a-MAZE-ing Memory

Testing a Rabbit's Spatial Learning and Memory.

Fourth Grade Science Fair Project

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17. Thank You

SAFETY FORM

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2025 Safety Form

☑ I have written a research plan that includes the following:
- The question or problem being addressed and the expected outcome
- Describes in detail the method and procedures including all safety precautions Includes all procedures to be used for data collection and/or building your prototype, if an engineering project
- Identifies any potential risks and safety precautions to complete the project safely
- Who will be supervising your project? For approval, an adult over 18 must be present and supervising during experimentation or prototype development and building.

☑ I have reviewed this research plan with my:
- Teacher
- Parent/Guardian
- Any other 18+ Adult who will be supervising the project (if not listed above)

☑ I have reviewed the rules for The Academy of Science – St. Louis Science Fair and verified with my teacher that my project adheres to the rules.

☑ I have reviewed the additional rules that apply if my project involves any of the following:
- Mold
- Bacteria
- Humans

I acknowledge that all of the above safety precautions will be followed and that this project will be completed in a safe manner. I also acknowledge that no humans or animals (vertebrates or invertebrates) will be harmed in any way.

Print or Type Student Name	Student Signature	Date
Piper Olsen	Piper Olsen	1-25-25
Print or Type Parent/Guardian Name	**Parent/Guardian Signature**	**Date**
Amy Olsen		1-25-25
Print or Type Teacher Name	**Teacher Signature***	**Date**
Mr. Kearney		1-25-25

*You may include a project approval email from your teacher in lieu of a teacher signature.

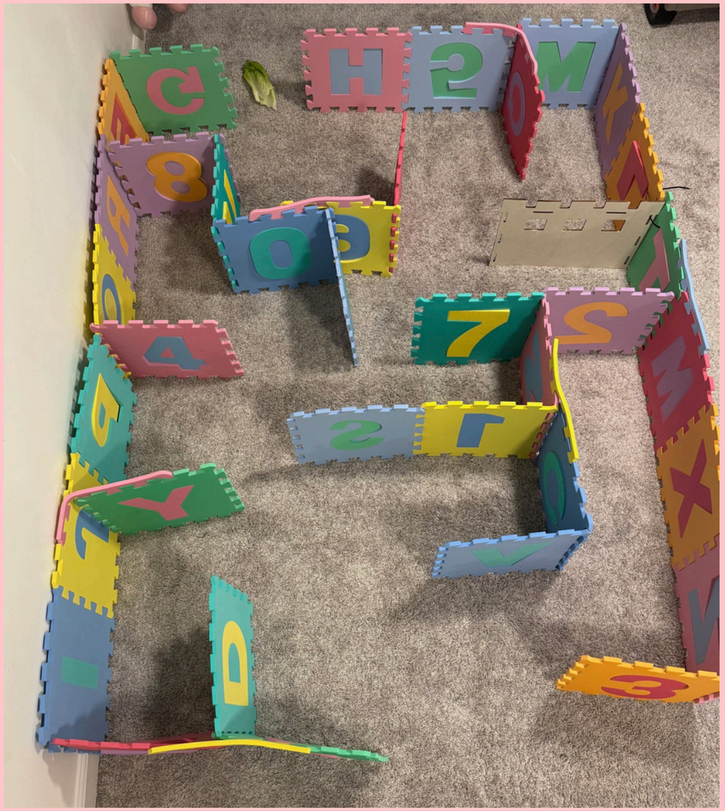
Questions? Contact your science teacher, or the Academy Fair Director at sciencefair@academyofsciencestl.org

Revised for 2025 Fair

Visit sciencefairstl.org for more information.

TESTABLE QUESTION

If I build a maze and put a treat at the end, will my pet rabbit make it through the maze quicker each time proving he has spatial memory?



HYPOTHESIS

If I make a maze for Caper (rabbit) and put a piece of lettuce at the end, then over time he will make it through the maze faster each time.

PROCEDURE

1.Build the maze with baby puzzle mats.
2. Acclimate Caper (rabbit) to baby puzzle mats.
3. Gather materials.
   -Lettuce
   -Baby puzzle mats
   -Rabbit
   -Two Stopwatches
   -Notebook
   -Pen
4. Place lettuce at the end of the maze.
5. .Put caper (rabbit) in the maze.
6. Close the entrance of the maze.
7. Start stop watch number one.
8. In a notebook record number of dead end turns he makes.
9. With stopwatch number two, record how long he stays in the dead end.
10. Once he reaches the lettuce stop stopwatch number one and record time.
11. Repeat this process two times a day for three consecutive days.
12. On the fourth day, change the maze pattern.
13. Record all data and compare.

