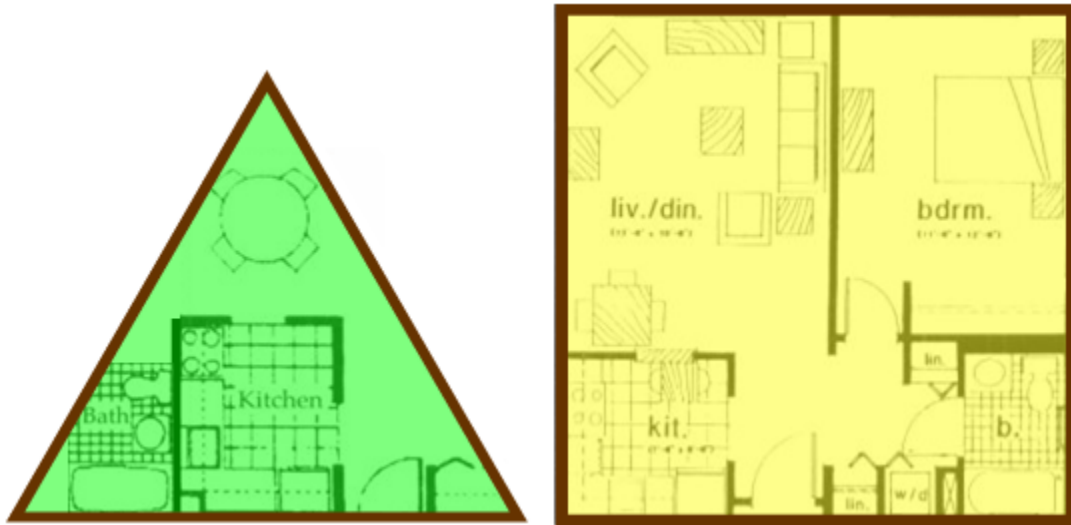
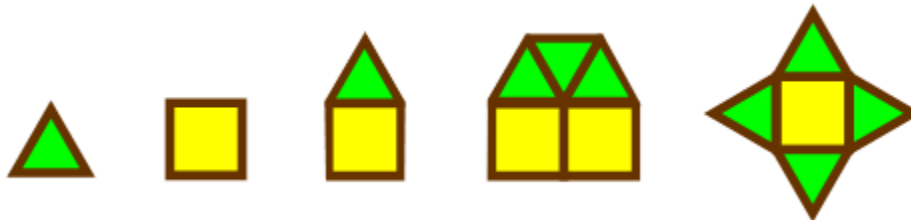


Modular Houses

The International Patent [PCT/GB03/01762](http://www.patent.gov.au/pct/GB03/01762) is for modular housing based on a hexagonal shape. A future development includes the creation of large housing complexes based on two inter-connecting modular units with the same side length:



In cold climates, energy conservation demands that we conserve heat. One way to do this is to ensure that any complex we build is convex. A convex complex has the property that if you tie a rope tightly around it, that the rope will always touch the walls.

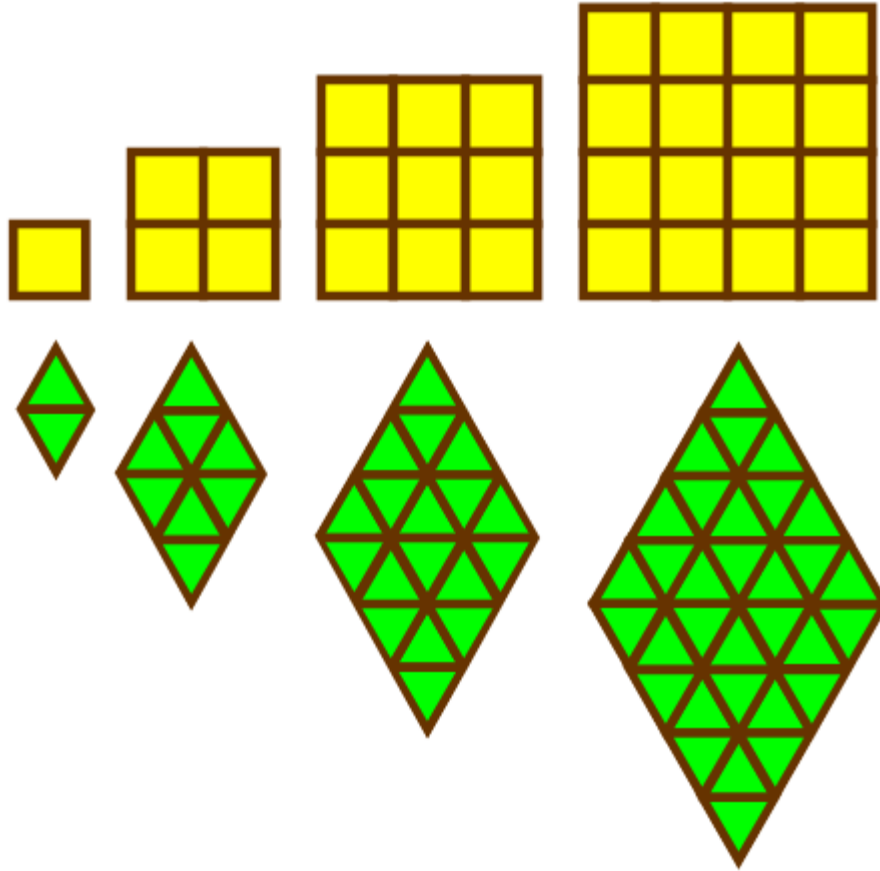


Examples of convex complexes with 3, 4, 5, and 6 sides and a non-convex complex of 8 sides.

Design convex complexes with 7, 8, 9, 10, 11 or 12 sides.

Extensions:

- Are the complexes you created the only ones possible? Can you prove that there are an infinite number of N-sided solutions for $N = 3$ to 12?
- Do all the 4-sided complexes differ only in size, but have the same shape? No, there are two 4-sided shapes, a square and a rhombus:



- How many different shapes of complexes are there that are N-sided?
- Is it possible to create a 12-sided complex that is regular (equal angles and sides).
- The square and equilateral triangle produced solutions for N-sided polygons for $N = 3$ to 12. Find an additional shape that you can add on to your 12-sided complex that allows complexes to be created over $N = 13$ to 24.
- Find a single modular unit that can be used to create convex complexes with N-sides where $N = 3$ to 25.

Credits:

Thanks to the Pacific Institute for the Mathematical Sciences for the initial polygon problem



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