# The University Interscholastic League
# Number Sense Test ● HS SAC ● 2022

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)** $631 - 136 =$ _____

**(2)** $341 + 789 =$ _____

**(3)** $1.4 \div 2\frac{1}{3} =$ _____ **(decimal)**

**(4)** $\frac{7}{9} \times 8 =$ _____ **(mixed number)**

**(5)** $16^2 =$ _____

**(6)** $10^0 + 10 - 2 =$ _____

**(7)** $32 + 8 \times 2 - 4 \times 8 =$ _____

**(8)** $125\% =$ _____ **(improper fraction)**

**(9)** $33 \times 41 + 57 \times 41 =$ _____

***(10)** $121 \times (121 + 129) =$ _____

**(11)** $32 \times 41 =$ _____

**(12)** The LCM of 24, 8, and 16 is _____

**(13)** $6\frac{1}{4}\%$ of 1200 is _____

**(14)** The smallest prime divisor of $48^2$ is _____

**(15)** $1023 \div 9$ has a remainder of _____

**(16)** If 3 dozen eggs cost $18.90, then 4 eggs will cost $ _____

**(17)** $33^2 - 31^2 = 4 \times$ _____

**(18)** $15 \times 68 =$ _____

**(19)** 1 gram = .04 oz. and 64 oz. = _____ grams

***(20)** $910 \times 1001 - 1029 \times 1105 =$ _____

**(21)** $511 \div 9 =$ _____ **(mixed number)**

**(22)** 60 is divisble by _____ positive prime integers

**(23)** Let A = 3, B = 4, and C = 6. Find $B^2 + AC$. _____

**(24)** $1697 \times 3 + 9 =$ _____

**(25)** $7\frac{1}{4} \times 7\frac{3}{4} =$ _____

**(26)** Find x, if $3x + 9 = 3$. x = _____

**(27)** 53 x 53 = _____

**(28)** $45551 \div 101 =$ _____

**(29)** $123_5 =$ _____ 10

***(30)** $\sqrt{101295} =$ _____

**(31)** $(10^3 - 1) \div (10 - 1) =$ _____

**(32)** $\frac{1}{2} - (\frac{1}{3} + \frac{1}{4}) =$ _____

**(33)** $[15 + 3 \times 8 + 6] \div 7$ has a remainder of _____

**(34)** The sum of three consecutive integers is 144. The middle number is _____

(35) Given: 0, 1, 4, 6, 8, p, r, 12, 14,... . $p + r =$ _____

(36) $4\frac{3}{5} \times 5\frac{3}{4} =$ _____

(37) How many integers between 1 and 20 are relatively prime to 20? _____

(38) $8^2 \div 4^2 \times 2^2 =$ _____

(39) 36 people ordered tea, 29 ordered coffee, and 15 ordered both. How many people were there? _____

*(40) $549822 \div 741 =$ _____

(41) $93 \times 98 =$ _____

(42) The product of the roots of $x^3 + 6x^2 + 12x + 8 = 0$ is _____

(43) Let $(12)^{(1.5)} = a\sqrt{b}$. Find a. _____

(44) 0.1666... + 0.333... = _____ (fraction)

(45) If $x + 3 > 7$, then $x - 2 >$ _____

(46) $4^3 - 1 =$ _____ 4

(47) Let $7\frac{7}{m} \times n\frac{7}{11} = 28$, where m, n are natural numbers. Find m — n. _____

(48) 256 has how many positive integral divisors? _____

(49) $28 \times \frac{27}{29} =$ _____ (mixed number)

*(50) $142857 \times 15 =$ _____

(51) $54^2 - 55^2 =$ _____

(52) $23_5 \times 4_5 - 132_5 =$ _____ 5

(53) If $2^x = 8.5$, then $2^{(x+1)} =$ _____

(54) $\log_4(32) \div \log_4(2) =$ _____

(55) $(3 + 7 + 10 + 17 + 27 + 44) +$ $(71 + 115 + 186 + 301) =$ _____

(56) Find the probability that an integer picked at random between 20 and 30 is divisable by 4. _____

