The University Interscholastic League
Number Sense Test • HS A • 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.

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STOP -- WAIT FOR SIGNAL!

(1) $11030 + 2025 =$ _____

(2) $\frac{1}{10} \div 0.4 =$ _____

(3) $\frac{2}{5} \times 130 =$ _____

(4) $2025 - 130 - 110 =$ _____

(5) $10\frac{1}{4}\% =$ _____ **(decimal)**

(6) $110 \div 25 + 130 \div 25 =$ _____

(7) $1030 \times 15 =$ _____

(8) $(2 \div 1 + 3 \times 4 - 7) \times 11 =$ _____

(9) $26^2 =$ _____

***(10)** $520 + 20111 + 13020 + 25 =$ _____

(11) $84 + 72 + 60 + 48 + 36 =$ _____

(12) $\frac{4}{7}$ **of 6 feet 5 inches =** _____ **inches**

(13) 13025 ÷ 9 has a remainder of _____

(14) $93 \times 98 =$ _____

(15) The number of positive integral divisors of $2 \times 3 \times 5 \times 7$ **is** _____

(16) 24% of $\frac{3}{4}$ **of 18 is** _____

(17) $MXXX - DXX - CX =$ _____ **(Arabic Numeral)**

(18) The sum of the median and the mode of the set of numbers {1, 1, 0, 2, 5, 1, 3, 0, 2, 5} is _____

(19) $1211 \times 11 - 121 =$ _____

***(20)** $11030 \div 25 =$ _____

(21) If $A^6 \times A^{-2} \div A^3 = A^k$ **and** $A > 1$**, then k =** ____

(22) $\sqrt[3]{2197} =$ _____

(23) A trapezoid has bases of 5 dm and 8 dm. If the altitude is 16 dm, then the area is _____ dm^2

(24) $(7^5 + 5^5 - 3) \div 12$ **has a remainder of** _____

(25) $6\frac{5}{7} \times 6\frac{2}{7} =$ _____ **(mixed number)**

(26) $[\{p, o, l, i, t, e\} \cap \{p, r, i, m, e\}] \cup \{n, u, m, b, e, r\}$ **contains how many distinct elements?** _____

(27) 6 gallons at $2.95 a gallon costs $ _____

(28) 6 gallons at $2.89 a gallon costs $ _____

(29) 6 gallons at $3.13 a gallon costs $ _____

***(30)** $\sqrt{1103025} =$ _____

(31) 1030 base 4 is written as _____ **base 10**

(32) $5\frac{3}{7} \times 7\frac{3}{5} =$ _____

(33) Find k, so that the roots of $4x^2 - 5x + k = 0$ **are equal.** _____

(34) The 11^{th} term of 2, 4, 7, 11, 16, 22, ... is 67. The 10^{th} term is _____

(35) 0.2888... = _____ (proper fraction)

(36) $(12)^{0.5} = a\sqrt{b}$ in simplified form and b = _____

(37) Let $2x + y = 5$ and $3x + y = 7$. Find x. _____

(38) 18% of $144\frac{4}{9}$ = _____

(39) If $f(x) = x^4 + 4x^3 + 6x^2 + 4x + 1$, then f(3) is ____

*(40) $34^2 + 2(26)(34) + 26^2$= _____

(41) $29^2 + 30^2$ = _____

(42) A regular dodecahedron has how many congruent pentagonal regions? _____

(43) $3^B + 3B = 93$ and B^3 = _____

(44) 12×11030 = _____

(45) Let $2^x \times 7^x = \frac{1}{196}$. Find x. _____

(46) The point (5, — 1) is reflected across the origin to the point (h, k). Find h + k. _____

(47) $77^2 + 37^2$ = _____

(48) ${}_5C_3 \div {}_5P_2$ = _____

(49) $(8^3 - 2^3) \div (8 - 2)$ _____

*(50) $\sqrt[3]{520203011}$ = _____

(51) $2 + 7 + 9 + 16 + 25 + 41 + 66 + 107 + 173 + 280$ = _____

(52) If urn A holds 10% more than urn B and urn C holds 54% more than urn B, then urn C holds what percent more than urn A? _____ %

(53) $(7^7 + 3^7 + 4) \div 10$ has a remainder of _____

(54) The average of 22_8, 31_8, and 35_8 is _____ 8

(55) The average of 24_8, 33_8, and 37_8 is _____ 8

(56) The average of 32_8, 41_8, and 45_8 is _____ 8

(57) The sum of the digits of a 3-digit number is 5. How many such numbers exist? _____

