

Ideas

Research

Hypothesis

Materials/Procedures  
and Variables

Data and Conclusion

Report

# Air vs. Nitrogen

# Table of Contents

Ideas

Background Research

-Source 1

-Source 2

-Source 3

Hypothesis

Materials, Procedures, and Variables

Data and Conclusion

Report

Ideas

Research

Hypothesis

Materials/Procedures  
and Variables

Data and Conclusion

Report

# Step 2 Ideas

**1st Idea:** Topic

**My idea:** balloon car

**Question:**

I will build a car out of tools and recycled materials to put the balloon car to the test

**2n<sup>d</sup> Idea:** Topic will build a car out of magnets

**My idea:** magnets will be in the front of the car propelling the hot wheels or car

Ideas

Research

Hypothesis

Materials/Procedures  
and Variables

Data and Conclusion

Report

# Step 3 Background Research Source 1

## Source 1

Title: Balloon powered car challenge

### Summary:

What's the big idea about the article?

I will build a balloon powered car to prove how nitrogen is better than air in a thrust application.

In complete sentences, describe a few details (who, what, where, when, why, and how)

While working on this project I discovered that nitrogen is lighter than the air in the atmosphere even if the atmosphere is mostly nitrogen.

## Source 1 Bibliography

This source is a:  Website  Other

The URL is

[https://www.sciencebuddies.org/science-fair-projects/project-ideas/Phys\\_p099/physics/balloon-powered-car-challenge](https://www.sciencebuddies.org/science-fair-projects/project-ideas/Phys_p099/physics/balloon-powered-car-challenge)

Last Date of Access: 2/10

Title of Article: Balloon Powered Car Challenge

Author's Name: Science Buddies

Date of Article: NA

# Step 4 Hypothesis

## Hypothesis:

We are looking to verify the difference from a Nitrogen gas to Atmosphere both using equal amounts of pressure (PSI)

Air and nitrogen are 2 different types of gases.

I feel that Nitrogen will possibly win

because Nitrogen is actually lighter than atmosphere air, allowing the gas to escape the balloon easier allowing the balloon car to accelerate faster.

## Hypothesis:

Being that nitrogen is 3% lighter than air, nitrogen will be able to escape the balloon faster causing more forward thrust to the balloon car.

# Step 5 Materials and Procedures

## Materials:

tape , bottle,scissors,bbq skewers, straws,4 plastic bottle caps, and a balloon

## Experiment Procedure:

Step 1: cut drinking straws (3) width of the bottle,then glue the straws to the bottom of the bottle.

Step 2: cut a hole in all of the bottle caps

Step 3: thread skewers through the straw and put bottle caps on skewers

Step 4: cut a hole on top of bottle and thread straw through the open mouth of the bottle

Step 5: grab two zip ties a put balloon on the straw and secure it

Step 6: blow up and enjoy!

# Variables

## Variables:

Independent Variable: (What are you changing?)

Air to nitrogen

Dependent Variable: (What are you measuring?)

Which goes faster and farther

Control: (What has to be the same?)

The pressure in the balloon

Ideas

Research

Hypothesis

Materials/Procedures  
and Variables

Data and Conclusion

Report

# Step 6: Data and Conclusion

## Data and Conclusions Checklist

- I kept a log of all of my observations, thoughts, and ideas for my experiment. The log or journal must be kept in your science fair binder. It can be loose leaf paper or a spiral notebook, but it must be kept in your binder.
- I kept track of all of my data by using charts, tables, graphs, etc., and put them in my science fair binder.
- I wrote my conclusion based on what happened in my experiment.
- I included in my conclusion whether or not I accept or rejected my conclusion

## Conclusion:

Write your conclusion below, the way that it will appear in your final report:

Based on the information and testing I came to the conclusion that nitrogen has more thrust than air. Not much of a difference but much more reliable than air.



# Step 7: Report

I would like to present to you, air vs nitrogen. I would love to prove that nitrogen is better than air thrust wise. I am making a balloon car filled with nitrogen and air to see which is better. Thank you for reading this message.

My purpose for this project is to see if air or nitrogen is better for thrust power. My purpose is to compare nitrogen power balloon car against an air power balloon car, and to compare to see if there's a difference. I believe the nitrogen power car will be faster than the air power car because I believe nitrogen is faster and better for thrust.

