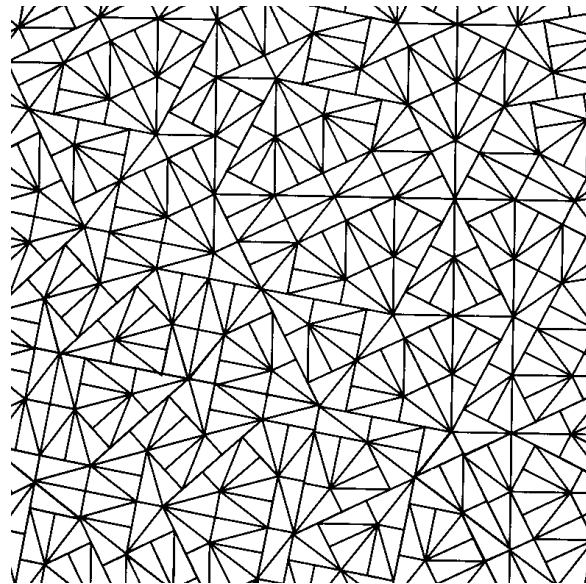
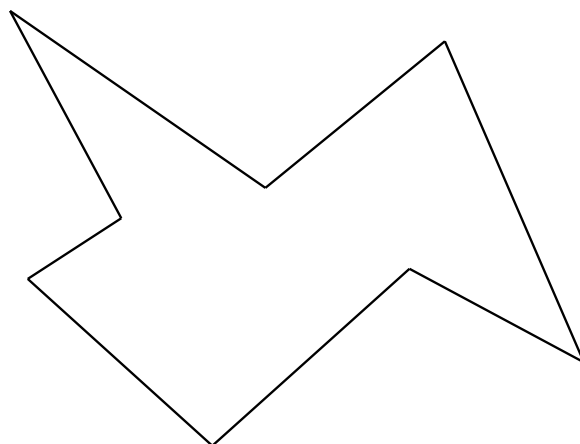


4. A doughnut passes through the 2-dimensional world. Sketch a series of diagrams that shows what the 2D creatures would see.
5. A Golden Rectangle has a long side that is 2 meters long. Find the length of the short side.
6. When talking about the Pinwheel pattern, what do we mean by a *super-tile*? Outline a *super-tile* in the figure below.



7. State the Pythagorean Theorem. (Note: you must include all the words, not just the formula $a^2 + b^2 = c^2$.)

8. Describe what happens to a Golden Rectangle if you remove the largest square.
9. A gallery requires 2 cameras to guard it. What can you say about the number of vertices?
10. Give real world uses of *two* of the following:
- (a) Symmetry or repeating patterns
 - (b) Möbius Strip
 - (c) Art Gallery Theorem
11. Triangulate the following gallery, color its vertices, and determine where you would place the cameras.



12. Consider this excerpt from the New York State Court of Appeals Summary of case No. 162, People v James Robbins, argued October 20, 2005:

James Robbins was arrested in March 2002 after allegedly selling crack cocaine to an undercover officer in a buy-and-bust operation at West 40th Street and Eighth Avenue in Manhattan, roughly three blocks from the Holy Cross grade school on West 43rd Street. He was convicted of third degree criminal sale of a controlled substance and criminal sale of a controlled substance in or near school grounds which, under Penal Law §220.00(14), requires proof the sale occurred in “any area accessible to the public located within 1,000 feet” of school property. Now serving concurrent prison terms of 6 to 12 years in prison, Robbins argues in this appeal that there was insufficient evidence the sale occurred within 1,000 feet of Holy Cross.

The statute does not declare whether the distance is to be measured as the crow flies or as a pedestrian would have to travel. Because buildings stand in the way, a detective was unable to directly measure the bee-line distance from the point of sale to Holy Cross; he measured one pedestrian route to be 1,294 feet and another route to be 1,091 feet. However, Supreme Court ruled the distance should be measured “in a direct line” from drug sale to school and it allowed the prosecution to employ geometry to figure it out, taking judicial notice of the Pythagorean theorem. The detective was sent back out to measure the two sides of the right triangle: up Eighth Avenue from 40th to 43rd street (764 feet) and then along 43rd Street to the school (490 feet).

Justify the prosecution’s claim that this sale counts as criminal sale of a controlled substance in or near school grounds.

Bonus: What does the word “vertices” mean? What is the singular form of this word?