Beautiful Geometry

Fall in love with geometry by uncovering elegant solutions to beautiful geometric problems.

35 Lessons

1 Introduction

Start

- Infinite Areas
- Polyomino Tiling
- Guards in the Gallery

2 Tessellations and Reptiles

- Regular Tessellations
- Semiregular Tessellations
- Transforming Tiles Part 1
- Transforming Tiles Part 2
- Irregular Tiles
- Reptiles
- Infinite Arithmetic

3 Polyominos

- Tiling a Chessboard
- Counting All Possible Solutions
- Bigger Polyomino Blocks
- Challenging Packing Puzzles
- X-Only
- Tiling and Cutting
- Congruent Cutting

4 Folding Puzzles

- Mathematical Origami
- Dragon Folding
- 1D Flat Folding
- 2D Holes and Cuts
- 2D Single-Vertex Flat Folding (I)
- 2D Single-Vertex Flat Folding (II)

5 Guarding Galleries

- Strange Polygons
- Convex vs. Concave
- Quadrilateral and Pentagonal Galleries
- Efficient Guard Placement
- Worst-Case Designs
- Fisk's Coloring Proof
- Further Art Gallery Research

6 Pick's Theorem

- Pegboard Rectangles
- Pegboard Triangles
- Pick's Theorem Generalized
- Pick's Theorem With One Hole
- Pick's Theorem With Multiple Holes

Course description

Are you ready to start loving geometry? This course is here to guide you through some of the magic of geometry, revealing the thought processes that lead to clever solutions to beautiful geometry problems.

By the end of this course, you'll have explored polyominoes, tessellations, origami folding, art gallery problems, and lattice polygons.

Topics covered

Convexity and Concavity
Deconstructing Origami
Fisk's Coloring Proof
Fractals
Lattice Polygons
Packing Puzzles
Pick's Theorem
Polyominoes
Reptiles
Tessellations
The Art Gallery Problem
Triangulation

Prerequisites Geometry Fundamentals

Next steps Geometry II