



PROBLEM SECTION

Dr. Burgstahler submitted the following problem:

Without using a hand calculator or a computer, decide which is larger--the cube root of 60 or  $2 \times$  the cube root of 7.

THE FIVE PLATONIC SOLIDS

A polyhedron is said to be regular if its faces are congruent regular polygons and its polyhedral angles are all congruent. While there are regular polygons of all orders, it is surprising that there are only five different regular polyhedra. The regular polyhedra are named according to the number of faces each has. Thus, there is the tetrahedron with 4 triangular faces, the hexahedron (or cube) with six square faces, the octahedron with 8 triangular faces, the dodecahedron with 12 pentagonal faces, and the icosahedron with 20 triangular faces.

A description of all five regular polyhedra was given by Plato, who in his Timaeus, shows how to construct models of the solids by putting triangles, squares, and pentagons together to form their faces. Plato's Timaeus is the Pythagorean Timaeus of Locri, whom Plato presumably met when he visited Italy. In Plato's work, Timaeus mystically associates the four easily constructed solids--the tetrahedron, octahedron, icosahedron, and cube--with the four Empedoclean primal "elements" of all material bodies--fire, air, water, and earth. The disturbing difficulty of accounting for the fifth solid, the dodecahedron, is taken care of by associating it with the enveloping universe.

Johannes Kepler, master astronomer, mathematician, and numerologist (1571-1630), gave an ingenious explanation of the Timaeus associations of the five Platonic solids. Of the regular solids, he intuitively assumed that the tetrahedron encloses the smallest volume for its surface, while the icosahedron encloses the largest. Now these volume-surface relations are qualities of dryness and wetness, respectively, and since fire is the driest of the four "elements" and water the wettest, the tetrahedron must represent fire and the icosahedron water. The cube is associated with earth since the cube, resting foursquarely on one of its square faces, has the greatest stability. On the other hand, the octahedron, held lightly by two of its opposite vertices between a forefinger and thumb, easily spins and has the instability of air. Finally, the dodecahedron is associated with the universe because the dodecahedron has twelve faces and the zodiac has twelve signs. (From In Mathematical Circles, by Howard W. Eves.)

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PL MU EPSILON

PL Mu Epsilon will meet at 8:00 on Wednesday, April 25, in the Math Conference Room. Everyone must attend. New officers will be elected.