AI SAFETY SANDBOX · BIOSECURITY

# Build a room air-cleaning calculator

Starter · 1–3 hours · Free · Step-by-step guide

Online version: https://ai-safety-sandbox.vercel.app/projects/air-cleaning-calculator/

## Summary

Make a tiny calculator (a spreadsheet, notebook or web page) that tells anyone how much a portable air purifier would clean the air in their room.

## Why it matters

It's on the source list of project ideas: a calculator for how powerful a fan or filter a room needs. Simple tools like this help schools, offices and families act without expert help.

## What you will have at the end

A working calculator other people can use, with a short "how it works" note.

## Steps (tick each box as you go)

- [ ] **1. Learn the one formula (15 min)**
  A purifier's clean air delivery rate (CADR, in $m^3$ per hour) divided by the room's volume ($m^3$) gives its "equivalent air changes per hour". If a CADR is listed in CFM, multiply by 1.7 to get $m^3$ per hour.

- [ ] **2. Collect real inputs (20 min)**
  Measure a real room (length × width × height). Look up the CADR of two or three purifiers people can actually buy.

- [ ] **3. Build the calculator (45 min)**
  Make inputs for room size and CADR, and outputs for equivalent air changes per hour, plus how many units would reach a target you choose. A spreadsheet is fine; a small web page is even better.

- [ ] **4. Find a sensible target (20 min)**
  Look up a published ventilation or air-cleaning recommendation for classrooms or offices, and cite it in your tool. Note that targets differ between sources.

- [ ] **5. Test it and share it (20 min)**
  Check one result by hand, ask a friend to try it on their own room, and share it with a short "how it works" note and its limits (for example, it assumes the air is well mixed).

## What you need

- A spreadsheet, or basic Python/JavaScript
- A tape measure
- About two hours

## What you will learn

- How air cleaning is quantified
- Turning a formula into a usable tool
- Communicating assumptions clearly

## Key terms

**Air changes per hour (ACH)**
How many times per hour a room's air is replaced with fresh or cleaned air. Higher ACH means airborne germs build up less.

## Source and links

Hatta & Bazarragchaa — A hundred project ideas in biosecurity (2025)
https://casualphysicsenjoyer.com/Essays+in+progress/Biosecurity/A+hundred+project+ideas+in+Biosecurity

## When you have finished

Write a few paragraphs on what you did, what you found and what you would try next, and share it with a friend, your society or online.

**Try next: Measure how well a room is ventilated**
https://ai-safety-sandbox.vercel.app/projects/co2-ventilation-check/

**Try next: Ventilation & air filtration project ideas**
https://ai-safety-sandbox.vercel.app/projects/ventilation-and-filtration-ideas/

Courses, mentors, small grants and communities:
https://ai-safety-sandbox.vercel.app/next-steps/

Questions? Ask in AI Safety Cardiff University (AISCU): https://aiscu.org/

## Notes