(58) The coefficient of the 3^{rd} term of $(2x + 3y)^5$ is ____

(59) $24^{10} \div 17$ has a remainder of _____

*(60) $[0.121212... \times 3295]^2$ = _____

(61) $2\cos^2\left(\frac{\pi}{4}\right) - 1$ = _____

(62) Let $i^{(22)} = a\sqrt{b}$. Find a + b. _____

(63) Change $0.1333..._6$ to a base 6 fraction. _____6

(64) If $1^3 + k^3 = 28$, then k = _____

(65) $f(x) = 2x^2 - 3x + 5$ and f(f(1)) = _____

(66) 75 miles per hour = _____ feet per second

(67) $9 + 6.75 + 5.0625 + 3.796875 + ...$ = _____

(68) 0.45 base 6 = _____ base 10 (fraction)

(69) Find k, if $\begin{vmatrix} 1 & 5k \\ 5 & 12 \end{vmatrix} = 22$. _____

*(70) A pipe with a diameter of 8 feet is 76 feet long. The volume of the pipe is _____cu. ft

(71) The horizontal asymptote for $y = 2^x + 1$ is y = ____

(72) Find x, $0 \leq x < 6$, if $4x \cong 22 \pmod 5$. _____

(73) $g(x) = \frac{x}{10} + \frac{1}{30}$ and $g^{-1}(-1)$ = _____

(74) The domain of $f(q) = \sqrt{\frac{1-q}{3q-2}}$ is $p < q \leq r$ and $q \in$ Reals. Find r. _____

(75) The rectangular coordinates of the polar coordinates $(2, \frac{3\pi}{2})$ are (x, y) and y = _____

(76) $1030_5 \div 4_5$ = _____ 5

(77) $\int_0^1 (2x - 3)\,dx + \int_1^2 (2x - 3)\,dx$ = _____

(78) 453×457 = _____

(79) Given: {3, 4, 7, 10, m, 21, n, ...}. Find m + n. _____

*(80) 5000 *varas* in Texas = _____ yards

University Interscholastic League - Number Sense Answer Key HS ● Invitation A ● 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) 13,055

(2) .25, $\frac{1}{4}$

(3) 52

(4) 1,785

(5) .1025

(6) 9.6, $\frac{48}{5}$, $9\frac{3}{5}$

(7) 15,450

(8) 77

(9) 676

***(10) 31,993 — 35,359**

(11) 300

(12) 44

(13) 2

(14) 9,114

(15) 16

(16) 3.24, $\frac{81}{25}$, $3\frac{6}{25}$

(17) 400

(18) 2.5, $\frac{5}{2}$, $2\frac{1}{2}$

(19) 13,200

***(20) 420 — 463**

(21) 1

(22) 13

(23) 104

(24) 9

(25) $42\frac{10}{49}$

(26) 8

(27) 17.70

(28) 17.34

(29) 18.78

***(30) 998 — 1,102**

(31) 76

(32) $\frac{1444}{35}$, $41\frac{9}{35}$

(33) 1.5625, $\frac{25}{16}$, $1\frac{9}{16}$

(34) 56

(35) $\frac{13}{45}$

(36) 3

(37) 2

(38) 26

(39) 256

***(40) 3,420 — 3,780**

(41) 1,741

(42) 12

(43) 64

(44) 132,360

(45) — 2

(46) — 4

(47) 7,298

(48) .5, $\frac{1}{2}$

(49) 84

***(50) 765 — 844**

(51) 726

(52) 40

(53) 4

(54) 30

(55) 32

(56) 40

(57) 15

(58) 720

(59) 2

***(60) 151,540 — 167,491**

(61) 0

(62) 0

(63) $\frac{4}{23}$

(64) 3

(65) 25

(66) 110

(67) 36

(68) $\frac{29}{36}$

(69) — .4, $-\frac{2}{5}$

***(70) 3,630 — 4,011**

(71) 1

(72) 3

(73) $-\frac{31}{3}$, $-3\frac{1}{3}$

(74) 1

(75) — 2

(76) 120

(77) — 2

(78) 207,021

(79) 46

***(80) 4,399 — 4,861**

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Number Sense Test • HS B • 2025