Background

I picked this project because I wanted to use one of my pets. I have realized over the past one and a half years that my rabbit is very curious, so I thought that if I make a maze that he might become more curious about the maze too. I made the maze to prove that my rabbit will make it through the maze faster each time, which then proves that he has spatial learning ability and a good memory. I also thought that if I put a piece of lettuce at the end of the maze it would encerage him to find his way though the maze.

Trials & Observations

1/25/25 - Day 1

Trial #1 and Trial #2 Observations

Caper (rabbit) was not going into the maze. So we had to make a lead into the maze. I also noticed that he seemed to learn how to get through the maze faster after trying it the first time. Seeing him learn the path a second time made me think about how wild rabbits can learn a quick path to their dens and get away from predators.

1/26/25 - Day 2

Trial #3 and #4 Observations

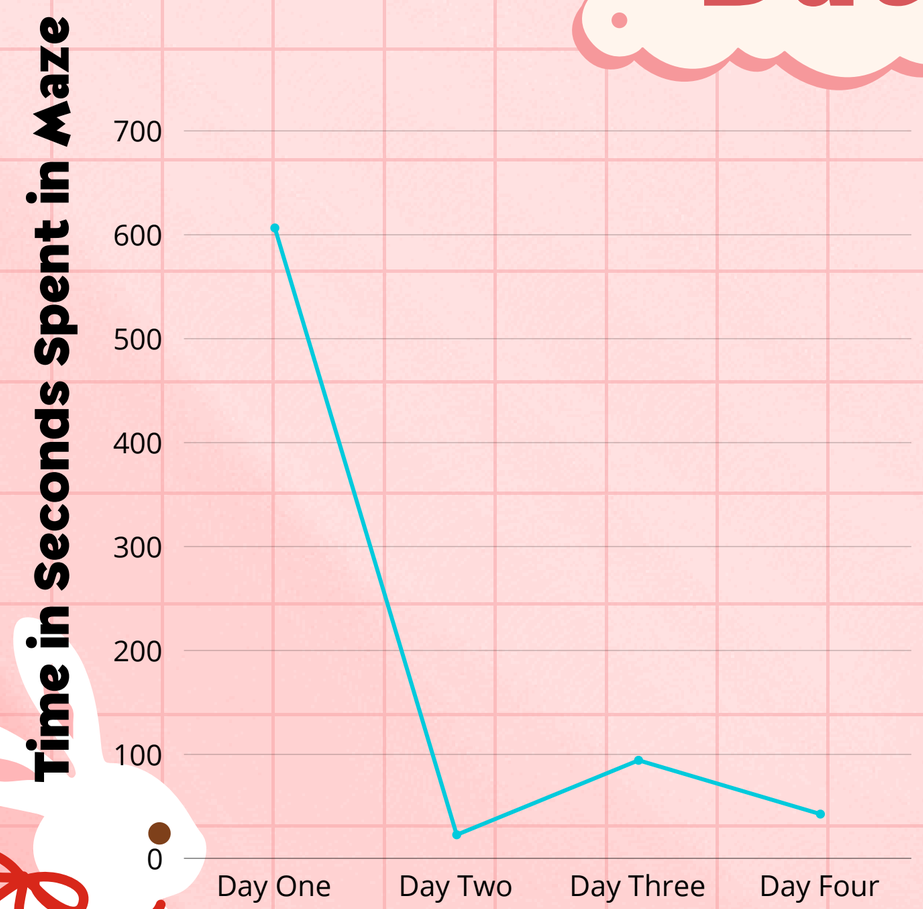
I noticed Caper (rabbit) was really quick through the maze and approached the maze almost immediately and went right to the lettuce.

1/27/25 - Day 3 + 1/28/25 Day 4

Trial #5 #6 and #7 Observations

Caper (rabbit) seemed very familiar with the maze, made it through quickly the first time and on trial 6, he seemed a little bored and uninterested. For trial #7, I changed the dead end pattern to test if it would take him longer to complete.

Data / Results



This line graph shows the total number of seconds Caper spent in the maze on each day.

Day 1 = 606.61 seconds

Day 2 = 22.63 seconds

Day 3 = 94.32 seconds

Day 4 = 42.55 seconds (changed the maze)

There was a giant drop in time spent in the maze from Day One to Day Two. And even on Day 4 with the maze being changed, his time improved a LOT from Day 1, which proves he has memory.

