



## STRAW ROCKETS

### MATERIALS:

Straw Rocket Template  
Smoothie Straw Piece  
Bendable Straw

Markers  
Glue Dot

### VOCABULARY:

Physics	Nose Cone	Fins
Force	Gravity	Inertia
Mass	Weight	Matter
Acceleration	Body Tube	Drag

### DIRECTIONS:

1. Color the Rocket Template using markers, crayons or colored pencils.
2. Glue the Smoothie Straw to the middle of the back of the Rocket Template using glue dot (or clear tape you provide) so the end that you taped closed is pointing towards the top of the rocket.
3. Bend the Bendable Straw at a 90 degree angle.
4. Insert the smaller section of the Bendable Straw into the Smoothie Straw.
5. Blow into the Bendable Straw to launch your Rocket!



### THE SCIENCE BEHIND THE EXPERIMENT:

This is a Physics and Engineering Project! Physics is a branch of science that studies matter and its motion as well as how it interacts with energy and forces. Engineering is a scientific field and job that involves taking our scientific understanding of the natural world and using it to invent, design, and build things to solve problems and achieve practical goals.

When you build and launch a straw rocket, you learn about the basic parts of all rockets and why they are able to launch. All rockets have three basic parts: body tube, fins, and nose cone. Physics and Newton's Three Laws explain why all rockets can launch/fly:

1. First Law: Law of Inertia. An object at rest will stay at rest and an object in motion will stay in motion unless a force is applied. We have to apply a force to move our straw rockets- in this case we are using air. The rocket will not fly forever because gravity pulls it down and drag from pushing through the air slows it down.
2. Second Law:  $F=m \times a$ . Force=Mass x acceleration. Mass is how much matter is packed into a space. Matter is anything that has mass and volume. The mass of an object determines how much force you must apply to make it move or accelerate. Our straw rockets have a small mass, so we do not need to apply a lot of force to make them launch. If we increase the force we apply, the rocket should go further and/or faster.
3. Third Law: For every action there is an equal and opposite reaction. For our rockets, when we blow air into the straw, it hits the end of the rocket and the force makes the rocket launch.

### BASEBALL CONNECTION:

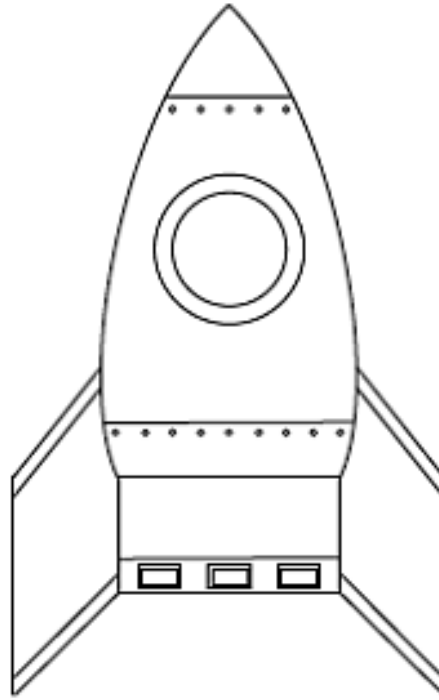
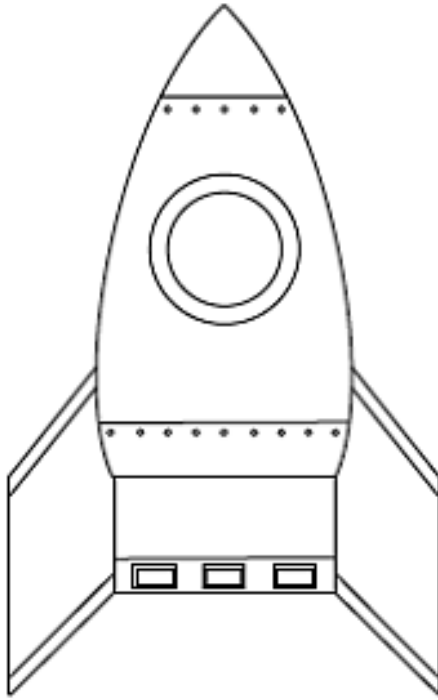
Just like the Straw Rockets, Newton's Laws can be used to explain how baseballs move! Baseballs are not going to move by themselves- a force has to be applied! This can happen when the ball is thrown, hit, dropped, etc.

### MAKE IT AWESOME:

Set up a target or some containers and try to make your rocket hit the target or land in the container.

### EXTENSIONS:

1. What happens when you change how hard you blow into the straw?
2. What happens when you change the angle of your bendable straw?
3. What other changes can you come up with for this experiment?



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