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(1) $2725 + \_\_\_\_\_ = 3825$

(2) $528.3 - 27.25 =$ _____ **(decimal)**

(3) $\frac{2}{7} \times \frac{3}{8} \times \frac{2}{5} =$ _____

(4) $2738 \div (-5) =$ _____ **(mixed number)**

(5) $\frac{27}{25} =$ _____ **%**

(6) $27 \times 25 - 38 \times 25 =$ _____

(7) $13.5 \times 10^2 - 25 =$ _____

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

(9) $23^2 =$ _____

***(10)** $207 + 2025 + 308 + 2025 =$ _____

(11) $27 + 38 + 49 + 60 + 71 =$ _____

(12) $\frac{3}{4}$ **of 3 gallons 2 quarts =** _____ **pints**

(13) $2738 \div 4$ **has a remainder of** _____

(14) $1996 \times 4 + 16 =$ _____

(15) The largest prime divisor of 38×27 **is** _____

(16) If 3 pens cost 42¢, then 10 pens cost $ _____

(17) The LCM of 8, 20, and 32 is _____

(18) $(5 \times 3^2 \times 2^3) \div (2 \times 5) =$ _____

(19) $104 \times 109 =$ _____

***(20)** $\sqrt{2738} \times 2025 =$ _____

(21) The additive inverse of $(6)^{-1}$ **is** _____

(22) $27\frac{3}{7} \div 3 =$ _____ **(improper fraction)**

(23) Write two and a fifth million twenty-five thousand five hundred two in digits. _____

(24) $\sqrt{5041} =$ _____

(25) $8\frac{1}{5} \times 2\frac{1}{5} =$ _____ **(mixed number)**

(26) 275 base 8 is written as _____ **base 10**

(27) $|2 - 7| - |2 - 5| - |3 - 8| - 25 =$ _____

(28) $24^2 \div 12^2 \times 6^2 =$ _____

(29) 207308 $\div$ **11 has a remainder of** _____

***(30)** $\sqrt{20252738} =$ _____

(31) 28% of $133\frac{1}{3} =$ _____ **(mixed number)**

(32) If x = 7 and y = 8, then $(x - y)(x^2 + xy + y^2) =$ ___

(33) If $f(x) = 2x^2 + 4x + 1$, **then** $f(-0.5) =$ _____

(34) How many of the first six hexagonal numbers are triangular numbers? _____

(35) $\frac{1}{5}$ of 275 is _____

(36) $\frac{4}{5}$ of 275 is _____

(37) $\frac{2}{5}$ of 275 $+$ $\frac{3}{5}$ of 275 is _____

(38) Set A = {2, 7, 3, 8, 2, 0, 2, 5). The range of set A minus the mode of set A is _____

(39) If $f(x) = x^3 + 3x^2 + 3x + 1$, then $f(-4)$ is _____

*(40) $(0.151515... \times 2738)^2$ = _____

(41) 48 is what percent greater 36? _____ %

(42) The modulus of $7 + 23i = k$ and k^2 = _____

(43) The product of the roots of $2x^2 + 7x = 8$ is _____

(44) 207×14 = _____

(45) $71^2 + 13^2$ = _____

(46) If 75 cows need 120 acres to graze sufficiently, how many acres will 125 cows need? _____

(47) The point $(-3, 8)$ is reflected across the line $y = 7$ to the point (h, k). Find $h + k$. _____

(48) $B^4 - 4B = 8$ and 4^B = _____

(49) Let $(7x - 8)^2 = ax^2 + bx + c$. Find $a + b + c$. ____

*(50) $\sqrt[3]{207308} + 2025$ = _____

(51) Let $\frac{7!}{8!} = \frac{(x)!}{(x+1)!}$. Find x. _____

(52) If a 3" by 6" picture is enlarged to a 9" by 18" picture, its perimeter is multiplied by _____

(53) $24^2 + 25^2$ = _____

(54) $1.1 + 2.2 + 3.3 + 5.5 + 8.8 + 13.13 + 21.21 + 34.34$ = _____ (decimal)

(55) $(7^3 - 8^3) \div (7 - 8)$ = _____

(56) $207_9 + 308_9 + 2025_9$ = _____ 9

(57) The probability of drawing a black king or an ace from a standard deck is _____

