

## The JETS Challenge

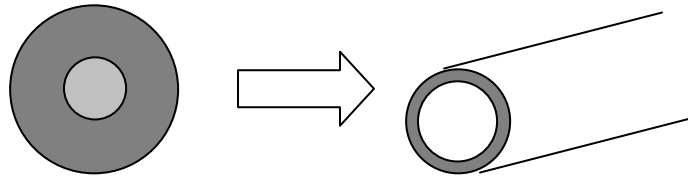
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### Challenge 102— The Jailhouse Rock Challenge

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**Problem:**

In 1877, Thomas A. Edison invented the phonograph. Sixty-five years later, in February 1942, the first gold album was awarded by RCA to Glenn Miller to celebrate 1,200,000 sales of “Chattanooga Choo Choo.” Fifty years ago, on September 24, 1957, “Jailhouse Rock” by Elvis Presley was released as a 45-rpm single and sold over 2 million copies. These 2.38 mm thick records were 175mm diameter disks made of polyvinyl chloride (PVC). The same material used today to make plastic drain pipe. Nominal two-inch (5.08 cm) outside diameter PVC pipe has a wall thickness of 4.166mm.



If all of the “Jailhouse Rock” copies could be melted and recycled into 2” PVC pipe, how many kilometers of pipe would be created?

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**Solution:**

**Disk (each)**

$$V = \pi r^2 h$$

$$= \pi \left( \frac{175}{2} \right)^2 2.38$$

$$V = 57,246 \text{ mm}^2 \text{ (each)}$$

× 2,000,000 copies

$$= 1.14492 \times 10^{11} \text{ mm}^3$$

**Pipe**

outside diameter = 5.08 cm

outside radius = 2.54 cm

$$= 25.4 \text{ mm}$$

inside radius = 25.4 - 4.166

$$= 21.234 \text{ mm}$$

**Cross Section**

$$\begin{aligned}A &= \pi r_o^2 - \pi r_1^2 \\ &= \pi(25.4)^2 - \pi(21.234)^2 \\ &= 610.34 \text{ mm}^2\end{aligned}$$

**So length of pipe, L is**

$$\begin{aligned}L &= \frac{1.14492 \times 10^{11} \text{ mm}^3}{610.34 \text{ mm}^2} \\ &= 187,587,246.5 \text{ mm} \\ &= 187.6 \text{ km}\end{aligned}$$