The University Interscholastic League
Number Sense Test, Series 990B

	Score	Initials
Final	_____	_____
1st	_____	_____
2nd	_____	_____

Contestant's Number _____

Read Directions Carefully Before Beginning Test

Do Not Unfold This Sheet Until Told To Begin

Directions: Do not turn this page until the person conducting this test gives the signal to begin. This is a ten-minute test. There are 80 problems. Solve accurately and quickly as many as you can in the order in which they appear. ALL PROBLEMS ARE TO BE SOLVED MENTALLY. Make no calculations with paper and pencil. Write only the answer in the space provided at the end of each problem. Problems marked with a (*) require approximate integral answers; any answer to a starred problem that is within five per cent of the exact answer will be scored correct; all other problems require exact answers.

The person conducting this contest should explain these directions to the contestants.

Stop - Wait for Signal!

(1) $5 \times 1999 + 10 =$ _____ .

(2) $2.5 \times 37 =$ _____ .

(3) $137 \div 5 =$ _____ (mixed number).

(4) $19 \times 19 =$ _____ .

(5) $593 + 395 =$ _____ .

(6) $32176 \div 16 =$ _____ .

(7) $841 - 148 =$ _____ .

(8) $13 \times 13 - 13 \times 17 =$ _____ .

(9) $\frac{5}{12} =$ _____ % (mixed number).

*(10) $13 + 28 + 315 + 424 + 535 =$ _____ .

(11) CCX = _____ (Arabic Numeral).

(12) $11 \times 187 =$ _____ .

(13) 14.5 is what percent of 58? _____ %.

(14) .025 = _____ (fraction).

(15) $12' \times 18' \times .5' =$ _____ cubic yards.

(16) $7(6) + 57(7) + 8(11) =$ _____ .

(17) The number 210 has _____ distinct positive prime factors.

(18) $26 - 8 \times 2 + 4 \div 2 =$ _____ .

(19) $1234 \div 9 =$ _____ (mixed number).

*(20) $19 \times 317 =$ _____ .

(21) Find the GCD of 132, 168 and 228. _____ .

(22) $(23 \times 7 + 6) \div 5$ has a remainder of _____ .

(23) If one dozen pencils cost \$4.14 then two pencils cost _____ cents.

(24) $17 \times 3367 =$ _____ .

(25) Find the smallest integer k, $k > 1$, such that $3k - 2$ is a prime number. _____ .

(26) $8\frac{1}{4} \times 8\frac{3}{4} =$ _____ (mixed number).

(27) 12% of 138 is 24% of _____ .

(28) $68 \times 72 =$ _____

(29) An item sells for x dollars plus 8% sales tax. If the sales tax is \$2.00 then x = _____ .

*(30) $29799 \div 129 =$ _____ .

(31) The square root of 28×63 is _____ .

(32) $27^2 + 54^2 =$ _____ .

(33) The LCM of 48 and 72 is _____ .

(34) $46^2 - 21^2 =$ _____ .

(35) $213_4 =$ _____ $_{10}$.

(36) If (23) (64) = 32y then y = _____.

(37) The cube root of 1,367,631 is _____.

(38) 15 x 446 = _____.

(39) The area of a circle is equal numerically to its circumference. The radius of the circle is _____.

*(40) $\sqrt{162536}$ = _____.

(41) If $216 = x^2 - y^2$ and x,y are positive triangular numbers, then x = _____.

(42) .416666... = _____ (fraction).

(43) If a regular polygon with n sides has an exterior angle of 24° then n = _____.

(44) The next term of 3,7,10,14,17,... is _____.

(45) 35 x 55 = _____.

(46) If $4^{2x+1} = 32$ then x = _____.

(47) $67^2 + 37^2$ = _____.

(48) $10111_2 =$ _____ $_4$.

(49) A right triangle has sides of x,x and 12 where $x < 12$. If $x = a\sqrt{b}$ then a = _____.

*(50) 18 x 16 x 20 = _____.

(51) If x + y = 9 and x − 2y = 0 then y = _____.

(52) If 1 − 4x < 53 then x > _____.

(53) 6" x 22" x 14" = _____ gallons.

(54) If $(a - 3i)^2 = 16 - 30i$ then a = _____.

(55) The total surface area of a cube with an edge of 3" is _____ sq. inches.

(56) $2^{-1} + 4^{-1} + 8^{-1} + \ldots =$ _____.

(57) Two numbers are in the ratio of 4:7. If their sum is 33, find the smaller number. _____.

(58) 112 x 103 = _____.

(59) If the volume of a sphere is 972π cubic units, then its radius is _____.

*(60) 16 x 32 x 35 = _____.

(61) If $\log_5 x = -2$ then x = _____.

(62) If $\cos 2x = k \cos^2 x - 1$ then k = _____.

(63) The expansion of $(2a - b)^4$ has _____ terms.

(64) $\sin(7\pi/6)$ = _____.

(65) The number of ways of factoring 48 (without regard to order) into 2 positive distinct integer factors is _____.

(66) 112 x 112 = _____.

(67) $\ln(e^4)$ = _____.

(68) 1.5π radians = _____ degrees.

(69) An urn contains 8 red and x white balls. Find x if the probability of drawing a red ball is 4/13. _____.

*(70) 29 x 31 + 28 x 32 = _____.

(71) If $f(x) = x^2 - 1$ then $f[f(3)]$ = _____.

(72) If $f(x) = \dfrac{3x + 2}{4x - 1}$ and $f^{-1}(x) = \dfrac{ax + 2}{cx + d}$ then a = _____.

(73) The radius of the inscribed circle of a 7,24,25 right triangle is _____.

(74) If $3x - 1 \equiv 1 \pmod 5$, $0 \le x \le 4$, then x = _____.

(75) Find the value of xy^2 if $x + y = 15$, $x,y > 0$ and xy^2 is a maximum. _____.

(76) The maximum value of $y = -x^2 - 6$ is _____.

(77) If $f(x) = 2x^2 - 5x$ then $f'(3)$ = _____.

(78) $\int_{-1}^{4} 2x \, dx$ = _____.

(79) If x is the largest positive integral root of $x^3 + x^2 - 4x - 4 = 0$ then x = _____.

*(80) 34^3 = _____.