

FUN WITH FUNDAMENTALS

Coin of the ream

Problem 180 — Where there's a will, there's a weigh, as this month's problem by Knute Hancock of Kinnelon, N.J., demonstrates.

Paparazzi, tabloid magazine reporters, and hordes of curious spectators all jostled each other for a view inside the offices of Luhpohl, Fuddle, and Dodge, Attorneys at Law. Their client, the famous old multimillionaire recluse, Thaddeus

Wadd IV, had died of mysterious causes earlier in the week, and two people had a vested interest in the testamentary depositions.

Inside the offices, Wadd's former business partner, who had just been released from prison, and his 21-year-old wife of one month craned forward eagerly. Luhpohl cleared his throat and began to read the last will and testament.

Wadd had converted his property into Krugerrands — gold coins that weigh 1

troy oz — and divided the coins evenly into two large bags. Into another bag he had put an equal number of fake gold coins that weighed 1.1 troy oz each. The bags were labeled #1, #2, and #3.

Under terms of the will, Maurice Flote would choose two bags for himself and Lulu "Gold" Digha Wadd would get the remaining bag. Wadd had also ordered that a direct-reading scale (not a balance-type), accurate to 0.1 oz, be in the room. The scale could be used only once. How can Flote determine which bag has the fake coins, and thus run *no* risk of choosing it?

Write a brief paragraph stating how and send it to:

Fun With Fundamentals
POWER TRANSMISSION DESIGN
1100 Superior Ave.
Cleveland, OH 44114-2543

Deadline is March 10. Good luck!

*Technical consultant, Jack Couillard,
Menasha, Wis.*



See ad on page A122 in the 1995 PTD Handbook.

Solution to last month's problem 179

— Your cup doesn't runneth over, if you answered **2 hr, 26 min.** Here's how Augustus Pfizz's speech was all wet.

First compute the volume of the inside of the cup. The height is given as 7 ft, and the equation for the slope of the sides is given as:

$$x = \sqrt[3]{y}$$

The equation is continuous on [1, 8], and so we can compute the volume by revolving the region bounded by $f(y) = x^3$ around the y axis. By definition of a solid of revolution, the equation for volume becomes:

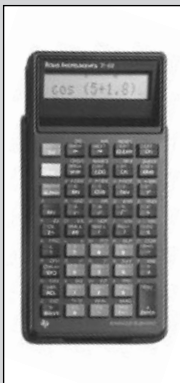
$$V = \int_1^8 \pi \left(\sqrt[3]{y} \right)^2 dy$$

Integrating and solving for y :

$$\begin{aligned} \int_1^8 \pi \left(y^{\frac{1}{3}} \right)^2 dy &= \left[\frac{3}{5} \pi y^{\frac{5}{3}} \right]_1^8 \\ &= 58.4 \text{ ft}^3 \times \frac{1 \text{ gal}}{0.1337 \text{ ft}^3} \\ &= 437 \text{ gal} \end{aligned}$$

437 gal ÷ 3 gpm is approximately 146 min, or 2 hr, 26 min.

Scrubbers at the d'Poo will be working lots of overtime.

**Contest winner**

— Congratulations to Charles Eumurian of Arden Hills, Minn., who won our November contest by having his name drawn from the 92 contestants who answered anywhere from 560 to 582 gal out of a total of 123 for that month. A TI-68 calculator is

in the mail to him.

The TI-68 Advanced Scientific Calculator by Texas Instruments can solve five simultaneous equations with real and complex coefficients and has 40 number functions that can be used in both the rectangular and polar coordinate systems. Other functions include formula programming, integration, and polynomial root finding. The calculator also features a last-equation replay function that lets you double-check your work.

To enter the contest, send your answer on a postcard or letter to POWER TRANSMISSION DESIGN, 1100 Superior Ave., Cleveland, OH 44114-2543.

You can also receive a TI-68 and credit in the magazine if you send in an *original* problem with solution, and we publish it.