Science Fair Logbook:

| Date | Time (hours) | Tasks | Remarks/reflections |
|---|---|---|---|
| November 14th | 2 hours | Porposal | mom sinded it |
| November 17th | 1 hour | talk in small groups. got feedback | got feedback |
| November 17th | 1 hour | reaserched how to measher the rebond of a ball | finished one colome |
| November 24st | 45 mins | reaserch perfect pressure size of ball | got both done II |
| November 25th | 1 hour | reaserch | ? ? ? |
| december 1 | 30 mins | prochdure Brainstorming | failed misurably |
| december | 1 hour | procudere writing | made it better |
| November 30th | 2 hours | background reaserch Paragraphs. | finished |

| Date | Time (hours) | Tasks | Remarks/reflections |
|---|---|---|---|
| december 3 | 45 mins | peer reflection | |
| decem 4 | 1 hour | perpare tables | |
| dec 4 | 30 mins | Check list | |
| dec 15 | 1 hour | update data tables ◻conclusion | |
| Jan 9th | 1 hour | Sours of error | |
| Jan 9th | 2 hours | real world applications | |
| Jan 16th | 2 hour | finished slide-show | |

## Science Fair Project:

Every student at RT Alderman is expected to complete a project to present to their class. In our grade 5 classes, this experiment must have a **testable question** that can be completed at home. For ethical reasons, we will not be conducting experiments on people or animals. Some projects from each grade will be chosen to represent our school at the *Calgary Youth Science Fair* in April 2026.

### Expectations:

**Home:**

- **Proposal (decide with parents)**
- **Purchasing of materials needed for experiment**
- **Experiment**
- **Pictures of experiment**
- **Observations and data collection**
- **Complete any work not completed at school by due dates below**

**School:**

- **Proposal (final approval by teacher)**
- **Background research**
- **Hypothesis and problem formatting**
- **Write procedure/plan**
- **Data analysis**
- **Conclusions**
- **Continue adding to digital presentation**
- **Practice presentation**

### Timeline:

| *Step* | *Description* | *Due Date* | *Check* |
|---|---|---|---|
| Write a proposal | - Testable Question and Hypothesis Approved by parents and teacher | November 17 | ✓ |
| Background Research | - Research Concepts and record jot notes<br>- Ask and Answer key questions about your topic | **Research notes by November 27** home work<br>**Paragraphs by December 12** home work | ✓<br>✓ |
| Make a plan | - Write Procedure/Plan for your experiment | December 5 | ✓ |
| **WORK AT HOME ***Take lots of pictures and videos** | - Perform your experiments<br>- Revise/Record observations, data tables - **bring results to school**<br>- **Three or more trials** | **DUE December 15** | ✓ |
| At School - Evaluate the Results | - Data analysis<br>- Conclusion | December 15 - 19 | ✓ |
| | - Real World Connections & Sources of Error<br>- Finalize Digital Presentation | January 9 | ✓ |
| Science Fair Presentations | - Present your project in science class at school. | **January 19 - 29** January 27th | ✓ |
| Science Fair Trifolds | - Prepare and present project at school-wide Science Fair | TBD | |

after the experiment there are many results to record and compare

# Grade 5 Science Fair Proposal

Student name: Natalie Blaine

**Project Title:** (be creative) - (Can be added later)

Soccer Science

**Project Testable Question:** (What problem are you going to explore?)

How does the amount of air influence the bounce of a soccer ball?

**Hypothesis:** based on your project question.

Example: If... (I do this)... then... (this will result)... because....

If the amount of air pressure is increased then the ball with the highest air pressure will bounce the highest because the ball will be harder against the hard ground so it goes higher in the air.

