

**Solid Mensuration**

**SPHERE**

**I. Sphere**

**A. Definition**

**B. Parts**

- Spherical surface
- Radius
- Diameter

Section (Greater & Small circle)

**C. Terms**

- Axis of a circle
- Poles of the circle
- Tangent
- Point of Tangency
- Inscribed
- Circumscribed
- Spherical Angle

**D. Surface Area & Volume**

- Surface Area,  $S=4\pi R^2$
- Volume,  $V=(4/3) \pi R^3$

**Solid Mensuration**

**SPHERE**

Ex#1. p148 No. 2

Ex#2. p148 No. 4

Solid Mensuration

**SPHERE**

**II. Spherical Segment**

- 1. Definition**
- 2. Parts**
  - a. Bases
  - b. Altitude
- 3. Terms**
  - a. Segment of one base
  - b. Hemisphere
- 4. Volume**

$$V = \frac{\pi h^2}{3}(3R - h) = \frac{\pi h}{6}(3a^2 + h^2)$$

$$V = \frac{\pi h}{6}(3a^2 + 3b^2 + h^2)$$

Solid Mensuration

**SPHERE**

Ex#3. p148 No. 10

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**III. Zone**

- 1. Definition**
- 2. Parts**
  1. Base
  2. Altitude
- 3. Area of a Zone,  $Z = 2\pi Rh$**
- 4. Surface Area**
  1. one-base TSA =  $Z + 2\pi Rh + \pi r^2$
  2. two-base TSA =  $Z + 2\pi Rh + \pi a^2 + \pi b^2$

Solid Mensuration

**SPHERE**

Ex#4. p148 No. 12

**Solid Mensuration**

**SPHERE**

**IV. Spherical Sector & Cone**

**1. Definition**

- Spherical Sector
- Spherical Cone

**3. Surface Area & Volume**

Surface Area  
 $S = 2\pi Rh + \pi rR = \pi R(2h + r)$

Volume  
 $V = (1/3)ZR = (2/3)\pi R^2 h$

open spherical sector

spherical cone

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**V. Spherical Polygons**

**1. Definition**

**2. Parts**

- Sides
- Vertices
- Interior Angles

Length (sides) – linear/degree

2 Theorems

**Solid Mensuration**

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**VI. Spherical Triangle**

**1. Definition**

**2. Types**

- Right Spherical  
Napier's Rule (SIN-TAAD/SIN-COOP)
- Oblique Spherical

**3. Area**

$$A = \frac{\pi R^2 E}{180}$$

$$E = (A + B + C) - 180$$

**Solid Mensuration**

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Ex#5. p148 No. 22

Ex#6. p148 No. 28

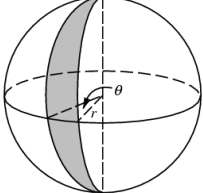
Ex#7. p148 No. 31

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**VII. Spherical Lune**

1. **Definition**  
Angle of a lune
2. **Surface Area**,  $S=2r^2\theta$



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Solid Mensuration

**SPHERE**

Ex#8. p148 No. 17

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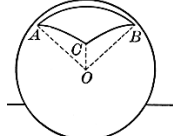
Solid Mensuration

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**VIII. Spherical Pyramid**

1. **Spherical Pyramid**
  - a. Definition
  - b. Volume  $V = \frac{\pi}{540} R^3 E$
2. **Spherical Wedge**
  - a. Definition
  - b. Volume
$$V = \frac{2}{3} R^3 \theta$$

$$V = \frac{\pi}{270} R^3 \phi$$



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**IX. Inscribed Solids Involving Spheres**

1.  $V_{sphere} = \frac{2}{3} V_{cylinder}$
- $$A_{sphere} = (LSA)_{cylinder} = \frac{2}{3} (TSA)_{cylinder}$$
2.  $V_{cone} = \frac{1}{3} V_{cylinder} = \frac{1}{2} V_{sphere}$
3.  $V_{sphere} = \frac{1}{2} V_{cube}$

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