The University Interscholastic League
Number Sense Test • HS SAC • 2024

Final _____ _____
2nd _____ _____
1st _____ _____
Score Initials

Contestant's Number _____

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) $2002 + 2025 - 23 =$ _____

(2) $25 \times 23 =$ _____

(3) $\frac{3}{8} \div \frac{4}{9} =$ _____

(4) $33\frac{1}{3}\%$ of 2.4 = _____ (proper fraction)

(5) $1 + 3 \times 6 \times 10 \div 15 - 21 =$ _____

(6) $24^2 =$ _____

(7) 2024 ÷ 4 has a remainder of _____

(8) $2\frac{3}{4}$ minutes = _____ (seconds)

(9) The sum of the proper factors of 6 is _____

***(10)** $239 \times 240 =$ _____

(11) $12\frac{1}{2}\% =$ _____ (fraction)

(12) $3\frac{2}{5} + 2\frac{1}{4} =$ _____ (mixed number)

(13) If 4 ounces of mixed nuts sells for $2.40, what will one pound of mixed nuts cost? $ _____

(14) $23 + 45 + 67 =$ _____

(15) $27^2 - 23^2 = 20 \times$ _____

(16) The smallest prime number greater than 24 is ____

(17) $94 \times 103 =$ _____

(18) $1207 \times 7 - 49 =$ _____

(19) GCD(16, x) = 2, LCM(16, x) = 144, and x = _____

***(20)** $\sqrt{57575} + 57.5 =$ _____

(21) If A = — 2, B = 3, and C = 5, then $A \div (B - C)^2 =$ _____

(22) 0.333... + 0.5 + 0.8333... = _____

(23) Write one and one-fourth million twenty-four in digits. _____

(24) $[20^6 - 3 \times 15] \div 4$ has a remainder of _____

(25) $7\frac{2}{5} \times 7\frac{3}{5} =$ _____ (mixed number)

(26) $5.40 + $4.05 + $.54 = $ _____

(27) $5.04 + $4.05 + $.45 = $ _____

(28) $5.14 + $4.15 + $1.54 = $ _____

(29) The 14^{th} term of 1, 3, 6, 10, 15, ..., 136, ... is _____

***(30)** 516200 ÷ 178 = _____

(31) $3\frac{2}{5} - 2\frac{1}{4} =$ _____ (mixed number)

(32) If $x + (x + 2) + (x + 4) + (x + 6) + (x + 8) = 40$, then $(x + 4) =$ _____

(33) $(2^3 + 5^3) \div 7$ has a remainder of _____

(34) $42 \times 47 =$ _____

(35) If $f(x) = x^2 - 8x + 16$, then $f(28) =$ _____

(36) $136_8 =$ _____ 10

(37) How many subsets containing the element 3 are there in {1, 2, 3}? _____

(38) $\sqrt[3]{13824} =$ _____

(39) 6% of $233\frac{1}{3} =$ _____

***(40)** $142857 \div 18 =$ _____

(41) $(3x - 5)^2 = ax^2 + bx + c$ and $a + b + c =$ _____

(42) $23_4 \times 3_4 + 123_4 =$ _____ 4

(43) The point (2, 1) is reflected across the y-axis to the point (h, k). Find $h + k$. _____

(44) $37^2 + 67^2 =$ _____

(45) $83^2 + 23^2 =$ _____

(46) $39^2 + 40^2 =$ _____

(47) 34 base 6 x 10 base 6 = _____ base 6

(48) 34 base 6 x 11 base 6 = _____ base 6

(49) 34 base 6 x 12 base 6 = _____ base 6

***(50)** 5 "leagues of land" in Texas is _____ acres

(51) $(7^3 - 5^3) \div (7 - 5) =$ _____

(52) $1 + 4 + 5 + 9 + 14 + 23 + 37 + 60 + 97 + 157 + 254 + 411 =$ _____

(53) $2 + \frac{1}{4} + \frac{1}{32} + \frac{1}{256} + \ldots =$ _____

(54) $(49)^{1.5} =$ _____

(55) $13^{16} \div 31$ has a remainder of _____

(56) A single card is drawn from a standard deck of cards. If it is a king, find the probability that it is a red king. _____%

(57) $4^B + 4B = 76$ and $B^4 =$ _____

(58) The smallest positive perfect number is _____

(59) The perimeter of a square is increased from 12 cm to 16 cm. Find the corresponding increase in its area. _____ cm^2

***(60)** If 200 Euros equals 217.82 dollars, then 625 Euros equals _____ dollars

(61) Let $\frac{7!}{5!} = \frac{x!}{(x-1)!}$. Find x. _____

(62) 22 feet per second = _____ miles per hour

(63) Which of the following is not a perfect number, 6, 24, 28? _____

(64) If $\frac{3x-2}{x-4} - \frac{2x+3}{x+5} = \frac{ax^2+bx+c}{dx^2+ex+f}$, then $a + b + c + d + e + f =$ _____

(65) Let $3x - y = 3$ and $x + y = 5$. Find $3x + y$. _____

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

(67) $1234 \times 14 =$ _____

(68) Change $0.2131313..._4$ to a base 4 fraction. _____4

(69) If $2\sin(20°) = k\sin(10°)\cos(10°)$, then k = _____

***(70)** The volume of a hemisphere with radius 12 cm is _____ cubic cm

(71) Let $f(x) = \frac{3}{4} - \frac{2x}{5}$. If $f^{-1}(x) = ax + b$, then a = ___

(72) $35^2 \bmod 8 =$ _____

(73) $204_5 \div 3_5 =$ _____ 10

(74) Let $h(x) = (2x + 1)^3$. Find $h'(-1)$. _____

(75) $\text{Log}_5 \sqrt{125} =$ _____

(76) $\int_1^2 \int_2^3 xy \, dxdy =$ _____

(77) $1^3 - 1^3 + 2^3 - 3^3 + 5^3 =$ _____

(78) Given: 1, 1, 3, 5, 9, 15, k, 41, ... k = _____

(79) $2024 \times 12 =$ _____

***(80)** $\sqrt[4]{11359152541} =$ _____