

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  $405 \text{ in}^2$ . The square is divided into two rectangles. If the difference in the areas of the two rectangles is  $225 \text{ in}^2$ , compute the number of inches in the perimeter of the smaller of the two rectangles.

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

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Problems 27-28. 10 minutes

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

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.]

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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  $\theta$  if  $\sin^2 \theta = \frac{2 - \sqrt{3}}{4}$  and  $\theta$  is a positive acute angle.