**Variables:**

Manipulated variable (what you change): amount of air (air pressure)

Responding variable (what you watch for): height of bounce

Constant variables (what stays the same): brand of pump, brand of ball, height of drop and surface it is on

**Required Materials:**
(basic items such as glue, beakers, popsicle sticks can be supplied by the school)

| Materials I will need: | |
|---|---|
| 1. Soccer ball | 6. Camra |
| 2. air pump | 7. timer |
| 3. flat surface | 8. |
| 4. presher gauge. | 9. |
| 5. Meshering tool | 10. |

## Testable Question Checklist:

| | |
|---|---|
| I chose a Grade 5 suggested Testable Question. | Yes/No<br>If no, complete NEXT checklist. |
| I can identify all the variables in my selection. | Yes/No |
| I will be able to get the materials I need to complete the experiment. | Yes/No |
| I have enough time to complete this experiment before December 15. | Yes/No |

## Feasibility Check on Testable Questions **OUTSIDE** the Grade 5 Suggested Options:

| | |
|---|---|
| I have a testable question with **ONE** manipulated variable. | Yes/No |
| I can identify all the variables in my selection. | Yes/No |
| I can find 3 sources for background information to help me better understand the science behind my experiment (URL's, books, etc.).<br>1) Science book as never seen before<br>2) Fifa ?<br>3) National geographic kid/or other science magazine | Yes/No |
| The experiment is safe to perform for myself and others. | Yes/No |
| I will be able to get the materials needed to complete the experiment. | Yes/No |
| I have enough time to complete this experiment before December 15. | Yes/No |

**FOR STUDENT:** I have discussed the project idea and the checklist with my parents/guardian, and I am willing to commit to following through on this project.

Student Signature Natalie B Date November 13

**FOR PARENT: I have discussed the project idea and the checklist with my child** and they can follow through with this project. I will support them, as needed, in completing this project. I understand that while parents can support their child in completing the project, the student is expected to do the work themselves and learn from their mistakes as part of the scientific process.

Parent Signature L. Blaine Date Nov. 13/25

Approved by Teacher: [signature] Date Nov 18/25

| Topic and Source | Jot Notes | Explanation of connection/relevance to experiment |
| --- | --- | --- |
| Topic 1: perfect pressure<br>Source: gosoccer.com/soccer-ball-inflation-the-perfect-pump/ | 7.3-8.7 psi practince ball<br>8.7-13.1 psi match ball<br>10.2-14.5 psi professionals<br>Size five | |
| Topic 2: gravitey<br>Source: | | |

| Topic and Source | Jot Notes | Explanation of connection/relevance to experiment |
| --- | --- | --- |
| Topic 3: how to mesher the reboand of a bouncing ball<br>Source:<br>Science Buddies<br>MhSe - toy spotlight | -reband is the hight of the first bounce<br>-video the dropping<br>-PE = mgh<br>PE: potential energy (J)<br>m: mass (kg)<br>g: gravity ($m/s^2$)<br>h: height (m)<br>-drop at 1 meter | I need to know how to mesher the reband of a ball<br>Consider<br>- researching PSI<br>- gravity got it! |
| Topic 4: What size of Soccer ball<br>Source: [redacted]<br>https://www.education.com/article/physics-Soccer-ball | -5 for air pressure experiment<br>-1 for dribbling experiment<br>-3 for shooting experiment | I need to know What size of ball I Should use to conducted my experiment<br>a+ |

# Procedural Writing

how to brush your teeth with Cedric toothbrush

1. Grab toothpaste.
2. Unscrew cap of toothpaste.
3. Pick up toothbrush.
4. Put toothpaste on bristles.
5. Put toothbrush in mouth.
6. Press "on" button.
7. Hold on One tooth at a time.
8. Slowly move along all teeth.
9. Repeat steps 7-8 for all four quadrants of mouth.

Conclusion

the hypothesis of _____ guess
proven/disproven
was _____.

proven → Summirize the Science to explain

Disproven → insted _____ Worked
the reasch shows _____
_____
_____.

# levers example

levers are one of six simpile that have been used for centuries. First of all, a lever is a long planck that helps humans do work easier by decreacing the force need to complete a task. This amazing tool works by creating leverage: a plank on a fulcrum. then, large loads can be moved with smaller force. To demonstrate there are some commory examples such as seesaws, twezzers, wheelbarrows pliers and scissors. In conclusion levers are a very useful tool to help with everyday life.

