutes with approximately another 15 minutes for the extension activity. More information on the specific NJL Standards described in the Activity Plan can be found at https://www.nj.gov/education/cccs/.

If you would like more information about the topic of this activity as well as related topics, please visit the Online Resources section of our website and/or the Alexandria Researcher to find materials curated in our resource lending library. Please know that library materials may be borrowed through our LRC Xpress service with curbside pickup at this time.

Enjoy!

The LRC-S Staff

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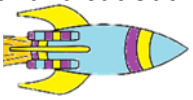
CONTENT CONNECTIONS

Balloon Rockets - Activity Plan	
Grade Level	K-8
Content	Next Generation Science Standards on Motion and Stability: Forces and Interactions
New Jersey Standards	K-PS2-2: Analyze data to determine if a design solution works as intended to change the speed or direction of an object. 3-PS2-1& 2: Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. & Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. MS-PS2-1: Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
Objective	Students will be able to build an air powered balloon rocket to examine forces such as thrust, gravity, and friction to estimate the effects on distance traveled.
Supplies Needed	String, Tape (masking and double sided), Balloon, Straw, Air Pump (optional)

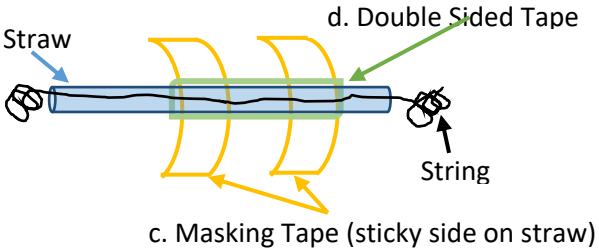
The Activity:

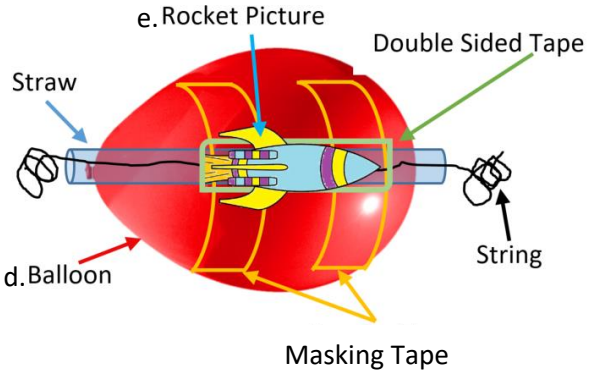
Build It!

1. Color and cut out rocket of your choice – one like this can be downloaded from Flickr.com



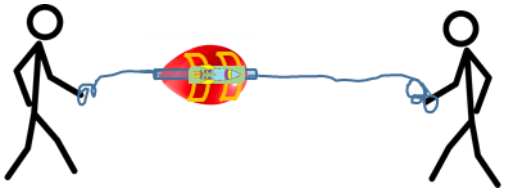
2. Assemble your balloon rocket by:
    a. Cut a length of string to at least 15 feet long (depending on the size of the balloon, you may need a longer string)
    b. Insert the string into your straw
    c. Put 2 pieces of masking tape crosswise onto straw sticky side on straw (don't pull out the string)
    d. Put 1 piece of Double Sided tape lengthwise on top of that
    e. Put rocket picture on top of Double Sided tape
    f. Inflate balloon and hold closed (be sure to inflate the balloon either the same number of breaths or pumps, so that it is roughly the same size for each test.)
    g. Attach inflated balloon onto the masking tape making sure the balloon and straw stay together



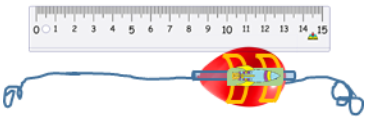


Fly It!

3. Stretch out string between 2 people/objects and mark the starting point of your rocket.



4. Let go of the balloon to see how far your rocket can fly along string
5. Measure how far your rocket flew from the starting point to the ending point. You can either use the front or back of the rocket to measure to, just make sure you do the same for all tests.

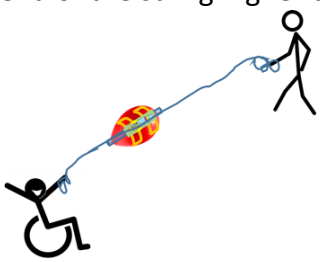


6. Record your data on the datasheet and think about your experiment.

Extension Activity:

7. Try changing something from your setup, to see how your results will change like:
    a. Type of String – you may wish to try yarn or fishing line to see if you get different results
    b. Amount of air in balloon – try using more or less air in the balloon to see if the rocket flies differently
    c. Try placing a fan in front of or behind your rocket. See if setting the fan to different speeds changes the distance the rocket travels along the string.

    d. Try lifting one end of the string higher than the other. Does this affect your distance?

