

✓4. Find the volume generated by revolving about OY the area bounded by the coördinate axes and the parabola $x^{\frac{1}{2}} + y^{\frac{1}{2}} = a^{\frac{1}{2}}$.

✓5. Find the volume generated by revolving about the x -axis the area bounded by the catenary $y = \frac{a}{2} \left(e^{\frac{x}{a}} + e^{-\frac{x}{a}} \right)$, the x -axis and the lines $x = \pm a$.

✓6. Find the volume generated by revolving one arch of the sine curve $y = \sin x$ about OX .

7. A cone has its vertex on the surface of a sphere and its axis coincides with a diameter of the sphere. Find the common volume.

8. Find the volume generated by revolving about the y -axis, the part of the parabola $y^2 = 4ax$ cut off by the line $x = a$.

9. Find the volume generated by revolving about $x = a$ the part of the parabola $y^2 = 4ax$ cut off by the line $x = a$.

10. Find the volume generated by revolving about $y = -2a$ the part of the parabola $y^2 = 4ax$ cut off by the line $x = a$.

* 11. Find the volume generated by revolving one arch of the cycloid

$$x = a(\phi - \sin \phi), \quad y = a(1 - \cos \phi)$$

about the x -axis.

✓12. Find the volume generated by revolving the curve

$$x = a \cos^3 \phi, \quad y = a \sin^3 \phi$$

about the y -axis.

✓13. Find the volume generated by revolving the cardioid $r = a(1 + \cos \theta)$ about the initial line.

14. Find the volume generated by revolving the cardioid $r = a(1 + \cos \theta)$ about the line $x = -\frac{a}{4}$.

15. Find the volume generated by revolving the ellipse

$$x^2 + xy + y^2 = 3$$

about the x -axis.

16. Find the volume generated by revolving about the line $y = x$ the part of the parabola $x^{\frac{1}{2}} + y^{\frac{1}{2}} = a^{\frac{1}{2}}$ cut off by the line $x + y = a$.

29. Volume of a Solid with Given Area of Section. — Divide the solid into slices by parallel planes. Let X be the area of section at distance x from a fixed point. The plate $PQRS$ with lateral surface perpendicular to PQR has the volume

$$PQR \cdot \Delta x = X \Delta x.$$