# Procedural writing

Set up

1. Gather materials listed on material list.
2. Tape a meter stick to the wall.
3. 
4. deflate the ball.

## Results of Experiment

Hypothsis: I was proven

Suprise result was that 5psi all 5 trials where the same

lowest.

## Connections to careeers / products / every day life

- big soccer ball companys like fifa can use the data to know the perfect psi to sell the balls at.
- profissal teams like the calgary wilds can use the results to pump the balls for ther games

## Connections to Humanity / Enviroment

knowing what psi to pump your ball with can produce less air polution

- take's less time to pump your flat balls to make it faster

## Questions to Research

- would the size of the ball impact the heights?
- how does the floor/ground impact the bounce heights

The scientific community works together to further scientific discoveries, through peer review of each other's work. Imagine you are meeting with a scientist to help you earn a Nobel Prize in your field. Your goal is to help each other better the experiments, give constructive feedback that improves the design and research.

As you begin:

- Explain your testable question to your partner
- Have the Peer Review Scientist read over your Background Research (jot notes if paragraphs are not complete
- Peer reviewer should provide constructive feedback
- Repeat for the Procedure Section

Name of Scientist being Reviewed: Natalie

Name of Peer Reviewer: Theo

PEER REVIEW

| Portion of Experiment _ | Information provided by the scientists | Rating | Constructive Feedback |
|---|---|---|---|
| Variables | ☑ Manipulated<br>☑ Responding<br>☑ 4x Controlled | 5 | Maybe make it more entertaining |
| Hypothesis | ☐ Follow If (general), then (specific guesses, because…<br>☐ Explanation connectid to science<br>☐ Author uses formal writing-omitting "I and my and your and you" | 4 | Make it longer With more detail and your if part is kind of not that general |
| Background Research | o Topics are connected to testable question<br>o Author writes how they are connected<br>o Transition words are used to improve flow<br>o Author uses formal writing-omitting "I and my and your and you" | | More detail and your skipping words like the, and Record data |
| Procedure | • Instructions are written in the imperative<br>o Instructions are clear and specific<br>o Steps are numbered<br>o Instructions could be followed to perform the experiment by someone else<br>o Instructions include set up<br>o Author uses formal writing-omitting "I and my and your and you"<br>o Any materials mentioned have a measurement of how much to use/size | 4 | |

# Super S  ccer Science

By: Natalie Blaine 501

# Testable Question

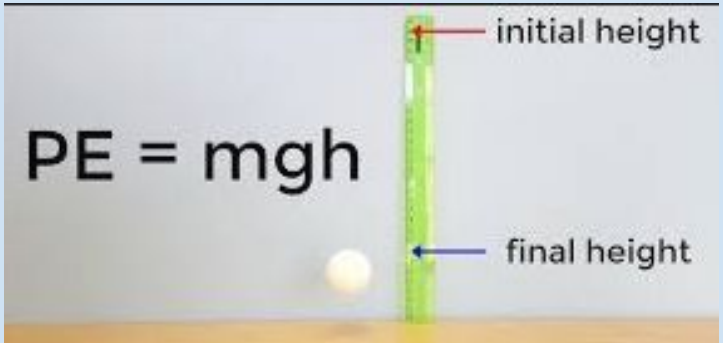
**How does** the amount of air pressure **influence** the height of the rebound of a soccer ball**.**

# Hypothesis

**IF** the amount of air pressure is changed in a soccer ball **THEN** the higher the psi in the ball, the higher it will bounce **BECAUSE** the ball will be harder against the hard ground. The reason for this is because the more air that is pumped into the ball, the more energy particles exist in the ball and the less space there is for them to move around.

# Background Research ~ How to Measure Rebound

What is rebound? First of all rebound is the height recorded of the first bounce it is critical that you measure the rebound of the **FIRST** bounce. Next you must video the dropping of the ball so that you can more easily record the rebound it is easier if You use a slo-mo video. Lastly make sure the camera is on a tripod at the same consistent height. In conclusion rebound is a way to measure bouncing balls.



