Mensuration

~ Quantitative Aptitude · SSC Exams ~

← green boxes = formulas · navy boxes = worked sums!

Mensuration = measuring shapes. 2D figures → **area** & **perimeter**. 3D solids → **surface area** & **volume**.

Perimeter → length of the boundary (units).

CSA / LSA → curved / lateral surface.

Volume → space filled ($unit^3$).

Area → region enclosed ($unit^2$).

TSA → total surface ($unit^2$).

Take π = 22/7 or 3.14.

① Square & Rectangle

SQUARE — side = a

- Area = a^2 ex: a=6 → area = 36
- Perimeter = $4a$ ex: a=6 → 4×6 = 24
- Diagonal = $a\sqrt{2}$ ex: a=6 → $6\sqrt{2} \approx 8.49$

RECTANGLE — length l, breadth b

- Area = $l \times b$ ex: 8×6 = 48
- Perimeter = $2(l + b)$ ex: 2(8+6) = 28
- Diagonal = $\sqrt{(l^2 + b^2)}$ ex: $\sqrt{(64+36)} = \sqrt{100} = 10$

Worked example — rectangular field 40 m × 30 m

Area = 40 × 30 = **1200 m^2**.

Perimeter = 2(40 + 30) = **140 m**.

Diagonal = $\sqrt{(40^2+30^2)} = \sqrt{2500}$ = **50 m**.

Fencing cost at ₹25/m = 140 × 25 = **₹3500**. ✅

② Triangle – Area & Heron

- Area = ½ × **base** × **height** ex: $b=10$, $h=6 \rightarrow ½×10×6 = 30$
- **Right triangle** Area = ½ × **base** × **perpendicular** ex: legs 6, 8 → $½×6×8 = 24$
- Hypotenuse = $\sqrt{(base^2+perp^2)}$ ex: $\sqrt{(36+64)} = 10$

HERON'S FORMULA – sides a, b, c

- Semi-perimeter $s = (a + b + c) / 2$
- Area = $\sqrt{(s(s-a)(s-b)(s-c))}$

ex: sides 3, 4, 5 → $s=6$, area=$\sqrt{(6·3·2·1)}=\sqrt{36} = 6$

Worked example – triangle with sides 13, 14, 15

Step 1 — $s = (13+14+15) / 2 = 42 / 2 = \mathbf{21}$.

Step 2 — Area = $\sqrt{(21·(21-13)·(21-14)·(21-15))} = \sqrt{(21·8·7·6)}$.

Step 3 — = $\sqrt{7056}$ = **84 unit²**.

Height on base 14 → $½×14×h = 84 \therefore h =$ **12**. ✅

💡 Use Heron only when the **height is unknown**. If you know base & height, plain ½bh is faster.

Special triangle facts

- **Isosceles** (equal sides a, base b): Area = $(b/4)\sqrt{(4a^2-b^2)}$.
- Common Pythagorean triples: **(3,4,5) (5,12,13) (8,15,17) (7,24,25)**.
- Area = ½ × d_1 × d_2 when the two known sides meet at 90°.

Mini – isosceles, equal sides 10, base 12

Area = $(12/4)\sqrt{(4·100-144)} = 3\sqrt{256} = 3×16 =$ **48 unit²**.

③ Equilateral Triangle

Side = a (all sides & angles equal)

- Area = $(\sqrt{3}/4)\,a^2$ ex: a=4 → $(\sqrt{3}/4)\times 16 = 4\sqrt{3} \approx 6.93$
- Height = $(\sqrt{3}/2)\,a$ ex: a=4 → $2\sqrt{3} \approx 3.46$
- Perimeter = $3a$ ex: a=4 → 12

Worked example — equilateral side 6

Area = $(\sqrt{3}/4)\times 6^2 = (\sqrt{3}/4)\times 36 =$ **$9\sqrt{3} \approx 15.59$**.
Height = $(\sqrt{3}/2)\times 6 =$ **$3\sqrt{3} \approx 5.20$**.
Perimeter = $3\times 6 =$ **18**. ✅

④ Parallelogram

- Area = **base × height** ex: base=12, h=5 → 60
- Perimeter = $2(a + b)$, a, b = adjacent sides ex: $2(12+8) = 40$
- Area (diagonals d_1, d_2, angle θ) = $\frac{1}{2}\, d_1\, d_2 \sin\theta$

Worked example — base 15, height 8

Area = base × height = $15 \times 8 =$ **120 unit^2**.
If adjacent side = 10 → **Perimeter** = $2(15+10) =$ **50**.
Note: the height is the ⊥ distance between the two parallel bases, not the slant side. ✅

✓ A diagonal splits a parallelogram into **two equal triangles** ∴ each triangle = ½ × area of the parallelogram.

