The University Interscholastic League
Number Sense Test • HS District • 2025

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) _____ **— 429 = 2025**

(2) $24 \times 25 =$ _____

(3) $2429 \div 6 =$ _____ **(mixed number)**

(4) $4\frac{2}{9} + 20\frac{2}{5} =$ _____ **(mixed number)**

(5) $4\frac{1}{4}\% =$ _____ **(decimal)**

(6) $0.0625 =$ _____ **(fraction)**

(7) $42.9 \times 10^2 - 25 =$ _____

(8) $4\frac{1}{2}$ **minutes =** _____ **(seconds)**

(9) $4 \times 6 \div 8 + 9 \times 10 - 12 =$ _____

***(10)** $292.5 \times 42.4 =$ _____

(11) $24 + 53 + 82 + 111 + 140 =$ _____

(12) GCD 34 and 51 is _____

(13) 2429 ÷ 4 has a remainder of _____

(14) If almonds sell for $1.60 an ounce, what will a pound of almonds cost? $ _____

(15) $93 \times 102 =$ _____

(16) $\$4.24 + \$4.29 + \$20.25 = \$$ _____

(17) $\$4.24 - \$4.29 + \$20.25 = \$$ _____

(18) $\$4.20 + \$4.33 + \$20.47 = \$$ _____

(19) MMCDXXIX — XV = _____ **(Arabic Numeral)**

***(20)** $\sqrt{242} \times \sqrt{925} =$ _____

(21) If $A^4 \times A^{-2} \div A^9 = A^k$ **and** $A > 1$**, then k =** _____

(22) $1492 \times 8 + 64 =$ _____

(23) $6^3 + \sqrt[3]{729} =$ _____

(24) $[24 + 29 \times 20 - 25] \div 7$ **has a remainder of** _____

(25) $5\frac{4}{5} \times 5\frac{1}{5} =$ _____ **(mixed number)**

(26) 24 base 6 is written as _____ **base 9**

(27) $[\{f, o, u, r\} \cup \{f, i, v, e\}] \cap \{e, i, g, h, t\}$ **contains how many distinct elements?** _____

(28) One and a fourth million plus two thousand nine hundred twenty-five is _____

(29) $53^2 + 57^2 =$ _____

***(30)** $520292 \div 424 =$ _____

(31) 24% **of** $266\frac{2}{3} =$ _____

(32) $(3^5 + 6^5) \div 9$ **has a remainder of** _____

(33) The quadratic equation, $9x^2 - 6x + k = 0$**, has two equal roots. Find k.** _____

(34) The 16^{th} **term of the sequence 1, 3, 6, 10, 15, ... is 136. The** 15^{th} **term is** _____

(35) Let $5x + y = 8$ and $2x + y = 4$. Find y. _____

(36) If $f(x) = x^2 + 14x + 49$, then $f(13) =$ _____

(37) Set A = {4, 2, 4, 2, 9, 2, 0, 2, 5). The range of set A minus the mode of set A is _____

(38) $\sqrt[3]{6859} =$ _____

(39) 0.9222... = _____ (proper fraction)

*(40) The circumference of a circle is 424 cm. The area of the circle is _____ sq. cm

(41) $(2x - 9)^2 = ax^2 + bx + c$ and $a + b + c =$ _____

(42) Find x, if $4^{3x} = 256$. _____

(43) $9^B + 3B = 87$ and $B^9 =$ _____

(44) $429 \times 13 =$ _____

(45) $23^2 + 73^2 =$ _____

(46) $(8^3 - 11^3) \div (8 - 11) =$ _____

(47) 424 base 9 × 2 base 9 = _____ base 9

(48) 424 base 9 × 2 base 9 + 25 base 9 = _____ base 9

(49) 424 base 9 × 3 base 9 + 25 base 9 = _____ base 9

*(50) $4\frac{3}{4}$ "leagues of land" in Texas is _____ acres

(51) $2 + 9 + 11 + 20 + 31 + 51 + 82 + 133 + 215 + 348 + 563 =$ _____

(52) If a 4" by 8" picture is enlarged to a 12" by 24" picture, its perimeter is multiplied by _____

(53) How many integers greater than 1 and less than 29 are relatively prime to 29? _____

(54) $\left(\frac{1}{3} + \frac{1}{6} + \frac{1}{10} + ... + \frac{1}{45} + \frac{1}{55}\right) \times 99 =$ _____

(55) $11^{44} \div 29$ has a remainder of _____

(56) The point $(-2, -9)$ is reflected across the line $y = x$ to the point (h, k). Find $h - k$. _____

