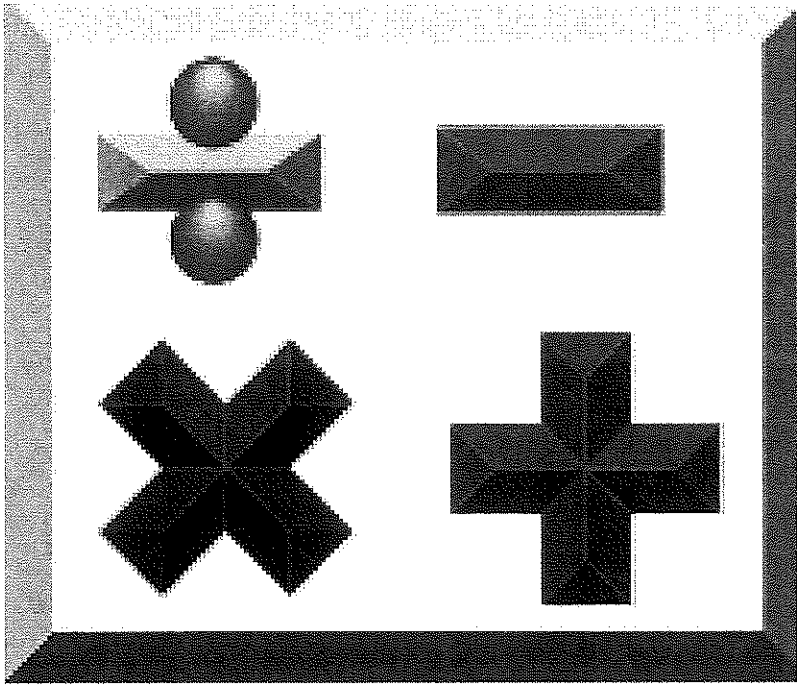
UNIVERSITY INTERSCHOLASTIC LEAGUE
Making a World of Difference

Number Sense

District 1 • 2015



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The University Interscholastic League
Number Sense Test • HS District 1 • 2015

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) $323 + 2015 =$ _____

(2) $2015 - 328 =$ _____

(3) $28 \times 15 =$ _____

(4) $2015 \div 3 =$ _____ (mixed number)

(5) $28^2 =$ _____

(6) $\frac{8}{125} =$ _____ % (decimal)

(7) $20\frac{1}{5} + 3\frac{2}{3} =$ _____ (mixed number)

(8) 15 is _____ % of 2000

(9) The LCM of 57 and 95 is _____

*(10) $32328 + 3232 + 323 + 32 =$ _____

(11) $5\frac{1}{20} - 8\frac{2}{3} =$ _____ (mixed number)

(12) 1 yard — 2feet — 3 inches = _____ inches

(13) $|3 - 2| - 3 + |3 - 2| + |8 - 15| =$ _____

(14) MMDCCLXXVII = _____ (Arabic Number)

(15) $25 \times 23 + 28 \times 25 =$ _____

(16) $\frac{11}{14} \times 11 =$ _____ (mixed number)

(17) $13^3 =$ _____

(18) $20 - 15 \div 3 \times 23 + 3 \times 2 - 8 =$ _____

(19) $123 \times 14 =$ _____

*(20) $510214 \div 283 =$ _____

(21) $8\frac{2}{3} \times 5\frac{1}{2} =$ _____ (mixed number)

(22) $(14 + 92 \times 17 - 76) \div 8$ has a remainder of ____

(23) If $x + (x + 3) + (x + 6) + (x + 9) + (x + 12) = 90$, then $(x + 6) =$ _____

(24) $23^2 + 69^2 =$ _____

(25) $\sqrt{216} - \sqrt{150} = \sqrt{x}$. Find x. _____

(26) If 15 ⊙ s cost \$22.50 then 8 ⊙ s cost \$ _____

(27) Find the ratio of the perimeter of a 4" x 5" rectangular picture to its area. _____

(28) 3233282015 ÷ 9 has a remainder of _____

(29) If $x = 23$ and $y = 28$ then $x^2 - 2xy + y^2 =$ _____

*(30) $\sqrt{325} \times \sqrt{398} =$ _____

(31) $4\frac{7}{12} \div 1\frac{5}{6} =$ _____ (mixed number)

(32) $6! - 5! + 4! - 3! + 2! - 1! =$ _____

(33) How many subsets of the set {l,u,c,a,s} are 4-element or 1-element subsets? _____

(34) 25% of 35 less 45 is _____

(35) Change 323 base 10 to base 8. _____ 8

(36) Round $\sqrt{5}$ to the thousandth place. _____

(37) $58^2 + 75^2 =$ _____

(38) $|3x - 2| = 8$. Find x, where $x \geq 0$. _____

(39) $323_4 + 232_4 + 233_4 =$ _____ 4

*(40) $57 \times 68 \times 79 =$ _____

(41) $21 \times \frac{23}{25} =$ _____ (mixed number)

(42) The sum of the roots of $27x^2 + 15x = 2$ is _____

(43) If $7^7 \times 7^{-3} \div 7^k = 7^6$, then k = _____

(44) Find the slope of a line containing the points $(-3, 2)$ and $(3, -8)$. _____

