What Is Computational Design?

Worksheet

Computational design is the use of algorithms and parametric software (like Grasshopper, Dynamo or Python scripts) to generate and optimize building geometry, structure and performance based on defined rules and data inputs.

Questions

1. What best defines computational design in architecture?

A) Hand-drawing floor plans
B) Using algorithms and parametric rules to generate and evaluate design options
C) Only using CAD software to draft walls
D) Choosing furniture from a catalog

2. If a design has 4 parameters with 3 options each, how many total variants exist?

A) 12
B) 64
C) 81
D) 243

3. Which tool is a visual scripting plugin for Rhino used in parametric design?

A) AutoCAD
B) Grasshopper
C) Photoshop
D) SketchUp

4. What is the main advantage of generative design over traditional manual design?

A) It removes the need for any human decision
B) It can rapidly generate and evaluate many more options than a person could draw by hand
C) It only works for interior design
D) It eliminates the need for simulation

5. A facade panel has 3 parameters (angle, size, material) each with 4 possible options. How many total variants can the algorithm generate?

6. A generative floor-plan tool tests 5 parameters with 2 options each (binary choices). How many layouts are possible?

7. An optimization script narrows 1,000 generated tower massing options down to the top 2% by daylight performance. How many options remain?

8. Define: What is computational design?

9. Define: What is parametric design?

10. Define: Name two common computational design tools.

Answer Key

1. B) Using algorithms and parametric rules to generate and evaluate design options - Computational design relies on algorithms/parametric logic to generate and test many design solutions, not manual drafting alone.

2. C) 81 - V = o^p = 3^4 = 81 variants.

3. B) Grasshopper - Grasshopper is Rhino's node-based visual scripting tool for parametric/generative design.

4. B) It can rapidly generate and evaluate many more options than a person could draw by hand - Generative design's core advantage is speed/scale - automatically producing and testing many options against performance criteria.

5. V = o^p V = 4^3 V = 64 possible facade variants

6. V = o^p V = 2^5 V = 32 possible layouts

7. Remaining = 1000 0.02 Remaining = 20 top-performing massing options

8. Using algorithms and parametric rules to generate, test, and optimize architectural designs instead of drawing one option manually.

9. A subset of computational design where geometry is driven by adjustable parameters (variables) linked by rules.

10. Grasshopper (Rhino) and Dynamo (Revit) - visual scripting plugins used for parametric and generative design.