



JETS Challenge 111

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Water to the Nation's Capital!

The residents of our nation's capital depend on a 143 year old brick lined pipe for their daily drinking water. The Washington Aquifer, completed by the Army Corps of Engineers in 1963, is a main drinking water source from the Potomac River that supplies DC residents with up to 1200 million liters of water per day through a brick lined circular tube that is 3m inside diameter. The inside surface dimensions of a brick are 90 cm by 20 cm and the aquifer is 20 km long.

The Challenge: How many bricks are required to complete the job?

$$\begin{aligned} \text{Brick A} &= (.2\text{m})(.90\text{m}) = 0.18\text{m}^2 \\ \text{Surface area of inside of aquifer is} &= \pi \cdot d \cdot \text{length} = \\ &= \pi \cdot (3\text{m}) \cdot (20,000\text{m}) = \\ &= 60,000 \pi \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \# \text{ bricks needed} &= \frac{60,000 \pi \text{ m}^2}{0.18 \text{ m}^2 / \text{brick}} \\ &= 1,047,197.5512 \end{aligned}$$

ANSWER:

1,047,198 bricks

JETS

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JETS Challenge problems are generously provided by Dave Meredith, Associate Professor, Penn State University-Fayette