Calculus Name_____ ID: 1

Volume with Cross Sections!

Date_____ Period____

For each problem, find the volume of the specified solid.

1) The base of a solid is the region enclosed by $y = 1$ and $y = x^2$. Cross-sections perpendicular to the y-axis are squares.

2) The base of a solid is the region enclosed by $y = -x^2 + 1$ and $y = 0$. Cross-sections perpendicular to the x-axis are squares.

3) The base of a solid is the region enclosed by $y = -x^2 + 1$ and $y = 0$. Cross-sections perpendicular to the x-axis are semicircles.

4) The base of a solid is the region enclosed by $y = 1$ and $y = \frac{x^2}{9}$. Cross-sections perpendicular to the y-axis are squares.

5) The base of a solid is the region enclosed by the semicircle $y = \sqrt{36 - x^2}$ and the x-axis. Cross-sections perpendicular to the x-axis are rectangles with heights half that of the side in the x y-plane.

6) The base of a solid is the region enclosed by the semicircle $y = \sqrt{25 - x^2}$ and the x-axis. Cross-sections perpendicular to the y-axis are squares.

7) The base of a solid is the region enclosed by the semicircle $y = \sqrt{36 - x^2}$ and the x-axis. Cross-sections perpendicular to the y-axis are semicircles.

8) The base of a solid is the region enclosed by $y = 1$ and $y = \frac{x^2}{4}$. Cross-sections perpendicular to the y-axis are equilateral triangles.

9) The base of a solid is the region enclosed by the semicircle $y = \sqrt{49 - x^2}$ and the x-axis. Cross-sections perpendicular to the y-axis are rectangles with heights twice that of the side in the xy-plane.

10) The base of a solid is the region enclosed by $y = 1$ and $y = \frac{x^2}{9}$. Cross-sections perpendicular to the x-axis are equilateral triangles.

11) The base of a solid is the region enclosed by $y = 1$ and $y = x^2$. Cross-sections perpendicular to the y-axis are equilateral triangles.

12) The base of a solid is the region enclosed by $y = -\frac{x^2}{9} + 1$ and $y = 0$. Cross-sections perpendicular to the y-axis are semicircles.

Answers to Volume with Cross Sections! (ID: 1)

1) $\int_{0}^{1} \left(\sqrt{y} + \sqrt{y}\right)^2 \, dy$

$= 2$

2) $\int_{-1}^{1} \left(-x^2 + 1\right)^2 \, dx$

$= \frac{16}{15} \approx 1.067$

3) $\frac{\pi}{8} \int_{-1}^{1} \left(-x^2 + 1\right)^2 \, dx$

$= \frac{2\pi}{15} \approx 0.419$

4) $\int_{0}^{1} \left(3\sqrt{y} + 3\sqrt{y}\right)^2 \, dy$

$= 18$

5) $\frac{1}{2} \int_{-6}^{6} \left(\sqrt{36 - x^2}\right)^2 \, dx$

$= 144$

6) $\int_{0}^{5} \left(\sqrt{25 - y^2} + \sqrt{25 - y^2}\right)^2 \, dy$

$= \frac{1000}{3} \approx 333.333$

7) $\frac{\pi}{8} \int_{0}^{6} \left(\sqrt{36 - y^2} + \sqrt{36 - y^2}\right)^2 \, dy$

$= 72\pi \approx 226.195$

8) $\frac{\sqrt{3}}{4} \int_{0}^{1} \left(2\sqrt{y} + 2\sqrt{y}\right)^2 \, dy$

$= 2\sqrt{3} \approx 3.464$

9) $2 \int_{0}^{7} \left(\sqrt{49 - y^2} + \sqrt{49 - y^2}\right)^2 \, dy$

$= \frac{5488}{3} \approx 1829.333$

10) $\frac{\sqrt{3}}{4} \int_{-3}^{3} \left(1 - \frac{x^2}{9}\right)^2 \, dx$

$= \frac{4\sqrt{3}}{5} \approx 1.386$

11) $\frac{\sqrt{3}}{4} \int_{0}^{1} \left(\sqrt{y} + \sqrt{y}\right)^2 \, dy$

$= \frac{\sqrt{3}}{2} \approx 0.866$

12) $\frac{\pi}{8} \int_{0}^{1} \left(\sqrt{9 - 9y} + \sqrt{9 - 9y}\right)^2 \, dy$

$= \frac{9\pi}{4} \approx 7.069$