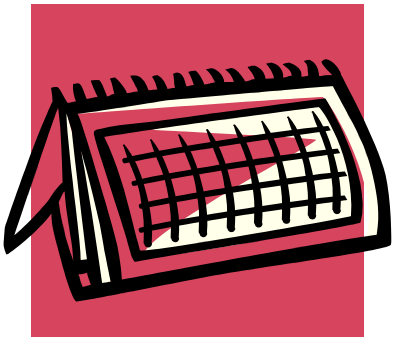
ROUND #1

Gainesville State College
Mathematics Tournament
April 14, 2012

Andrea, Bob, Carrie, and Dave work at a college bookstore. Andrea and Bob work on Mondays; Andrea and Dave work on Tuesdays; Bob and Carrie work on Wednesdays; Carrie and Dave work on Thursdays.

In how many different ways could the store manager assign each of the four workers one month of summer vacation (June, July, or August) in such a way that no people working on the same day have the same month of vacation?



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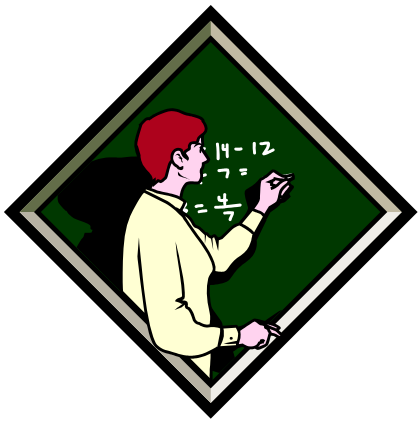
ROUND #2

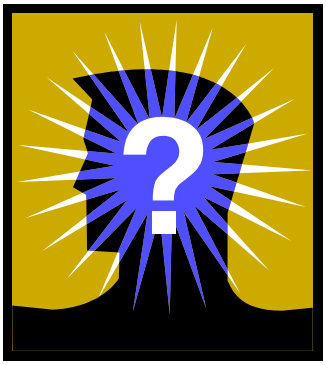
Gainesville State College
Mathematics Tournament
April 14, 2012

Find the remainder when $x^5 - 9$ is divided by $x - 2$.



ROUND #3

Gainesville State College
Mathematics Tournament
April 14, 2012



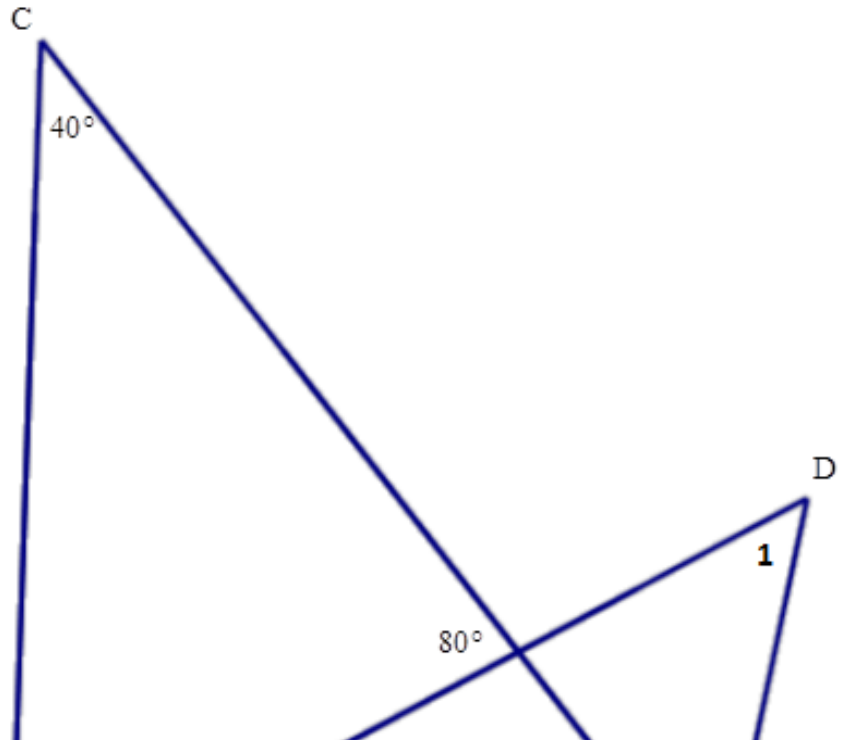
How many numbers between 1 and 5000 have 5 different prime numbers as factors?

ROUND #4

Gainesville State College
Mathematics Tournament
April 14, 2012

In the following figure, $\angle 1 = \angle 2$ and $\angle DAB = 103°$.

Find the measure of $\angle DBA$.



