# Mensuration Formulas

## 2D Shapes (Plane Figures)

| Shape | Formula |
|---|---|
| Square | Perimeter = `4a`, Area = `a²`, Diagonal = `√2 a` |
| Rectangle | Perimeter = `2(l+b)`, Area = `l × b`, Diagonal = `√(l²+b²)` |
| Triangle | Perimeter = `a+b+c`, Area = `½ × base × height`, Heron's Formula = `√[s(s−a)(s−b)(s−c)]`, s=(a+b+c)/2 |
| Equilateral Triangle | Perimeter = `3a`, Area = `(√3/4)a²`, Height = `√3/2 a` |
| Parallelogram | Perimeter = `2(a+b)`, Area = `base × height` |
| Rhombus | Perimeter = `4a`, Area = `½(d₁ × d₂)` |
| Trapezium | Perimeter = sum of sides, Area = `½(a+b)h` |
| Circle | Circumference = `2πr`, Area = `πr²`, Diameter = `2r` |
| Ellipse | Area = `πab` (a=semi-major, b=semi-minor) |

## 3D Shapes (Solid Figures)

| Shape | Formula |
|---|---|
| Cube | LSA = `4a²`, TSA = `6a²`, Volume = `a³`, Diagonal = `√3 a` |
| Cuboid | LSA = `2h(l+b)`, TSA = `2(lb+bh+hl)`, Volume = `l × b × h`, Diagonal = `√(l²+b²+h²)` |
| Sphere | Surface Area = `4πr²`, Volume = `4/3 πr³` |
| Hemisphere | CSA = `2πr²`, TSA = `3πr²`, Volume = `2/3 πr³` |
| Cylinder | CSA = `2πrh`, TSA = `2πr(h+r)`, Volume = `πr²h` |
| Cone | Slant height = `√(r²+h²)`, CSA = `πrl`, TSA = `πr(l+r)`, Volume = `1/3 πr²h` |
| Frustum of Cone | Slant height = `√(h²+(r₁−r₂)²)`, CSA = `πl(r₁+r₂)`, TSA = `πl(r₁+r₂)+π(r₁²+r₂²)`, Volume = `1/3 πh(r₁²+r₂²+r₁r₂)` |
| Pyramid (Square Base) | TSA = `a² + 2al`, Volume = `1/3 a²h` |