

MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 5 - FEBRUARY 2012
ROUND 6 ALG 2: SEQUENCES AND SERIES

ANSWERS

A) _____

B) _____ : _____

C) _____

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| ***** NO CALCULATORS ON THIS ROUND ***** |
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A) $4x+1$, $7x$, $8x+3$ form an arithmetic progression.
Find the sum of the first 30 terms of this progression.

B) The following three terms $(x+2)$, $(4x+2)$ and $(12x+6)$ are the second, third and fourth terms of a geometric sequence. When 12 is added to the middle term, this sequence of three terms becomes the first three terms of an arithmetic sequence. Compute the ratio of the fifth term of the arithmetic sequence to the sixth term of the geometric sequence

C) Given: $t_n = -2, \frac{4}{3}, -\frac{8}{9}, \frac{16}{27}, \dots$, $A = \sum_{n=1}^{\infty} (t_n)$ and $B_n = \sum_{k=1}^n (1-i)^k$, where $i = \sqrt{-1}$.

Compute $\frac{A}{B_3}$ as a reduced quotient.