Name _____ Date _____

Cavalieri's Principle - Guided Lesson Explanation

Explanation # 1

$$V = \int_a^b A(x)dx$$

$$V = \int_0^1 \Pi \sqrt[8]{x^5}dx$$

$$V = \Pi \int_0^1 x^{\frac{5}{8}}dx$$

$$V = \Pi \times \left. \frac{x^{\frac{5}{8}+1}}{\frac{5}{8}+1} \right|_0^1$$

$$V = \Pi \times \left. \frac{x^{\frac{13}{8}}}{\frac{13}{8}} \right|_0^1$$

$$V = \frac{8\Pi}{13}\left(1^{\frac{13}{8}} - 0^{\frac{13}{8}}\right)$$

So the volume of solid is, $V = \frac{8\Pi}{13}$

Explanation # 2

$$V = \int_a^b A(x)dx$$

$$V = \int_0^1 \sqrt[9]{x^2}dx$$

$$V = \int_0^1 x^{\frac{2}{9}}dx$$

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$$V = \left. \frac{x^{\frac{2}{9}+1}}{\frac{2}{9}+1} \right|_0^1$$

$$V = \frac{9}{11} x^{\frac{11}{9}} \Big|_0^1$$

$$V = \frac{9}{11}\left(1^{\frac{11}{9}} - 0^{\frac{11}{9}}\right)$$

So the volume of solid is, $V = \frac{9}{11}$

Explanation # 3

Step 1) First we have to see what is being asked.

"Calculate the volume of the cup."

Step 2)

$$V = \int_a^b A(x)dx$$

$$V = \int_0^1 \Pi \sqrt[11]{x^4}dx$$

$$V = \Pi \int_0^1 x^{\frac{4}{11}}dx$$

$$V = \Pi \times \left. \frac{x^{\frac{4}{11}+1}}{\frac{4}{11}+1} \right|_0^1$$

$$V = \Pi \times \left. \frac{x^{\frac{15}{11}}}{\frac{15}{11}} \right|_0^1$$

$$V = \frac{11\Pi}{15}\left(1^{\frac{15}{11}} - 0^{\frac{15}{11}}\right)$$

So the volume of solid is, $V = \frac{11\Pi}{15}$