

Watch. Practice. Understand. | Lesson 323

Calculus BC Surface Area with Revolution (Rogawski 8.1)

Watch the matching video: https://www.youtube.com/watch?v=_Bzqx0cE0L4

Practice focus: Surface area of revolution

Original extra practice matched to the listed lesson topic.

Name: _____ Date: _____ Show your reasoning and check units.

01 Rotate $y=x$ on $[0,2]$ about the x -axis. Find surface area (excluding any end disk).

02 Rotate $y=3$ on $[0,4]$ about the x -axis. Find lateral surface area.

03 Set up surface area for $y=\sqrt{x}$ on $[1,4]$ rotated about the x -axis.

04 What changes when a nonnegative $x=f(y)$ graph is rotated about the y -axis?

Worked answers | Lesson 323

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Practice focus: Surface area of revolution

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01 Rotate $y=x$ on $[0,2]$ about the x -axis. Find surface area (excluding any end disk).

$$S=2\pi \int y\sqrt{1+(y')^2} dx = 2\pi \int_0^2 x dx = 4\pi.$$

02 Rotate $y=3$ on $[0,4]$ about the x -axis. Find lateral surface area.

$$S=2\pi \int_0^4 3 dx = 24\pi, \text{ matching a radius-3, height-4 cylinder.}$$

03 Set up surface area for $y=\sqrt{x}$ on $[1,4]$ rotated about the x -axis.

$$S=2\pi \int_1^4 \sqrt{x} \sqrt{1+1/(4x)} dx.$$

04 What changes when a nonnegative $x=f(y)$ graph is rotated about the y -axis?

Use radius $x=f(y)$ and integrate $2\pi f(y)\sqrt{1+(f'(y))^2} dy$ over the y -interval.