⑤ Rhombus

Diagonals d_1, d_2 (they bisect at 90°)

- Area = $\frac{1}{2} \times d_1 \times d_2$ ex: $16 \times 12 \to \frac{1}{2} \times 16 \times 12 = 96$
- Side = $\sqrt{(d_1/2)^2 + (d_2/2)^2}$ ex: $\sqrt{8^2+6^2} = 10$
- Perimeter = **4 × side**   ex: $4 \times 10 = 40$

Worked example — rhombus, diagonals 24 & 10

Area = $\frac{1}{2} \times 24 \times 10$ = **120 unit²**.

Side = $\sqrt{12^2+5^2} = \sqrt{169}$ = **13**.

Perimeter = 4×13 = **52**. ✅

⑥ Trapezium

- Area = **½ × (sum of parallel sides) × height**

  $= \frac{1}{2} \times (a + b) \times h$ ex: $a=10$, $b=14$, $h=6 \to \frac{1}{2} \times 24 \times 6 = 72$
- Height (h) = the ⊥ gap between the two parallel sides.

Worked example — parallel sides 20 & 12, height 8

Area = $\frac{1}{2} \times (20+12) \times 8 = \frac{1}{2} \times 32 \times 8$ = **128 unit²**.

Reverse → if area 128 & sides 20, 12 known, then $h = 2 \times 128 / 32$ = **8**. ✅

*Memory hook → trapezium area = **average of parallel sides × height**. Only **two** sides are parallel (else it is a parallelogram).*

⑦ Circle & Semicircle

CIRCLE — radius r (diameter = 2r)

- Area = πr^2 ex: r=7 → (22/7)×49 = 154
- Circumference = $2\pi r$ ex: r=7 → 2×(22/7)×7 = 44

SEMICIRCLE — half a circle

- Area = ½ πr^2 ex: r=7 → ½×154 = 77
- Perimeter = $\pi r + 2r$ ex: r=7 → 22 + 14 = 36

(perimeter = curved arc πr plus the straight diameter 2r)

Worked example — circle of radius 14 cm (π = 22/7)

Area = (22/7)×14^2 = (22/7)×196 = **616 cm²**.

Circumference = 2×(22/7)×14 = **88 cm**.

Diameter = 2×14 = **28 cm**.

Semicircle area = ½×616 = **308 cm²**. ✅

✓ Pick **r = a multiple of 7** and **π** = 22/7 — the 7's cancel and the answer comes out clean. Exam-setters love r = 7, 14, 21.

Handy circle relations

- Area in terms of diameter: $\pi d^2/4$. · Area in terms of circumference C: $C^2/4\pi$.
- If radius ×2 → area ×4 (area scales with r^2).

⑧ Sector of a Circle

Angle θ (degrees), radius r

- Area = $(\theta/360°) \times \pi r^2$ ex: θ=90°, r=14 → ¼×616 = 154
- Arc length = $(\theta/360°) \times 2\pi r$ ex: θ=90°, r=14 → ¼×88 = 22
- Perimeter of sector = **arc + 2r** ex: 22 + 28 = 50

Worked example — θ = 60°, r = 21 cm

Area = $(60/360)\times(22/7)\times21^2 = \frac{1}{6}\times(22/7)\times441 = \frac{1}{6}\times1386 =$ **231 cm²**.

Arc = $(60/360)\times2\times(22/7)\times21 = \frac{1}{6}\times132 =$ **22 cm**. ✅

⑨ Ring / Annulus

Outer radius R, inner radius r

- Area of ring = $\pi(R^2 - r^2) = \pi(R+r)(R-r)$

ex: R=14, r=7 → (22/7)(196−49) = (22/7)×147 = 462

Worked example — circular track, R = 21 m, r = 14 m

Area of path = $(22/7)(21^2-14^2) = (22/7)(441-196) = (22/7)\times245 =$ **770 m²**.

