

Calculus

Volume by Cross Sections



This packet contains 4 worksheets that students can use to practice finding the volume of solids that are made of cross-sections.

Answer Keys are provided.

Do you need more work with volume?

Check out these products:

1) Volume of Solids of Revolution Task Cards

<https://www.teacherspayteachers.com/Product/Calculus-Volume-of-Solids-of-Revolution-Task-Cards-1181354>

2) Volumes by Cross Sections Task Cards

<https://www.teacherspayteachers.com/Product/Calculus-Volume-by-Cross-Sections-Task-Cards-with-and-without-QR-Codes-1184680>

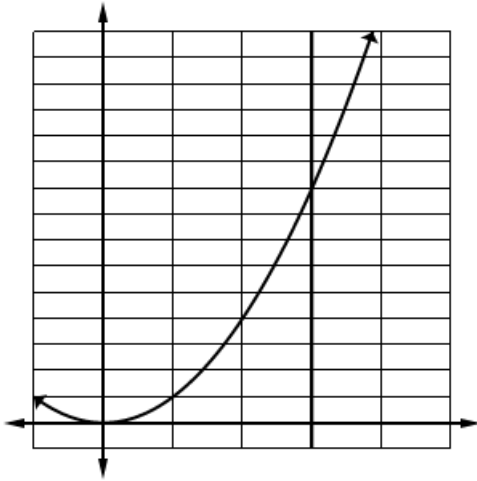
3) Volumes by Rotation and Cross Sections Puzzle

<https://www.teacherspayteachers.com/Product/Calculus-Volumes-of-3D-Solids-of-Rotation-and-Cross-Section-Puzzle-578890>

Calculus

Volume of a Solid by Cross Sections A

1. Consider the space bounded by $y = x^2$, the line $x = 3$, and the x-axis. Suppose a three dimensional solid is made by making cross sections **perpendicular to the x-axis**.



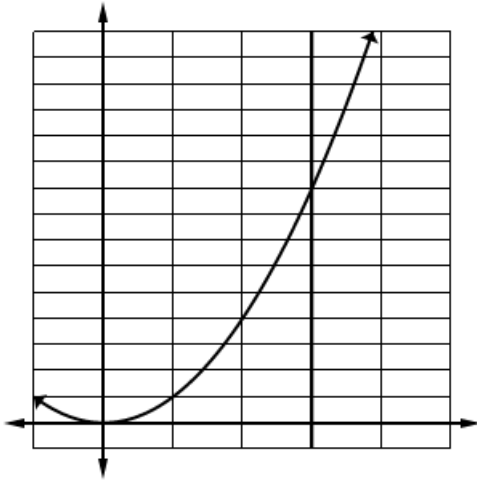
- A. What will the volume of the shape be if the cross sections are squares?

- B. What will the volume of the shape be if the cross sections are semi-circles?

- C. What will the volume of the shape be if the cross sections are equilateral triangles?

Calculus
Volume of a Solid by Cross Sections A
ANSWER KEY

1. Consider the space bounded by $y = x^2$, the line $x = 3$, and the x -axis. Suppose a three dimensional solid is made by making cross sections **perpendicular to the x -axis.**



- A. What will the volume of the shape be if the cross sections are squares?

$$\frac{243}{5}$$

- B. What will the volume of the shape be if the cross sections are semi-circles?

$$\frac{243\pi}{40}$$

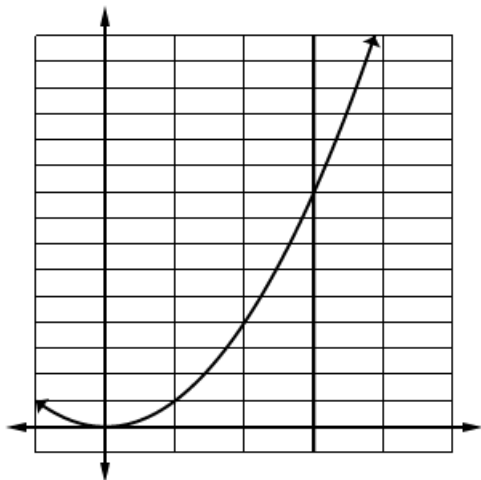
- C. What will the volume of the shape be if the cross sections are equilateral triangles?

$$\frac{243\sqrt{3}}{20}$$

Calculus

Volume of a Solid by Cross Sections B

1. Consider the space bounded by $y = x^2$, the line $x = 3$, and the x -axis. Suppose a three dimensional solid is made by making cross sections **perpendicular to the y -axis.**



- A. What will the volume of the shape be if the cross sections are squares?

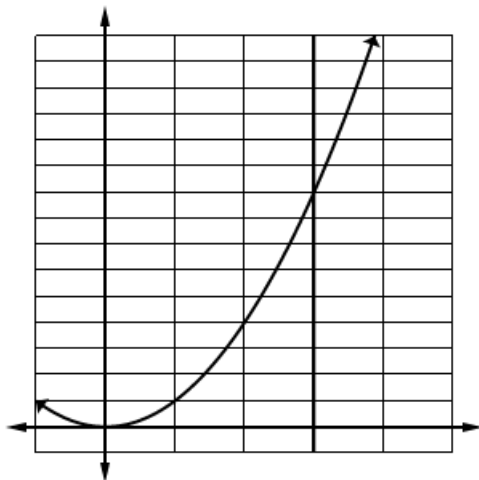
- B. What will the volume of the shape be if the cross sections are semi-circles?