Data / Results

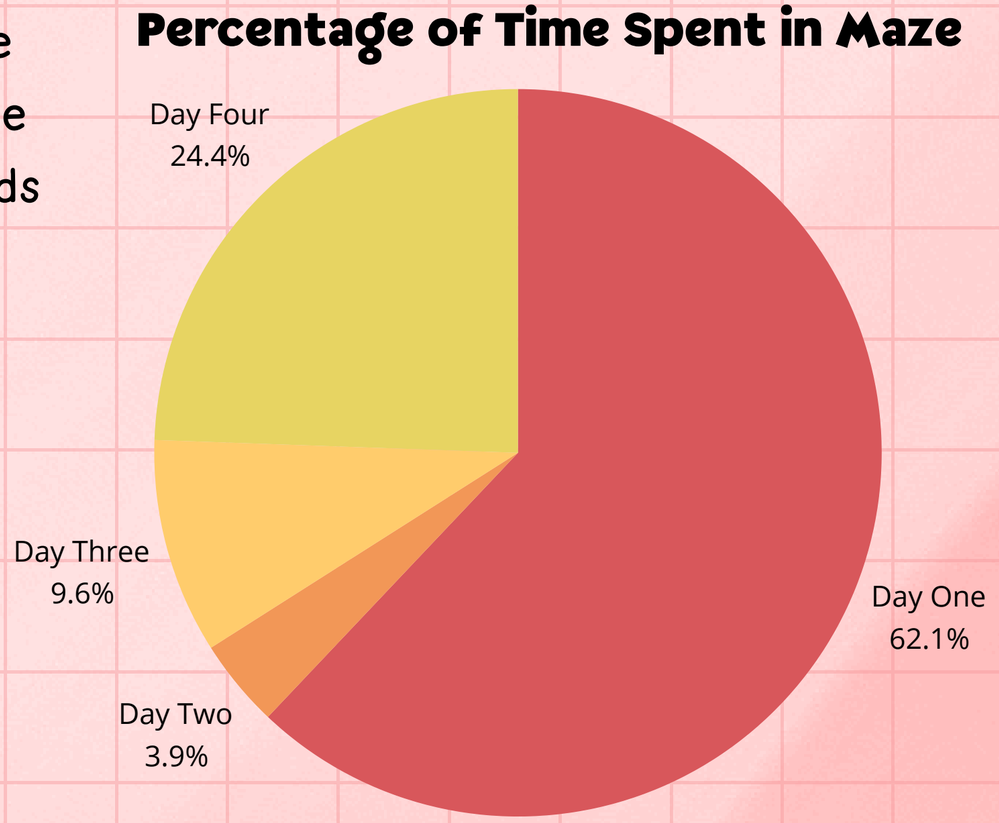
This pie chart shows the percentage of total time Caper spent in dead ends each day,

Day 1 = 47.36 seconds

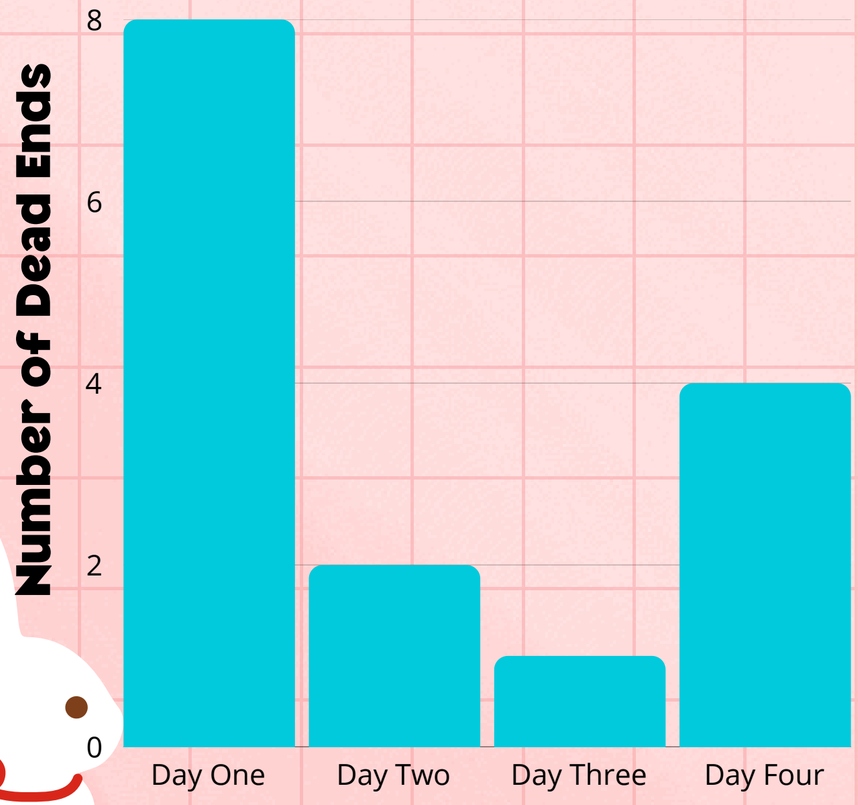
Day 2 = 3.02 seconds

Day 3 = 7.3 seconds

Day 4 = 18.65 seconds (new maze pattern)



Data / Results



This bar chart shows the total number of dead ends Caper went into each day.

