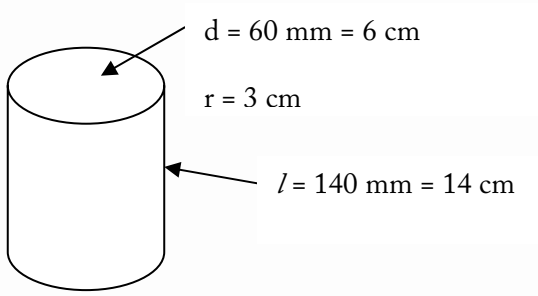
JETS Challenge 106

Recycle Just One Soup Can!

If you recycle just one soup can you can reduce the mass of metal added to a landfill. A soup can measures 60 mm in diameter by 140 mm high and is made of 0.5 mm thick metal with a density of 7.2 grams per cubic centimeter.

The Challenge: Including both ends, what is the mass of an empty can?



0.5 mm thick = 0.05 cm
Density = 7.2 grams/cm^3

volume (V) = area (A) · thickness (t) and mass (M) = density (d) · volume (V)

$A_{lid\ and\ bottom} = \pi r^2 + \pi r^2 = 2\pi r^2 = 2\pi(3\ cm)^2 = 18\ \pi cm^2$
$A_{side} = \pi dl = \pi(6cm)(14cm) = 84\pi cm^2$
$A_{total} = 18\ \pi cm^2 + 84\ \pi cm^2 = 102\ \pi cm^2$

$V = A \cdot t = (102\ \pi cm^2)\ (0.05\ cm) = 5.1\ \pi cm^3$

$M = d \cdot V = (7.2\ g/cm^3)(5.1\ \pi cm^3) = 115$ grams

ANSWER: 115 grams

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