The University Interscholastic League
Number Sense Test, Series UU-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 only approximate 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) $24 \times 10 \div 2 + -2^0 =$ _____.

(2) Write in figures $1\frac{3}{8}$ million. _____.

(3) $1\frac{1}{2} \div 18 =$ _____.

(4) $18\frac{3}{4}\% =$ _____ (fraction).

(5) $8 \times 37\frac{1}{2} =$ _____.

(6) $57 \times 43 =$ _____.

(7) $627 \div 9 =$ _____ (mixed number).

(8) $115 \times 115 =$ _____.

(9) $9\frac{1}{11}\%$ of $671 =$ _____.

*(10) $268 \times 271 =$ _____ (Integer).

(11) $\sqrt{12\frac{1}{4}} =$ _____.

(12) $\frac{3}{5}$ of 4 feet 7 inches = _____ yard.

(13) $(4 \times 10 \times 7) \div (5 \times 21 \times 12) =$ _____.

(14) $\frac{1}{30} + \frac{1}{42} + \frac{1}{56} =$ _____ (fraction).

(15) If $66\frac{2}{3}\%$ of x is 84, then x = _____.

(16) $15 \times 25 \times 32 =$ _____.

(17) At $2.00 a yard, find the cost of fencing a garden 90' by 90'. $_____.

(18) $10 \times 7\frac{5}{12} =$ _____.

(19) The sum of the GCD and LCM of 12 and 21 is _____.

*(20) $96839 \div 179 =$ _____ (Integer).

(21) The product of the divisors of 6 is _____.

(22) $7\frac{1}{5} \times 7\frac{4}{5} =$ _____.

(23) What is the largest divisor of 150 which is less than 50? _____.

(24) $23_8 =$ _____ 2.

(25) $72 \times 32 =$ _____.

(26) If I buy pencils at $1.00 a dozen and sell them at 5 for 60 cents, how much will I make if I sell 60 pencils? $ _____.

(27) $49 \times 111 =$ _____.

(28) $.\overline{321} =$ _____ (fraction).

(29) The smaller root of $\sqrt{25 - x^2} = 3$ is _____.

*(30) $(42)^3 =$ _____ (Integer).

(31) If a 6" x 10" picture is decreased to 3" x 5", its area is multiplied by _____.

(32) $43_6 - 14_6 =$ _____ 6.

(33) The sum of the roots of $3x^2 - 6x + 12 = 0$ is _____.

(34) $\overline{2} + \overline{5} =$ _____ (fraction).

(35) If A = 3 and B = 8, then $\sqrt{AB} =$ _____.

(36) If it takes 3 men 4 days to do a job, how many days will it take 7 men to do it? _____ days.

(37) $4^8 \div 12$ has a remainder of _____.

(38) Find the next term of 2, 9, 28, 65, 126, ... _____.

(39) Find k in $3x^2 + (k - 5)x + 2k - 4 = 0$, so that the sum and product of the roots are equal. _____.

*(40) 139416 ÷ 111 = _____ (Integer).

(41) Two angles are supplementary and one is four times the other. The larger angle contains _____ degrees.

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

(43) The shortest distance between y = x and the point (2,0) is _____.

(44) $(625)^{1/4} =$ _____.

(45) The sum of the squares of the roots of $2x^2 - 2x + 3 = 0$ is _____.

(46) If $x^2 + 15^2 = 17^2$, x < 0, then x = _____.

(47) A regular octahedron has 8 congruent regions that have _____ sides.

(48) If the perimeter of an equilateral triangle increases from 3" to 15", its area is multiplied by _____.

(49) How many positive integers less than 28 are relatively prime to 28? _____.

*(50) 142857 x 42 = _____ (Integer).

(51) If y varies directly as the square of x and y = 4 when x = 3, find y when $x = \frac{3}{2}$. _____.

(52) $(1 + i) \div 2i = a + bi$ and b = _____.

(53) In the sequence $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \ldots, \frac{1}{128}$ is the _____ term.

(54) $\log_4 \sqrt{2} =$ _____.

(55) $(2 + i)^3 = a + bi$ and a = _____.

(56) How many distinct diagonals does a regular hexagon have? _____.

(57) $22 \frac{ft}{sec} =$ _____ mph.

(58) The coefficient of the 3rd term in the expansion of $(x + \frac{1}{2})^4$ is _____.

(59) $(23_5)^2 =$ _____$_{10}$.

*(60) $(10\pi^2 - 1)^2 =$ _____ (Integer).

(61) If cot A = 2, sin A > 0, then csc A = _____.

(62) How many distinguishable permutations can you make using the letters G,O,O,D? _____.

(63) In the triangle with sides 4, 6 and 8, the area is _____.

(64) $[-1 \ 4] \times \begin{bmatrix} 2 \\ 3 \end{bmatrix} = [$ _____ $]$.

(65) A box contains 4 red and 6 black balls. Two balls are drawn without replacement. Find the probability that one is red and one is black. _____.

(66) $\cos(\text{Tan}^{-1} 1) =$ _____.

(67) Two dice are rolled. Find the probability that neither a sum of 7, 8 or 12 will show. _____.

(68) If $\det \begin{vmatrix} x & 1 \\ 2x & 1 \end{vmatrix} = 4$, then x = _____.

(69) ${}_6C_3 + {}_6C_4 = {}_nC_4$, n = _____.

*(70) 128 x 210 + 29 x 209 = _____ (Integer).

(71) If $f^{-1}(3) = 2$, then f (2) = _____.

(72) Change .25, base 6, to a base ten fraction. _____.

(73) The remainder when $f(x) = 2x^2 + 11x - 3$ is divided by 2x - 1 is _____.

(74) Find x, $0 \le x < 7$, such that $3x \equiv 29 \pmod 7$. _____.

(75) $\lim_{x \to 3} \frac{x^2 - 7}{x + 1} =$ _____.

(76) $f(x) = (2x + 1)^2$, find f' (x). _____.

(77) f' (x) = 3x, $f(x) = ax^2 + b$, find a. _____.

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

(79) Tank A holds 20% more than tank B and tank C holds 10% less than tank B. What percent less does C hold than A? _____ %.

*(80) 32 x 111 + 1111 x 160 = _____ (Integer).