

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  $x^2 - 6x + 1 = 0$ .

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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.

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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.