(58) $2345_7 \div 6_7$ has a remainder of _____

(59) 105 miles per hour = _____ feet per second

*(60) $[0.2666... \times 4444]^2$ = _____

(61) $\text{Arccos}\left(-\frac{1}{2}\right) = k\pi$ rads, $0 < k < 1$, and k = ____

(62) $1^3 + 3^3 + 5^3 + 7^3$ = _____

(63) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\sqrt{10} + \sqrt{7}\right]$. _____

(64) $f(x) = x - 2$, $g(x) = 3x + 4$, and $f(g(-1))$ = _____

(65) The coefficient in the x^2y^2 term if $(2x + y)^4$ is ____

(66) The total surface area of a hemisphere with a 10 inch diameter is $k\pi$ sq. inches. k = _____

(67) If $\sqrt{6 + 5\sqrt{18\sqrt{9 - x}}} = 6$, then x = _____

(68) If $\frac{3x-1}{x+3} - \frac{2x-1}{x+2} = \frac{ax^2+bx+c}{dx^2+ex+f}$, then $(a + b + c) + (d + e + f)$ = _____

(69) If $\frac{3}{11}$ base 7 = 0.ababab... base 7, then $a + b$ = ____

*(70) $1^3 + 2^3 + 3^3 + 4^3 + ... + 13^3$ = _____

(71) The sum of the digits of a 3-digit number is 11. How many such numbers exist? _____

(72) 354×356 = _____

(73) If $N \div 3$ has a remainder of 2, then $5N \div 3$ has a remainder of _____

(74) If the initial point of vector v is (1, 3) and the terminal point is $(1, -4)$, then $||v||$ = _____

(75) $\int_1^3 (4x - 2)\,dx + \int_3^5 (4x - 2)\,dx$ = _____

(76) Let $f(x) = (3x + 4)^2$. Find $f'(-2)$. _____

(77) The ratio of p to q is 1 to 3 and $p - q = 6$. p = ____

(78) Given: 2, 2, 5, 8, 14, k, 38, 62,... . Find k. _____

(79) The harmonic mean of 1, 4, and 4 is _____

*(80) 2738 yards = _____ *varas* (Texas)

University Interscholastic League - Number Sense Answer Key HS ● Invitation B ● 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) 1,100

(2) 501.05

(3) $\frac{3}{70}$

(4) — $547\frac{3}{5}$

(5) 108

(6) — 275

(7) 1,325

(8) — 66

(9) 529

***(10) 4,337 — 4,793**

(11) 245

(12) 21

(13) 2

(14) 8,000

(15) 19

(16) 1.40

(17) 160

(18) 36

(19) 11,336

***(20) 100,662 — 111,257**

(21) — $\frac{1}{6}$

(22) $\frac{64}{7}$

(23) 2,225,502

(24) 71

(25) $18\frac{1}{25}$

(26) 189

(27) — 28

(28) 144

(29) 2

***(30) 4,276 — 4,725**

(31) $37\frac{1}{3}$

(32) — 169

(33) — .5, — $\frac{1}{2}$

(34) 6

(35) 55

(36) 220

(37) 275

(38) 6

(39) — 27

***(40) 163,495 — 180,704**

(41) $\frac{100}{3}$, $33\frac{1}{3}$

(42) 578

(43) — 4

(44) 2,898

(45) 5,210

(46) 200

(47) 3

(48) 16

(49) 1

***(50) 1,980 — 2,188**

(51) 7

(52) 3

(53) 1,201

(54) 89.58

(55) 169

(56) 2542

(57) $\frac{3}{26}$

(58) 2

(59) 154

***(60) 1,334,164 — 1,474,602**

(61) $\frac{2}{3}$

(62) 496

(63) 5

(64) — 1

(65) 24

(66) 75

(67) 5

(68) 7

(69) 6

***(70) 7,867 — 8,695**

(71) 61

(72) 126,024

(73) 1

(74) 7

(75) 40

(76) — 12

(77) — 3

(78) 23

(79) 2

***(80) 2,810 — 3,104**

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(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**

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

Final _____ _____

Contestant's Number _____ 2nd _____ _____

1st _____ _____

Score **Initials**

Read directions carefully before beginning test

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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.

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STOP -- WAIT FOR SIGNAL!