# Background Research~What Size of Soccer Ball

What size of ball do you think is best here's what it really is. First different types of experiments need different sizes of ball. Next there are five sizes of soccer balls to pick from. Size 5 is used in professional soccer and smaller sizes are used by younger players. Finally some different sizes are used for different experiment types, size 5 for air pressure experiment, size 1 for dribbling experiment, and size 3 for shooting experiment. To conclude this experiment will be using a size 5 ball

# Background Research~ is there a Perfect Pres

To begin, the perfect pressure will vary for every player. First of all, some players prefer softer balls even when harder balls have a more consistent rebound height. Secondly, the perfect pressure will vary based on the size, type, condition, and usage of each ball. There are five sizes three types and many uses for all soccer balls. Lastly, perfect pressure is a subjective measure, so to know what the perfect pressure for a particular player is, you would need to ask them. To finish there really is no perfect pressure for everyone.

# Background Research~ Gravity

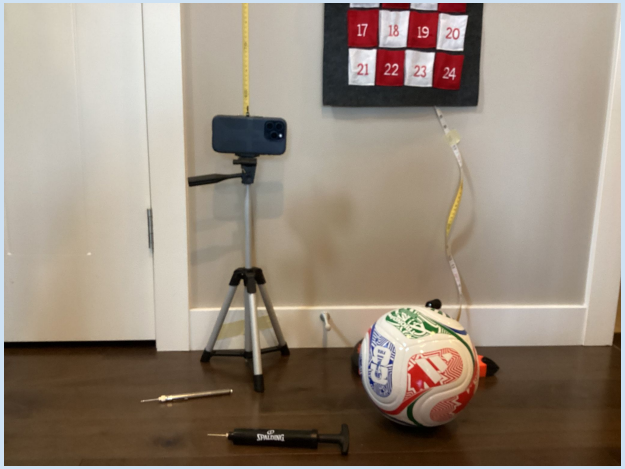
To start, on earth gravity pulls objects toward the center of earth. This is what makes objects fall. Next, the longer an object falls the faster it goes. An example of this is when a pencil is dropped from 5cm then 15cm it goes much faster. Finally, in this experiment to accurately measure how the air pressure changes the rebound height the drop height **MUST** be consistent. To sum it up dropping it from the same height is super important.

# Variables

| | |
|---|---|
| Manipulated Variable | Amount of air pressure in the soccer ball |
| Controlled Variables | Same pump, same ball, height of drop,surface ball hits, unit of measure |
| Responding Variable | Height of the rebound |

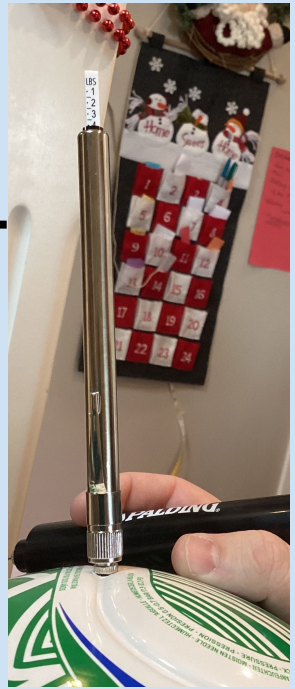
# Materials

- Soccer ball (size 5)
- Air pump
- Flat surface
- Pressure gauge
- Meter stick
- Camera
- Tripod
- Helper
- Flashlight (added during the experiment)



# Procedure: Setup

1. Gather materials on material list.
2. Tape a meter stick to the wall with the bottom touching the ground.
3. Place camera at the 40 cm mark with a camera stand.
4. Deflate the ball so its flat.
5. Inflate ball to 1 psi (or other air pressures).
6. Record air pressure.