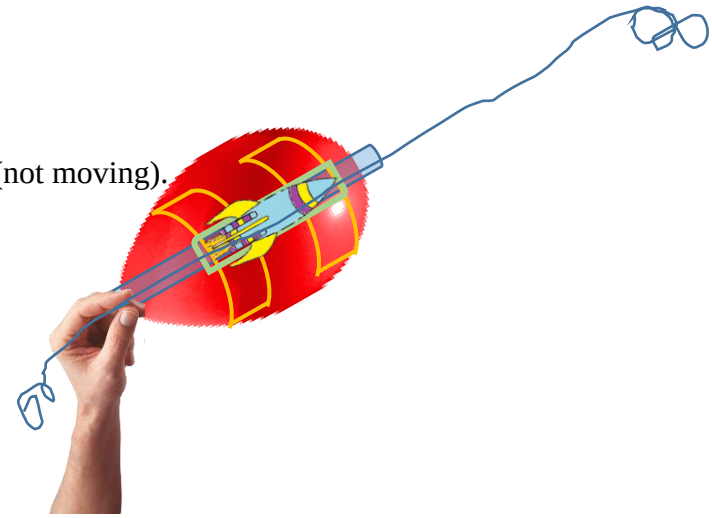


CONTENT CONNECTIONS

Explanation of Content:

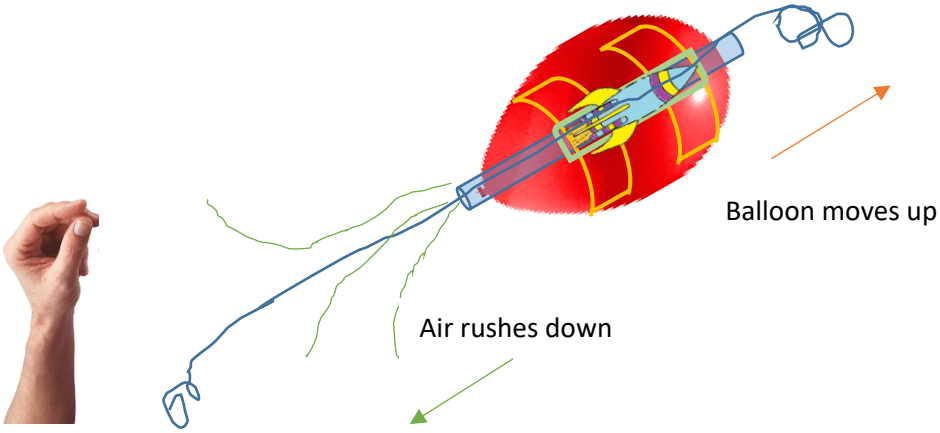
Why does the balloon rocket move?

When you are holding the balloon, it is at **equilibrium** (not moving).



According to **Newton's Third Law of Motion**, every action has an equal and opposite reaction.

When you let go of the balloon, the air is released from the balloon. The air in the balloon pushes against the outside air, and the outside air pushes back (the 2 pockets of air are colliding opposing forces).



As a result, the rocket is propelled forward by the opposing force. This opposing force is called **thrust**.

In the same manner, with similar but larger forces, space shuttles can be launched from the Earth.

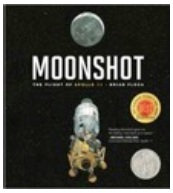
CONTENT CONNECTIONS

LRC-South Resources Available:

Click this link to go directly to our Alexandria Researcher for more information.

How to Build a Fizzy Rocket (45464)

A 4D book
by Lori Shores.
Have you ever wanted to launch your own rocket? This book shows you how! Using simple materials and easy step-by-step instructions, young readers can explore the science behind this fun project.



Moonshot (44601)

The Flight of Apollo 11
Brian Floca.
Simply told, grandly shown, here is the flight of Apollo 11. Here for a new generation of readers and explorers are the steady astronauts, clicking themselves into gloves and helmets, strapping themselves into sideways seats. Here are their great machines in all their detail and monumentality, the ROAR of rockets, and the silence of the Moon. Here is a story of adventure and discovery—a story of leaving and returning during the summer of 1969, and a story of home, seen whole, from far away.

Space Exploration (44603)

Written by Carole Stott; photographed by Steve Gorton.
Discover the secrets of space and humankind's quest to learn about our universe. An informative guide to the mysteries beyond Earth and its atmosphere, Space Exploration takes young readers on a journey through the solar system and highlights advancements in space technology. Discover how satellites help us forecast the weather, how the Large Space Simulator is used to test spacecraft, what happens at liftoff and blastoff, and how the landing craft probes and explores planets. Learn about a day in the life of an astronaut including how a special sleeping bag helps them to sleep in weightless conditions, how astronauts repair an orbiting spacecraft from the outside, and how an astronaut's body is affected upon reentering the Earth's atmosphere.

Outer Space (33506)
Bill Nye the Science Guy
Bill Nye the Science Guy knows how to provide easy access to hard science. What's his secret? A fast paced approach blending humorous hijinks with hands on activities. In this DVD, Bill gives students the inside scoop on planets, stars, galaxies, and the universe.

Visit the LRC Xpress Service Page on our website for more information about borrowing resources though curbside pickup!