Day 1 = 8

Day 2 = 2

Day 3 = 1

Day 4 = 4 (Maze changed this day)

This is interesting because is proves that Caper learned his way through the maze over time, and proves that he has spatial learning

Variables and Conditions

Independent Variable

Maze

Dependent Variable

The Time it takes for the Rabbit to complete the maze

Constant Conditions

Lettuce as a reward

Using the same Rabbit

Same time of day

Conclusion

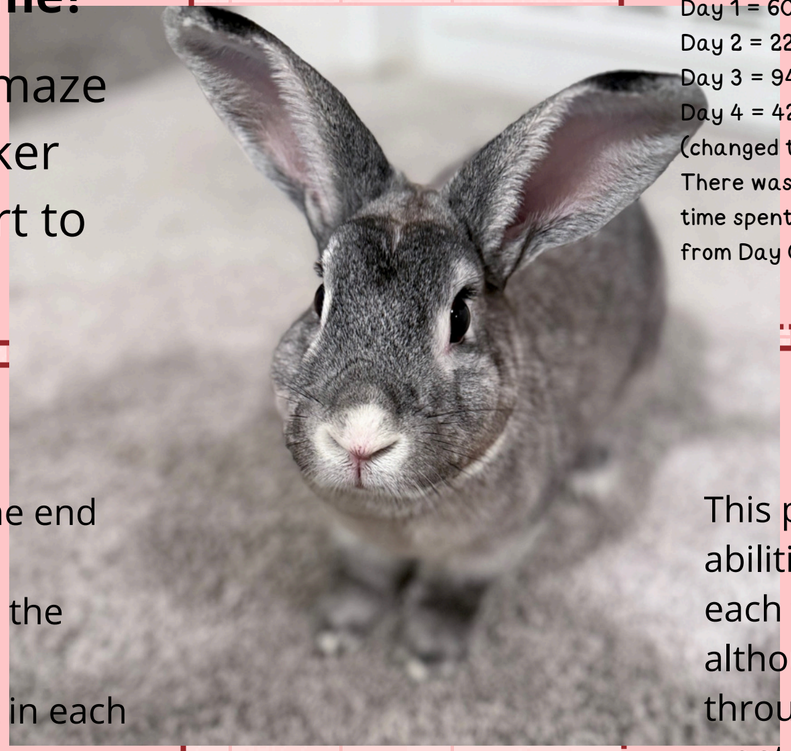
This project proved that my Rabbit, Caper, has spatial learning and memory abilities. Over time he went through the maze quicker each time. On the fourth day when I changed the maze, Caper knew what to do, but immediately ran into a dead end. He solved the maze a lot quicker though then his very first time in. (42.55 seconds compared to 606.61 seconds). I was surprised by how fast he learned the maze. His first trial took 9 minutes and 6.91 seconds with 8 dead ends, and his second trial took 1 minute and 5.69 seconds with zero dead ends. I learned that rabbits are smart and fast learners. I would not change anything with this project because it worked, but to continue it I could make two mazes and see if he gets them confused!

a-MAZE-ing Memory Quad Chart

Testable Question

Will my rabbit prove he has spatial learning and memory by making it through a maze faster each time?

I believe my rabbit will learn the maze path and make it through quicker because rabbits have to be smart to survive in the wild.

