

## Let the Races Begin! Homemade Balloon Rockets



### Simple Supplies:

- Balloons
- Markers (Optional)
- One Regular Length Straw
- One Longer Length Straw
- Tape
- Long Strings (At least 2)

\*Tip – If you only have one size of straw, simply take a second straw and cut it shorter by at least 1/4<sup>th</sup>. Also depending on the number of strings you will use; you may increase the number of straws.

### Set Up:

- Tie one end of each string to a dining room chair or table. You may also tie the string to any other kind of suitable furniture, like a bed or table depending on your home's layout.
- On the remaining loose end of the string, load one straw per string.
- Then tie the other end of the strings to another chair, table, etc. Just make sure it's on the same height.

### Pre-Activity Time Questions:

- Ask the children what is a rocket?
- What are rockets used for?
- Do rockets use a lot of energy to do their job?
- Are rockets plain or are they decorated? (If you choose to use the markers to decorate the rockets.)
- Can you race with rockets?

### Activity Time:

- Decorate your rockets with the markers before blowing them up.
- Almost Race Time! Cover the following main points for the lesson:
  - Energy
  - Propulsion
  - Friction
  - Pressure
- Reinforcement questions
  - Who knows how rockets work? *Rockets work by energy that is focused in a single direction creating enough force to move the rocket or propel it forward. In this case, our air will be the fuel that makes the energy.*
  - How is our air or fuel going to move the rocket? *Because there is only a small hole or opening for the air to use to exit the balloon.*
  - What do you think is going to make the air want to get out of the balloon rockets? *Pressure. With the balloon wanting to return to its normal size, the pressure of the shrinking balloon will force the air out.*
  - Other than running out of fuel or energy, what do you think will slow the rocket balloons down? *What slows it down is friction. Friction is caused by everything that pushes against the rocket.*
  - In our races, that's going to be what? *Air, the string, the weight of the design, etc.*
- Race Time!
  - Blow up your balloon but do not tie it. Just pinch the end with your fingers so the air does not get out. Make sure you have enough fuel to get to the end so the bigger the better.
  - Have an adult or sibling gently (So it can be removed without damaging the balloon) tape your balloon to the straw. Use as much as the child thinks will work better. Too much tape, just like not enough tape, will vary the performance of the balloon rocket. Make sure the balloon's opening is facing away from where you want your balloon rocket to go.
  - When the second balloon rocket is ready, release the balloon rocket and race against the rocket on the other string.
  - When completed, switch out the balloon rockets with the other string and the shorter/longer straw. Then repeat the process and see if the length of the straw makes a difference in speed.
  - Repeat until all kids have raced their rockets on each string.

### Post Activity Questions:

- Do you think the shorter straw was faster or slower than the longer straw?  
*Friction*
- Do you think the size of the balloon gave it more fuel? *Energy*
- Do you think the amount of tape used made the balloon rocket work better or worse? *Propulsion*
- Why do you think the balloon wants to return to its smaller size? *Pressure*
- Do you have any other questions that you could think of about the balloon rockets?

### Fun Things to Try:

- Elevate one point of the string to see if gravity plays a roll in slowing the balloon rocket as it goes up the string.
- Try taping two balloons to the straw to see how that will affect the propulsion of the balloon rocket.
- Try different shaped balloons to see if the pressure and speed remain the same, increase, or decrease.

### More Information:

These are points to cover with older school aged children. Use your best judgment on what information to include when you do your experiment.

- Rockets work because the combustion of the fuel creates pressure within the fuel tank.
- Pressure is expelled by a valve that focuses the energy in a single direction creating thrust.
- By controlling the direction of the force, and creating thrust, the rocket is propelled in the opposite direction
- Concentrated molecules will move to areas of lower concentration. The air is concentrated inside the balloon, it wants to move to the outside of the balloon where air is in lower concentration. This is very similar to riding in a cramped car for a long time (concentrated space) and wanting to get out and stretch (moving to an area of lower concentration).