(1) $2526 =$ _____ $+ 2025$

(2) $26.25 \div 4 =$ _____ **(decimal)**

(3) $\frac{4}{5} \times \frac{2}{3} \times \frac{5}{6} =$ _____

(4) $22\frac{2}{9}\%$ **of 5.4 =** _____ **(improper fraction)**

(5) $\frac{3}{16} =$ _____**%** **(decimal)**

(6) $4252 \div 6 =$ _____

(7) The reciprocal of — 2.5 is _____

(8) $(4 \div 2 + 5 \times 2 - 6) \times 25 =$ _____

(9) $26^2 =$ _____

***(10)** $425 + 2025 + 5202 + 624 =$ _____

(11) $4\frac{2}{5} - 2\frac{5}{6} =$ _____ **(mixed number)**

(12) The LCM of 34 and 51 is _____

(13) The arithmetic mean of 24, 25, 26, and 20 is _____

(14) 426 feet = _____ **fathoms**

(15) The number of positive integral divisors of $2 \times 5 \times 6$ **is** _____

(16) The sum of the GCD and LCM of 40 and 56 is ____

(17) If 4 lbs of nuts cost $2.50, then 6 lbs cost $ _____

(18) $1294 \times 6 + 36 =$ _____

(19) $97 \times 106 =$ _____

***(20)** $\sqrt{425} \times \sqrt{624} =$ _____

(21) The additive inverse of $5^{(-2)}$ **is** _____

(22) $0.444... + 0.222... + 0.666... =$ _____

(23) $[26 + 25 \times 25 - 20] \div 4$ **has a remainder of** _____

(24) $(5^5 + 6^5 - 4) \div 11$ **has a remainder of** _____

(25) 4 is to 25 as k is to 5. Find k. _____

(26) The product of the roots minus the sum of the roots of $4x^3 + 2x^2 - 5x - 6 = 0$ **is** _____

(27) $252_6 =$ _____ $_{10}$

(28) $26^2 \div 13^2 \times 6.5^2 =$ _____

(29) The 11^{th} **term of 2, 3, 5, 7, ..., 79, 83, ... is** _____

***(30)** $625204 \div 5220 =$ _____

(31) 37.5% of $24.80 is $ _____

(32) 42.5% of $24.80 is $ _____

(33) 32.5% of $24.80 is $ _____

(34) If $4x + 25 = 26$, **then** $4x - 20 =$ _____

(35) The third hexagonal number is _____

(36) Write four and a fourth million twenty-six thousand twenty-five in digits. _____

(37) If $f(x) = x^3 + 3x^2 + 3x + 1$, then f(8) is _____

(38) $\sqrt[3]{29791}$ = _____

(39) If $(2x - 5)(2x + 6) = ax^2 + bx + c$, then $a + b + c$ = _____

*(40) $26^2 + 4(25)(25) + 20^2$= _____

(41) $22_5 \times 4_5 - 202_5$ = _____ 5

(42) 14×1357 = _____

(43) 11 is what percent less than 25? _____ %

(44) $47^2 + 67^2$ = _____

(45) The point (— 2, — 6) is reflected across the line $y = x + 4$ to the point (h, k). Find h — k. _____

(46) $2 + 6 + 8 + 14 + 22 + 36 + p + q + r + 246$ = _____

(47) 553×557 = _____

(48) $42^2 + 16^2$ = _____

(49) ${}_6P_2 \div {}_5C_2$ = _____

*(50) $\sqrt[3]{62524} + 5202$ = _____

(51) $25_7 + 26_7 + 2025_7$ = _____ 7

(52) $(25_7 + 26_7 + 2025_7) \times 4$ = _____ 7

(53) $(25_7 + 26_7 + 2025_7) \div 4$ = _____ 7

(54) How many integers between 4 and 26 are relatively prime to 26? _____

(55) $35^{10} \div 19$ has a remainder of _____

(56) The first 4 digits of the decimal of $\frac{37}{60}$ is 0._____

(57) A single card is drawn from a standard deck of cards. If the card's number of pips is a prime number, find the probability it is a 7. _____%

(58) The sum of the digits of a 3-digit number is 20. How many such numbers exist? _____

(59) $42526_8 \div 7_8$ has a remainder of _____

*(60) If 10 dollars is exchanged for 207.98 pesos, then 208 dollars is exchanged for _____ pesos

