What is Structural Grid Planning?

Worksheet

Structural grid planning is the design of a repeating column-and-beam layout, defined by a bay spacing, that transfers gravity and lateral loads safely while allowing flexible, economical floor plans.

Questions

1. A building is 60 m long with a 6 m bay spacing. How many bays are there?

A) 6
B) 10
C) 12
D) 60

2. What does 'bay spacing' describe?

A) The height of a floor
B) The distance between adjacent columns
C) The thickness of a wall
D) The number of floors

3. Why might a designer choose a wider structural grid?

A) To use less material everywhere
B) To reduce open floor space
C) To create column-free open space
D) To add more columns

4. If a building is 100 m long and needs 20 m bays for its structural system, how many columns line up along that grid line?

A) 4
B) 5
C) 6
D) 20

5. A steel-framed warehouse is 72 m long. The engineer recommends a 9 m bay spacing for the portal frames. How many bays and columns run along that line?

6. An open-plan office needs column-free spans of 8 m across a 48 m wide floor plate. How many bays does the grid create?

7. A parking garage uses the common 8.4 m x 8.4 m grid (car length + drive aisle). For a garage 100.8 m long, how many bays are there?

8. Define: What is a structural grid?

9. Define: What is bay spacing?

10. Define: Why does grid spacing matter for cost?

Answer Key

1. B) 10 - n = L / S = 60 / 6 = 10 bays.

2. B) The distance between adjacent columns - Bay spacing is the column-to-column distance along a grid line.

3. C) To create column-free open space - Wider bays mean fewer columns, giving more flexible, column-free floor area - at the cost of larger beams.

4. C) 6 - n = 100/20 = 5 bays, so columns = n + 1 = 6.

5. n = L / S = 72 / 9 = 8 bays Columns = n + 1 = 8 + 1 = 9 columns

6. S = 8 m (given span requirement) n = L / S = 48 / 8 = 6 bays

7. n = L / S = 100.8 / 8.4 = 12 bays

8. A repeating pattern of gridlines, usually labeled with letters and numbers, marking where columns sit in a building.

9. The distance between two adjacent columns along a grid line, typically 6-12 m in commercial buildings.

10. Wider bays need deeper beams and more steel or concrete; tighter bays cost less per span but add columns that block open space.