

Math News

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Solutions to our Previous Puzzles

A) If the average of four numbers is five less than the average of the three numbers that remain after one has been eliminated, and if the eliminated number is 2, we find the average of the four numbers thusly. Let the four numbers be $a, b, c,$ and $d,$ and let e be their average $(a + b + c + d)/4$.

If $d = 2,$ then $(a + b + c + 2) \div 4 = e.$ Let the average of the other three numbers be $f = (a + b + c) \div 3$ so $a + b + c = 3f.$

In the first equation, we replace $a + b + c$ by $3f$ and d by 2 to get $(3f + 2) \div 4 = e.$ It is given that $e = f - 5$ so we replace e by $f - 5$ and get $(3f + 2) \div 4 = f - 5.$ Now we solve for $f:$

$3f + 2 = 4(f - 5), 3f + 2 = 4f - 20, f = 22.$ Then $e = 22 - 5,$ so $e,$ the average of the four numbers, is 17.

B) This solution will involve Cavalieri's principle, which roughly states that two solids having equal height are equal in volume if planar cross-sections by parallel planes at the same distance from their respective bases have equal areas. First, we consider a cross-section of the "holey sphere" as described in November. Let R be the radius of the sphere and r be the radius of the circular hole. Since the hole has a length of 6 inches, it follows that $R^2 = r^2 + 3^2.$ Now, let's consider the cross-section of the sphere with a plane that is perpendicular to the axis of the cylinder at a distance of $d, 0 \leq d \leq 3,$ from the center of the sphere. The cross-section is an annulus having an area of $(3^2 - d^2)\pi,$ which follows directly from $R^2 = d^2 + O^2$ and $A = (O^2 - r^2)\pi.$ [O is the outer radius of the annulus.] Next, consider a standard sphere having a radius of 3 inches and intersect the sphere with a plane at a distance of d from its center. Notice that the area of this planar slice is again $(3^2 - d^2)\pi.$ So, we have shown that the cross-sections of these two objects are equal and will be so for each value of $d.$ Thus, by Cavalieri's principle, the two solids will have the same volume. Then the desired volume is $(4/3)(3^3)\pi = 36\pi$ cubic inches. Note that removing the cylinder from the larger sphere removes the same volume as does reducing the radius to 3 (no matter, interestingly, the radius of the cylinder).

C) To solve $\sqrt{x + \sqrt{x + \sqrt{x + \dots}}} = 5,$ we note that removing the outermost iteration, of infinitely many, leaves exactly that with which we began. Since that is given to be equal to 5, we write $\sqrt{x + 5} = 5.$ Square each side and subtract 5 from each, yielding $x = 20,$ a verifiable solution.

KME Corner

The annual KME induction ceremony is scheduled for the afternoon of Sunday, March 1st and will feature a presentation by Dr. Marc Michael. Applications for membership in the mathematics honor society are due Thursday, February 12th.

Fall 2015 Courses

MATH 236.001	MTRF	8:00- 8:50	Lance Revenaugh
MATH 236.002	MTRF	11:00-11:50	Justin Dunmyre
MATH 236.003	MTRF	2:00- 2:50	Laxman Hegde
MATH 237.001	MTRF	11:00-11:50	Mark Hughes
MATH 237.002	MTRF	2:00- 2:50	Mark Hughes
MATH 238.001	MTRF	11:00-11:50	Frank Barnet
MATH 315.001	MWF	1:00- 1:50	Rob Forsythe
MATH 350.001	TR	12:30- 1:45	Frank Barnet
MATH 432.001	MWF	1:00- 1:50	Justin Dunmyre
MATH 452.001	TR	12:30- 1:45	Gerry Wojnar
MATH 461.001	MW	4:30- 5:45	Mark Hughes
MATH 491.001	TR	3:30- 4:45	Mark Hughes
MATH 680.001	MWF	11:00-11:50	Lance Revenaugh

Faculty Professional Presentations

Dr. Gerry Wojnar gave a seminar presentation "New Discoveries Connecting the Cardano Cubic Formula, Statistics, Triangle Geometry, & Polynomial Graphs" in October, explaining results of most of his research efforts (working with his friend Dr. Len Brin and Dr. Wojnar's son Daniel). He says these results all sprouted from such humble beginnings as fiddling with simple facts connecting parabolas, statistics, the quadratic formula, and "what a triangle is".

Dr. Lance Revenaugh presented "Relating Hypothesis Tests, Confidence Intervals, Means, and Standard Deviations" at the Regional NCTM Meeting in Richmond, Virginia, in November. He discussed testing hypotheses for which several one-sample, two-sample, and three-sample situations were discussed along with confidence intervals and their relationship to hypotheses testing.

In January, Dr. Justin Dunmyre made a presentation titled "Reflections on flipped classrooms - implementation and small tweaks with big effects" at Frostburg State University. His presentation focused on implementation of the Pongelley model for his mathematics classes.

Intelligent Life?

From an alien classroom blackboard far in outer space:

$13 + 15 = 31$ $10 \times 10 = 100$ $6 \times 3 = 24$
How many fingers do those aliens have?