(61) $\frac{4!\,5!}{6!}$ = _____

(62) Change $0.2666..._9$ to a base 9 fraction. _____9

(63) If $\frac{4}{2x-5} - \frac{2x+6}{2x+5} = \frac{ax^2+bx+c}{dx^2+ex+f}$, then $(a + b + c) - (d + e + f)$ = _____

(64) $f(x) = 5x - 2$, $g(x) = 2x + 6$, and $f(g(4))$ = _____

(65) If $x = -5$ and $y = -6$, then $(x - y)(x^2 + xy + y^2)$ = _____

(66) $(2^7 - 1)(2^6)$ = _____

(67) $26 + 13 + 6.5 + 3.25 + ... + 0.40625$ = _____

(68) If $A = \begin{bmatrix} 1 & 3 & 6 \\ 1 & 4 & 9 \\ 1 & 5 & 12 \end{bmatrix}$, then $|A|$ = _____

(69) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\sqrt{6} + \sqrt{5} - \sqrt{2}\right]$. _____

*(70) 25 leagues of land in Texas minus 26 labors of land in Texas is _____ acres

(71) $(x^3 - 12x^2 - 42) \div (x - 3)$ has remainder _____

(72) $\lim_{x \to 5} \frac{x^2 - x - 20}{x - 5}$ = _____

(73) If $f(x) = \frac{4x+5}{2}$ and $f^{-1}(x) = ax + b$, then $f^{-1}(6)$ = _____

(74) Let $f(x) = (4x^2 + 2x + 6)^2$. Find $f'(-1)$. _____

(75) $\int_0^1 \int_0^4 (5x - 2)\, dxdy$ = _____

(76) $2^3 - 1^3 + 3^3 - 4^3 + 7^3$ = _____

(77) Using the number 8128, write the largest 3-digit even number using each digit only once. _____

(78) Let $42B - 2B6 = 13^2$. Find digit B. _____

(79) Given: {1, 1, 3, 5, 9, a, b, 41, 67, ...}. Find $a + b + 1$. _____

*(80) $33550336 \div 8128 - (496 + 28 + 6)$ = _____

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

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(1) 501

(2) 6.5625

(3) $\frac{4}{9}$

(4) $\frac{6}{5}$

(5) 18.75

(6) $\frac{2126}{3}$, $708\frac{2}{3}$

(7) — .4, — $\frac{2}{5}$

(8) 150

(9) 676

***(10) 7,863 — 8,689**

(11) $1\frac{17}{30}$

(12) 102

(13) 23.75, $\frac{95}{4}$, $23\frac{3}{4}$

(14) 71

(15) 12

(16) 288

(17) $3.75

(18) 7,800

(19) 10,282

***(20) 490 — 540**

(21) — .04, — $\frac{1}{25}$

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

(23) 3

(24) 7

(25) .8, $\frac{4}{5}$

(26) 2

(27) 104

(28) 169

(29) 31

***(30) 114 — 125**

(31) 9.30

(32) 10.54

(33) 8.06

(34) — 19

(35) 15

(36) 4,276,025

(37) 729

(38) 31

(39) — 24

***(40) 3,398 — 3,754**

(41) — 4

(42) 18,998

(43) 56

(44) 6,698

(45) — 12

(46) 638

(47) 308,021

(48) 2,020

(49) 3

***(50) 4,980 — 5,503**

(51) 2112

(52) 11451

(53) 354

(54) 10

(55) 16

(56) 6166

(57) 25

(58) 36

(59) 5

***(60) 4,110 — 4,542**

(61) 4

(62) $\frac{12}{40}$

(63) 73

(64) 68

(65) 91

(66) 8,128

(67) 51.59375, $\frac{1651}{32}$, $51\frac{19}{32}$

(68) 0

(69) 3

***(70) 100,800 — 111,409**

(71) — 123

(72) 9

(73) 1.75, $\frac{7}{4}$, $1\frac{3}{4}$

(74) — 96

(75) 32

(76) 313

(77) 882

(78) 5

(79) 41

***(80) 3,418 — 3,777**

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

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2nd _____ _____
1st _____ _____
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(1) $521 - 202 + 5 =$ _____