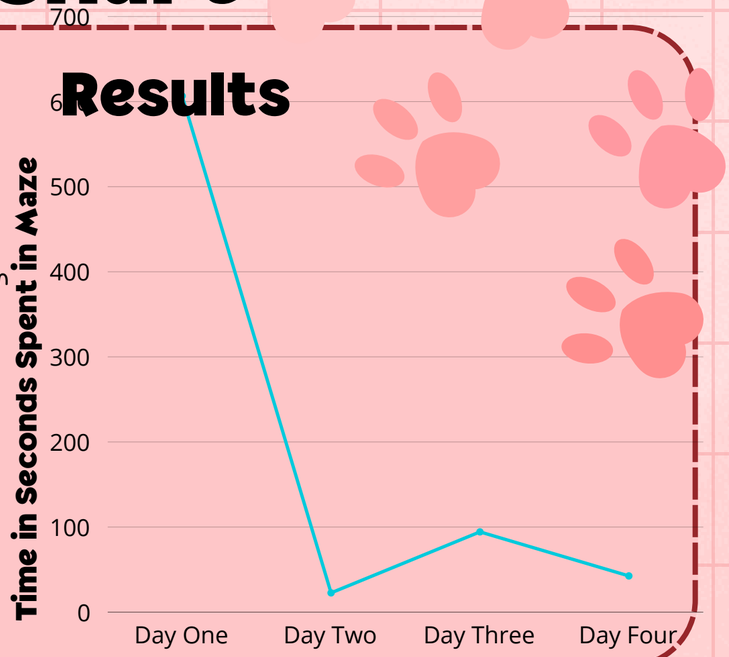


Project Design

- Build a maze for a rabbit and put a treat at the end
- Gather materials
- Time how long it takes for the rabbit to finish the maze
- Record number of dead ends and time spent in each dead end
- Repeat twice a day for three days
- On day 4, change the maze pattern
- Time and record rabbit's path
- Summarize data and make conclusion

Results

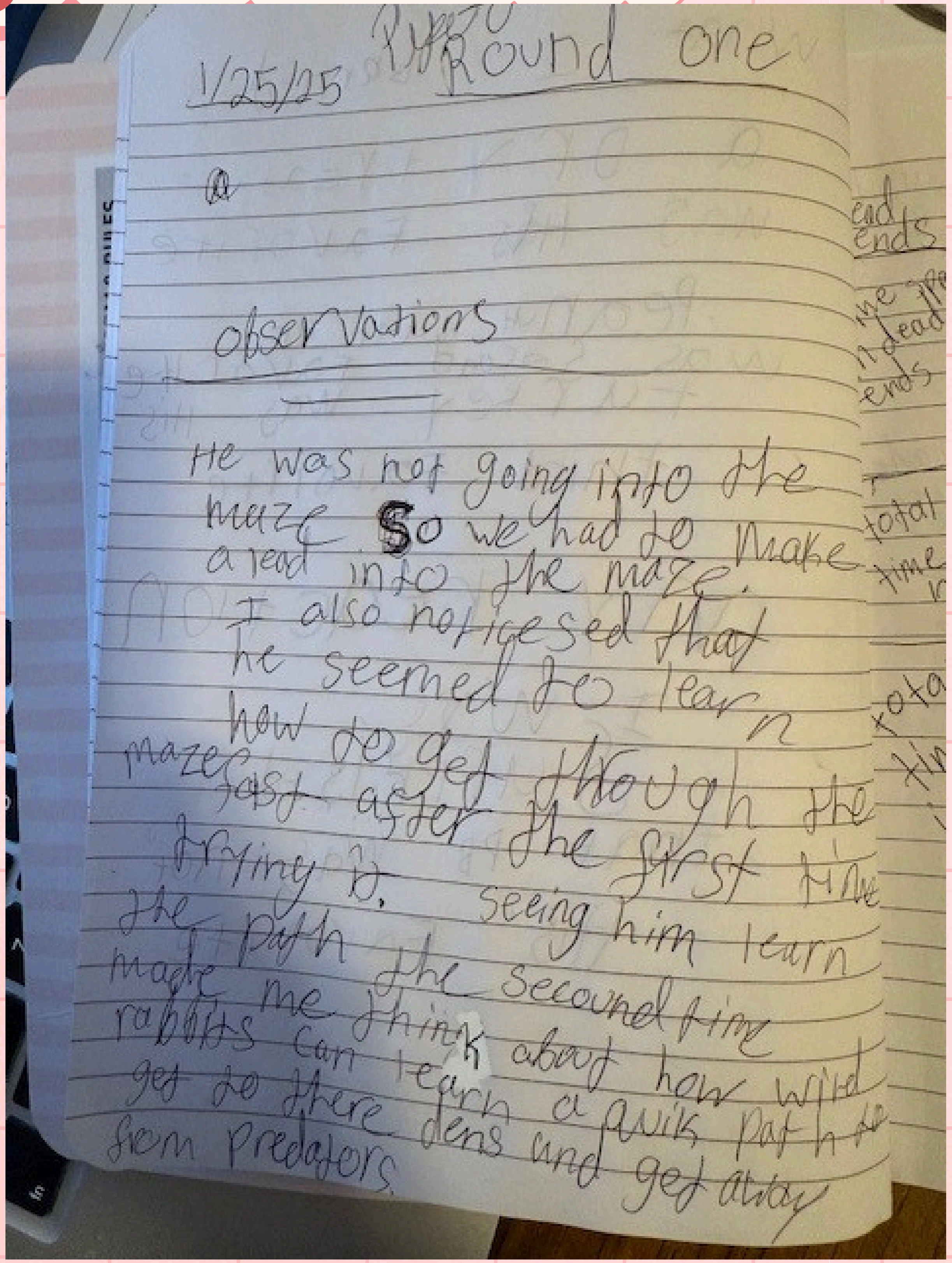
This line graph shows the total number of seconds Caper spent in the maze on each day.
Day 1 = 606.61 seconds
Day 2 = 22.63 seconds
Day 3 = 94.32 seconds
Day 4 = 42.55 seconds
(changed the maze)
There was a giant drop in time spent in the maze from Day One to Day Two.

