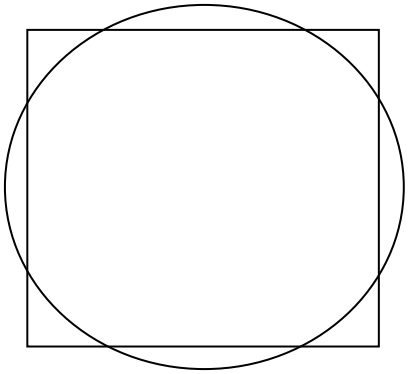
ROUND #1

University of North Georgia
Nineteenth Annual Sophomore Level Mathematics Tournament
April 6, 2013

A square and a circle intersect so that each side of the square contains a chord of the circle which equals the circle's radius. What is the ratio of the area of the square to the area of the circle? (Leave answer in terms of π.)



If you need this document in another format, please email minsu.kim@ung.edu or call 678−717−3546.

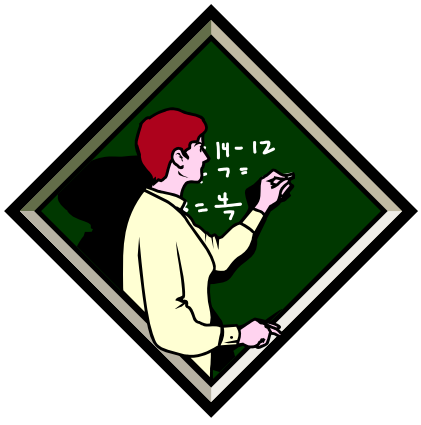
ROUND #2

University of North Georgia
Sophomore Level Mathematics Tournament
April 6, 2013

Find the product.

123,456,789 * 123,456,789

Note: The answer needs to be given in standard notation to the exact integer. Do NOT round and do NOT give in scientific notation.



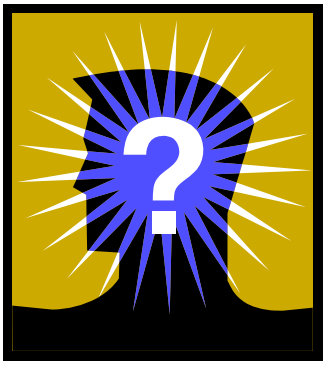
ROUND #3

University of North Georgia
Sophomore Level Mathematics Tournament
April 6, 2013

A ship needs three weeks to go from New Orleans to St. Louis up the Mississippi River. The same ship needs only two weeks to go from St. Louis back to New Orleans. How many weeks will it take a wooden raft (no power) to float from St. Louis to New Orleans down the Mississippi River? Assume the speed of the ship with respect to the water is constant, and that the speed of the current is constant.

ROUND #4

University of North Georgia
Sophomore Level Mathematics Tournament
April 6, 2013



Suppose the coefficients of x^3 and x^4 of a polynomial $(x+a)^5$ are the same and suppose $a>0$.

Find the value of a.

ROUND #5

University of North Georgia
Sophomore Level Mathematics Tournament
April 6, 2013

Cages are to be designed to house wild animals so they can roam freely at a zoo. If one animal can harm another, then those two animals **cannot** share the same cage as shown in the table below.