# Procedure: Experiment

Don't be in the way

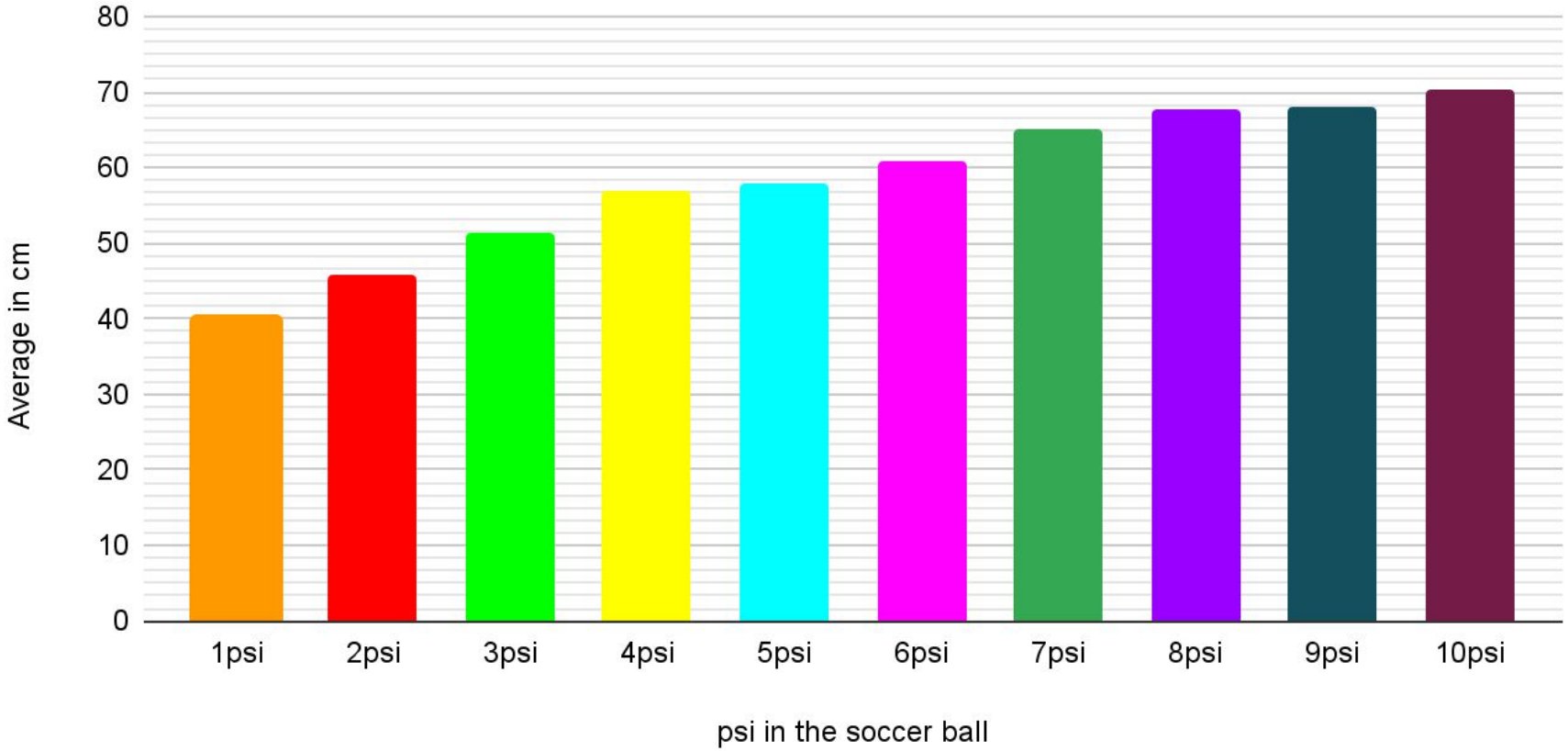
1. Hold ball on the top of the meter stick.
2. Have your helper start a slo-mo video .
3. Drop the ball.
4. Stop the video after the ball has rebounded to its maximum height.
5. Watch the video to determine the height of the rebound.
6. Record the quantitative data (height of the rebound).
7. Record the qualitative data ( what it looks like ).
8. Repeat steps 1-7 for all trials.
9. Repeat steps 5-6 ( set up) for all pressures.

