Calculating the Future: Student Capacity in Classrooms Considering Social Distancing

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What is the problem we need to solve?

- How many students can we fit per classroom?
- How many classrooms do we need?
- How many sessions of school do we need to educate our student population?
How do we scale this?
Initial Concept

Filling spaces by hand in PowerPoint

\[4+6+4+6+4 = 24 \text{ ft}\]

\[6+4+6 = 16 \text{ ft}\]
“This will take you way too long to figure out, it’s not efficient, and may be incorrect”
Existing Resources
Be aware! - The algorithm is quite simple - switching rectangle width and height may influence the number calculated. Switching the input values above changes the layout and gives

Maximum number of circles with the triangular pattern inside a 24 x 36 rectangle is: 6

Note! - with some combinations of rectangular shapes and circle sizes - one or two more circles - or even more - may be added with a modified layout of the circles. In the default triangular example above - two more circles can be added in between if the left and right bottom circles are moved to the left and right border. The algorithm used for the calculation is quite simple and may underestimate the number of circles in some cases.
Rectangular Pattern
Maximum number of circles inside the 20 x 28 rectangle is: 4

Triangular Pattern
Maximum number of circles with the triangular pattern inside the 20 x 28 rectangle is: 4
This model is incorrect as it uses square footage and overestimates the number of people per room.
How can this be modeled

Using the edges of a room

Not using edges of a room
Screenshare Demo
What about weird geometry?
What about weird geometry?
What about weird geometry?
Monte Carlo Simulations vs. Algorithm
Scenario Modeling: Questions to Ask

- Desks against walls
- Or not?
- Rows of students
- Or not?
Where else can this model be used?
What the model does not do.....

You have to determine where the teacher is located and how much space to allocate to teacher.

You have to think about how students enter and exit the class and the impact on social distancing (and if they need to go to the bathroom). First-in last-out

You have to think about where the door is located and if this eliminates space for a student (some doors open in, some open out, some classrooms have vestibules etc.)
Frequently Asked Questions

- Question: Can I open the model in Google Sheets?
  - No, the model is an Excel model.

- Question: Why does the model not seem to work?
  - Please confirm that you have enabled macros. This may require making the model “safe” or saving it.

- Question: Why does the summary spreadsheet not calculate?
  - The summary spreadsheet is a macro and required that you “press” the calculate button (found below column L).
Helpful Tips

- The desk radius is the additional “wiggle room” that can be used to think through spaces in different areas. It is intended to literally provide the wiggle room that expands on the 6’ distance between students. It be worthwhile to rerun the models with different desk radii as you think through space.

- Before using the Room Calculator, look at the images and notes in the various packing models. These will help as you think about various classrooms. For instance, it may be harder to use Square Packing (which places students along the walls) in a lower school classroom if there are bookshelves or materials along the walls.

- The hexagon packing models are intended for larger spaces (multi-purpose rooms).

- The no-wall square packing is intended for a gym or an area where a large group of students need to be separated but there is the desire for a walkway between students so that the person radius is not compromised. We have used the terminology “column spacing” for this additional area between students.
Questions

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