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APPLICATIONS OF THE DEFINITE INTEGRAL

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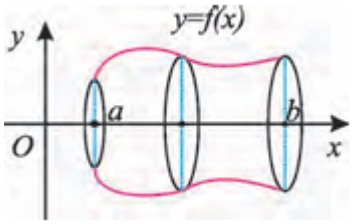
Annotation*: This article studies the calculation of the volume of solids of revolution using the integral.*

Keywords*: integral, curved trapezoid, surface of a sphere.*

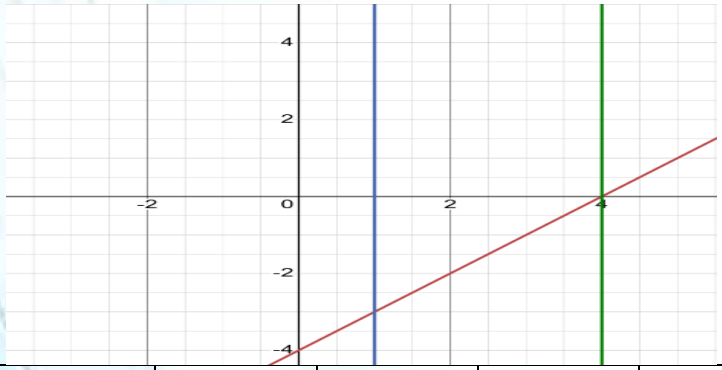


The volume of the solid formed by rotating a curved trapezoid around the Ox axis.

It can be proved that $V = \pi \int_a^b f^2(x)dx$ is calculated by the formula. From this formula, by choosing f(x), the volumes of a truncated cone, cone, cylinder, sphere, and sphere segment can be easily found.

Example 1: Calculate the volume of the solid bounded by the straight line $y = x - 4$ *and the points* $a = 1;\ b = 4$.

We can graph the straight line y=x-4:



X	0	1	2	3	4
y	-4	-3	-2	-1	0

We can graph the function using points The graph of the function y=x-4 intersects the Ox axis at the point x=4 and we can also plot the points a=1; b=4.

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The volume of the resulting object formed as a result of rotating the resulting function around the Ox axis is calculated. The resulting object forms a cone, the volume of the cone is found by the following formula.

$$V = \pi \int_a^b f^2(x)dx$$

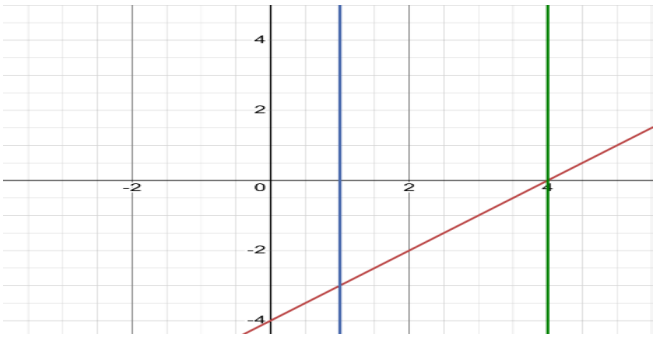
$$V = \pi \int_1^4 (x-4)^2 dx$$

$$= \pi \int_1^4 (x^2 - 8x + 16)dx$$

$$= \pi \left(\int_1^4 x^2 dx - 8 \int_1^4 x dx + 16 \int_1^4 dx \right)$$

$$= \pi \left(\frac{x^3}{3} - 4x^2 + 16x \right) \Big|_1^4 = \pi \big((21) - 4(16-1) + 16(4-1) \big)$$

$$= \pi(21 - 60 + 48) = 9\pi$$



Example 2: Calculate the volume of the solid bounded by the straight line y=x-4 and the points a=1; b=4.

If we calculate geometrically, we calculate it using the formula for finding the volume of a cone.

$$V = \frac{1}{3}\pi R^2 H$$

$$V = \frac{1}{3}\pi 3^2 \cdot 3 = 9\pi$$

In conclusion, we can use the algebraic or geometric method depending on the condition of the function.

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USED AND RECOMMENDED LITERATURE

1. Sh.A. Alimov and dr. Algebra and basic mathematical analysis, textbook for 10-11 classes. Uchebnik dlya bazovogo i profilnogo obrazovaniya.- M., "Prosveshchenie", 2016.

2. Mal Coad and others. Mathematics for international students. Mathematical Studies SL 2nd edition. Haese and Harris publications. 2010.

3. A.N. Kolmogorov and dr. Analysis of Algebra. Uchebnoe posobie dlya 10-11th graders.- M., "Prosveshchenie", 2018.

4. E. Saidamatov and dr. Algebra and basic mathematical analysis. chast 2, uchebnoe posobie.- T., "Ilm ziyo", 2016.

5. A.U. Abduhamidov and others. Basics of algebra and mathematical analysis, part 1. - T., "Teacher", 2012.

6. N.P. Filicheva. Leveling and system leveling: Educational and methodological posobie.- "Ryazan", 2009.

7. M.I. Israelov. Calculation methods.- Tashkent, "Teacher", 1988. 8. G.K. Muravin and dr. Analysis of Algebra. Textbook for 10th grade. M., "Drofa", 2006.

9. Algebra. Uchebnoe posobie dlya 9-10 klassov. Pod ed. N. Ya. Vilenkina. - M., "Prosveshchenie", 2004.

10. G.P. Bevz i dr., Algebra i nachala analiza. Textbook for 11th grade. Kyiv, 2011.