The University Interscholastic League
Number Sense Test, Series XX-A

Contestant's Number _____ Contestant's Score _____

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) $213 + 312 - 123 =$ _____.

(2) $50 \times 187 =$ _____.

(3) $(17)(5 + 6) =$ _____.

(4) $407 \div 9 =$ _____ (mixed number).

(5) $36^2 =$ _____.

(6) $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} =$ _____.

(7) $4^3 + 3^2 + 2^0 =$ _____.

(8) $16 \times 44 + 16 \times 36 =$ _____.

(9) $\frac{3}{40} =$ _____ %.

*(10) $149 \times 251 =$ _____.

(11) $11 \div 2\frac{1}{2} =$ _____ (decimal).

(12) The smallest prime divisor of 15^5 is _____.

(13) $12 \times 19 =$ _____.

(14) Which is smaller, $\frac{3}{10}$ or .333... ? _____.

(15) Subtract $87\frac{1}{2}$ % of \$16.40 from \$16.40. \$ _____.

(16) $7\frac{1}{2} \times 68 =$ _____.

(17) The GCD of 20 and x is 5 and their LCM is 140. $x =$ _____.

(18) 1 gallon = _____ cubic inches.

(19) The median of 72, 60, 81 and 52 is _____.

*(20) $\sqrt{48400} + 80 =$ _____.

(21) 798 is what percent less than 840? _____ %.

(22) .2666... = _____ (fraction).

(23) $13\frac{2}{5} \times 13\frac{3}{5} =$ _____ (mixed number).

(24) $(22.4 \times 10^5) \div (.32 \times 10^3) =$ _____.

(25) A book costs \$9.99 plus 8% sales tax. The total cost of the book is \$_____.

(26) $(15^2 + 3 \times 6) \div 4$ has a remainder of _____.

(27) What number times 3 and subtracted from 3 gives the same result? _____.

(28) If $x^3 + 27 = 0$, then $x =$ _____.

(29) $\sqrt{132\frac{1}{4}} =$ _____ (improper fraction).

*(30) $101926 \div 226 =$ _____.

(31) $4^4 \div 12$ has a remainder of _____.

(32) $32^2 - 29^2 = (3)$ _____.

(33) 18 is to 84 as 21 is to _____.

(34) $32 \times 111 =$ _____.

(35) A rectangle's sides have a ratio 3:5. The perimeter is 32. The longer side is _____.

(36) $43_7 =$ _____ $_{10}$.

(37) Find x, if $x + y = 4$ and $y = -2$. _____.

(38) If $3^4 \times 9^3 \div 27^3 = 3^n$, then $n =$ _____.

(39) The next term of 2,3,5,9,17,33,... is _____.

*(40) 1726494 ÷ 1111 = _____.

(41) 42 x 43 = _____.

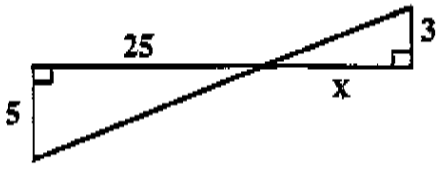
(42) (x,y) is the midpoint of the line segment through endpoints (1,4) and (3,7). x = _____.

(43) If $3^x = 37.5$, then 3^{x-1} = _____.

(44) An interior angle of a regular pentagon has measure _____ degrees.

(45) The conjugate of 3 + 7i is _____.

(46) Find x in the drawing.



x = _____.

(47) 1 + 2 + 3 + ... + 18 = _____.

(48) If a 6 inch square is inscribed in a circle, the radius of the circle is $a\sqrt{b}$ and a = _____.

(49) 16 ft/sec = _____ ft/min.

*(50) $[.125 \times 4240]^2$ = _____.

(51) 3 men date 3 women. How many possible couples are there? _____.

(52) If $\log_2 x = 3$, then x = _____.

(53) Find the largest value of x such that $2x^2 - 7x - 4 \leq 0$. _____.

(54) If ${}_7C_6 = {}_7C_x$, $x \neq 6$, then x = _____.

(55) Given the parabola $y^2 = 16x$, the focus is at (a,0). a = _____.

(56) 97 x 92 = _____.

(57) If $\frac{a}{13}$ has a remainder of 5 and $\frac{b}{13}$ has a remainder of 7, then $\frac{ab}{13}$ has a remainder of _____.

(58) 41_6 = _____ 3.

(59) $4 + 1 + \frac{1}{4} + \ldots$ = _____.

*(60) $(15)^4$ = _____.

(61) A cube has a surface area of 96. The length of an edge is _____.

(62) If $\log_8(3x^3 - 16) = 1$, then x = _____.

(63) The tenth term in the sequence 3,8,13,18,... is _____.

(64) $\tan(\text{Cos}^{-1}\frac{1}{4})$ = _____.

(65) The number of digits in the number $N = 5^9 \times 2^4$ is _____.

(66) Find the height of a right circular cylinder whose volume is 180π and radius is 6. _____.

(67) $(1 + \sqrt{2})^4 = a + b\sqrt{c}$ and a = _____.

(68) $\sum_{k=1}^{4} k^2$ = _____.

(69) $\sqrt{1 - \cos^2 135^0}$ = _____.

*(70) 39 x 40 x 41 = _____.

(71) $(2, \frac{\pi}{6})$ are polar coordinates for a point (x,y) are the rectangular coordinates. x = _____.

(72) The vertical asymptote furtherest to the left for $y = \frac{2x + 1}{x^2 - 3x + 2}$ is x = _____.

(73) If $3^3 = x$, $0 \leq x \leq 4 \pmod 5$, then x = _____.

(74) How many ways can 7 people be seated 3 at a time in 3 chairs in a row? _____.

(75) If f(x) = 2x + 7 and $f^{-1}(x) = ax + b$, then a = _____.

(76) If $f(x) = 3x^2 + 2$, then $f'(x)$ = _____.

(77) If $f(x) = 2x^3 - 3x^2 + k$, determine k so that f(x) is divisible by x - 2. _____.

(78) How many subsets of 2 elements can be formed from a set that has 5 elements? _____.

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

*(80) Evaluate the determinant $\begin{vmatrix} 10 & 1 & 7 \\ 30 & 2 & 4 \\ 0 & 1 & 3 \end{vmatrix}$ _____.