- C. What will the volume of the shape be if the cross sections are isosceles right triangles (the leg of the right triangle stretches across the base of the shape)?

Calculus
Volume of a Solid by Cross Sections B

ANSWER KEY

1. Consider the space bounded by $y = x^2$, the line $x = 3$, and the x -axis. Suppose a three dimensional solid is made by making cross sections **perpendicular to the y -axis.**



- A. What will the volume of the shape be if the cross sections are squares?

$$\frac{27}{2}$$

- B. What will the volume of the shape be if the cross sections are semi-circles?

$$\frac{27\pi}{16}$$

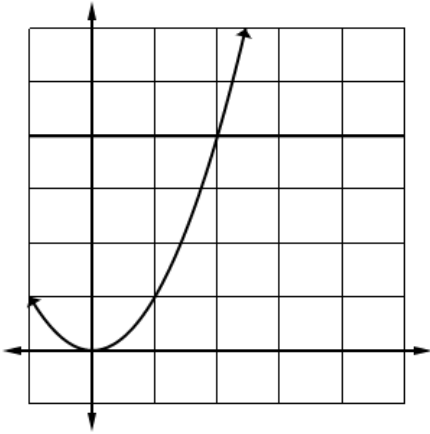
- C. What will the volume of the shape be if the cross sections are isosceles right triangles (the leg of the right triangle stretches across the base of the shape)?

$$\frac{27}{4}$$

Calculus

Volume of a Solid by Cross Sections C

1. Consider the space bounded by $y = x^2$, the line $y = 4$, and the y -axis. Suppose a three dimensional solid is made by making cross sections **perpendicular to the x -axis.**



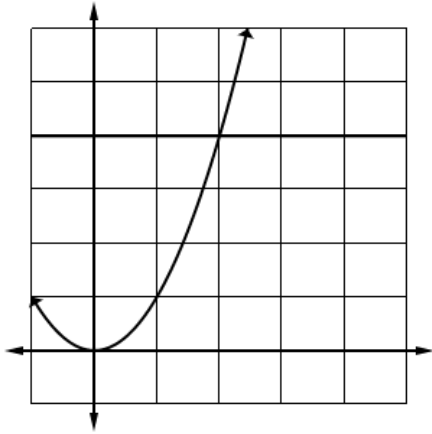
- A. What will the volume of the shape be if the cross sections are squares?

- B. What will the volume of the shape be if the cross sections are semi-circles?

- C. What will the volume of the shape be if the cross sections are equilateral triangles?

Calculus
Volume of a Solid by Cross Sections C
ANSWER KEY

1. Consider the space bounded by $y = x^2$, the line $y = 4$, and the y -axis. Suppose a three dimensional solid is made by making cross sections **perpendicular to the x -axis.**



- A. What will the volume of the shape be if the cross sections are squares?

$$\frac{256}{15}$$

- B. What will the volume of the shape be if the cross sections are semi-circles?

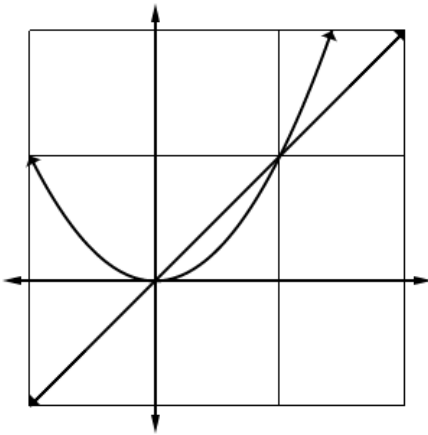
$$\frac{32\pi}{15}$$

- C. What will the volume of the shape be if the cross sections are equilateral triangles?

$$64\sqrt{3}$$

Calculus
Volume of a Solid by Cross Sections D

1. Consider the space bounded by $y = x^2$ and $y = x$ in the first quadrant. Suppose a three dimensional solid is made by making cross sections **perpendicular to the x-axis.**



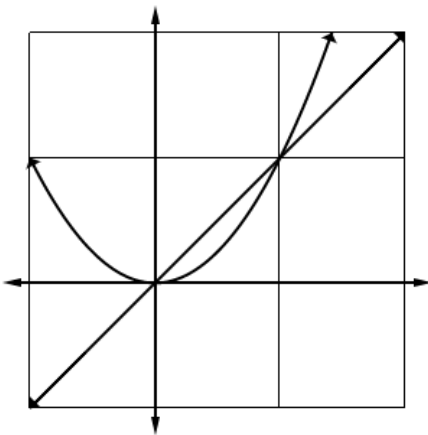
- A. What will the volume of the shape be if the cross sections are squares?

- B. What will the volume of the shape be if the cross sections are semi-circles?

- C. What will the volume of the shape be if the cross sections are equilateral triangles?

Calculus
Volume of a Solid by Cross Sections D
ANSWER KEY

1. Consider the space bounded by $y = x^2$ and $y = x$ in the first quadrant. Suppose a three dimensional solid is made by making cross sections **perpendicular to the x-axis.**



- A. What will the volume of the shape be if the cross sections are squares?

$$\frac{1}{30}$$

- B. What will the volume of the shape be if the cross sections are semi-circles?

$$\frac{\pi}{240}$$

- C. What will the volume of the shape be if the cross sections are equilateral triangles?

$$\frac{\sqrt{3}}{120}$$