The University Interscholastic League

Number Sense Test, Series TT-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) $9781 + 1987 =$ _____.

(2) $1.21 \times 10^3 - 57 =$ _____.

(3) $85 \times 65 =$ _____.

(4) $15 + 6\ 2/3\ \% =$ _____.

(5) $208 = 14 \times 14 +$ _____.

(6) $37^2 =$ _____.

(7) $15 \times 62 =$ _____.

(8) $3/40 =$ _____ %.

(9) $111 \times 235 =$ _____.

*(10) $151 \times 151 + 99 =$ _____ (Integer).

(11) 3/4 of 6 feet 4 inches = _____ in.

(12) $96 \times 92 =$ _____.

(13) 54 = 37 1/2% of _____.

(14) $(18 \times 60) \div (12 \times 3) =$ _____.

(15) What is the largest value of x, such that 100 is the LCM of 10, 20 and 4x? _____.

(16) If eight balls cost $18.00, how much do two balls cost? $ _____.

(17) 18 2/11% of 1331 = _____.

(18) Which is larger, 11/38 or 2/7? _____.

(19) 252 sq. in. = _____ square feet.

*(20) $833800 \div 379 =$ _____ (Integer).

(21) If $2^x - 2 = 14$, then x = _____.

(22) $231_6 - 42_6 =$ _____ 6.

(23) The discriminant of $3x^2 - 5x + 2 = 0$ is _____.

(24) $(3 \times 19 + 5) + 9$ has a remainder of _____.

(25) How many integers between 6 and 49 are divisible by 7? _____.

(26) $F(x) = (x + 2)^3 + 3$. Evaluate F(3). _____.

(27) Change 42, base 7, to base 8. _____ 8.

(28) $1111 \times 412 =$ _____.

(29) The larger root of $2x^2 + 3x + 1 = 0$ is _____.

*(30) $150 \times 170 \times 160 =$ _____ (Integer).

(31) The geometric mean of 37 and 43 is $\sqrt{a}$. a = _____.

(32) $36 \times 24 - 16 \times 24 =$ _____.

(33) How many integers between 1 and 62 are positive integral powers of 2? _____.

(34) $(43_5)(4_5) =$ _____ 5.

(35) A rectangle's sides are in the ratio 5:4. The long side is 12 and the short side is _____.

(36) $725483 \div 1111 =$ _____.

(37) The smallest fraction greater than each of: .027, .02727, .0272727, . . . is _____.

(38) Find y, if $3x = y$ and $x + y = 6$. _____.

(39) The next term in the sequence 2, 5, 11, 23, 47, . . . is _____.

*(40) $39 \times 110 + 109 \times 109 =$ _____ (Integer).

(41) The sum of the interior angles of a regular hexagon is _____ degrees.

(42) Find x, if $2^{3x} = 32$. _____.

(43) The side opposite 60° in a right triangle with hypotenuse 6" is _____ in.

(44) $(1/8)^{-2/3}$ = _____.

(45) The smallest positive integer x, such that $|x + 1| > 5$ is _____.

(46) If $2^x = 20.7$, then 2^{x+1} = _____.

(47) The distance from (1,2) to (5,4) is $b\sqrt{a}$. a = _____.

(48) If 44 is in base 8, then its square root in base 8 is _____.

(49) What is the length of the tangent to a circle from a point 26" from the center, if the diameter is 20"? _____ inches.

*(50) $\sqrt{907256}$ = _____ (Integer).

(51) $(3 + 2i)^2 = a + bi$. b= _____.

(52) $1^2 + 2^2 + 3^2 + 4^2 + 5^2$ = _____.

(53) If log 4 = .6, then log 16 = _____.

(54) The coefficient of x^2y^3 term in the expansion of $(2x - y)^5$ is _____.

(55) Two dice are tossed. What is the probability that the sum of the faces is 7? _____.

(56) How many 3-digit numbers are divisible by 5? _____.

(57) log x - log 4 = log 5. x = _____.

(58) How many different sets of three books can be selected from nine distinct books? _____.

(59) The area of the ellipse $16x^2 + 4y^2 = 64$ is aπ. a= _____.

*(60) π^3 = _____ (Integer).

(61) The surface area of a sphere with radius 8 is aπ. a= _____.

(62) $1 - \sin^2 60°$ = _____.

(63) If $\log_2 4 = \log_6 x$, then x = _____.

(64) The volume of a cone is 12π and its height is 9. The radius of the base is _____.

(65) sin(Arcsin 1/4) = _____.

(66) 10 + 4 + 8/5 + 16/25 + . . . = _____.

(67) Suppose sin .3 = .3. What is csc .3? _____.

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

(69) If $f(x) = 2^x - 1$ and $g(x) = 3$, find f[g(x)]. _____.

*(70) 142857 x 16 = _____ (Integer).

(71) Change .22, base 4, to a base ten decimal. _____.

(72) $(4, \pi/4)$ are polar coordinates for (x,y). y = _____.

(73) Find x, $0 \le x < 6$, such that $3 + x \equiv 10 \pmod 6$. _____.

(74) $\lim_{x \to \infty} \frac{4x + 3}{x - 1}$ = _____.

(75) $F(x) = x^3 + (x + 2)^2$, find $F''(x)$. _____.

(76) The slope of the line tangent to $f(x) = 3x^2 + 4x + 2$ at $f(-1) = 1$ is _____.

(77) $f(x) = 3x - 2$, find $f^{-1}(x)$. _____.

(78) The maximum value of $f(x) = -2x^2 + 4x + 1$ is _____.

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

*(80) The perimeter of the ellipse $50x^2 + 22y^2 = 1100$ is _____ (Integer).