Volume - Answer Key

1. Find the volume, where the base is the region bounded by $y = x$ and $y = \sqrt{x}$, and whose cross-sections perpendicular to the y-axis are squares.
$\dfrac{1}{30}$.

2. Find the volume, where the base is the region bounded by $y = x$ and $y = \sqrt{x}$, and whose cross-sections perpendicular to the y-axis are semi-circles.
$\dfrac{\pi}{240}$.

3. Find the volume of the solid whose base is the region bounded by $y = x$ and $y = \sqrt{x}$, and cross-sections perpendicular to the y-axis are equilateral triangles.
$\dfrac{\sqrt{3}}{120}$.

4. Write an integral expression for the volume of a pyramid with height 9 and square base with side 4.
$\displaystyle\int_0^9 \left(\dfrac{4h}{9}\right)^2 dh$.

5. Write an integral expression for the volume of a sphere with radius 5.
$\displaystyle\int_{-5}^5 \pi \left(25 - (5 - h)^2\right) dh$.

6. Find the volume of the solid whose base is the region bounded by $y = e^{-x}$, $y = 0.5$ and $x = 0$, and cross-sections perpendicular to the y-axis are circles.
$\frac{\pi}{4}\left(2 - \frac{1}{2}(\ln 2)^2 - \ln 2\right)$.

7. Find the volume of the solid whose base is the region bounded by $y = e^{-x}$, $y = 0.5$ and $x = 0$, and cross-sections perpendicular to the y-axis are squares.
$2 - \frac{1}{2}(\ln 2)^2 - \ln 2$.

8. Write an integral expression for the volume of a hemisphere with radius a.
$\pi \displaystyle\int_0^a \sqrt{a^2 - (a - x)^2}\,dx$.

9. Find the volume of the solid whose base is the region bounded by $y = e^{-x}$, $y = 0.5$ and $x = 0$, and cross-sections perpendicular to the y-axis are equilateral triangles.
$\frac{\sqrt{3}}{4}\left(2 - \frac{1}{2}(\ln 2)^2 - \ln 2\right)$.

10. Write an integral expression for the volume of a pyramid with height 10 and circular base with radius a.
$\displaystyle\int_0^{10} \pi \left(\dfrac{ah}{10}\right)^2 dh$.

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