Width of the path = R − r = 21 − 14 = 7 m. ✅

*A path/border **around** a circle is a ring. A path **inside** a rectangle → big rectangle area − inner rectangle area.*

2D Formula Recap — at a glance

Shape	Area	Perimeter / other
Square	a^2	$4a$ · diag = $a\sqrt{2}$
Rectangle	$l \times b$	$2(l+b)$ · diag = $\sqrt{(l^2+b^2)}$
Triangle	½ × b × h	Heron $\sqrt{(s(s-a)(s-b)(s-c))}$
Equilateral	$(\sqrt{3}/4)\ a^2$	$3a$ · height = $(\sqrt{3}/2)\ a$
Parallelogram	base × height	$2(a+b)$
Rhombus	½ $d_1\ d_2$	4 × side · side = $\sqrt{((d_1/2)^2+(d_2/2)^2)}$
Trapezium	½$(a+b) \times h$	sum of all 4 sides
Circle	πr^2	$2\pi r$
Semicircle	½ πr^2	$\pi r + 2r$
Sector	$(\theta/360°)\ \pi r^2$	arc = $(\theta/360°)\ 2\pi r$
Ring	$\pi(R^2 - r^2)$	outer $2\pi R$, inner $2\pi r$

Mixed worked — a square & a circle have equal perimeters

Square side = 11 → perimeter = 44. Circle circumference = 44 = $2\pi r$ → $2\times(22/7)\times r = 44$ ∴ r = **7**.

Areas: square = 11^2 = **121**; circle = $(22/7)\times 49$ = **154**. ∴ the **circle encloses more area** for the same boundary. ✅

Mixed worked — path around a garden

A rectangular garden 20 m × 14 m has a 2 m wide path **outside** it. Outer size = 24 × 18 = 432 m^2; garden = 280 m^2.

Area of path = 432 − 280 = **152 m^2**. ✅

✓ Golden 2D rule ⟶ area is always in **square** units; if lengths double, area becomes **4×** (scales as the square of the ratio).

PART B — 3D SOLIDS. Now shapes have depth: measure **Volume** (space filled, $unit^3$) and **Surface Area** — CSA/LSA (curved / lateral) and **TSA** (total).

⑩ Cube

Edge = a

- Volume = $\mathbf{a^3}$ ex: a=5 → 125 · Diagonal = $\mathbf{a\sqrt{3}}$ ex: $5\sqrt{3} \approx 8.66$
- TSA = $\mathbf{6a^2}$ ex: 6×25 = 150 · LSA = $\mathbf{4a^2}$ ex: 4×25 = 100

Worked — cube of edge 6 cm

Volume = 6^3 = **216 cm^3** · TSA = 6×36 = **216 cm^2** · LSA = 4×36 = **144** · diagonal = $6\sqrt{3} \approx$ **10.39 cm.** ✅

⑪ Cuboid

Length l, breadth b, height h

- Volume = **l × b × h** ex: 5×4×3 = 60
- TSA = **2(lb + bh + hl)** ex: 2(20+12+15) = 94
- LSA = **2h(l + b)** ex: 2×3×9 = 54 · Diagonal = $\mathbf{\sqrt{l^2+b^2+h^2}}$

Worked — room 6 m × 5 m × 4 m

Volume = 6×5×4 = **120 m^3** · TSA = 2(30+20+24) = **148 m^2** · LSA (4 walls) = 2×4×11 = **88 m^2** · diagonal = $\sqrt{(36+25+16)} = \sqrt{77} \approx$ **8.77 m.** ✅

A cube is a cuboid with l = b = h. To **paint 4 walls** use LSA; to include floor+ceiling use TSA.

⑫ Cylinder 

Radius r, height h

- Volume = $\pi r^2 h$ ex: r=7, h=10 → (22/7)×49×10 = 1540
- CSA = $2\pi rh$ ex: 2×(22/7)×7×10 = 440
- TSA = $2\pi r(r + h)$ ex: 2×(22/7)×7×17 = 748
- Hollow (pipe) volume = $\pi h(R^2 - r^2)$ R outer, r inner

Worked example — cylinder r = 7 cm, h = 20 cm

Volume = $(22/7)\times7^2\times20 = (22/7)\times49\times20 =$ **$3080\ cm^3$**.

CSA = $2\times(22/7)\times7\times20 =$ **$880\ cm^2$**.

