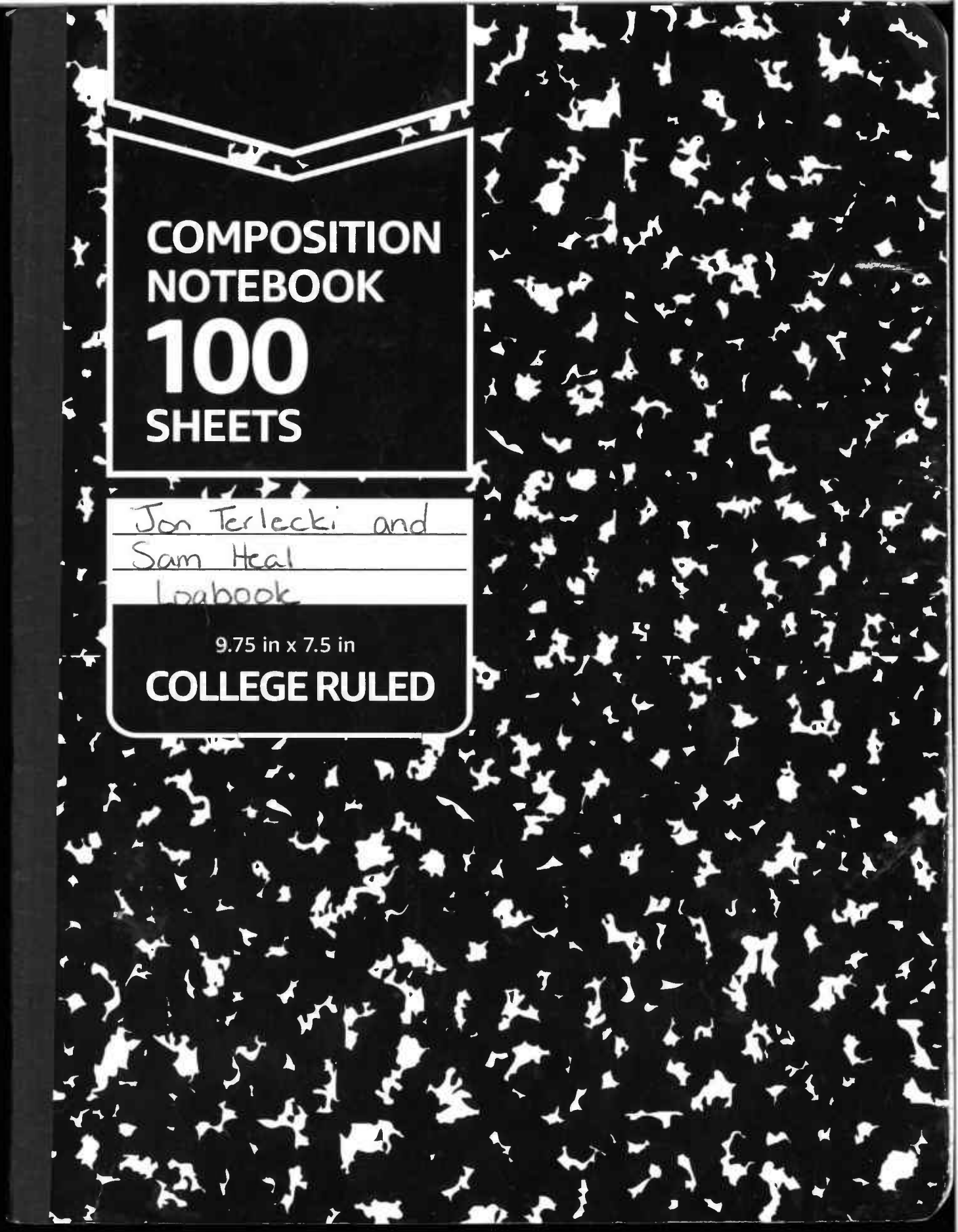

COMPOSITION
NOTEBOOK
100
SHEETS
Jon Terlecki and
Sam Heal
Logbook
9.75 in x 7.5 in
COLLEGE RULED

Timetable

Jan 17, 2026 — 12:00 pm to 5:30pm
Jan 18, 2026 — 2:30pm - 4:00pm
Jan 20, 2026 4:00pm - 7:00pm
Jan 22, 2026 4:00 — 6:30

Feb 25, 2026 - 10:40 — 11:42
Feb 25, 2026 12:30 — 1:00
Feb 25, 2026 2:00 - 2:30
Mar 1, 2026 2:00 - 5:30

Jan 12th 2026

include sources

Background Research

when you pull back the shower curtian it creats more space in the bucket this will make the presure inside go down when you let go of the shower curtian it pushes the air in the bucket into a smaller space creating a vortex of air

---

emilys wonder lab is a netfix show and shows how to build a cannon and show cases it. And that gave us an idea to build an air cannon and test Different ext- wipes instead of just a circle.

