What are Residential Design Strategies?

Worksheet

Residential design strategies are the approaches - such as passive solar orientation, natural ventilation, efficient floor plans and material choices - that architects use to make homes comfortable, energy-efficient and functional for their occupants.

Questions

1. What is passive solar design?

A) Using solar panels only
B) Orienting and shading a building to use natural sun and light
C) Painting walls white
D) Installing air conditioning

2. What does cross-ventilation require?

A) Windows on opposite walls
B) A single large window
C) No windows at all
D) Mechanical fans only

3. Which is an example of an active design strategy?

A) South-facing orientation
B) A shading overhang
C) A smart thermostat with HVAC
D) Thermal mass walls

4. A 120 m house has 18 m of circulation space. What percentage of the plan is circulation?

A) 10%
B) 15%
C) 18%
D) 25%

5. A house in a hot climate has a 20 m south-facing wall. Adding a 0.6 m overhang blocks high summer sun but lets in low winter sun. If the sun angle in summer is 70 and in winter is 30, roughly how much shadow does this overhang cast in each season?

6. A 100 m house plan allocates 15% to circulation (hallways). How much usable living area remains?

7. A bedroom needs at least two openable windows for cross-ventilation, each contributing to a code-required 10% of floor area in glazing. If the room is 12 m, what is the minimum total window area?

8. Define: What is a residential design strategy?

9. Define: What is passive solar design?

10. Define: What is cross-ventilation?

Answer Key

1. B) Orienting and shading a building to use natural sun and light - Passive solar design relies on orientation and shading, not mechanical equipment.

2. A) Windows on opposite walls - Cross-ventilation needs openings on opposite sides of a room so air can flow through.

3. C) A smart thermostat with HVAC - Active strategies rely on mechanical/electronic systems, unlike passive orientation or shading.

4. B) 15% - 18 120 = 0.15 = 15%.

5. Shadow depth = overhang length tan(sun angle) Summer: 0.6 tan(70) 0.6 2.75 0.22 m - the overhang blocks the high summer sun from hitting most of the wall Winter: 0.6 tan(30) 0.6 0.58 1.04 m - the low winter sun reaches much further into the wall, warming the house The same overhang blocks summer heat while allowing winter warmth.

6. Circulation area = 100 0.15 = 15 m Usable area = 100 15 = 85 m An efficient plan keeps circulation loss low, maximizing livable space.

7. Minimum window area = floor area 0.10 12 0.10 = 1.2 m At least 1.2 m of openable window area is required for adequate natural ventilation.

8. An approach architects use to make homes comfortable, efficient and functional - such as orientation, ventilation or flexible layouts.

9. Orienting and shading a building to use the sun's heat and light naturally, reducing the need for mechanical heating and cooling.

10. Placing windows on opposite walls so breezes flow through a room, cooling it naturally.