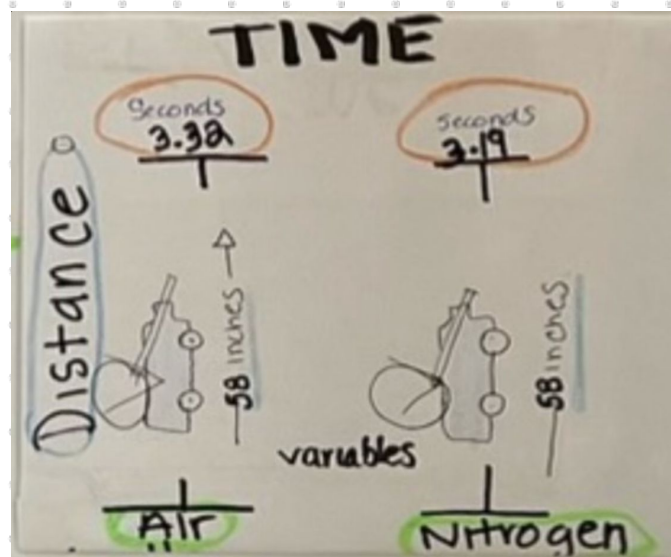
The materials I used for this project were: tape, 2 straws, one plastic bottle, 4 plastic bottle caps, scissors, balloon, nitrogen, air, 2 wood skewers, and a tape measurement.

Here are the steps to make a balloon car:

1. Attach the bendy straw to the center of one of the plastic bottle caps using tape.
2. Insert skewers or toothpicks, through the center of the other plastic bottle cap, and secure them to the sides of the bottle cap with tape.
3. Attach for plastic bottle caps or small plastic wheels to the end of the skewers on both sides.
4. Lower the balloon and attach it to the to the end of the bendy straw place the corner, smooth surface.
5. Add wire around the midsection of the plastic bottle to contain balloon alignment in place.
6. Inflate balloon with air and then nitrogen.
7. Release the air from the balloon, measure distance and time, and watch it fly forward.

# Step 7: Report

We prepared a flat area to test the vehicle, we first try the vehicles with air in the balloon to test distances, then we marked 58 inches base on our testing. After having the testing area ready we first filled up the balloon car with air and release air from starting line and measured time from release time to finish line 58 inches. We noticed that the air car made it to the finish line in 3.32 seconds with not much power left. Then, we place nitrogen filled car balloon at the starting line and filled up the balloon with nitrogen gas. Then we release pressure and made it to the finish line 58 inches in 3.19 seconds and went even farther than the finish line about 6 inches farther showing much more energy.



Based on the information and testing I came to the conclusion that nitrogen has more thrust than air. Not much of a difference but much more reliable than air.

# Step 7: Report

Ideas

Research

Hypothesis

Materials/Procedures  
and Variables

Data and Conclusion

Report

## AIR VS. NITROGEN

**PURPOSE**  
My purpose for this project is to see if air or nitrogen is better for thrust power. My purpose is to compare nitrogen power balloon car against an air power balloon car, and compare to see if there's a difference.

**QUESTION**  
Will the Nitrogen power car be faster than the Air power balloon car?

**HYPOTHESES**  
I believe the nitrogen power car will be faster than the nitrogen, air power car because I believe nitrogen is faster and better for thrust.

**MATERIALS**

1. TAPE
2. 2 STRAWS
3. One plastic bottle
4. 1 plastic bottle cap
5. Straws
6. Balloon
7. Nitrogen
8. Air
9. 2 wheel axles
10. Tape (masking or painter)

**PROCEDURE**

1. Attach the Bandy straw to the center of one of the parallel straw necks.
2. Insert seaweed or twigs into the center of the other plastic bottle cap, and secure them to the inside of the bottle cap with tape.
3. Attach the plastic bottle cap to the neck of the balloon to the end of the seaweed or twigs.
4. Lower the balloon or attach it to the end of the Bandy straw using the center, seaweed twigs.
5. Add water around the center of plastic to the to ensure bottom alignment in place.
6. Inflate balloon with air and then nitrogen.
7. Release the air from the balloon, measure distance and time, inflation it fly forward.

**RESULTS**

We prepared a flat area to test the vehicle, we inflated the vehicle with air and balloon to test the vehicle, then we mark 5-6 inches base on our testing, after having testing area ready we first filled up the balloon car with air and release it from starting line and measured time to finish time to finish time 5.8 inches. We noticed that air car made it to finish line in 0.32 seconds with no much power left. Then we place Nitrogen filled car balloon at starting line and filled up balloon with nitrogen gas then we release the pressure once we did it took the first 0.28 inches in 0.16 seconds and went even further than that first line about 6 inches further showing much more power.

**CONCLUSION**

Based on the experiment data testing, I conclude that Nitrogen has more power than air because of the amount of thrust and the amount of distance that it traveled.

**Variables**

**Independent Variables**  
AIR NITROGEN

**Controlled Materials of Car**

**Dependent Variables**  
Distance Time

**TIME**

Distance	Air	Nitrogen
0-33	0.32	0.16

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