ROUND #1

Given the following rectangle, find all possible values for $\tan \alpha$.
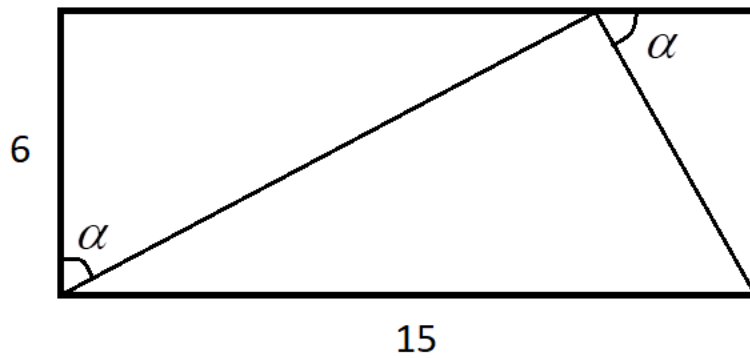
ROUND #2

Each bag to be loaded onto a plane weighs either 12, 18 or 22 lb. If the plane is carrying exactly 1000 lb. of luggage, what is the largest number of bags it could be carrying?

ROUND #3

Let angles A and B be such that $A \le B$ and satisfy the following two equations:

$$\cos A + \cos B = 0$$

$$\sin A + \sin B = \frac{1}{2}$$

Determine $B - A$ to the nearest integer degree, where $0° \le A \le B \le 180°$.
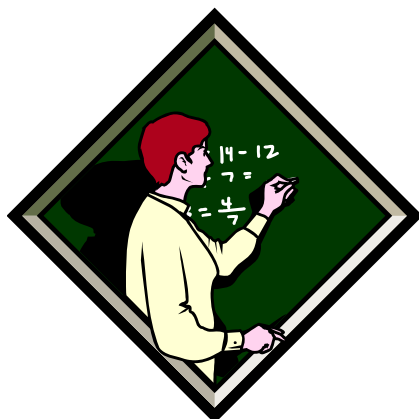
ROUND #4

Suppose there is a 40% chance of getting freezing rain, a 10% chance of getting snow and freezing rain, and an 80% chance of getting snow or freezing rain. Find the chance of getting snow.

ROUND #5

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A farmer brings a number of oranges to sell in the local farmer's market. First, he sells half of the oranges and another half of one orange. Second, he sells half of the remaining oranges and another half of one orange. Third, he sells half of the remaining oranges and another half of one orange. At this time, the farmer knows that he still has 24 oranges. How many oranges did he have at the beginning?
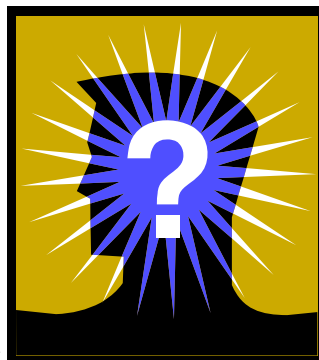
ROUND #6

Find the minimum of the function $f(x) = |x - 2017| + |x - 2018|$.

ROUND #7

Distinct points *A*, *B*, *C*, and *D* lie on the circle $x^2 + y^2 = 25$ and have integer

coordinates. The distances *AB* and *CD* are irrational numbers.

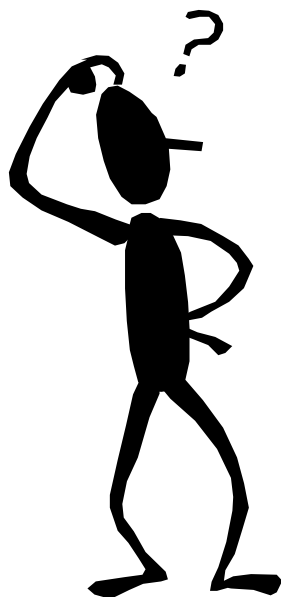What is the greatest possible value of the ratio $\dfrac{AB}{CD}$?

ROUND #8

Find a real number m such that the equation $\left| x^2 + 4x - 5 \right| = m$

will have exactly 3 real solutions.

ROUND #9

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If the 3rd and 12th terms of an arithmetic sequence are -7 and 56, respectively, then 28 is which term of the sequence?

ROUND #10

The sum of the squares of the sides of a right triangle is 578.

The perimeter of the right triangle is 40.

What is the length of its smallest side?