Nasa.Gov- -NASA explains that when you pull back on a cullen (in a cup style air cannon) you pull in air when you release it the air rushes forward. The air in the middle Travels faster than the air near the edges with in creates a vortex →

(Nasa) (a spinning ring of air) this shows that air speed depends on how quickly the air is pushed and how evenly the air can escape from the cannon opening

Science world.ca explains that the puff of air coming out of a cup style air cannon is part of a vortex shaped like a Donut (torus) The air rolls from the center to the edges Because the air in the middle exits faster than the air around the edges

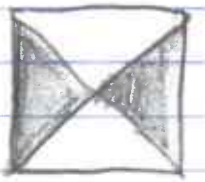
•Scitable bubbles.org vortex cannon activity explains that air is every where even though we can not see it and that you can push air using force Pulling back on a balloon and releasing it pushes air out quickly this shows how consistent forces make consistency

Problem / Hypothesis

Jan 17, 2026

Problem/question How does air move through different shapes.
Does the exit shape change air speed

Hypothesis: The air will travel the fastest in a circle ~~knock down the most~~ ~~cups~~ and move the slowest in square because it has the most edges to catch on.



Variables

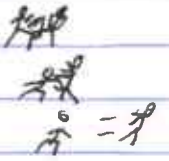
Jan 17, 2026. The controlled is the distance the pull dir cannon, cups, distance measured
~~manipulated~~ changes, cannon responding Air ~~movement~~ and speed
Pull back Pungle

Manipulated - ~~pull of the bungee~~ Shape of exit
- ~~atm fatigue~~

Controlled - Setting of cannon
- measured at distances 12", 18", 24"

Jan 17th 2026

Materials



- Air cannon
- 3 buckets
- 1 shower curtain
- 3 plastic pop bottles
- 3 bungee cords
- ~~15 cords~~
- 1 roll of tape seal
- 1 roll of clear packing tape
- 1 fog machine
- 1 anemometer
- 2 pices of 1x3 wood
- 1 note book
- 3 plastic knobs
- 6 2"5 wood screws
- 6-1 metal bolts

~~Building~~

- 3-shoelaces
- 3-1 wood screws
- 12 metal washers
- 6 metal nylock nuts

1-Fog Machine

Tools used

- Drill, Skill saw, propane torch, screw driver, mini impact driver, socket wrench, sidecutter, jigsaw, framing squares, measuring tape, pliers, nails, scisors

Jan 17, 2024 Application / Extension

I shows people how air pressure works \ responds to different shapes also It shows people how tornados work

- how drains get cleared

Building the Canon

Jan 17 2024 At beginning The canon looked ~~pale~~ like a pale bazooka

Plan the shapes:

cannon # 1 is a 5 inch diameter circle

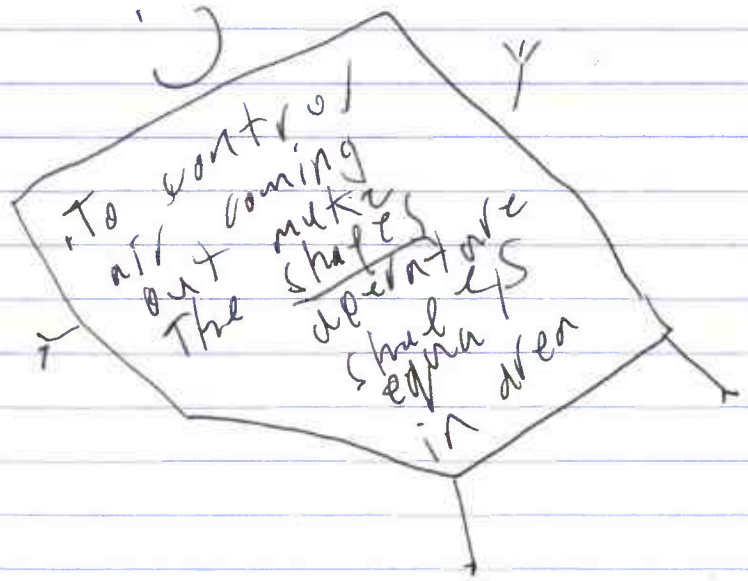
area of a circle = (pi) x radius^2 (squared)

(3.14)

