than trying to carve out cubes from a given large cube!

The first time was many years ago when Robert Messer at Albion College in Albion, MI had his
students build one; they got halfway to stage 3. Some years later, Ada Dong did the same, getting to
stage 2 with her class in a summer program for high school students at Lawrence Technological
University. This effort was recreated by my Lawrence Technological University Math Club students,
and is an ongoing project.

The project was conceived and implemented by Laura Taalman (James Madison University, VA and
Mathematical Association of America Ambassador) and Matt Parker (Queen Mary University, London
UK and Think Maths) and circulated via the website megamenger.com (5). Cubes would be built using
folded business cards, and linked together to form higher stages. It was timed to coincide with the
Celebration of the Mind gatherings in honor of Martin Gardner, held in late October.

I first found out about the MegaMenger Sponge project (megamenger.com) from a distribution list
by some fraction. The rule is then applied to each new part of the structure to generate more, smaller
parts you will divide each face into nine equal squares, and thus divide the cube into 27 equal
dimension (2). It is a 3-D version of the 2-D Sierpinski Carpet, and the 1-D Cantor Set, created by a
Karl Menger produced the 3-D fractal that bears his name in 1926 in his research in topological
geometry. The Sierpinski Carpet is a 2-D version of the Menger Sponge, made by deleting the
middle third of each square (or cube, in this case), then repeating the process on the remaining
squares (or cubes)

Here is a look at what the Menger Sponge is and how to create it (1, 2). A fractal is generated by a
rule that is repeated at each stage. When a fractal is generated by this rule, the dimension of the
fractal is less than the dimension of the space it is generated in. In the case of the Menger Sponge,
the dimension is 2.5.

There were 18 teams, and a number of people working on cubes at each stage. Many of the cubes
were made by students in high school summer programs. Others were made by teams of business
people, or educators, or individuals. The cubes were made of business cards, which were supplied,
along with printed cover cards. The cover cards were to mask the tabs and reinforce the edges.

By late morning when we arrived, many people were busy at work. We sat at the beginner's table
(“fold and fold” to make stage 0 cubes, Figures 1a and 1b). My cousin caught on quickly, and we both enjoyed the
activity (4). I discovered their Menger Sponge project and knew I had to take my cousin, with whom I
was staying. She is my arts guide, and I am her math guide.

I joined the group at the Museum of Mathematics (MoMath) in New York City, while on a weekend visit
to see my sister. Knowing I was visiting for the weekend, I had checked the MoMath website for
refreshing supplies, and caring for all aspects of the project, was Laura Taalman, this year's
Mathematician in Residence at MoMath!

It was well organized. There were tables for assembling each stage, from 0 to 3. Directions were on
whiteboards. The tables had construction baskets at one end, and a place to put the completed cubes.
At each table, there was a stuffed animal attached to the table. Some of the stuffed animals were
cubes, others were toys that could be attached to the cubes. The stuffed animals were there to help
students practice attaching the cubes together.

Step 1 in creating the MegaMenger Sponge. Building stage 0 cubes.

Step 2 in creating the MegaMenger Sponge. Building stage 1.

Step 3 in creating the MegaMenger Sponge. Attaching stage 1 blocks.

Final version of IMaGe logo created by Allen K. Philbrick from original artwork from the Founder.
Figure 7. Step 5 in creating the MegaMenger Sponge. Attaching stage 2 blocks.

Figure 8. Step 6 in creating the MegaMenger Sponge. Attaching stage 2 blocks. Whoopee!

I gave information about the AMC8 contest to a woman whose 9-year-old daughter and friend were busy making cubes. A high school teacher and I talked about books on origami, and also information on fractals. (In a nice coincidence, we crossed paths later in the afternoon while walking the High Line, a former elevated railway now a walking trail and park by the Hudson River—we had geographic as well as mathematical curiosity.) One of the other participants mentioned that he had used a stage 2 Sponge as a coffee table for a while. I did not ask what happened to it.

The day produced several stage 2 sponges, as well as much fun and learning experience for the participants. Laura Taalman sent participants an email, calling for those who could come back to continue to build during the week, and also on the next weekend. Photos show some of the results.

Here is a sample quiz.

Given:
Stage 0 takes 6 business cards to make (without the cover cards for a smooth surface); stage 1 takes 20 of the stage 0 cubes; stage 2 takes 20 stage 1's; stage 3 takes 20 stage 2's; and stage 4 takes 20 stage 3's.

Find:
(a) How many business cards are needed for each of stages 1 – 4? (Ignore the covers that make the finished product look smooth.)
(b) How much does each stage weigh (approximately)?
(c) How many cards are needed for covering the outer surface (to smooth the surface) of each stage 1 – 4?
(d) How much weight has been added to the object by the covering cards at each stage?

REFERENCES
3. www.megamenger.com
4. www.momath.org
5. Sponsors include Queen Mary University, Museum of Math, and the Manchester (UK) Science Festival.

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^The author wishes to thank Judy and Marcelle Villeneuve for sharing some photos of the event.