Math Notes

Mensuration
PART 1 - Shapes, Volume and Surface area

List of 2D Shapes we will be covering
- Squares
- Rectangle
- Triangle
- Parallelogram
- Trapezium
- Rhombus

List of 3D Shapes we will be covering
- Prism
- Cylinder
- Cone
- Pyramid
- Sphere

Area is the amount of space inside a boundary of an object.

- Basic -
Square
- Length x Length
- All sides are of same length
- Right angle at every corner

Rectangle
- Length x Breadth
- Two pairs of sides of equal length
- Right angle at every corner

Area of a Triangle
- It is 1/2 the area of a corresponding square or rectangle of same perpendicular height and base
- Basically, Area of triangle = 1/2 x Base x Perpendicular height

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Area of Parallelogram
- Parallelograms have two pairs of parallel lines.
- Shifting a triangle from one side to another, you form a rectangle.
- With that in mind, Area of Parallelogram = Base x Perpendicular Height

Area of Rhombus
- Similar to a parallelogram, the area = Base x Perpendicular Height
- Area can also be (1/2) x Product of diagonals
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Area of Trapezium
- A trapezium consists of a rectangle and two triangles.
- With that in mind, the area would be the average length of the parallel lines multiplied by perpendicular height since the area of a triangle is 1/2(base)(perpendicular height)
- (1/2)(a+b)h

Prism
- Volume of prism is base area x height.
- Surface area is 2 x base area added to the sides.

Cylinder
- Volume = π x Radius^2 x Height
- Similar to the prism, it uses the same idea of base area x height, where (π x Radius^2) is the base area.
- Curved Surface Area = 2 x Radius x π x Height where (2 x Radius x π) is the circumference.
- Total surface area then, will be (2 x π x Radius x Height) + 2(π x Radius ^2). Simplified : (2 x π x Radius)(Radius + Height)

Pyramid
- A solid where all vertices of its polygonal base are connected to a point(apex) above its base.
- Volume = (1/3) x base x height

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Cone
- A pyramid where the base is a circle.
- Volume of cone = (1/3) x (π x radius^2) x height where π x radius ^2 is the base.
- Curved surface area of the cone = π x radius x l where l is the slant height of the cone.

Sphere
- Any point from edge to middle is the radius
- Volume of sphere = (4/3) x π x radius^3
- Curved Surface Area = 4 x π x radius^2

2D Shape	Area
Square	L x L
Rectangle	L x B
Triangle	(1/2) x Base x H
Parallelogram	L x H
Trapezium	1/2(A+B)H
Rhombus	L x H

3D Shape	Volume	Surface Area
Prism	Base Area x Height	2(Base Area) + sides
Cylinder	$\pi(r^2)h$	$2\pi r(r+h)$
Cone	$(1/3)\pi(r^2)h$	$\pi r(r+l)$
Pyramid	(1/3)Base Area x Height	Base area + Sides
Sphere	$(4/3)\pi r^3$	$4\pi r^2$

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9. Mensuration
PART 2 - Unit Conversion

2 Ways of changing units
Method 1: Convert 3m^2 to cm^2

Step 1. Copy units
1m = 100cm
Step 2. Square
(1^2)m^2 = (100^2)cm^2
1m^2 = 10000cm^2
3m^2 = 30000cm^2

Method 2: Convert 25m/s to km/h
25m/1s = 0.025km/(1/3600)h = 90km/h

When asked questions that are not applicable:
Convert 5m^2 (Area) to m^2 (Volume)
Answer = No solution/ Not applicable