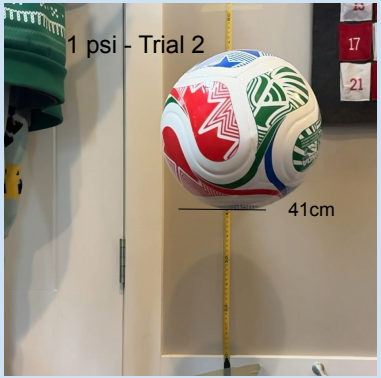

5 trials per pressure

# Quantitative Observations

| air pressure in soccer ball (psi) | Trial 1 (cm) | Trial 2 (cm ) | Trial 3 (cm) | Trial 4 (cm) | Trial 5 (cm) | Average (cm) |
|---|---|---|---|---|---|---|
| 1 | 40 | 41 | 39 | 39 | 42 | 40.2 |
| 2 | 45 | 47 | 45 | 45 | 47 | 45.8 |
| 3 | 52 | 53 | 51 | 51 | 50 | 51.4 |
| 4 | 58 | 57 | 57 | 55 | 57 | 56.8 |
| 5 | 58 | 58 | 58 | 58 | 58 | 58.0 |
| 6 | 61 | 61 | 60 | 61 | 61 | 60.8 |
| 7 | 67 | 68 | 62 | 64 | 65 | 65.2 |
| 8 | 67 | 70 | 65 | 67 | 69 | 67.6 |
| 9 | 69 | 68 | 69 | 67 | 68 | 68.2 |
| 10 | 71 | 70 | 67 | 72 | 71 | 70.2 |

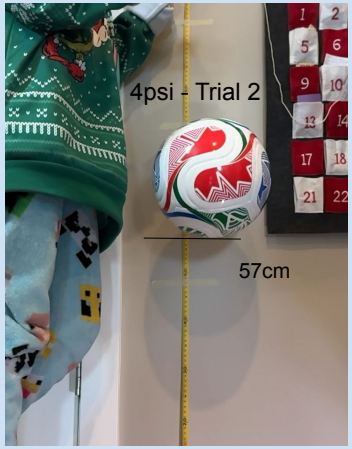
# Height the Soccer Ball Rebounded to for Each Psi (Average)

