

16/16

### Activity 4.5: Volumes of solids of revolution

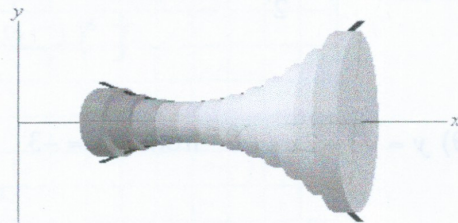
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Use <https://www.geogebra.org/student/mJ6zfMMCV> to visualize the formation of the volume

To find the volume use

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

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



Source: [http://tutorial.math.lamar.edu/Classes/Calcl/Area\\_Volume\\_Formulas.aspx](http://tutorial.math.lamar.edu/Classes/Calcl/Area_Volume_Formulas.aspx) Retrieved on July 4, 2016

Find the volume generated by revolving the given function around the x axis, between  $x = a$  and  $x = b$

1)  $y = \sqrt{2x-1}$  between  $x = \frac{1}{2}$  and  $x = 3$   $6.25\pi u^3$

2)  $f(x) = 3-x$  between  $x = 0$  and  $x = 3$   $9\pi u^3$

3)  $f(x) = 2e^x$  between  $x = 0$  and  $x = 1$   $12.71\pi u^3$

4)  $f(x) = \sqrt{(2x+1)^3}$  from  $x = 0$  until  $x = 2$   $78\pi u^3$

5)  $f(x) = 4\sin(4x)$  between  $x = 0$  and  $x = \frac{\pi}{4}$   $2\pi^2 u^3$

6)  $y = 6x$  between  $x = -2$  and  $x = 0$   $40\pi \text{ u}^3$

7)  $f(x) = x^3$  between  $x = 1$  and  $x = 2$   $18.14\pi \text{ u}^3$

8)  $f(x) = (1 + \frac{x}{2})^2$  between  $x = -1$  and  $x = 0$   $0.3875\pi \text{ u}^3$

9)  $y = \sqrt{3-2x}$  from  $x = -3$  until  $x = -1$   $14\pi \text{ u}^3$

10)  $y = \frac{1}{x}$  between  $x = 1$  and  $x = 3$   $\frac{2}{3}\pi \text{ u}^3$

11)  $y = \frac{3}{2}x$  between  $x = 0$  and  $x = 2$   $6\pi \text{ u}^3$

12)  $f(x) = \sqrt{x} + 1$  between  $x = 0$  and  $x = 4$   $\frac{68}{3}\pi \text{ u}^3$

13)  $f(x) = 1 - x^2$  from  $x = -1$  until  $x = 1$   $\frac{16}{15}\pi \text{ u}^3$

14)  $f(x) = \sqrt{7x-5}$  between  $x = \frac{5}{7}$  and  $x = 3$   $\frac{128}{9}\pi \text{ u}^3$

15)  $f(x) = \frac{4}{x}$  from  $x = 1$  until  $x = 4$   $12\pi \text{ u}^3$

16)  $y = \sqrt{16-x^2}$  and the x-axis  $x = -4$   $x = 4$   $\frac{256}{3}\pi \text{ u}^3$

