

MATHEMATICS OF ARCHITECTURE

20 Working Model Suggestions for Grades IX–XII

No.	Working Model	Mathematical Concept	Working Feature
1	Geodesic Dome	Triangles, geometry, symmetry	Dome assembled from triangular modules.
2	Parabolic Arch Bridge	Quadratic equations, parabola	Adjustable arch showing different parabolic curves.
3	Golden Ratio Building	Golden ratio, proportions	Sliding panels demonstrate 1:1.618 proportions.
4	Fibonacci Spiral Architecture	Fibonacci sequence, spiral	Rotating spiral showing Fibonacci rectangles.
5	Suspension Bridge	Parabola, coordinate geometry	Moving cables demonstrate the cable curve.
6	Earthquake-Resistant Building	Geometry, force distribution	Shake-table demonstrates different building designs.
7	Triangular Truss Bridge	Triangles, structural stability	Load placed on bridge to compare truss designs.
8	Domes & Load Distribution	Arcs, symmetry, forces	Apply weights to different roof shapes.
9	Arch Strength Tester	Circle, semicircle, compression	Compare straight beam and arch under load.
10	3D Coordinate Building	Coordinates, 3D geometry	Movable points construct a 3D building.
11	Rotating Tower	Angles, rotation, geometry	Tower rotates around its central axis.
12	Spiral Staircase Model	Helix, angles, circles	Rotating staircase demonstrates angular movement.
13	Perspective in Architecture	Similarity, ratios, geometry	Sliding viewpoint demonstrates perspective.
14	Shadow Architecture	Trigonometry, similar triangles	Light creates shadows; height calculated from angle.
15	Solar Building	Angles, trigonometry	Adjustable panels demonstrate optimum angle.
16	Tensegrity Structure	Geometry, balance, symmetry	Floating-looking structure held by tension.
17	Geometric Pattern Generator	Tessellation, symmetry, transformations	Rotating tiles create repeating patterns.
18	Vault & Dome Generator	Circles, arcs, 3D geometry	Interchangeable roof sections show different shapes.
19	Minimum Material Building	Optimization, surface area & volume	Compare structures using different material amounts.
20	Smart Mathematical City	Geometry, coordinates, optimization	Working city with roads, buildings, shortest routes and zoning.

Recommended Exhibition Structure

Zone 1 – Shape & Symmetry: Geodesic dome, Golden ratio, Fibonacci spiral, tessellation and geometric patterns.

Zone 2 – Strength & Stability: Truss bridge, arch tester, dome load distribution, tensegrity and earthquake-resistant building.

Zone 3 – Mathematics in Construction: 3D coordinates, perspective, spiral staircase, shadow calculations and optimization.

Zone 4 – Future Architecture: Solar building, rotating tower, smart city, shortest-path roads and sustainable structures.

Suggested Main Exhibition Title: “MATHEMATICS OF ARCHITECTURE: From Ancient Structures to Smart Cities”