



MONTGOMERY COUNTY MATHEMATICS LEAGUE

Individual for Contest # 4

(No Calculators)

2014-2015

Time: 10 minutes

1. Of 46 people expressing an opinion about ice cream and cake, 21 liked ice cream, 26 liked cake, and 8 liked neither. How many liked both?

2. If $x \neq \frac{k\pi}{2}$, where k is an integer, then $\frac{\cot^2 x - \tan^2 x}{2 + \cot^2 x + \tan^2 x} + 2\sin^2 x$ has a minimum value of m and a maximum value of M , for x a real number. Find the ordered pair (m, M) .

Time: 10 minutes

3. Two vertical poles are on level ground, 9 meters apart. The distance between a point 6 meters above the ground on one pole and 4 meters above the ground on the other pole is \sqrt{x} . Find x .

4. Find all real values of x which satisfy $(2x + 8)^3 + (2x - 4)^3 = (4x + 4)^3$.

Time: 10 minutes

5. A, B, and C played a three round game in which the winner of each round received from EACH of the other two players an amount equal to what the winner had at the start of that round. Player A began the game with \$10 and won the first round, B won the second round and C won the third. At the conclusion of the game, each player had the same amount of money with which he began. With how many dollars did C begin?

6. The length of the three altitudes of a triangle are 20, 24, and 24. Find the perimeter of this triangle.