What is Climate-Responsive Design?

Worksheet

Climate-responsive design means adapting a building's orientation, massing, materials and openings to the specific sun, wind, temperature and humidity conditions of its location, so the building itself does much of the work of staying comfortable.

Questions

1. Which strategy suits a hot-arid climate best?

A) Thin, lightweight walls
B) Thick, high-mass walls with small shaded openings
C) Large unshaded glass walls
D) Dark, heat-absorbing roofs

2. In a cold climate, glazing should be concentrated on which facade (northern hemisphere)?

A) North
B) East only
C) South
D) West only

3. Why is cross-ventilation prioritized in hot-humid climates?

A) It blocks all sunlight
B) Thermal mass can't dissipate heat when nights stay warm
C) It increases humidity
D) It reduces daylight

4. A compact building form with less exposed surface area mainly helps in which climate?

A) Hot-humid
B) Cold
C) Hot-arid
D) Temperate only

5. A house is being designed in a hot-arid desert climate. Recommend two climate-responsive strategies.

6. A house is being designed in a cold northern climate with harsh winters. Recommend two strategies.

7. A building in a hot-humid tropical climate needs passive cooling. What strategy fits best?

8. Define: What is climate-responsive design?

9. Define: Best wall strategy for hot-arid climates?

10. Define: Best glazing strategy for cold climates?

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Answer Key

1. B) Thick, high-mass walls with small shaded openings - High thermal mass delays desert heat swings; small shaded openings limit solar gain.

2. C) South - South-facing glazing captures the most winter sun for passive heat gain.

3. B) Thermal mass can't dissipate heat when nights stay warm - Continuous airflow removes heat and moisture when nighttime cooling by mass isn't effective.

4. B) Cold - Less surface area means less heat loss to cold outside air, saving heating energy.

5. Strategy 1: use thick, high-thermal-mass walls (adobe/rammed earth) to delay peak heat by hours Strategy 2: keep window openings small and shaded, oriented away from low western sun

6. Strategy 1: design a compact, low-surface-area form to reduce heat loss Strategy 2: place most glazing on the south facade to capture winter solar gain, minimize north glazing

7. Humid heat cannot be delayed by mass (nights stay warm) prioritize cross-ventilation Use raised floors, large shaded openings, and light, low-mass materials to let heat escape continuously

8. Shaping a building's form, materials and orientation to work with the local climate rather than against it.

9. Thick, high-mass walls that delay and dampen daytime heat before it reaches the interior.

10. Maximize south-facing glazing for solar heat gain; minimize north-facing glazing to cut heat loss.

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