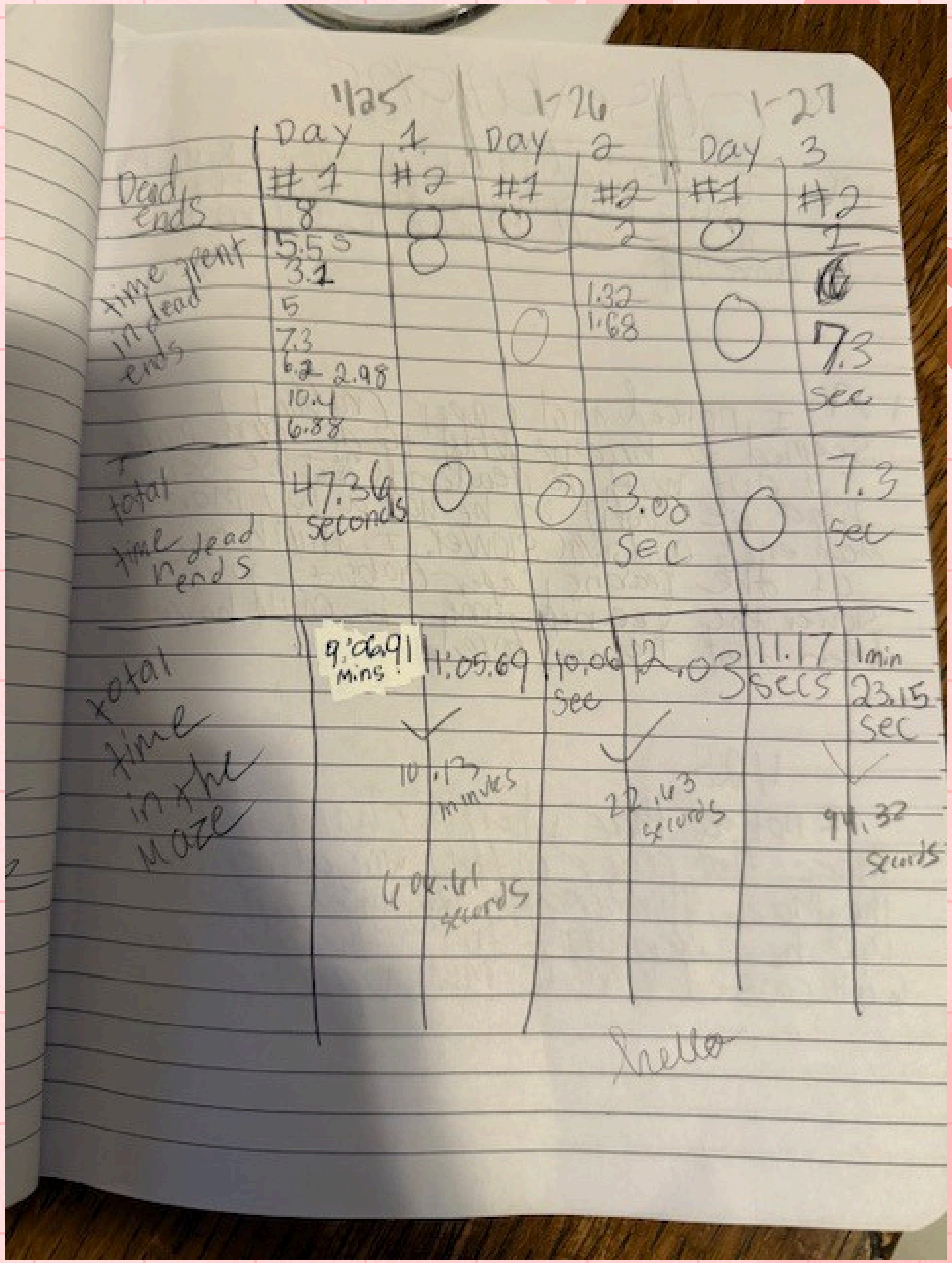


Conclusion

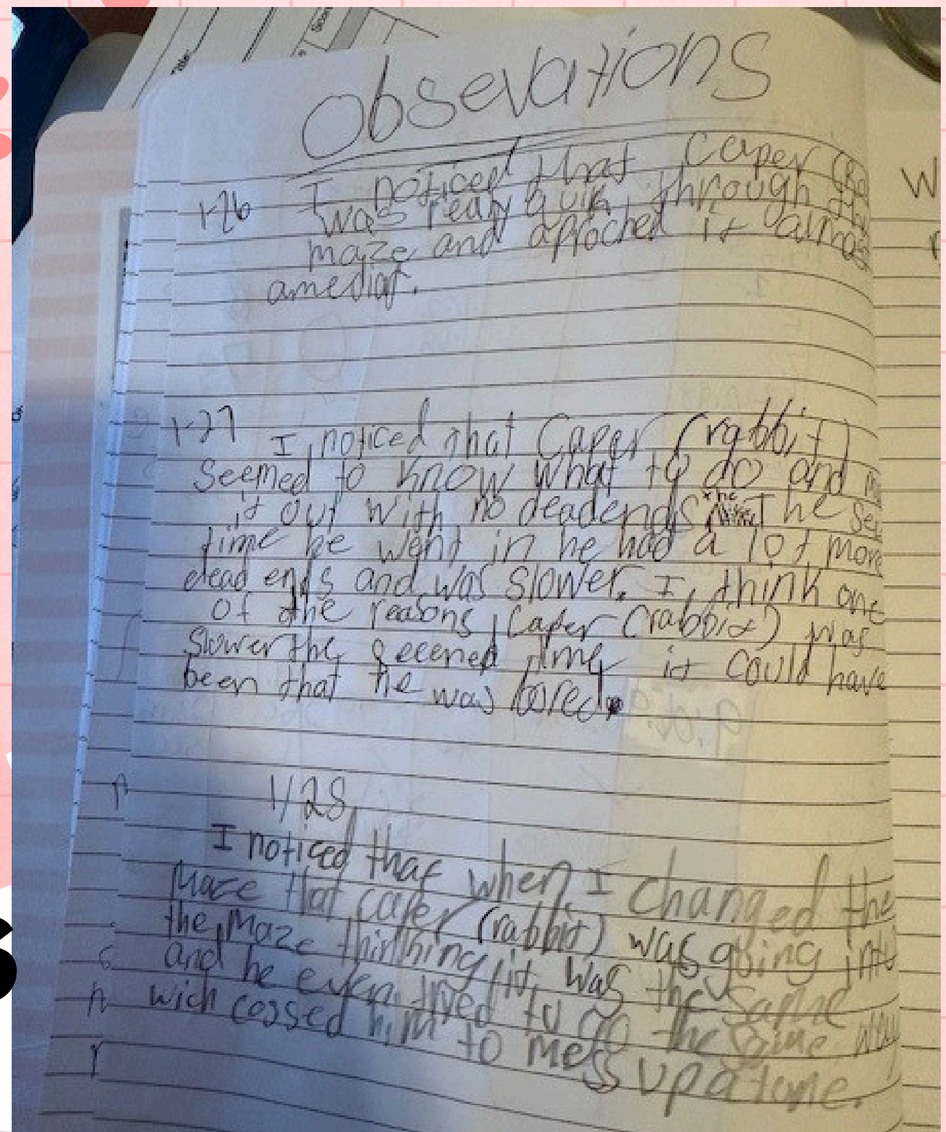
This project proved that my rabbit has spatial learning abilities. His time to get through the maze decreased each time, and when I changed the maze the final time, although he hit dead ends, he knew the goal was to get through and find the lettuce because the first time he went through the maze it took him almost 10 minutes compared to under 1.5 minutes.

