SOLID MENSURATION

Mathematics

Instructor:
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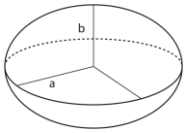
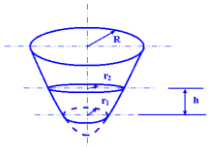
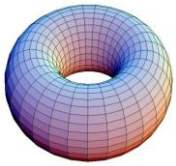
Chapter 12- Miscellaneous Solids







MISCELLANEOUS SOLIDS

I. Ellipsoid

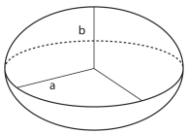
A. Definition

B. Parts

a. Semi-major, a

b. Semi-minor, b

If a=b: spheroid = sphere



C. Volume $V_{ellipsoid} = \frac{4}{3}\pi abc$

$$V_{spheroid} = \frac{4}{3}\pi a^2 c = \frac{4}{3}\pi b^2 c$$

D. Rotation

a. Minor Axis → oblate spheroid (earth)

b. Major Axis → Prolate Spheroid (watermelon)

E. Semi-ellipsoid – half of ellipsoid $V_{semi-ellipsoid} = \frac{2}{3}\pi r^2 h$

MISCELLANEOUS SOLIDS

Ex#1. p158 No.1

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MISCELLANEOUS SOLIDS

II. Paraboloid

A. Definition

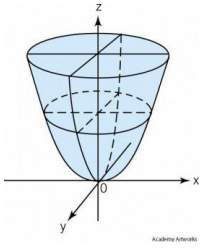
B. Types

a. One-base

$$V_{one-base} = \frac{1}{2}\pi r^2 h$$

b. Two-base

$$V_{two-base} = \frac{1}{2}\pi h(r_1^2 + r_2^2)$$



Ex#2. p158 No.3

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MISCELLANEOUS SOLIDS

III. Torus

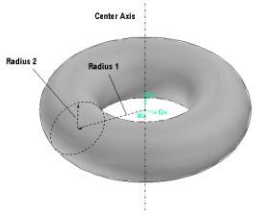
A. Definition

B. Volume

$$V_{torus} = 2\pi^2 r^2 R$$

C. Area

$$A_{torus} = 4\pi^2 rR$$



Ex#3. p159 No.4

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MISCELLANEOUS SOLIDS

IV. Pappus-Guldinus Theorem

A. Volume & Surface Area of a Solid of Revolution

Center of gravity – centroid

B. Pappus-Guldinus Theorems

A. Theorem I

$$A = 2\pi \sum LC$$

B. Theorem II

$$V = 2\pi \sum AC$$

Ex#4. p159 No.7

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MISCELLANEOUS SOLIDS

V. Composite Solids

$$V_T = V_1 + V_2 + V_3 + \ldots + V_n = \sum_{i=1}^{n} V_n$$

Ex#5. p160 No.12