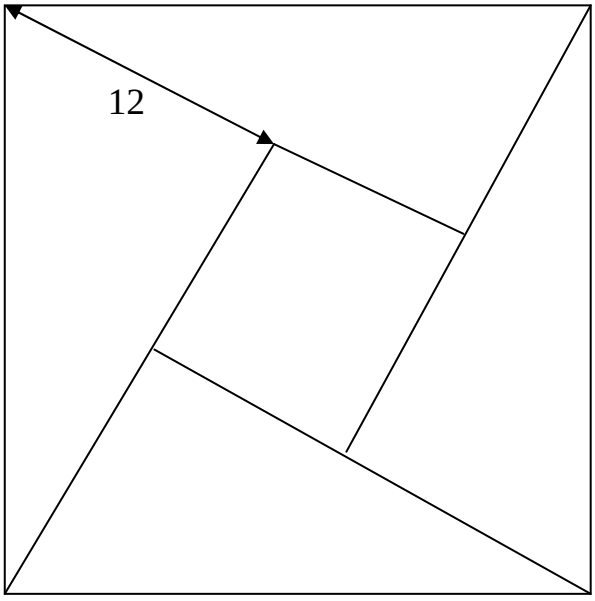
Animal	***CANNOT** be placed with*
Tiger	Zebra, Leopard, Rhino, Giraffe, Antelope, Ostrich
Leopard	Zebra, Boar, Antelope, Giraffe, Ostrich
Crocodile	Ostrich, Heron
Boar	Tiger, Crocodile, Zebra
Snake	Boar, Tiger, Crocodile, Leopard

Find the least number of cages necessary to contain ALL the animals.

ROUND #6

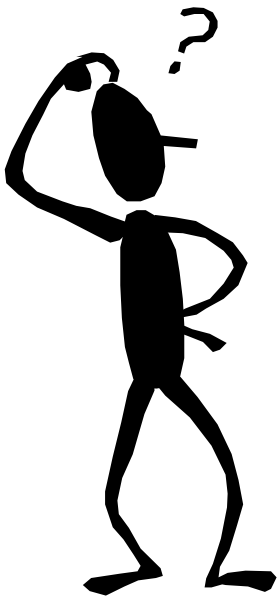
University of North Georgia
Sophomore Level Mathematics Tournament
April 6, 2013

Two squares are nestled as shown and form 4 congruent triangles. The large square's area is 400 square units. What is the small square's area?



ROUND #7

University of North Georgia
Sophomore Level Mathematics Tournament
April 6, 2013



An equilateral triangle has sides 1 inch long. An ant walks around the triangle, maintaining a distance of 1 inch from the outside of the triangle at all times. How far does the ant walk?

Note: An exact answer or approximation to two decimal places will be accepted.

ROUND #8

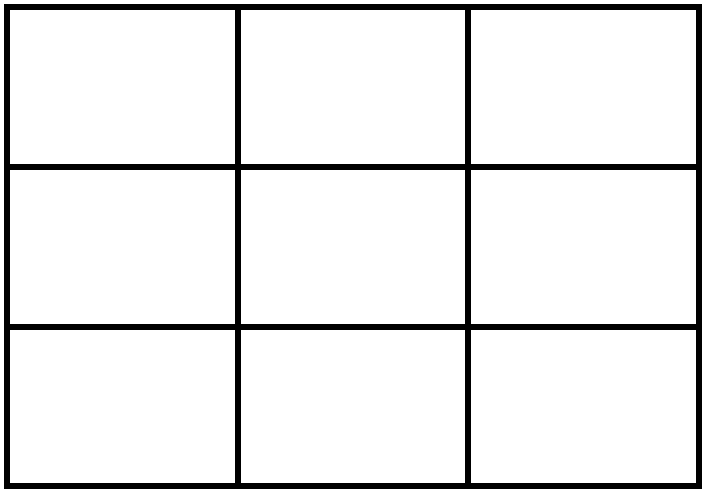
University of North Georgia
Sophomore Level Mathematics Tournament
April 6, 2013

A regular pentagon is inscribed in a circle of area $16\pi\, cm^2$. Find the perimeter of the pentagon approximated to the nearest tenth of a *cm*.

ROUND #9

University of North Georgia
Sophomore Level Mathematics Tournament
April 6, 2013

How many rectangles are there in the diagram?



ROUND #10

University of North Georgia
Sophomore Level Mathematics Tournament
April 6, 2013

A cyclist travels downhill at a speed of 12 *mph*, on the level part of the road at 8 *mph*, and uphill at 6 *mph*. She takes 4 hours to travel from town M to town N. The return trip takes 4.5 hours. Find the distance between the two towns.