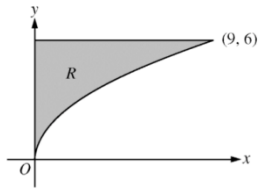
Volume using Cross Sections

2010 #4

Let R be the region in the first quadrant bounded by the graph of $y = 2\sqrt{x}$, the horizontal line y = 6, and the y-axis, as shown in the figure.

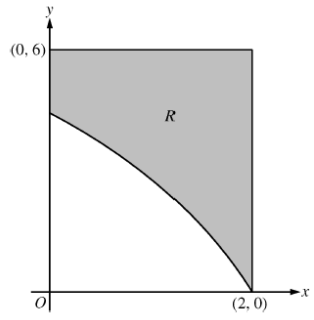


Region R is the base of a solid. For each y, where $0 \le y \le 6$, the cross section of the solid taken **perpendicular to the y-axis** is a rectangle whose height is 3 times the length of its base in region R. Write, but do not evaluate, an integral expression that gives the volume of the solid.

2010 Form B BC1

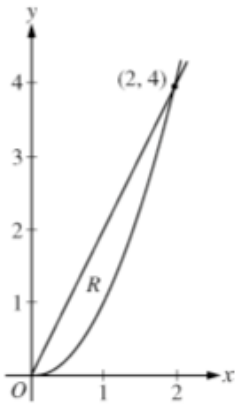
In the figure, R, is the shaded region in the first quadrant bounded by the graph y = 4ln(3– x), the horizontal line y = 6, and the vertical line x = 2.

c. The region R is the base of a solid. For this solid, each cross section **perpendicular to the x-axis** is a square. Find the volume of the solid.



2009 AB#4

Let R be the region in the first quadrant enclosed by the graphs of y = 2x and $y = x^2$, as shown in the figure.



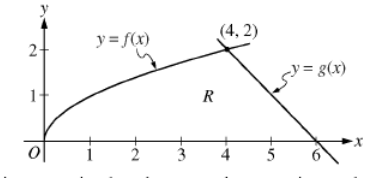
a. The region R is the base of a solid. For this solid, at each x the cross section **perpendicular to the x-axis** has area A(x) = $\sin\left(\frac{\pi}{2}x\right)$. Find the volume of the solid.

b. Another solid has the same base R. For this solid, the cross sections **perpendicular to the y-axis** are **squares**. Write, but do not evaluate, an integral expression for the volume of the solid.

2011 BC Form B

The functions f and g are given by $f(x) = \sqrt{x}$ and g(x) = 6 – x. Let R be the region bounded by the x-axis and the graphs of f and g, as shown in the figure above.

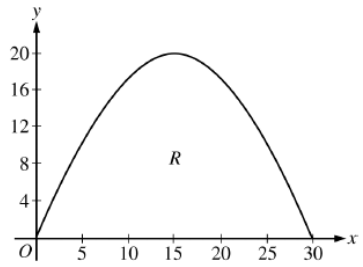
a) The region R is the base of a solid. For each y, where $0 \le y \le 2$, the cross section of the solid taken **perpendicular to the y-axis** is a **rectangle** whose base lies in R and whose height is 2y. Write, but do not evaluate, an integral expression that gives the volume of the solid.



2009 Form B BC1

A baker is creating a birthday cake. The base of the cake is the region R in the first quadrant under the graph of y = f(x) for $0 \le x \le 30$, where $f(x) = 20\sin\left(\frac{\pi x}{30}\right)$. Both x and y are measured in centimeters. The region R is shown in the figure above. The derivative of f is $f'(x) = \frac{2\pi}{3}\cos\left(\frac{\pi x}{30}\right)$.

a. The cake is a solid with base R. Cross sections of the cake **perpendicular to the x-axis** are **semicircles**. If the baker uses 0.05 gram of unsweetened chocolate for each cubic centimeter of cake, how many grams of unsweetened chocolate will be in the cake?

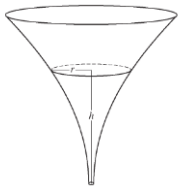


2007 BC 1

Let R be the region in the first and second quadrants bounded above the graph of $y = \frac{20}{1+x^2}$ and below by the horizontal line y = 2.

a. The region R is the base of the solid. For this solid, the cross sections **perpendicular to the x-axis** are **semi-circles**. Find the volume of this solid.

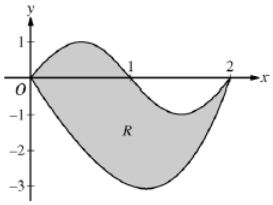
2016 BC 5



The inside of a funnel of height 10 inches has circular cross sections, as shown in the figure above. At height h, the radius of the funnel is given by $r = \frac{1}{20}\left(3 + h^2\right)$, where $0 \le h \le 10$. The units of r and h are in inches.

b) Find the volume of the funnel.

2008 BC1



Let R be the region bounded by the graphs of $y = \sin(\pi x)$ and $y = x^3 - 4x$, as shown in the figure.

b. The region R is the base of a solid. For this solid, each cross section **perpendicular to the x-axis** is a **square**. Find the volume of a solid.

89. The region bounded by the graph of $y = 2x - x^2$, and the x-axis is the base of a solid. For this solid, each cross section **perpendicular to the x-axis** is an **equilateral triangle**. What it the volume of the solid?

A) 1.333 B) 1.067 C) 0.577 D) 0.462 E) 0.267

87. Let R be the region in the first quadrant bounded above by the graph of $y = \ln(3 - x)$, for $0 \le x \le 2$, R is the base of a solid for which each cross section **perpendicular to the x-axis** is a **square**. What is the volume of the solid?

A) 0.442 B) 1.029 C) 1.296 D) 3.233 E) 4.071