



JETS Challenge 121

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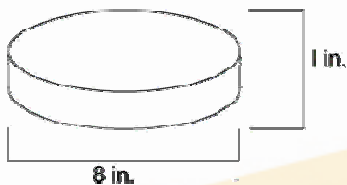


Salting the Roads

During the winter snow season, salt trucks spread ashes or salt (depending on the temperature) using dump trucks with tilt beds measuring $8 \times 10 \times 4$ feet. The material is dropped onto a rotating disk, which flings the materials across both lanes. The disk measures 1 inch high by 8 inches in diameter, with 6 flinging blades. As the truck cruises down the highway, each full disk spreads a measured quantity of material over the full width of a 9-foot length of highway. For a certain county, there are 590 miles of roads that must be treated during each snowstorm.

The Challenge: If all roads are treated, how many truckloads of material are required for each snowstorm?

each disk:



$$V = \pi r^2 \times h$$
$$= \pi \left(\frac{4}{12}\right)^2 \left(\frac{1}{2}\right) \text{ft}^3$$

$$V_{\text{disk}} = .029088820867 \text{ ft}^3$$

How many 9 foot lengths (disk fulls) in 580 miles = 3,062,400 feet

$$\# \text{ disk fulls} = \frac{3,062,400}{9} = 340,266.\bar{6}$$

$$\text{So, } (340,266.\bar{6}) \times (.029088820867 \text{ ft}^3)$$

$$= 9,897.95611368 \text{ ft}^3 \text{ of salt/ash needed}$$

Since there is $8 \times 10 \times 4 = 320 \text{ ft}^3$ per truckload, then

$$\# \text{ truck loads} = \frac{9,897.95611368}{320}$$

$$= 30.93 \text{ truck loads}$$

$$= 31 \text{ truck loads}$$

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