Problem of the Month

Largest Sphere

April 2010

Three spheres of radius $\sqrt{3}$ are glued together and placed on a table. A sphere of radius $2\sqrt{3}$ is stacked on top. Find the radius of the largest sphere that can be placed in the hollow spot between the four spheres?

SUBMIT your solution to

- Dr. Erol Akbas @ matexa@langate.gsu.edu **or**
- Dr. Yuanhui Xiao @ matyxx@langate.gsu.edu

before the **deadline**: **Friday, April 30, 2010, 5:00PM**.

You may get a copy of this problem from **the wall behind you**.

Problem of Last Month: Averaging Digits

How many *four-digit numbers are composed of four distinct digits (no leading 0s), such that* **one digit is the average of the other three***? Examples of such numbers: 3621 (3 is the average of 6, 2 and 1), 5210 (2 is the average of 5, 1 and 0).*

Winner: Brendon Benshoof.

Solution. For four distinct digits, the possible quadruples ("**a** bcd" means $a = (b+c+d)/3$) are:

- **3** 126
- **4** 129; **4** 138; **4** 237; **4** 156
- **5** 168; **5** 249; **5** 267; **5** 348
- **6** 189; **6** 279; **6** 378; **6** 459
- **7** 489
- **2** 015
- **3** 018; **3** 027; **3** 045
- **4** 039; **4** 057
- **5** 069; **5** 078

Each of the quadruples that does not include 0 has 24 (= 4!) possible arrangements.

Each of the triples that does include 0 has only 18 ($= 3 \times 3 \times 2 \times 1$) possible arrangements since 0 can not be the leading digit.

Thus, the total number of such 4-digit numbers is $14 \times 24 + 8 \times 18 = 480$.