Diameter = 5" radius in half the diameter radius 2.5

radius squared 2.5 x 2.5 = 6.25 inches

Pi (3.14) x 6.25 inches = 19.635 inches



Jan 1, 2024

Bucket #2 Square aperature

19.635 inches from Bucket 1

Area of a square is (length x width)

to figure out the ~~sq~~ area for the square from 19.635 you need the square root of 19.635

$\sqrt{19.635 \text{ inches}} = 4.431 \text{ inches}$

4.431 inches (Length) x 4.431 inches (width)

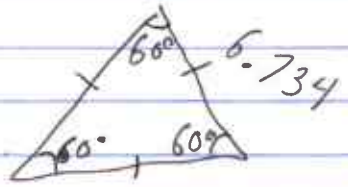
= 19.634 inches

Bucket #3 Triangle Aperature

Jan 17 2022

To figure area of a tringle from 19.634 inches

equilateral triangle



h)

$$A = \frac{\sqrt{3}}{4} s^2$$

$$s = \sqrt{\frac{4A}{\sqrt{3}}} \qquad s = \sqrt{\frac{4 \times 19.635}{\sqrt{3}}}$$

dth)

$$s = \sqrt{\frac{78.54}{1.732}} \qquad s = \sqrt{45.346}$$

$$\boxed{s = 6.734}$$

Building the cannon

Jan 17 2020

cut the different shapes in the buckets ensuring same all in each shape, - see notes on and calculations

- cut the wood to build handel and bucket
- line up wood to measure the support to the right of bucket
- cut wood for handle
- mark 3 holes on the support wood
  - at top and bottom
- drill holes on the support wood at top and bottom
- drill holes through the bucket
- add screws and washer and nut to secure support
- Drill holes through handle and support to attach handle to support
  Drill screws though holes

Take soda bottle and measure from top cap down 2 inches mark a line around the bottle 2 inches down

cut bottle around line

- move 2 holes on each cut bottle top near the across from each other
- melt a hole through plastic where marker the melted plastic makes it stronger.

- Drill knob through top of bottle cap secure with a screw.

- Drill a hole in the air cannon bucket on 1 1/4" from bottom on each side

- Take shower curtain and and put the pop bottle top and measure a circle around it

From the pop bottle top measure out 8" and create a large circle along

- cover the entire circle w clear tape

- cut around the circle

- place on the bucket opening and tape edge of shower curtain to the bucket using duct tape

- Take bungee cord and feed it through the hole that was drilled in the bucket then through the holes on the pop bottle bucket but the other side of the bucket

- secure w knot on each side

Use fog machine to load fog to each cannon (1st) which uses make fog ring

Jan 18, 2024

Procedure

Set Air cannon on edge of counter with bucket i.e resting on edge of counter so it couldn't move.

* control setting *

mark counter at 12 inches, 18 inches and 24 inches

[illegible]

trial 1 - circle, square, triangle.

For each shaped cannon we did air speed tests at 3 distances 12", 18", 24".

We positioned the cannon on the counter and captured the speed at each distance 5 times. each

Sam - 5 pulls at 12", 18", 24"
Jon - 5 pulls at 12", 18", 24"

We did this for each shape air cannon.

Observation Jan 18, 2025

- arm gets sore
- [illegible]
- the speeds on the square was faster than the circle
- the air seems to travel down
- Triangle is same, low air
- Circle is strongest
-

Jan 20
2026

Trial 1

Average Speed

Triangle: 24" 3.6 Km/h
4.6
4.6
4.6 5.4
12" 3.9
4.6
4.3
3.9
4.6

Square: ~~24"~~ 6.4
6.1
4.6
5.4 5.4
12" 5.4
5.4
5.4
6.4
5.7

Circle: 24" 2.8
3.2
3.6
3.9
3.9
12" 5.7
4.6
6.4
5.7
7.2

Jan 20 2026 Trial 2

Square: 24" 3.9 Km/h
3.6
3.6
5.7
5.0

12" 5.0
5.4
5.0
5.4
6.1

Circle: 24" 3.6
3.9
3.6
4.3
4.6

12" 6.1
5.7
6.4
6.1
6.8

Triangle: 24" 5.4
4.3
5.4
4.3
3.9

12" 4.6
4.6
4.3
5.4
4.6

Jan 12

Trial #3

Circle	24"	4.6	12"	6.4
		3.9		6.1
		5.0		6.8
		4.5		6.4
		4.6		7.1

Triangle	24"	4.6	12"	3.9
		4.6		4.6
		5.0		5
		4.6		3.2
		4.3		3.9

Square	24"	4.6	12"	5.4
		6.4		6.4
		6.8		5.7
		5.0		6.8
		5.7		6.1

Jan 22 Trial #4

Triangle

24"	12"
3.6	5.0
4.3	4.6
2.9	4.6
3.9	4.6
3.6	

Square

24"	12"
4.8	4.3
4.3	5.4
4.3	6.1
3.4	5.0
5.0	4.6
4.3	
12"	