(57) $21^{22} \div 23$ has a remainder of _____

(58) The vertex of the parabola $y = x^2 - 6x + 1$ is (h, k). h = _____

(59) If $\sum_{k=1}^{n} (-1)^k(k^2) = -45$, then n = _____

*(60) An angle of 11 radians = _____ degrees

(61) $22 \times 4! + 32 \times 3! =$ _____

(62) $\sqrt{8} + \sqrt{18} = \sqrt{x}$. x = _____

(63) The harmonic mean of $\frac{1}{2}$, 1, and 4 is _____

(64) The det $\begin{vmatrix} 1 & 3 \\ x & 2 \end{vmatrix}$ = det $\begin{vmatrix} 4 & 1 \\ 5 & 1 \end{vmatrix}$ and x = _____

(65) If f(x) = 4x and g(x) = x — 1, then f(g(— 3) = _____

(66) A circular based can, 4" high, holds 12 ounces. A similar can, 2" high, holds _____ ounces

(67) $(0 + i)^{38} =$ _____

(68) Change $\frac{9}{16}$ to a base 4 decimal. _____ 4

(69) $\sin\left(\text{Arcsin } \frac{4}{5}\right) =$ _____

*(70) $\sqrt[3]{9101011} =$ _____

(71) If xy = 3 and $x + y = 6$ then $x^3 + y^3 =$ _____

(72) $(3, \frac{\pi}{6})$ are polar coordinates for (x, y). y = _____

(73) Find x, $9 \leq x \leq 17$, if $2x + 1 \cong 25 \pmod 9$. _____

(74) Let $f'(x) = 2x$ and f(0) = 1. Find f(1). _____

(75) $\lim_{x \to 2} \frac{x^2 - 4}{x - 2} =$ _____

(76) $\int_1^4 (-x)\, dx =$ _____

(77) The slope of the line tangent to $y = 3x^3 + 1$ at the point (2, 25) is _____

(78) Given: 1, 2, 3, 4, 6, 5, k, — 2, — 11,... . k = _____

(79) If the fourth term in the expansion of $(x - y)^6$ is $cx^ay^b$, then $a + b + c =$ _____

*(80) $0.1555... \times 9 \times 10^3 =$ _____

**University Interscholastic League - Number Sense Answer Key HS ● SAC ● Fall 2022**

***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) 495**

**(2) 1,130**

**(3) .6**

**(4) $6\frac{2}{9}$**

**(5) 256**

**(6) 9**

**(7) 16**

**(8) $\frac{5}{4}$**

**(9) 3,690**

***(10) 28,738 — 31,762**

**(11) 1,312**

**(12) 48**

**(13) 75**

**(14) 2**

**(15) 6**

**(16) 2.10**

**(17) 32**

**(18) 1,020**

**(19) 1,600**

***(20) — 237,441 — — 214,829**

**(21) $56\frac{7}{9}$**

**(22) 3**

**(23) 34**

**(24) 5,100**

**(25) 56.1875, $\frac{899}{16}$, $56\frac{3}{16}$**

**(26) — 2**

**(27) 2,809**

**(28) 451**

**(29) 38**

***(30) 303 — 334**

**(31) 111**

**(32) — $\frac{1}{12}$**

**(33) 3**

**(34) 48**

**(35) 19**

**(36) 26.45, $\frac{529}{20}$, $26\frac{9}{20}$**

**(37) 7**

**(38) 16**

**(39) 50**

***(40) 705 — 779**

**(41) 9,114**

**(42) — 8**

**(43) 24**

**(44) $\frac{1}{2}$**

**(45) 2**

**(46) 333**

**(47) 7**

**(48) 9**

**(49) $26\frac{2}{29}$**

***(50) 2,035,713 — 2,249,997**

**(51) — 109**

**(52) 20**

**(53) 17**

**(54) 5**

**(55) 781**

**(56) $\frac{2}{9}$**

**(57) 1**

**(58) 3**

**(59) 9**

***(60) 599 — 661**

**(61) 720**

**(62) 50**

**(63) $\frac{12}{13}$**

**(64) 1**

**(65) — 16**

**(66) 1.5, $\frac{3}{2}$, $1\frac{1}{2}$**

**(67) — 1**

**(68) .21**

**(69) .8, $\frac{4}{5}$**

***(70) 199 — 219**

**(71) 162**

**(72) 1.5, $\frac{3}{2}$, $1\frac{1}{2}$**

**(73) 12**

**(74) 2**

**(75) 4**

**(76) $-7.5, -\frac{15}{2}, -7\frac{1}{2}$**

**(77) 36**

**(78) 4**

**(79) — 14**

***(80) 1,330 — 1,470**