

HIGH SCHOOL MATHEMATICS CONTESTS

Math League Press, P.O. Box 17, Tenafly, New Jersey 07670-0017

All official participants must take this contest at the same time.

Contest Number 6 *Any calculator without a QWERTY keyboard is allowed. Answers must be exact or have 4 (or more) significant digits, correctly rounded.* March 16, 2021

Name _____ Teacher _____ Grade Level _____ Score _____

Time Limit: 30 minutes

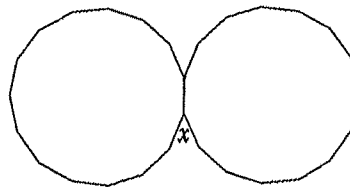
FINAL CONTEST OF THE YEAR

Answer Column

6-1. If x is real, what is the greatest possible value of $\frac{4042}{2021x^{2020} + 2}$?

6-1.

6-2. Two coplanar congruent regular 15-gons share a side in common, but have no interior points in common, as shown. What is the degree-measure of the angle marked x ?



6-2.

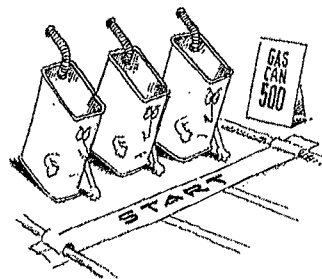
6-3. If $\log_{10}(1) + \log_{10}(2) + \log_{10}(3) + \dots + \log_{10}(2000) = 5735.52\dots$, then how many digits are there in the expansion of $2000!$, where the exclamation point represents "factorial"?

6-3.

6-4. If the roots of $x^3 + ax^2 + bx + c$ are 1, 2, and 3, what are the roots of $(x-2)^3 + a(x-2)^2 + b(x-2) + c = 0$?

6-4.

6-5. My three cars can travel the same distance on a tank of gas. My second car gets 6 kilometers per liter more than my first, but its tank holds 3 fewer liters than my first. My third car gets 6 kilometers per liter less than my first, but its tank holds 6 more liters than my first. How many kilometers can each car travel on a tank of gas?



6-5.

6-6. By drawing a line parallel to its bases, I can split trapezoid T into two new trapezoids whose areas are equal. If the bases of T have lengths 2 and 14, how long is the segment common to the new trapezoids?

6-6.

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