

Worksheet Ready to Print!

6th-8th Grade

STEM ACTIVITY CHALLENGES

**Teacher
Demo Video!!**



Levitating Ping-Pong Ball

- ✓ Teacher Instructions
- ✓ Student Worksheet
- ✓ Teacher Demo Video
- ✓ Grading Rubric



Levitating Ping Pong Ball



In this activity students will work in groups to discover the phenomenon that occurs when a ping pong ball is placed above a straw and air is blown through the straw. Most people would expect the ping-pong ball to fly up and off to the side—but it doesn't. Due to Bernoulli's Principle, the ball will hover in the air above the straw. This project can end with a demonstration using a shop-vac or hair dryer with a ping-pong ball that will produce the same interesting results.

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VIDEO LINK

<https://www.youtube.com/watch?v=for5ISNGD6o>

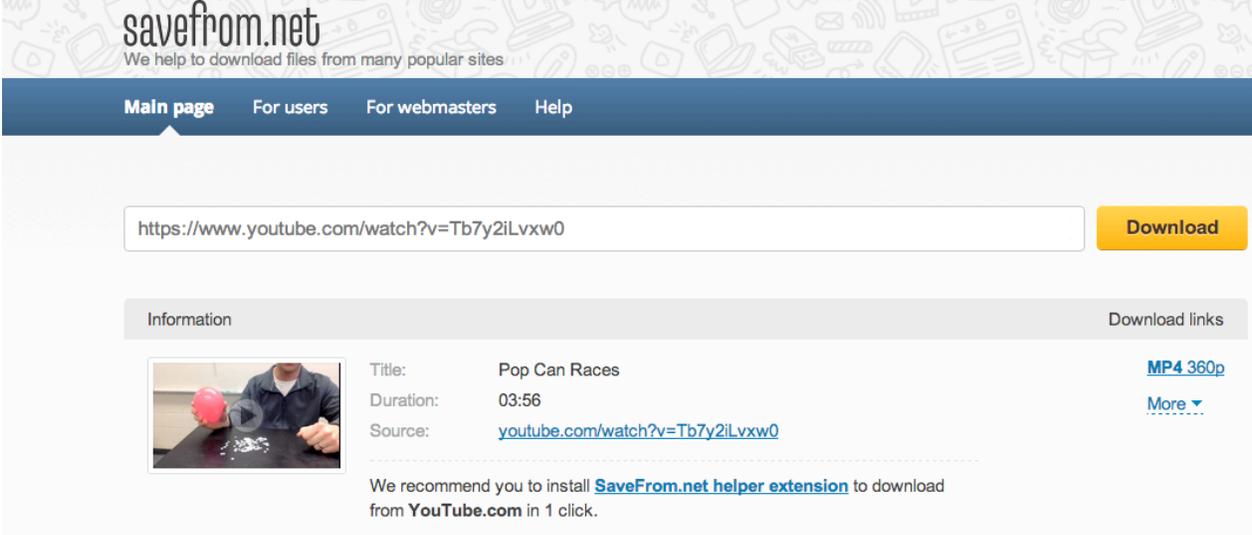
Due to the size of my videos, and the size limit that TPT and Teacher's Notebook puts on the files I can provide for you, I've included your video as an unlisted youtube link (meaning you can find it, whereas the general public can't). Some people like to have these actual video files stored on their computers as mp4s. If you would like to do this, I've provided instructions below on how to download it.

How to download my youtube video as a video file on your computer

There are numerous websites that will help you download a youtube video onto your computer. This just happens to be my favorite one. What you'll need to do is follow these 3 steps:

1. Copy the URL that I provided above
2. Paste it into the box on savefrom.net (see screenshot below)
3. Click the download button then select "MP4 360p" as the quality

After it has downloaded, it will be available in your downloads folder!



The screenshot shows the savefrom.net website. The header includes the logo and tagline "We help to download files from many popular sites". Navigation links for "Main page", "For users", "For webmasters", and "Help" are visible. A search bar contains the URL "https://www.youtube.com/watch?v=Tb7y2iLvxw0" and a yellow "Download" button. Below the search bar, there are two sections: "Information" and "Download links". The "Information" section includes a video thumbnail, title "Pop Can Races", duration "03:56", and source "youtube.com/watch?v=Tb7y2iLvxw0". The "Download links" section shows "MP4 360p" and a "More" dropdown menu. A recommendation at the bottom suggests installing the "SaveFrom.net helper extension" for easier downloading from YouTube.





STEM CHALLENGE ACTIVITY:

Teacher Instructions (Levitating Ping Pong Ball):

There are many ways to use this activity in your classroom. Below is just one suggestion.

Set out the materials:

Straws, paper clips, tape, ping pong balls, and student instructions need to be spread out on different tables. **You will need to split your students into groups.**

Ask them if it's possible to levitate (float in the air). Ask if any of them can levitate (or float). Have any volunteers try :) Then tell them that today we are going to try to get your ping pong balls to levitate.

Give them between 3 and 10 minutes (depending on the age of your students) to construct the apparatus. (For younger students you may want to show them a picture of what the apparatus could look like).

Sharing time:

Ask for any volunteers to show what they've learned. Then encourage other students / groups to make modifications to their projects based on what they've seen

After students have had time to get their project working, ask them to brainstorm additional ways to get the ping-pong ball to levitate. Based on their responses, you could ask them how we might get the ball to levitate for a longer time.

When a student suggests a hair dryer or a shop vac, pull it out, and allow students to practice with their ball.

Ask students to think about why this happens. Tell them that it doesn't seem to make sense why did the ball stay in the air? After listening to some responses and answers, you can talk about "bernoulli's principle".

