The University Interscholastic League
Number Sense Test, Series YY-4

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) $1995 + 5991 =$ _____.

(2) $75 \times 37 =$ _____.

(3) $6 \times 32\frac{1}{2} =$ _____.

(4) $11 \times 139 =$ _____.

(5) $333 \div 9 =$ _____.

(6) $138 - 831 =$ _____.

(7) The largest prime divisor of 231 is _____.

(8) $109 \times 109 =$ _____.

(9) $782 \div 9 =$ _____ (mixed number).

*(10) $38 \times 81 + 29 =$ _____.

(11) $50 \div 2\frac{1}{2} =$ _____.

(12) CXV - V = _____ (Roman numeral).

(13) $256 = 16 + (8)$ _____.

(14) $23 \times 17 + 17 \times 67 =$ _____.

(15) $(56 \times 7) \div 8$ has a remainder of _____.

(16) Which is larger, $\frac{7}{-9}$ or $\frac{-4}{5}$? _____.

(17) $15 \times 62 =$ _____.

(18) The GCD of 138 and 92 is _____.

(19) If 3 apples cost 82 cents then one dozen cost $ _____.

*(20) $\sqrt{674} \times 34 =$ _____.

(21) $\frac{11}{2^3(5^2)} =$ _____%.

(22) $\frac{1}{4}$% of 24 is 10% of _____.

(23) $96 \times 93 =$ _____.

(24) $.575757... =$ _____ (fraction).

(25) $57^2 - 54^2 =$ _____.

(26) What number times 8 and added to 5 gives the same result? _____.

(27) $4\frac{3}{8} \times 4\frac{5}{8} =$ _____ (mixed number).

(28) Find k, so that the roots of $9x^2 - kx + 4 = 0$ are equal. _____.

(29) $12 \times 87 =$ _____.

*(30) $66816 \div 348 =$ _____.

(31) The product of the GCD and LCM of 14 and 44 is _____.

(32) $213_5 =$ _____ 10.

(33) $4\frac{1}{3} \times 8\frac{1}{3} =$ _____ (mixed number).

(34) $(10^4 - 1) \div (10 - 1) =$ _____.

(35) How far do you travel in one minute at 44 ft/sec? _____ yards.

(36) $10111_2 =$ _____ 8.

(37) In a rectangle the ratio of the width to the length is 2 to 7 and the perimeter is 72. The width is _____.

(38) $\frac{x}{6} + \frac{y}{3} = 1$ is a line. The slope is _____.

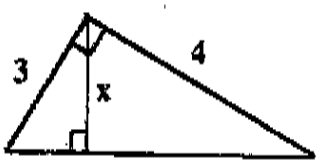
(39) If the sum of the roots of $(x + 1)(x - 2)(x + k) = 0$ is 5, then k = _____.

*(40) $(42)^3$ = _____.

(41) The larger root of $(6x + 1)^2 = \frac{1}{49}$ is _____.

(42) If $x < 0$ and $|3x + 2| = 10$, then x = _____.

(43) Find x in the drawing below. x = _____.



(44) Evaluate $2(xy)^{1/2}$ if x = 2 and y = 18. _____.

(45) Find k, so that k2k is the smallest 3-digit number divisible by 4. _____.

(46) Find x, if $3^{x-1} = 81$. x = _____.

(47) The distance from (1,2) to (6,3) is _____.

(48) If $x - 2 > 11$ then $x + 5 >$ _____.

(49) The remainder, in base 7, when 125, base 7 is divided by 6 is _____

*(50) $19^4 \div 19^2 \times 68$ = _____.

(51) The next term of the sequence 5, 8, 11, 14, ... is _____.

(52) Find the modulus of $3 + 4i$. _____.

(53) Give the parabola, $y = 2x^2 + 4x + 9$, the vertex is at (h,k). h = _____.

(54) $(42 + 5 \times 6 + 3) \div 4$ has a remainder of _____.

(55) What term of the sequence -2, 3, 8, 13, 18, ... is 398? _____.

(56) $\sec \frac{4\pi}{3}$ = _____.

(57) Two dice are tossed. What is the probability that the sum of the faces is 9? _____.

(58) The number halfway between 31 and 127 is _____.

(59) The simplified coefficient of the x^2y^2 term in the expansion of $(2x + 3y)^4$ is _____.

*(60) $\sqrt{707281}$ = _____.

(61) How many 3-digit numbers are divisible by 2? _____.

(62) Find the shortest distance between the lines $5x + 12y = 4$ and $5x + 12y = 43$. _____.

(63) $\log x - \log 3 = \log 27$. x = _____.

(64) The surface area of a sphere with diameter 4 is $k\pi$ and k = _____.

(65) If $\cos A = \frac{1}{4}$ then $\sec^2 A$ = _____.

(66) The area of the ellipse $4x^2 + 9y^2 = 36$ is $k\pi$ and k = _____.

(67) $2 - \cos^2 45^\circ$ = _____.

(68) The tenth term in the sequence 3, 7, 11, 15, ... is ____.

(69) $\det \begin{vmatrix} 7 & 3 \\ 6 & 9 \end{vmatrix}$ = _____.

*(70) $261 \times 139 + 139 \times 139$ = _____.

(71) $f(x) = x^3 + 1$, find $f^{-1}[f(3)]$. _____.

(72) Find x, $0 \le x < 6$, if $3x - 1 \equiv 15 \pmod 7$. _____.

(73) Change .44, base 8 to a base 10 fraction. _____.

(74) The minimum value of $y = 3x^2 + 9$ is _____.

(75) $(3, \frac{3\pi}{2})$ are polar coordinates for (x y). y = _____.

(76) $f(x) = x^2$, $x > 0$, find $f^{-1}(x)$. _____.

(77) $\lim_{x \to 4} \frac{x^2 - 2x - 8}{x - 4}$ = _____.

(78) $\int_2^4 x^2 \, dx$ = _____.

(79) $f'(x) = 4x$, $f(x) = ax^2 + b$, find a. _____.

*(80) 142857×36 = _____.