(45) $7 + 8 + 15 + 23 + 38 + \ldots + 160 =$ _____

(46) A set containing k elements has 255 proper subsets. Find k. _____

(47) $516\frac{2}{3}\%$ of 24 is = _____

(48) $(4 - 9i)(5 + 2i) = a + bi$. Find $a - b$. _____

(49) $322_8 \div 6_8 =$ _____ 8

*(50) $\sqrt{23282015} =$ _____

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

(52) If $\log_8(4) = x$, then x = _____

(53) $12^3 \div 6^3 \times 3^3 =$ _____

(54) $328 \times 323 =$ _____

(55) The first 4 digits of the decimal of $\frac{31}{90}$ is 0._____

(56) If $\frac{3x}{5}$ has a remainder of 2 and $\frac{2y}{5}$ has a remainder of 3 then $\frac{xy}{5}$ has a remainder of _____

(57) The point $(-3, -1)$ is reflected across the line $x = 2$ to the point (h, k). Find $h + k$. _____

(58) ${}_7P_4 =$ _____

(59) $34^5 \div 11$ has a remainder of _____

*(60) $9^4 \div 6^3 \times 3^2 =$ _____

(61) If $\sec\theta = 2.8$ then $\cos\theta =$ _____

(62) The greatest integer function $f(x) = [x + 1]$ has a value of _____ for $f(\sqrt{8})$

(63) $0.353535\ldots_6 =$ _____ 6 (proper fraction)

(64) How many positive integers less than or equal to 28 are relatively prime to 28? _____

(65) The simplified coefficient of the x^2y^2 term in the expansion of $(2x + 3y)^4$ is _____

(66) Find k, $0 \leq k \leq 6$, if $3k + 2 \cong 3 \pmod 7$. _____

(67) If $g(x) = \frac{3 + 2x}{3}$, then $g^{-1}(15) =$ _____

(68) If $\ln(216) = 3\ln(2) + k\ln(3)$, then k = _____

(69) The probability of randomly selecting a triangular number from the set of the first 20 natural numbers is _____%

*(70) $8571.42 \times 55 =$ _____

(71) Let $f(x) = x^5 + 5x^4 + 10x^3 + 10x^2 + 5x + 1$. Find $f'(4)$. _____

(72) Find k if $\begin{vmatrix} k & -4 \\ 4 & -6 \end{vmatrix} = 1$. k = _____

(73) The perimeter of a square is increased from 12" to 20". Find the corresponding increase in the area is _____ sq. in.

(74) $999 \times \frac{27}{37} =$ _____

(75) $\int_{-1}^{2} (2x - 1)\,dx =$ _____

(76) Find the slope of the line tangent to $y = 3x^2 + 2x - 8$ at $x = -2$. _____

(77) The graph of $y = x + \frac{1}{x}$ has _____ asymptote(s)

(78) If $f(x) = 2x^3 + 7x^2 - 2x - 15$, then $f''(1) =$ _____

(79) $143 \times 630 = 1001 \times$ _____

*(80) $\sqrt[3]{8232015} =$ _____

University Interscholastic League - Number Sense Answer Key HS • District 1 • 2015

*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) 2,338

(2) 1,687

(3) 420

(4) $671\frac{2}{3}$

(5) 784

(6) 6.4

(7) $23\frac{13}{15}$

(8) .75, $\frac{3}{4}$

(9) 285

*(10) 34,120 — 37,710

(11) $-3\frac{37}{60}$

(12) 9

(13) 6

(14) 2,777

(15) 1,275

(16) $8\frac{9}{14}$

(17) 2,197

(18) −97

(19) 1,722

*(20) 1,713 — 1,893

(21) $47\frac{2}{3}$

(22) 6

(23) 18

(24) 5,290

(25) 6

(26) $12.00

(27) .9, $\frac{9}{10}$

(28) 2

(29) 25

*(30) 342 — 377

(31) $2\frac{1}{2}$

(32) 619

(33) 10

(34) $-36.25, -\frac{145}{4}, -36\frac{1}{4}$

(35) 503

(36) 2.236

(37) 8,989

(38) $\frac{10}{3}, 3\frac{1}{3}$

(39) 2120

*(40) 290,894 — 321,514

(41) $19\frac{8}{25}$

(42) $-\frac{5}{9}$

(43) −2

(44) $-\frac{5}{3}, -1\frac{2}{3}$

(45) 411

(46) 8

(47) 124

(48) 75

(49) 43

*(50) 4,584 — 5,066

(51) $\frac{1}{30}$

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

(53) 216

(54) 105,944

(55) 3444

(56) 1

(57) 6

(58) 840

(59) 1

*(60) 260 — 287

(61) $\frac{5}{14}$

(62) 3

(63) $\frac{35}{55}$

(64) 12

(65) 216

(66) 5

(67) 21

(68) 3

(69) 25

*(70) 447,857 — 494,999

(71) 3,125

(72) 2.5, $\frac{5}{2}, 2\frac{1}{2}$

(73) 16

(74) 729

(75) 0

(76) −10

(77) 2

(78) 26

(79) 90

*(80) 192 — 212