Circle

24"	12"
3.6	5.0
3.9	7.2
3.2	5.7
3.9	6.4
3.9	6.8

Jan 22

Observations:

The triangle range, speed to 12 and 24 inches is almost the same

The ~~circles~~ 24 inch pull is the ~~stronger~~ squares

The Square, air speed slows down ~~over~~ farther distences

The circles air speed is the slowest ~~at~~ 24 inch and the 12 inch is ~~1st~~ fastest

The circle has very consistant ~~average~~ from the 1 to 4

The square was very consistant except trial 3 and 4 had weak 24 inch pulls

The ~~average~~ of the triangle is almost the exact same every time

Jan 22

Analysis:

We think our trial provided good data, good control, and we got the conclusion that the Sprite is the fastest at 24 inches and [illegible] at 24 inches but the fastest at 12 inches

our Sources of error where each Stage may have [illegible] to cutting through edges and plastic bags, the air cannon was not pressed against the counter perfectly the same each time, the bungee could stretch as well. Human error in reading #'s, for example we would write 5.0 instead of 5.8 Temp of the air in the room could change.

unmeasured could move or not be lined up perfectly calibration of unmeasured placement of measurement to retain exit air flow

EXTENSION

22

- Test more shapes like oval or rombus.
- Different size of air cannon and shape.
- Test more distances
- Build a fixed Bucket holder and anometer holder
- Test in different air Temperature
- Build from different materials like wood cardboard or plastic

Jan 22

Conclusion

Our hypothesis for the circle shaped cannon was correct when we measured the air speed at 12" but was not supported at 24" inches. Our hypothesis was incorrect for the square shape as the air speed at both 12" and 24" were faster on the square than the triangle. This means that the exit shape does impact the exit air speed.

Application

- HVAC
- Aerodynamics
- To study tornadoes and wind patterns
- Leaf blowers

Feb 25 Trial 5

Square

24"	12"
5.0	7.2
5.0	5.6
4.6	5.7
4.3	5.4
4.6	6.1

Circle

24"	12"
3.2	5.7
2.8	7.2
2.5	7.5
3.2	5.4
2.5	7.2

Triangle

24"	12"
4.6	3.6
5.0	3.2
3.9	2.5
4.6	3.6
3.6	3.6

Feb 25 Trial 6

Circle

24"	12"
3.6	4.6
3.5	6.4
2.8	5.4
2.8	5.
3.2	6.8
2.8	

Triangle

24"	12"
3.2	2.5
3.1	4.3
3.6	3.6
3.9	3.6
3.6	3.9

SqJest

24"	12"
3.9	5.0
4.6	6.4
4.3	6.4
4.3	6.8
4.3	6.4

Trial 7

Triangle

24"	12"
2.0	3.2
3.2	3.6
3.6	3.6
2.8	2.5
3.6	3.9

Square

24"	12"
4.3	5.4
4.3	4.3
3.9	4.6
3.9	4.6
5.7	5.7

Circle

24"	12"
3.2	6.1
3.6	5.0
3.2	5.4
2.1	5.0
3.6	5.0

Trial 8

Square	24"	12"
	4.3	4.3
	5.4	5.4
	4.6	4.6
	4.6	5.0
	3.6	5.7

.5
9

Circle	24"	12"
	2.8	3.6
	3.9	4.3
	3.2	4.3
	3.2	3.9
	2.1	4.6

Triangle	24"	12"
	3.2	3.6
	3.2	4.2
	2.8	3.6
	2.1	3.2
	3.2	3.6

Trial 9

Circle 24"

3.9
3.6
2.8
3.2
2.5

12"

4.3
3.9
5.4
4.2
3.9

Triangle 24"

3.6
2.5
3.9
2.0
3.6
4.3

12"

3.2
3.2
3.6
4.6
3.2

Square 24"

4.3
7.2
7.2
6.1
7.5

12"

5.7
5.0
6.1
5.4
5.4

Trial 10

Triangle

24"

3.6
3.2
3.9
3.2
3.9

12"

2.5
3.6
3.2
4.6
3.6

Square 24"

6.4
5.0
4.6
6.1
6.4

12"

6.4
5.4
5.4
6.1
6.4

Circle

24"

4.3
3.6
2.5
3.2
3.6

12"

5.4
5.7
6.1
5.0
5.0