Log Book


1/25/25 Round one
observations
He was not going into the maze so we had to make a trail into the maze.
I also noticed that he seemed to learn how to get through the maze fast after the first time trying it. Seeing him learn the path the second time made me think about how wild rabbits can learn a quick path to get to there dens and get away from predators


1/25 Day 1 #1 #2
1-26 Day 2 #1 #2
1-27 Day 3 #1 #2
Dead ends
time spent in dead ends
total time dead ends
total time in the maze
47.36 seconds
3.00 sec
7.3 sec
9:06.91 mins
1:05.69
10.06 sec
12.03
11.17 secs
1min 23.15 sec
10.13 minutes
22.63 seconds

Log Book

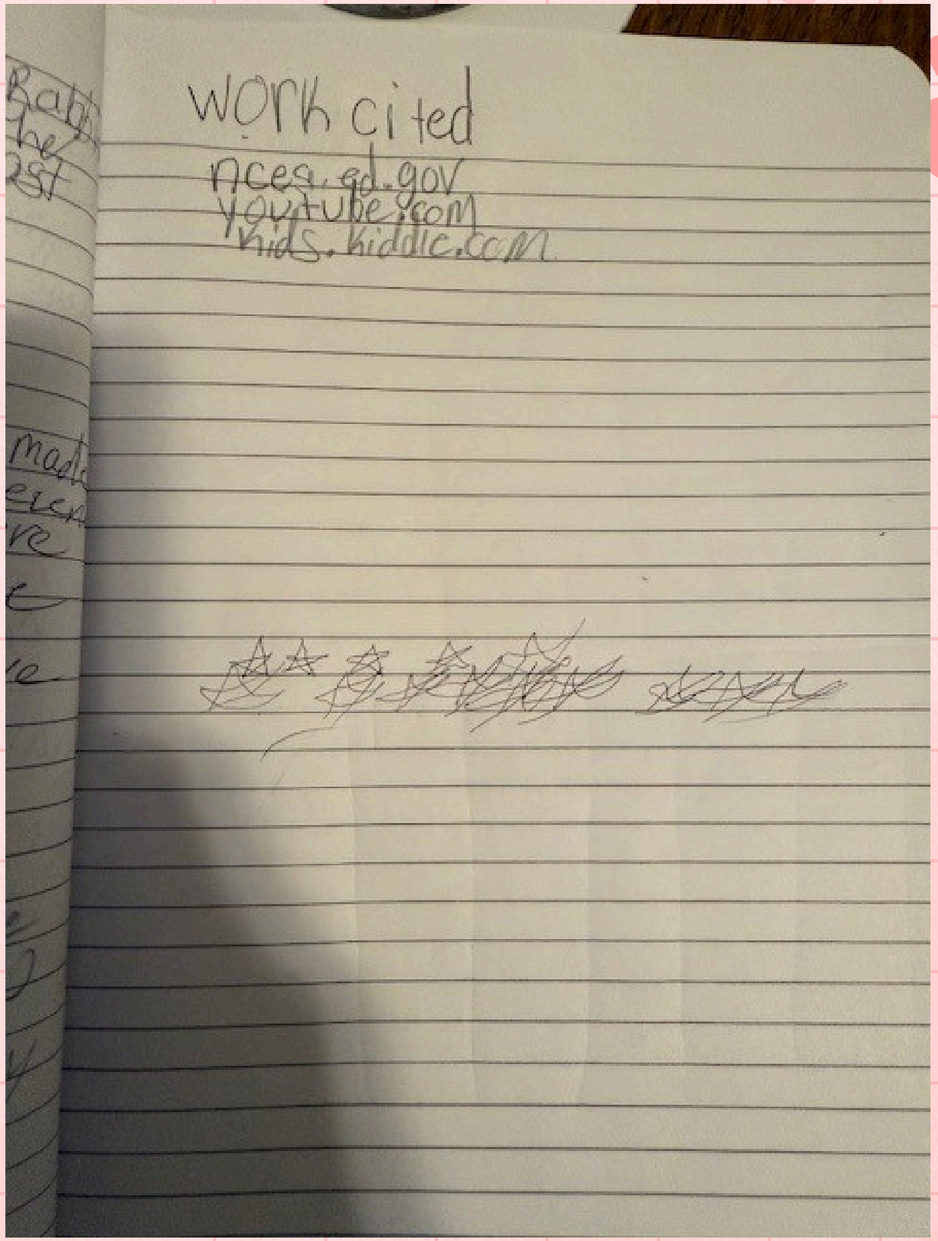


Observations

1/6 I noticed that Caper (Rabbit) was really quick through the maze and approached it calmly amediatly.

1/7 I noticed that Caper (rabbit) seemed to know what to do and the set it out with no deadends. The next time he went in he had a lot more dead ends and was slower. I think one of the reasons (Caper (rabbit)) was slower the second time it could have been that he was bored.

1/8
I noticed that when I changed the maze that caper (rabbit) was going into the maze thinking it was the same and he even tried to do the same which caused him to mess up alone.



Work cited

nces.ed.gov
Youtube.com
kids.kiddle.com

THANK YOU

My mom helped me with my project by doing stopwatch number one,
and also helped with building the graphs for this presentation.
She also emailed me the pictures from her phone of my logbook and Caper