NASSAU COUNTY INTERSCHOLASTIC MATHEMATICS LEAGUE

2007 - 2008

No Calculator Allowed

Contest #3

Answers must be in simplest exact terms unless otherwise specified.

Problems 13-14. 10 minutes

- 13. If x, y, and z are positive integers such that 4x = 7y = 11z, compute the least possible value of x + y + z.
- 14. Compute the numerical value of (r-4)(r-2)(r-7)(r+1) if r is a root of $x^2-6x+1=0$.

Problems 15-16. 10 minutes

- 15. Compute the average of the four numbers a, b, c, and 20 if the average is 12 less than the average of the three numbers a, b, and c.
- 16. Runners A and B maintain a constant speed as they run around a circular track in opposite directions. They meet every 24 seconds. Runner A can complete one lap around the track in 56 seconds. Compute the number of seconds runner B takes to complete one lap around the track.

Problems 17-18. 10 minutes

- 17. Compute $\sqrt[3]{18 \cdot 2^{11} + 30 \cdot 2^{10} + 36 \cdot 2^9 + 96 \cdot 2^8}$.
- 18. A commuter uses either her compact car or her midsize car to get to and from her job each workday. She uses the compact car $33\frac{1}{3}\%$ of the time and, when she does, she arrives home by 6:30 pm 40% of the time. When she uses the midsize car, she arrives home by 6:30 pm 90% of the time. Compute the probability that she used her midsize car, given that she arrived home after 6:30 pm.