NASSAU COUNTY INTERSCHOLASTIC MATHEMATICS LEAGUE

2007 – 2008 **No Calculator Allowed** **Contest #5**

Answers must be in simplest exact form unless otherwise specified.

Problems 25-26. 10 minutes

25. The area of a square is 405 in^2. The square is divided into two rectangles. If the difference in the areas of the two rectangles is 225 in^2, compute the number of inches in the perimeter of the smaller of the two rectangles.

26. Determine all real values x for which $16x^6 + 324 = 64x^4 + 81x^2$.

Problems 27-28. 10 minutes

27. Compute x such that $25^{1/4} + x^{1/3} = \dfrac{59}{8-\sqrt{5}}$.

28. Two identical cylindrical candles burn at the same uniform rate. It takes 5 hours for each of the candles to be consumed. If one candle is lit at 7 pm and the second candle is lit at 8 pm on the same day, at what time of the day will the second candle lit be exactly 4 times the height of the first candle lit? [Your answer must indicate am, pm, noon, or midnight.]

Problems 29-30. 10 minutes

29. For $x \geq 3$, compute x if ${}_9C_2 + {}_9C_3 = {}_xC_3$.

30. Compute the degree-measure of θ if $\sin^2\theta = \dfrac{2-\sqrt{3}}{4}$ and θ is a positive acute angle.