The University Interscholastic League
Number Sense Test, Series VV-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) $631 - 136 =$ _____.

(2) $25 \times 31 =$ _____.

(3) $231 \div 9 =$ _____ (mixed number).

(4) $7 \times 13 + 13 \times 13 =$ _____.

(5) $32^2 =$ _____.

(6) $10\frac{2}{9} \div 5 =$ _____.

(7) $125\% =$ _____ (decimal).

(8) $.235 \times 10^2 \div 4 =$ _____.

(9) $3\frac{2}{5}\% =$ _____ (fraction).

*(10) $201 \times 199 + 100 =$ _____.

(11) $616 \div 11 =$ _____.

(12) $(67 + 213) \div 3$ has a remainder of _____.

(13) The smallest prime divisor of 48^2 is _____.

(14) $22 \times 13 =$ _____.

(15) The negative reciprocal of $\frac{3}{4}$ is _____.

(16) If 1 gram = .04 oz., 64 oz. = _____ grams.

(17) $33^2 - 31^2 = 4 x$ _____.

(18) Find the simple interest on $500 at 6% for 6 months.
$ _____.

(19) 55 pints = _____ quarts.

*(20) $(199 \times 201)^2 \div (198 \times 201) =$ _____.

(21) The GCD of 104 and 32 is _____.

(22) $1 + 2 + 2^2 + 2^3 + 2^4 =$ _____.

(23) $58 \times 62 =$ _____.

(24) The largest integer less than 89 which is relatively prime to 86 is _____.

(25) If A = 4, B = 5 and C = 6, then (ABC) + B = _____.

(26) $123_5 =$ _____ $_{10}$.

(27) If $\frac{3}{x} = \frac{x}{7}$, $x < 0$, then $x =$ _____.

(28) The smallest root of $x^2 + x - 2 = 0$ is _____.

(29) Find x, if $3x + 9 = 3$. $x =$ _____.

*(30) $36089 \div 239 =$ _____.

(31) The product of the roots of $2x^2 - 5x - 3 = 0$ is _____.

(32) $(10^3 - 1) \div (10 - 1) =$ _____.

(33) How many integers between 3 and 29 are divisible by 4? _____.

(34) Find x, if $x + y = 6$ and $y = 2x$. $x =$ _____.

(35) If the sum of the roots of $(x + 1)(x + 3)(x + k) = 0$ is -3. $k =$ _____.

(36) $.\overline{235} =$ _____ (fraction).

(37) The next term in the sequence 6,4,5,3,4,2,... is_____.

(38) The smallest value of x such that $|x + 1| = 7$ is _____.

(39) The area of an equilateral triangle with side 1 inch is _____ square inches.

*(40) $149 \times 21 \times 151 =$ _____.

(41) $4^3 - 1 =$ _____ (base 4).

(42) The smallest integer x such that $1 - x < 6$ is _____.

(43) $111 \times 43 =$ _____.

(44) Find x, if LCM of 8, 4 and x is 16 and their GCD is 2. _____.

(45) Find y, if $4^y \times 4^2 = 64$. y = _____.

(46) The ninth term in the sequence 2,5,8,11,... is_____.

(47) Find b, if $33_b = 15$. b = _____.

(48) A regular n-gon has an exterior angle of measure 6 degrees. n = _____ sides.

(49) The distance between the line x = 4 and the point (-2, -3) is _____.

*(50) $142857 \times 15 =$ _____.

(51) If $2^x = 8.57$, then $2^{x+1} =$ _____.

(52) The area of the ellipse $4x^2 + 2y^2 = 8$ is $k\pi$ and k = _____.

(53) Using the numeral 1988, write the largest 3-digit number possible using a digit only once. _____.

(54) $51 \times 1111 =$ _____.

(55) Find k so that the 3-digit number 4k2 is divisible by 6 and 9. k = _____.

(56) The sum of the squares of the roots of $x^2 - 5x + 6 = 0$ is _____.

(57) If $f(x) = x^2 + \log_3 x$, find f(9). _____.

(58) $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \ldots =$ _____.

(59) The third term in the expansion of $(x - y)^6$ is? _____.

*(60) $\sqrt{31} \quad \sqrt{450} =$ _____.

(61) $13875 \div 111 =$ _____.

(62) The probability of drawing a red king from a standard deck of 52 cards is _____.

(63) On the graph of $y = 2 - 4 \sin^2 x$, the amplitude is _____.

(64) $(2 + i)(3 - i) = a + bi$ and a = _____.

(65) If $f(x) = 4x$ and $g(x) = x - 1$, find f[g(3)]. _____.

(66) If $\det \begin{vmatrix} 1 & x \\ 3 & 4 \end{vmatrix} = 7$, then x = _____.

(67) If a triangle has sides of x, 5 and 7, then $x + 5 >$_____.

(68) Arcsin $(\frac{1}{2}) =$ _____ degrees.

(69) If x and y vary directly and x = 3 when y = 2, find x when y = 6. x = _____.

*(70) $201 \times 14 - 202 \times 16 =$ _____.

(71) Change .44, base 5, to a base ten fraction. _____.

(72) $(3, \frac{\pi}{4})$ are polar coordinates for (x,y). y = _____.

(73) The remainder when $f(x) = x^4 - 3x^2 + 1$ is divided by x - 2 is _____.

(74) Find x, $0 \le x \le 8$, if $x - 4 \equiv 17 \pmod 9$. _____.

(75) How many distinguishable permutations can you make using the letters, M, A, M, A ? _____.

(76) The horizontal asymptote for $y = 3^{x+1} + 2$ is y = _____.

(77) $\lim_{x \to 4} \frac{x^2 - 16}{x - 4} =$ _____.

(78) $\int_1^2 x^3 \, dx =$ _____.

(79) If $f'(x) = 2x + 1$ and $f(2) = 7$, find f(x). _____.

*(80) $.1\overline{5} \times 9 \times 10^3 =$ _____.