TSA = $2\times(22/7)\times7\times(7+20) = 44\times27 =$ **$1188\ cm^2$**. ✅

Hollow pipe — R = 5 cm, r = 3 cm, length 14 cm

Volume of metal = $\pi h(R^2 - r^2) = (22/7)\times14\times(25-9) = 44\times16 =$ **$704\ cm^3$**. ✅

✓ TSA = CSA + **two circular ends** ($2\pi r^2$). An open tank/tin (no lid) has area = CSA + **one** base = $2\pi rh + \pi r^2$.

Quick check

r=14, h=5 → V = (22/7)·196·5 = **3080**

r=3.5, h=10 → V = (22/7)·12.25·10 = **385**

r=7, h=1 → CSA = 2·22 = **44**

1 L water fills how tall in r=7 tin? **≈6.5 cm**

⑬ Cone

Radius r, height h, slant l

- Slant $l = \sqrt{(r^2 + h^2)}$ ex: $r=5$, $h=12 \to \sqrt{169} = 13$
- Volume $= 1/3\ \pi r^2 h$ $= 1/3$ of a cylinder of same r, h
- CSA $= \pi r l$ · TSA $= \pi r(r + l)$ = CSA + base πr^2

Worked example — cone $r = 7$ cm, $h = 24$ cm

Slant $l = \sqrt{(7^2+24^2)} = \sqrt{(49+576)} = \sqrt{625} =$ **25 cm**.

Volume $= 1/3 \times (22/7) \times 49 \times 24 = 1/3 \times 22 \times 7 \times 24 =$ **1232 cm³**.

CSA $= (22/7) \times 7 \times 25 =$ **550 cm²**.

TSA $= (22/7) \times 7 \times (7+25) = 22 \times 32 =$ **704 cm²**.

l, r, h form a right triangle $\to l^2 = r^2 + h^2$. Watch out: CSA uses **slant l**, volume uses **vertical height h** — never mix them.

Cone vs Cylinder — same r & h

- Volume of cone = **1/3** × volume of cylinder (same base & height).
- ∴ **3 cones** of ice fill exactly **1 cylinder** of the same r and h.
- Ex: cylinder V = 1848 → matching cone V = 1848/3 = **616**.

Mini — find h from volume

Cone volume 462 cm³, $r = 7 \to 1/3 \times (22/7) \times 49 \times h = 462 \to (154/3)h = 462$ ∴ $h =$ **9 cm**.

⑭ Sphere

Radius r

- Volume = $\mathbf{4/3\ \pi r^3}$ ex: $r=7 \rightarrow (4/3)\times(22/7)\times343 \approx 1437.3$
- Surface area = $\mathbf{4\pi r^2}$ ex: $r=7 \rightarrow 4\times(22/7)\times49 = 616$

⑮ Hemisphere

Radius r (half a sphere)

- Volume = $\mathbf{2/3\ \pi r^3}$ ex: $r=7 \rightarrow (2/3)\times(22/7)\times343 \approx 718.7$
- CSA (curved) = $\mathbf{2\pi r^2}$ ex: $r=7 \rightarrow 2\times154 = 308$
- TSA = $\mathbf{3\pi r^2}$ ex: $r=7 \rightarrow 3\times154 = 462$ (curved + flat circle)

Worked example – sphere of radius 21 cm

Surface area = $4\times(22/7)\times21^2 = 4\times(22/7)\times441 = 4\times1386 =$ **5544 cm²**.

Volume = $4/3\times(22/7)\times21^3 = 4/3\times(22/7)\times9261 = 4/3\times29106 =$ **38808 cm³**. ✅

Worked example – hemispherical bowl, r = 7 cm

CSA = $2\times(22/7)\times49 =$ **308 cm²** · **TSA** = $3\times154 =$ **462 cm²**.

Capacity = $2/3\times(22/7)\times343 =$ **718.67 cm³** ≈ 0.72 litre. ✅

Sphere surface = $\mathbf{4\pi r^2}$ = exactly **4 great circles**. Hemisphere TSA has a $\mathbf{+\pi r^2}$ for the flat top, so it is $3\pi r^2$, not $2\pi r^2$.

⑯ Frustum of a Cone

A frustum = a cone with its top sliced off parallel to the base. Outer (bottom) radius **R**, top radius **r**, vertical height **h**.

- Volume = $\mathbf{1/3\ \pi h(R^2 + Rr + r^2)}$
- Slant l = $\mathbf{\sqrt{(h^2 + (R - r)^2)}}$
- CSA = $\mathbf{\pi(R + r)\ l}$ · TSA = CSA + $\mathbf{\pi R^2 + \pi r^2}$ (both ends)

Worked example — bucket, R = 6, r = 3, h = 4 (cm)

R^2+Rr+r^2 = 36 + 18 + 9 = 63.

