The University Interscholastic League
Number Sense Test • HS SAC • 2014

Final _____ _____

Contestant's Number _____ 2nd _____ _____

1st _____ _____

Score **Initials**

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 percent 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) $913 + 2014 =$ _____

(2) $11.15 - 2.014 =$ _____ **(decimal)**

(3) $80 \times 25 =$ _____

(4) $2015 \div 5 =$ _____

(5) $37.5\% =$ _____ **(proper fraction)**

(6) $11 \times (120 - 15) + 27 \div 9 =$ _____

(7) $3\frac{4}{5} - 2\frac{3}{4} =$ _____ **(mixed number)**

(8) $17^2 =$ _____

(9) 9272014 ÷ 11 has a remainder of _____

***(10)** $913 + 927 + 111 + 1115 =$ _____

(11) 5.76 is 24% of _____

(12) DCCLXXIV = _____ **(Arabic Numeral)**

(13) $27 \times 13 =$ _____

(14) $9\frac{1}{3} + 11\frac{1}{5} =$ _____ **(mixed number)**

(15) $1 + 2 + 3 + 4 + \ldots + 39 =$ _____

(16) 1 gallon + 1 quart + 1 pint = _____ fluid ounces

(17) $9 \times 13 + 9 \times 27 =$ _____

(18) If 7 YIPS cost $6.37 then 21 YIPS cost $_____

(19) The multiplicative inverse of 1.8333... is _____

***(20)** $1115111 \div 2015 =$ _____

(21) $3^2 + 9^2 =$ _____

(22) $(12 \times 15 + 18) \div 8$ has a remainder of _____

(23) Convert 53 base 10 to base 7. _____$_7$

(24) 0.0625 ÷ 0.08333... = _____ **(decimal)**

(25) If 6 ⋈ s cost $5.50 then 9 ⋈ s cost $ _____

(26) $2\frac{4}{5} \times 3\frac{1}{8} =$ _____ **(mixed number)**

(27) The number of positive integral divisors of 60 is __

(28) If $f(x) = x^3 + 3x^2 + 3x + 1$ then f(9) is _____

(29) Set A has 5 elements and set B has 8 elements. If $A \cap B$ has 3 elements, then $A \cup B$ has ___ elements

***(30)** $\sqrt{913} \times 927 =$ _____

(31) $2014 \times 15 =$ _____

(32) $5! - 4! + 3! - 2! =$ _____

(33) How many subsets containing only 3 elements does the set {n,u,m,b,e,r} have? _____

(34) $1115_6 + 2014_6$ = _____ 6

(35) $|2x - 3| = 5$. Find x, where $x \leq 0$. _____

(36) If x = 7 and y = 11 then $x^2 + 2xy + y^2$ = _____

(37) Find k if $17^2 - 13^2 = 4k$. k = _____

(38) $3\frac{1}{8} \div 3\frac{3}{4}$ = _____

(39) If $x + (x + 4) + (x + 8) + (x + 12) + (x + 16) = 50$ then $(x + 8)$ = _____

*(40) $1115 \times 2014 \div 111$ = _____

(41) 9% of $133\frac{1}{3}$ = _____

(42) The sum of the roots of $x^2 + 6x + 9 = 0$ is _____

(43) $54 \times 0.555...$ = _____

(44) If $A^k \div A^4 \times A^{-6} = A^8$ and $A > 1$, then k = ____

(45) The point (4, 2) is reflected across the line y = 3 to the point (h, k). Find h + k. _____

(46) $1 + 5 + 6 + 11 + 17 + 28 + 45 + 73$ = _____

(47) If x + y = 2 and x − y = 5 then y = _____

(48) $(1 + 2i)(3 - 4i) = a + bi$. Find a + b. _____

(49) A right triangle has a base of 12" and a hypotenuse of 13". What is the length of the altitude? _____ in

*(50) $\sqrt{13270115}$ = _____

(51) ${}_5C_3$ = _____

(52) If $\log_4(x) = 2.5$ then x = _____

(53) The coefficient of the xy term when $(2x + 3y)^2$ is expanded is _____

(54) $9 + 6 + 4 + 2.666... + 1.777... + ...$ = _____

(55) $232_8 \div 7_8$ = _____ 8

(56) The first 4 digits of the decimal of $\frac{23}{99}$ is 0._____

(57) The smaller root of $x^2 - 5x + 6 = 0$ is _____

(58) 302×203 = _____

(59) The probability of randomly selecting a Fibonacci number from the set of odd digits is _____%

*(60) $11^3 \div 22^2 \times 33$ = _____

(61) $\sin(30°) + \cos(60°) + \tan(45°)$ = _____

(62) 112×108 = _____

(63) Change $0.5333..._6$ to a base 6 fraction. _____ 6

(64) The frequency of $y = 1 - 2\sin 3\pi(4\theta - 5)$ is _____

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

(66) $f(x) = x^2 - 3$ and $g(x) = 1 - 3x$. f(g(2)) = _____

(67) If $\ln(40) = \ln(5) + k\ln(2)$, then k = _____

(68) The determinant of $\begin{bmatrix} -1 & -2 \\ 1 & 3 \end{bmatrix}$ is _____

(69) If $f(x) = \frac{3 - 2x}{4}$, then $f^{-1}(1)$ = _____

*(70) The surface area of a sphere with a diameter of 6 inches is _____ sq. inches

(71) $F(x) = x^3 + 3x^2 + 3x + 1$. Find $F'(1)$. _____

(72) The base of a triangle is 27". If the altitude is increased from 13" to 17", the corresponding increase in the area is _____ sq. in.

(73) The harmonic mean of the roots of $x^3 - 7x^2 + 14x - 8 = 0$ is _____

(74) Let $\frac{6!}{4!} = \frac{x!}{(x-1)!}$. Find x. _____

(75) $\int_{-1}^{1} (x + 1)\,dx$ = _____

(76) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\sqrt{2} + \sqrt{3} + \sqrt{5}\right]$. _____

(77) The first *perfect* number is _____

(78) GCD(k, 15) = 3. LCM(k, 15) = 135. k = _____

(79) $11_2 + 33_4$ = _____ 8

*(80) $\sqrt[3]{9132014}$ = _____