(2) $810.45 - 52.125 =$ _____ **(decimal)**

(3) **75% of 21 =** _____

(4) $2125 \div 5 =$ _____

(5) $815 \times 25 - 821 \times 25 =$ _____

(6) **0.5625 =** _____ **(fraction)**

(7) $21 + 36 + 51 + 66 + 81 + 96 + 111 =$ _____

(8) $7 - 2 \times 9 + (1 - 9) \div 4 \times 6 =$ _____

(9) $8\frac{3}{4}\% =$ _____ **(fraction)**

***(10)** $81547 + 82149 + 73052 - 52125 =$ _____

(11) $89 \times 98 =$ _____

(12) $8\frac{4}{5} - 5\frac{1}{7} =$ _____ **(mixed number)**

(13) **5212025 ÷ 11 has a remainder of** _____

(14) **MCMXLVII — DCCCXV =**
_____ **(Arabic Numeral)**

(15) **0.545454... =** _____ **(proper fraction)**

(16) **521 pecks =** _____ **bushels (decimal)**

(17) $47 \times 52 =$ _____

(18) $(5 \times 3^2 \times 2^3) \div (4 \times 6) =$ _____

(19) **In checking 140 houses with ants and/or roaches, they found 105 with roaches and 75 with ants. How many had just roaches?** _____

***(20)** $\sqrt{52125} + 12.5 =$ _____

(21) **If** $A^k \times A^5 \div A^2 = A^{-1}$ **and** $A > 1$**, then k =** _____

(22) **If** $x + (x + 2) + (x + 4) + (x + 6) + (x + 8) = 52$**, then** $(x + 4) =$ _____ **(decimal)**

(23) **Write two and three-fifth million seventy thousand eleven in digits.** _____

(24) $44^2 + 46^2 =$ _____

(25) $7\frac{2}{9} \times 7\frac{7}{9} =$ _____ **(mixed number)**

(26) $(8 + 10 \times 19 - 45) \div 11$ **has a remainder of** _____

(27) $5\frac{1}{4}$ **is to 25 as 7 is to k. Find k.** _____

(28) **Let p, q, r be the roots of** $4x^3 + 2x^2 - 5x - 6 = 0$**. Find** $pq + qr + pr + pqr - p - q - r$**.** _____

(29) **521 base 7 is written as** _____ **base 10**

***(30)** $8151947 \div 521 =$ _____

(31) $5\frac{2}{5} \div 2\frac{1}{2} =$ _____ **(mixed number)**

(32) $7 \times \frac{12}{17} =$ _____ **(mixed number)**

(33) **The quadratic equation,** $4x^2 + 60x + k = 0$**, has two equal roots. Find k.** _____

(34) How many of the first twelve positive triangular numbers are hexagonal numbers? _____

(35) The 10^{th} term of the sequence 1, 8, 27, 64, 125, ... is 1000. The 9^{th} term is _____

(36) If $f(x) = 3x^4 - 12x^3 + 18x^2 - 12x + 3$, then f(4) is _____

(37) Let $5x - y = 9$ and $5x + 2y = 1$. Find y. _____

(38) $22 \times 22 =$ _____

(39) $22 \times 22.5 =$ _____

*(40) 22% of $(22 \times 22 + 22 \times 22.5) =$ _____

(41) Let $(4x - 7)^2 = ax^2 + bx + c$. Find $a - b + c$. ___

(42) The measure of each of the exterior angles of a convex regular nonagon is _____°

(43) The point (5, 2) is reflected across the line $y = 1 - x$ to the point (h, k). Find $h + k$. _____

(44) $1921 \times 14 =$ _____

(45) The sum of the Fibonacci characteristic sequence $5 + a + b + c + d + e + f + g + h + i + 280$ is 731. Find g. _____

(46) $47^2 + 67^2 =$ _____

(47) $37\frac{1}{2}$% of 0.625 divided by $\frac{7}{8}$ is _____

(48) $521_8 - 215_8 + 152_8 =$ _____ 8

(49) $8^{25} \div 47$ has a remainder of _____

*(50) $\sqrt[3]{19202125} =$ _____

(51) $(3^3 + 11^3) \div (3 + 11) =$ _____

(52) A 3" by 5" picture is enlarged to 12" by 20". The original area is increased by a multiple of _____

(53) Let $(5 + 21i) \div (i^3) = a + bi$. Find $a - b$. _____

(54) $21 + 26 + 31 + 36 + ... + 96 =$ _____

(55) $521 \times 125 =$ _____

(56) The sum of the digits of a 3-digit number is 13. How many such numbers exist? _____