Volume = 1/3×(22/7)×4×63 = 1/3×(22/7)×252 = 1/3×792 = **264 cm^3**.

Slant l = $\sqrt{(4^2+(6-3)^2)}$ = $\sqrt{(16+9)}$ = $\sqrt{25}$ = **5 cm**.

CSA = (22/7)×(6+3)×5 = (22/7)×45 = **≈ 141.4 cm^2**. ✅

✓ Everyday frustums ⟶ a **bucket**, a **drinking glass**, a **lampshade**. If r = 0 the frustum becomes a full cone; if R = r it becomes a cylinder.

Second worked — capacity in litres

A bucket has R = 21 cm, r = 7 cm, h = 24 cm. R^2+Rr+r^2 = 441 + 147 + 49 = 637.

Volume = 1/3×(22/7)×24×637 = 1/3×(22/7)×15288 = 1/3×48048 = **16016 cm^3**.

∴ capacity = 16016 ÷ 1000 = **16.016 litres**. ✅

For CSA/TSA of a frustum use **slant l**; for volume use **vertical h**. The two differ whenever R ≠ r.

⑰ Prism

Uniform cross-section, length h

- Volume = **(base area) × height**
- LSA = **(base perimeter) × height** · TSA = LSA + **2 × base area**

Worked — triangular prism, base 6-8-10, length 15

Base area = ½×6×8 = 24 → Volume = 24×15 = **360**. Base perimeter = 6+8+10 = 24 → LSA = 24×15 = **360**; TSA = 360 + 2×24 = **408**. ✅

⑱ Pyramid

Base area B, height h, slant height l

- Volume = **1/3 × (base area) × height**
- LSA = **½ × (base perimeter) × slant height** · TSA = LSA + base area

Worked — square pyramid, base side 10, height 12

Slant L = $\sqrt{(h^2+(side/2)^2)}$ = $\sqrt{(12^2+5^2)}$ = $\sqrt{169}$ = 13. Volume = 1/3×10^2×12 = **400**; LSA = ½×40×13 = **260**; TSA = 260 + 100 = **360**. ✅

3D Formula Recap

Solid	Volume	CSA / LSA	TSA
Cube	a^3	$4a^2$	$6a^2$
Cuboid	l b h	2h(l+b)	2(lb+bh+hl)
Cylinder	$\pi r^2 h$	$2\pi rh$	$2\pi r(r+h)$
Cone	1/3 $\pi r^2 h$	πrl	$\pi r(r+l)$
Sphere	4/3 πr^3	—	$4\pi r^2$
Hemisphere	2/3 πr^3	$2\pi r^2$	$3\pi r^2$
Frustum	1/3 $\pi h(R^2+Rr+r^2)$	$\pi(R+r)l$	CSA+$\pi R^2+\pi r^2$

Recasting, Melting & Units

Key facts to lock in

- Melting / recasting keeps **VOLUME constant** → equate the two volumes.
- **1 m^3 = 1000 litres** · **1 litre = 1000 cm^3** · 1 m = 100 cm.
- **Painting / plastering** cost uses **surface area**; filling / capacity uses **volume**.

Worked 1 — sphere melted into a cylinder

Sphere r = 6 cm is melted & recast into a cylinder of base radius 4 cm. Find its height.

Equate volumes → $4/3\ \pi(6)^3 = \pi(4)^2 h$ → $4/3 \times 216 = 16h$ → $288 = 16h$ ∴ $h =$ **18 cm**. ✅

Worked 2 — cone recast into a sphere

Metallic cone r = 6, h = 24 is melted into a single sphere. Find the sphere's radius.

Cone $V = 1/3\pi(36)(24) = 288\pi$. Sphere $4/3\pi R^3 = 288\pi$ → $R^3 = 216$ ∴ $R =$ **6 cm**. ✅

Worked 3 — small cubes into one big cube

Three metal cubes of edges 3, 4, 5 cm are melted into one cube. Edge = ?

Total volume = 27 + 64 + 125 = 216 → edge = $\sqrt[3]{216}$ = **6 cm**. New TSA = 6×6^2 = **216 cm^2**.
✅

Worked 4 — tank capacity & painting cost

A tank 2 m × 1.5 m × 1 m: capacity = 3 m^3 = **3000 litres**.