ROUND #5

Gainesville State College
Mathematics Tournament
April 14, 2012

A rectangular room is 30 feet in length, 12 feet in width, and 12 feet in height. A spider is at the middle of one of the 12 foot by 12 foot walls, one foot from the ceiling. A fly is at the middle of the opposite wall, one foot above the floor. The fly is so frightened that it can't move. What is the shortest distance that the spider must crawl in order to reach the fly?

Round your answer to the nearest tenth of a foot.

ROUND #6

Gainesville State College
Mathematics Tournament
April 14, 2012

Consider the sequence:

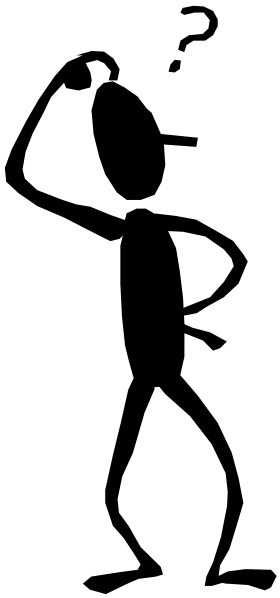
1, 0, 0, 1, 2, 1, 0, 1, 0, 0, 1, 2, 1, 0, 1, 0, 0, 1, 2, 1, 0, 1, 0, 0, 1, 2, 1, 0, 1, 0, …

Let T_n represent the nth term so that $T_1 = 1$, $T_2 = 0$, etc.

What is the ratio of $\left(T_{2014} - T_{2012}\right) : \left(T_{2013} - T_{2011}\right)$?

ROUND #7

Gainesville State College
Mathematics Tournament
April 14, 2012



Suppose $3\cos(2x)+17\cos x = 0$.

Find $\tan^2 x$.

ROUND #8

Gainesville State College
Mathematics Tournament
April 14, 2012

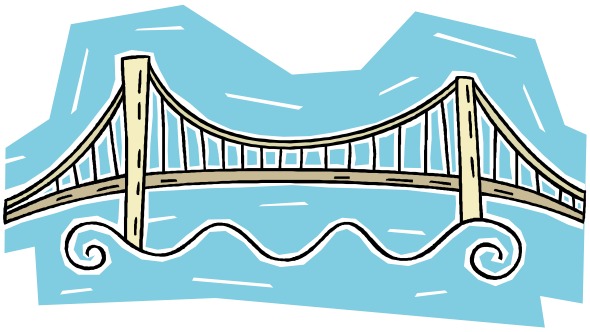
Determine how many different rectangles could be formed by joining four of the following points:

$$\begin{array}{cccc} (0,0) & (0,1) & (0,2) & (0,3) \\ (1,0) & (1,1) & (1,2) & (1,3) \\ (2,0) & (2,1) & (2,2) & (2,3) \end{array}$$

ROUND #9

Gainesville State College
Mathematics Tournament
April 14, 2012

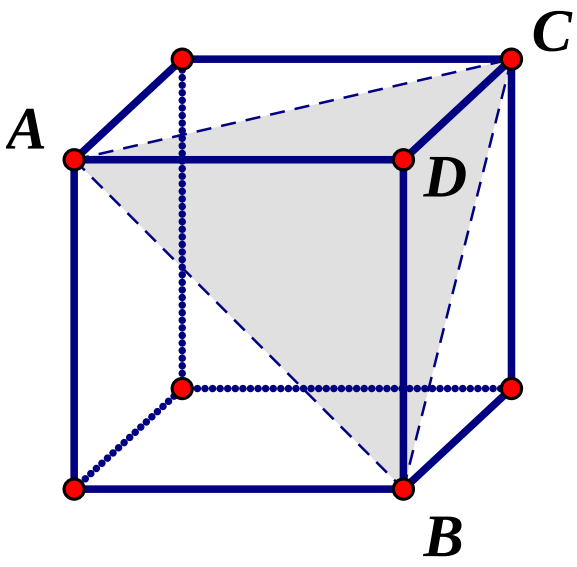
A swimmer jumps off a bridge and begins to swim against the current. The same moment a hat blows off a man's head on the bridge and begins to float downstream. After 10 minutes, the swimmer turns back, reaches the bridge, and is asked to swim until he catches up with the hat. He does, under a second bridge 1000 yards from the first. The swimmer does not vary his effort. What is the speed of the current?



ROUND #10

Gainesville State College
Mathematics Tournament
April 14, 2012

Consider the following drawing of a triangular pyramid ABCD inside of a cube. If the volume of the pyramid is 972 cubic meters, what is the length of one edge of the cube?


C
A
D
B