$$1. \pi \int_0^3 (\sqrt{2x-1})^2 dx$$

$$\pi \int_0^3 2x-1 dx$$

$$\pi \int_0^3 x^2-x$$

$$\pi [(3^2-3) - (0.5^2-0.5)]$$

$$\underline{6.25\pi}$$

$$7. \pi \int_1^2 (x^3)^2$$

$$\pi \int_1^2 x^6$$

$$\pi \int_1^2 x^7/7$$

$$\pi [(2^7)/7 - (1^7)/7]$$

$$\underline{18.14\pi}$$

$$2. \pi \int_0^3 (3-x)^2 dx$$

$$-\pi \int_0^3 (3-x)^3$$

$$-\pi \int_0^3 (3-3)^3 - (3-0)^3$$

$$-\pi (-9)$$

$$\underline{9\pi}$$

$$8. \pi \int_0^1 [(1+\frac{x}{2})^2]^2$$

$$\pi \int_0^1 (1+\frac{x}{2})^4$$

$$2\pi \int_0^1 (1+\frac{x}{2})^5$$

$$2\pi [(1+\frac{0}{2})^5 - (1+\frac{1}{2})^5]$$

$$\underline{0.3875\pi}$$

$$3. \pi \int_0^1 (2e^x)^2 dx$$

$$\pi \int_0^1 (2e^x)^3/3$$

$$\pi [(2e^1)^3 - (2e^0)^3]$$

$$\underline{12\pi}$$

$$9. \pi \int_0^1 [\sqrt{3-2x}]^2$$

$$\pi \int_0^1 3-2x$$

$$\pi \int_0^1 3x-x^2$$

$$\pi [(3(-1) - (-1)^2) - (3(-5) - (-3)^2)]$$

$$\underline{14\pi}$$

$$4. \pi \int_0^2 [\sqrt{(2x+1)^3}]^2$$

$$\pi \int_0^2 (2x+1)^3$$

$$\frac{1}{2}\pi \int_0^2 (2x+1)^4/4$$

$$\frac{1}{2}\pi [(2(2)+1)^4 - (2(0)+1)^4]$$

$$\underline{78\pi}$$

$$10. \pi \int_0^3 [1/x]^2$$

$$\pi \int_0^3 1/x^2$$

$$\pi \int_0^3 -1/x$$

$$\pi [-1/3 - -1/1]$$

$$\underline{0.66\pi}$$

$$5. \pi \int_0^{\pi/4} [4\sin(x)]^2$$

$$\pi \int_0^{\pi/4} 8\sin^2(x)$$

$$\pi [8\sin^2(\pi/4) - 8\sin^2(0)]$$

$$\underline{4\pi/2\pi^2}$$

$$11. \pi \int_0^2 [\frac{3}{2}x]^2$$

$$\pi \int_0^2 \frac{9}{4}x^2$$

$$\pi \int_0^2 \frac{9}{2}x^3$$

$$\pi [\frac{9}{2}(2)^3 - \frac{9}{2}(0)^3]$$

$$\underline{6\pi}$$

$$6. \pi \int_0^2 (6x)^2 dx$$

$$\pi \int_0^2 36x^2$$

$$\pi \int_0^2 12x^3$$

$$\pi [(2(0)^3 - 12(-2)^3)]$$

$$\underline{96\pi}$$

$$12. \pi \int_0^4 [\sqrt{x}+1]^2$$

$$\pi \int_0^4 x + 2\sqrt{x} + 1$$

$$\pi \int_0^4 \frac{x^2}{2} + \frac{4}{3}x^{3/2} + x$$

$$\pi [(4)^2 + \frac{4}{3}(4)^{3/2} + (4) - (\frac{0}{2} + \frac{4}{3}(0)^{3/2} + (0))]$$

$$\underline{22.66\pi}$$

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6)  $y =$

$$13. \pi \int_{-1}^1 (1-x^2)^2 dx$$

$$\pi \int_{-1}^1 1 - 2x^2 + x^4 dx$$

$$\pi \left[ x - \frac{2}{3}x^3 + \frac{x^5}{5} \right]_{-1}^1$$

$$\pi \left[ (1) - \frac{2}{3}(1)^3 + \frac{(1)^5}{5} - (-1) - \frac{2}{3}(-1)^3 + \frac{(-1)^5}{5} \right]$$

7)  $f(x)$

$$\underline{1.066\pi}$$

8)  $f(x)$

$$14. \pi \int_{\frac{1}{2}}^3 (7x-5)^2 dx$$

$$\pi \int_{\frac{1}{2}}^3 7x - 5 dx$$

$$\pi \left[ \frac{7}{2}x^2 - 5x \right]_{\frac{1}{2}}^3$$

$$\pi \left[ \frac{7}{2}(3)^2 - 5(3) - \left( \frac{7}{2}(\frac{1}{2})^2 - 5(\frac{1}{2}) \right) \right]$$

$\underline{18.285\pi}$

9)  $y =$

$$15. \pi \int_1^4 \left( \frac{4}{x} \right)^2 dx$$

$$\pi \int_1^4 16/x^2 dx$$

$$\pi \int_1^4 -16/x dx$$

$$\pi \left[ -16/\ln x \right]_1^4$$

10)  $y$

$$\underline{12\pi}$$

11)  $y =$

$$16. \pi \int_0^4 (16-x^2)^2 dx$$

$$\pi \int_0^4 16 - x^2 dx$$

$$\pi \int_0^4 16x - x^3/3 dx$$

$$\pi \left[ 16(4) - (4)^3/3 - (16(0) - (0)^3/3) \right]$$

$\underline{85.33\pi}$

12)  $f(x)$

13)  $f(x)$

14)  $f(x)$

15)  $f(x)$

16)  $y = \sqrt{16-x^2}$  and the x-axis

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