Paint its 4 walls: LSA = $2 \times 1 \times (2+1.5) = 7\ m^2$; at ₹40/$m^2$ → cost = **₹280**. ✅

In every recasting sum the **π cancels** — so never plug in 22/7; just equate volumes and solve for the unknown.

Solved Examples — exam style

Q1 — area of an equilateral triangle of side 12 cm

Area = $(\sqrt{3}/4)\times 12^2$ = $(\sqrt{3}/4)\times 144$ = $36\sqrt{3}$ = **$36\sqrt{3} \approx 62.35$ cm^2**. ✅

Q2 — a wire is bent into a square of side 11, then reshaped into a circle

Wire length = 4×11 = 44 = circumference = $2\pi r$ → $2\times(22/7)\times r$ = 44 ∴ r = **7**.

Circle area = $(22/7)\times 49$ = 154 > square area 121 → the **circle holds more area**. ✅

Q3 — largest sphere carved from a cube of edge 14 cm

Sphere diameter = cube edge = 14 → r = 7. Volume = $4/3\times(22/7)\times 343$ = **≈ 1437.3 cm^3**. ✅

Q4 — cylinder has CSA 880 cm^2 and height 20 cm; find its volume

CSA = $2\pi rh$ → $2\times(22/7)\times r\times 20$ = 880 → r = 7. Volume = $(22/7)\times 49\times 20$ = **3080 cm^3**. ✅

Q5 — ratio of volumes: cone : sphere : cylinder (same r, height = 2r)

Cone $1/3\pi r^2(2r)$ = $2/3\pi r^3$; sphere $4/3\pi r^3$; cylinder $\pi r^2(2r)$ = $2\pi r^3$.

Ratio = 2/3 : 4/3 : 2 = **1 : 2 : 3**. ✅

Q6 — longest rod that fits in a room 12 m × 9 m × 8 m

Longest rod = space diagonal = $\sqrt{12^2+9^2+8^2}$ = $\sqrt{144+81+64}$ = $\sqrt{289}$ = **17 m**. ✅

✓ *Remember the trio ratio **cone : sphere : cylinder = 1 : 2 : 3** (equal r, h = 2r) — a favourite one-line SSC question.*

Practice Set

1. Area of square, side 15 cm?
2. Diagonal of rectangle 9 × 12?
3. Heron area of triangle 7, 24, 25?
4. Area of equilateral, side 10?
5. Area of rhombus, diagonals 30, 16?
6. Trapezium sides 8, 12, height 5?
7. Area of circle, r = 21 cm?
8. Ring area, R = 10, r = 6?
9. Volume of cube, edge 9?
10. Diagonal of cuboid 3, 4, 12?
11. Volume of cylinder r=7, h=15?
12. TSA of cone r=7, l=25?
13. Surface area of sphere r=14?
14. TSA of hemisphere r=7?
15. Sphere r=3 melted → wire? V=?

Answer Key — with working

1→ 225 (15^2) · **2→ 15** ($\sqrt{81+144}$) · **3→ 84** (½×7×24, right ∠) · **4→ 25√3** (√3/4×100) · **5→ 240** (½×30×16) · **6→ 50** (½×20×5) · **7→ 1386** ((22/7)×441) · **8→ 64π≈201** (π(100−36)) · **9→ 729** (9^3) · **10→ 13** ($\sqrt{9+16+144}$) · **11→ 2310** ((22/7)×49×15) · **12→ 704** (π×7×32) · **13→ 2464** (4×(22/7)×196) · **14→ 462** (3×154) · **15→ 36π≈113.1** (4/3π×27).

Quick Revision

✓ Square a^2 · Rect l×b · Triangle ½bh / Heron · Equilateral $(\sqrt{3}/4)a^2$ · Rhombus $½d_1d_2$ · Trapezium ½(a+b)h · Circle πr^2.

✓ Cube a^3, $6a^2$ · Cuboid lbh, 2(lb+bh+hl) · Cylinder πr^2h, $2\pi rh$ · Cone $1/3\pi r^2h$, πrl · Sphere $4/3\pi r^3$, $4\pi r^2$.

✓ Recasting → equate volumes · 1 m^3 = 1000 L · paint → surface area · use π = 22/7.

☆ Area, surface, volume — formulas at your fingertips! ☆