After teaching about bernoulli's principle, ask students to think about and share ideas where bernoulli's principle is seen in the real world. Their research question asks them to research how an airplane wing gets "lift".

NOTE: Remind students that they can only put their lips on their own straw!!!!



STEM CHALLENGE ACTIVITY:

Materials Needed - Levitating Ping Pong Ball Activity

Materials listed below are per group (3-4 students)

Straws

Paper clips

Tape

Ping pong balls

Student instructions (need to be spread out on different tables)

You will need to split your students into groups.



STEM CHALLENGE ACTIVITY:

Student Instructions (Levitating Ping Pong Ball):

Student Name(s): _____

Challenge:

Can you get a ping-pong ball to levitate in the air? If so, how long can you keep it in the air without touching it?

Use the materials provided by your teacher to construct something that will help you keep the ball in the air.

Share ideas with people in your group.

When something starts to work, share this with your team!

1. What are some of the problems that we might have with this project?

2. What could we do to solve these problems?

3. **Get creative:** What fun / interesting things can you do with this activity?

Research Question:

What causes "lift" on an airplane wing? Use the internet to research this question and be ready to report back to your class.

STEM Activity Rubric

Activity /
Challenge: Levitating Ping Pong

Grade

Teacher Name: _____

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Student Name: _____

CATEGORY	4	3	2	1
Problem-solving	Actively looks for and suggests solutions to problems.	Refines solutions suggested by others.	Does not suggest or refine solutions, but is willing to try out solutions suggested by others.	Does not try to solve problems or help others solve problems. Lets others do the work.
Contributions	Routinely provides useful ideas when participating in the group and in classroom discussion. A definite leader who contributes a lot of effort.	Usually provides useful ideas when participating in the group and in classroom discussion. A strong group member who tries hard!	Sometimes provides useful ideas when participating in the group and in classroom discussion. A satisfactory group member who does what is required.	Rarely provides useful ideas when participating in the group and in classroom discussion. May refuse to participate.
Attitude	Never is publicly critical of the project or the work of others. Always has a positive attitude about the task(s).	Rarely is publicly critical of the project or the work of others. Often has a positive attitude about the task(s).	Occasionally is publicly critical of the project or the work of other members of the group. Usually has a positive attitude about the task(s).	Often is publicly critical of the project or the work of other members of the group. Often has a negative attitude about the task(s).
Focus on the task	Consistently stays focused on the task and what needs to be done. Very self-directed.	Focuses on the task and what needs to be done most of the time. Other group members can count on this person.	Focuses on the task and what needs to be done some of the time. Other group members must sometimes nag, prod, and remind to keep this person on-task.	Rarely focuses on the task and what needs to be done. Lets others do the work.
Working with Others	Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together.	Usually listens to, shares with, and supports the efforts of others. Does not cause "waves" in the group.	Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player.

Comments:

EDITABLE FILES LINK



Editable Files:

Levitating Ping-Pong Ball

To access the editable files such as the students instruction worksheets and rubrics, click on this link:

<https://drive.google.com/folderview?id=0B9zyAOeZmTHeFnZjR2IzTXBudnpFUXhVR00yYWhzdG13NjQyYTNldHRYV1FEcW9KcGItSWM&usp=sharing>



RELATED NGSS STANDARDS

6th – 8th Grade

MS. Forces and Interactions

Students who demonstrate understanding can:

MS-PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.*
[Clarification Statement: Examples of practical problems could include the impact of collisions between two cars, between a car and stationary objects, and between a meteor and a space vehicle.] [Assessment Boundary: Assessment is limited to vertical or horizontal interactions in one dimension.]

MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. [Clarification Statement: Emphasis is on balanced (Newton's First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's Second Law), frame of reference, and specification of units.] [Assessment Boundary: Assessment is limited to forces and changes in motion in one-dimension in an inertial reference frame and to change in one variable at a time. Assessment does not include the use of trigonometry.]

MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.
[Clarification Statement: Examples of devices that use electric and magnetic forces could include electromagnets, electric motors, or generators. Examples of data could include the effect of the number of turns of wire on the strength of an electromagnet, or the effect of increasing the number or strength of magnets on the speed of an electric motor.] [Assessment Boundary: Assessment about questions that require quantitative answers is limited to proportional reasoning and algebraic thinking.]

MS-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. [Clarification Statement: Examples of evidence for arguments could include data generated from simulations or digital tools; and charts displaying mass, strength of interaction, distance from the Sun, and orbital periods of objects within the solar system.] [Assessment Boundary: Assessment does not include Newton's Law of Gravitation or Kepler's Laws.]

MS-PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. [Clarification Statement: Examples of this phenomenon could include the interactions of magnets, electrically-charged strips of tape, and electrically-charged pith balls. Examples of investigations could include first-hand experiences or simulations.] [Assessment Boundary: Assessment is limited to electric and magnetic fields, and is limited to qualitative evidence for the existence of fields.]

MS.Engineering Design

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution,taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

For complete details, please visit the NGSS website: <http://www.nextgenscience.org/>



Thank You!

from my family to you.



THANK YOU for purchasing this product!
I'm confident that you'll find this resource to be very valuable. I take great pride in the products that I sell here and I would greatly appreciate you taking the time to review this product.

My goal is to earn your "A" rating and positive feedback! If for ANY reason you are not 100% satisfied, please give me the opportunity to make it right before leaving feedback. You can contact me either through my store, or by emailing me at josh@sciencedemoguy.com.

Have a great day!

- Josh (AKA, Science Demo Guy)