(57) $2125_6 \div 5_6$ has a remainder of _____

(58) How many ways can 5 people be seated in a circle with 6 chairs? _____

(59) Let t and n be consecutive triangular numbers such that $t + n = 196$. Find t, $t < n$. _____

*(60) $(0.252525... \times 1250)^2 =$ _____

(61) Let $A = \begin{bmatrix} 1 & 1 \\ 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 3 & 4 \end{bmatrix}$. Find $|AB|$. ____

(62) $\cos^2(\tan^{-1}(1)) =$ _____

(63) $f(x) = 2x - 1$, $g(x) = 2x + 5$, and $f(g(-5)) =$ _____

(64) Change $0.5212121..._7$ to a base 7 fraction. _____ 7

(65) Ed's weekly salary of $780 was increased 5%. How much is Ed's weekly salary now? $ _____

(66) Jo's weekly salary of $780 was decreased 5%. How much is Jo's weekly salary now? $ _____

(67) Tim's weekly salary of $780 was increased 5%. After the increase his new salary was raised 2%. How much is Tim's weekly salary now? $ _____

(68) If $\frac{3}{20}$ base 5 = 0.abbb... base 5, then $a + b =$ _____

(69) $(1, \frac{5\pi}{6})$ are polar coordinates for (x, y). y = _____

*(70) The total surface area of a hemisphere with a radius of 5.2 cm is _____ square cm

(71) 8128 written in base 2 is _____ 2

(72) Let $f(x) = \frac{\cos(x)}{2}$. Find $f''(\frac{3\pi}{2})$. _____

(73) The directrix of $x^2 - 2x - 4y = 7$ is y = _____

(74) The domain of $f(q) = \sqrt{\frac{5q + 21}{2 - 5q}}$ is $p \leq q < r$ and $q \in$ Reals. Find $p + r$. _____

(75) $(-1, \frac{5\pi}{2})$ are polar coordinates for (x, y). y = ____

(76) $\int_0^5 \int_1^2 xy \, dxdy =$ _____

(77) $3^{76} \div 35$ has a remainder of _____

(78) Given: 1, 2, 3, 4, 6, 5, k, — 2, — 9... . Find k. _____

(79) $\sqrt[3]{140608} =$ _____

*(80) 5 *leagues* of land plus 21 *labors* of land plus 2025 square *varas* of land in Texas is _____ acres

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(1) 324

(2) 758.325

(3) 15.75, $\frac{63}{4}$, $15\frac{3}{4}$

(4) 425

(5) — 150

(6) $\frac{9}{16}$

(7) 462

(8) — 23

(9) $\frac{7}{80}$

***(10) 175,392 — 193,854**

(11) 8,722

(12) $3\frac{23}{35}$

(13) 5

(14) 1,132

(15) $\frac{6}{11}$

(16) 130.25

(17) 2,444

(18) 15

(19) 65

***(20) 229 — 252**

(21) — 4

(22) 10.4

(23) 2,670,011

(24) 4,052

(25) $56\frac{14}{81}$

(26) 10

(27) $\frac{100}{3}$, $33\frac{1}{3}$

(28) .75, $\frac{3}{4}$

(29) 260

***(30) 14,865 — 16,429**

(31) $2\frac{4}{25}$

(32) $4\frac{16}{17}$

(33) 225

(34) 6

(35) 729

(36) 243

(37) — $\frac{8}{3}$, — $2\frac{2}{3}$

(38) 484

(39) 495

***(40) 205 — 226**

(41) 121

(42) 40

(43) — 5

(44) 26,894

(45) 66

(46) 6,698

(47) $\frac{15}{56}$

(48) 456

(49) 17

***(50) 255 — 281**

(51) 97

(52) 16

(53) — 26

(54) 936

(55) 65,125

(56) 69

(57) 0

(58) 120

(59) 91

***(60) 94,658 — 104,621**

(61) 1

(62) .5, $\frac{1}{2}$

(63) — 11

(64) $\frac{151}{220}$

(65) 819.00

(66) 741.00

(67) 835.38

(68) 3

(69) .5, $\frac{1}{2}$

***(70) 243 — 267**

(71) 1111111000000

(72) 0

(73) — 3

(74) — 3.8, — $\frac{19}{5}$, — $3\frac{4}{5}$

(75) — 1

(76) 18.75, $\frac{75}{4}$, $18\frac{3}{4}$

(77) 11

(78) 4

(79) 52

***(80) 24,570 — 27,155**