(57) The sum of the digits of a 3-digit number is 8. How many such numbers exist? _____

(58) $2025_8 \div 7_8$ has a remainder of _____

(59) The multiplicative inverse of 0.91666... is _____

*(60) If $10.00 can buy 1564.69 yen, then $2429.00 can buy _____ yen

(61) If $\frac{2x+9}{2x} + \frac{2x+4}{2x-5} = \frac{ax^2+bx+c}{dx^2+ex+f}$, then $(a + b + c) \div (d + e + f) =$ _____

(62) $\text{Arccsc}(-2) = k\pi$ rads and k = _____

(63) $6 = 110_2$, $28 = 11100_2$, and 496 = _____ 2

(64) Change $0.13444..._6$ to a base 6 fraction. _____6

(65) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\sqrt{2} + \sqrt{3} + \sqrt{5} + \sqrt{7}\right]$. ____

(66) If $A = \begin{bmatrix} 1 & 0 & 1 \\ 2 & 3 & 5 \\ 4 & 6 & 8 \end{bmatrix}$, then $|A| =$ _____

(67) Let $i^{(19)} = a\sqrt{b}$. Find b — a. _____

(68) If $\sqrt{16 - \sqrt{18\sqrt{20 - 22x}}} = 2$, then x = _____

(69) Two dice are thrown. What are the odds that their sum is divisible by 4? _____

*(70) $\sqrt[3]{424292025} =$ _____

(71) The directrix of $x = y^2$ is x = _____

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

(73) If $f(x) = \frac{4x+24}{29}$ and $f^{-1}(x) = ax + b$, then b = ___

(74) The initial point of vector v is (2, 3) and the terminal point is (5, — 7). If $||v|| = k$, then $k^2 =$ ___

(75) Let $h(x) = (2x + 3)^4$. Find $h'(-5)$. _____

(76) $\int_0^1 \int_1^2 xy \, dydx =$ _____

(77) 440 feet per second = _____ miles per hour

(78) Given: 2, 8, 18, 32, k, 72, ... Find k. _____

(79) $\lim_{x \to \infty} \left(\frac{x-1}{x^2+5}\right) =$ _____

*(80) 42925 *varas* (Texas) = _____ yards

DO NOT DISTRIBUTE TO STUDENTS BEFORE OR DURING THE CONTEST

University Interscholastic League - Number Sense Answer Key HS ● District ● 2025

***number) x — y means an integer between x and y inclusive**

NOTE: If an answer is of the type like $\frac{2}{3}$ it cannot be written as a repeating decimal

(1) 2,454

(2) 600

(3) $404\frac{5}{6}$

(4) $24\frac{28}{45}$

(5) .0425

(6) $\frac{1}{16}$

(7) 4,265

(8) 270

(9) 81

***(10) 11,782 — 13,022**

(11) 410

(12) 17

(13) 1

(14) 25.60

(15) 9,486

(16) 28.78

(17) 20.20

(18) 29.00

(19) 2,414

***(20) 450 — 496**

(21) — 7

(22) 12,000

(23) 225

(24) 5

(25) $30\frac{4}{25}$

(26) 17

(27) 2

(28) 1,252,925

(29) 6,058

***(30) 1,166 — 1,288**

(31) 64

(32) 0

(33) 1

(34) 120

(35) $\frac{4}{3}, 1\frac{1}{3}$

(36) 400

(37) 7

(38) 19

(39) $\frac{83}{90}$

***(40) 13,591 — 15,021**

(41) 49

(42) $\frac{4}{3}, 1\frac{1}{3}$

(43) 512

(44) 5,577

(45) 5,858

(46) 273

(47) 848

(48) 874

(49) 1408

***(50) 19,984 — 22,086**

(51) 1,465

(52) 3

(53) 27

(54) 81

(55) 24

(56) — 7

(57) 36

(58) 2

(59) $\frac{12}{11}, 1\frac{1}{11}$

***(60) 361,061 — 399,066**

(61) 3.5, $\frac{7}{2}, 3\frac{1}{2}$

(62) $-\frac{1}{6}$

(63) 111110000

(64) $\frac{121}{500}$

(65) 8

(66) — 6

(67) 0

(68) — 2

(69) $\frac{1}{3}$

***(70) 714 — 789**

(71) $-.25, -\frac{1}{4}$

(72) $-1.5625, -\frac{25}{16}, -1\frac{9}{16}$

(73) — 6

(74) 109

(75) — 2,744

(76) .75, $\frac{3}{4}$

(77) 300

(78) 50

(79) 0

***(80) 37,759 — 41,732**