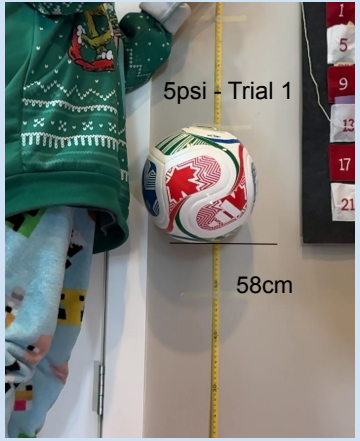



1 psi - Trial 2
41cm

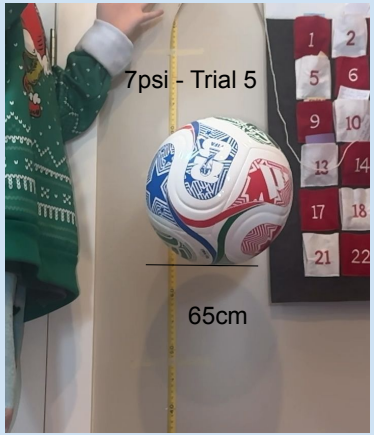

2psi - Trial 3
45cm


3psi - Trial 4
51cm

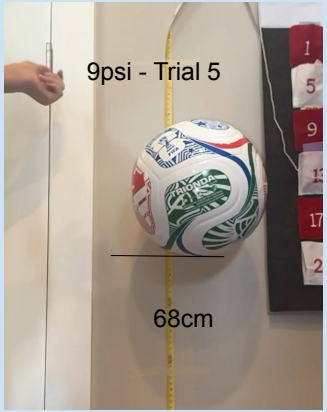

4psi - Trial 2
57cm

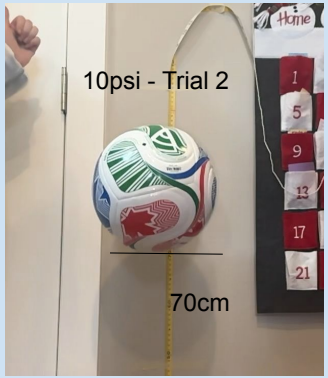

5psi - Trial 1
58cm


61cm
6psi - Trial 3


7psi - Trial 5
65cm


8psi - Trial 1
67cm


9psi - Trial 5
68cm


10psi - Trial 2
70cm

# Qualitative Observations

| air pressure in soccer ball (psi) | Observations |
|---|---|
| 1 | The ball was bounced relatively the same height. Not super flat compared to a game ball. |
| 2 | Sounded hard on the floor. Softer than normal but not super flat. |
| 3 | Felt like a game ball maybe a little flater. Does the floorboard matter? |
| 4 | Little bit of squish but still really hard. |
| 5 | Sounded like a rock. Barley any squish. All the same rebound height. |
| 6 | No squish. Almost the same rebound height. THUNK noise |
| 7 | No squish. Hit the wall a little redid that trial. |
| 8 | ROCK hard. Lots of little bounces. Sounds like a rock. |
| 9 | My dad can barley squish the ball. Bouncing off the bottom of the wall. |
| 10 | ROCK hard. Really high rebounds. Thunk sound when rebounded. |

# Analysis

To start, every increase in the psi made a higher average bounce. After 7 psi the increases where smaller. The rebound height at 10 psi was almost double what it was at 1 psi. An interesting trend noticed was that 5 psi had all the same rebound heights and for 6 psi, only one trial has a 1cm difference.  These were the two most consistent trials. Secondly, during the experiment one change was made, a flashlight was added to make it easier to read the markings on the tape measure. Before the drop there was a lots of little movements to make sure the ball was at exactly the 1 meter dropping height. Lastly, the research that probably was needed was where the best location to drop the ball is and how it it best to drop the ball.

# Conclusion

The hypothesis was proven true. It is true because the data shows that there was an increase in the average rebound heights the higher the psi got. Because the psi was higher, this means there were more particles in the ball. This made the ball harder against the hard ground and so bounced higher.

# Real World Applications

If you are setting up your soccer ball to get kicked the hardest inflating it to the highest psi is the best. The applications of this experiment can be used or related to in other sports not just soccer. Some examples of these other sports include basketball where the ball needs to be super bouncy or you can't play that sport.

Another application for this topic would be landing rovers on Mars. NASA surrounds the rovers in airbags or huge puffy balloons. These airbags need to be a certain psi to ensure that the the rover bounces a little bit but not way too much.

For real world soccer applications, because the rebound height didn't change much after 6 psi it might be better to play or practice soccer at about 6 to 7 psi. This is because the ball will be softer than at 10 psi so it won't hurt your foot as much but you won’t lose much rebound speed.

# Next steps

The things that would be next for this experiment are, testing how the ground or floor the ball is dropped on impacts the rebound height. If the size of the ball impacts the rebound height. Would the brand or type of ball matter to the rebound height.

Other testable questions could be:

- How does the ground impact the height of the rebound of a soccer ball?
- How does the type of ball impact the rebound height?
- How does the size of soccer ball impact the rebound height?
- How does the amount the ball has been used impact the rebound height?

# Sources of Error

- Spin on the ball could have slightly impacted the rebound height but not greatly.

- Camera angle could have slightly impacted the height that was seen.

- The pressure gauge could have been slightly inaccurate but very unlikely.

- Where the ball landed could have slightly impacted the rebound depending how hard the floor board was.

- When the pump or pressure gauge was removed a little bit of air could have been let out.

# Citations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