The University Interscholastic League
Number Sense Test • HS State • 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) $526 + 2015 =$ _____

(2) $822 - 526 =$ _____

(3) $26 \times 15 =$ _____

(4) $20.15 \div 5 =$ _____ (decimal)

(5) $\frac{1}{9} =$ _____% (mixed number)

(6) $26^2 =$ _____

(7) $0.41666... =$ _____ (proper fraction)

(8) $5 \div 10 + 2 \times 6 - 2 \times 5 =$ _____

(9) $2\frac{5}{6} + 20\frac{1}{5} =$ _____ (mixed number)

*(10) $52620 + 52815 =$ _____

(11) The GCD of 48 and 72 is _____

(12) $MCXI + DLV =$ _____ (Arabic Number)

(13) $25 \times 26 + 25 \times 28 =$ _____

(14) $2 + 5 + 8 + 11 + ... + 41 =$ _____

(15) $6\frac{2}{5} - 5\frac{1}{2} =$ _____

(16) 5 yards + 2 feet + 6 inches = _____ inches

(17) The average of 5, 26, 20, and 15 is _____

(18) $23 \times 45 =$ _____

(19) $13^3 =$ _____

*(20) $135 \times 246 + 789 =$ _____

(21) $(5 \times 26 - 20 + 15) \div 6$ has a remainder of _____

(22) If 6 ♦s cost \$8.50 then 15 ♦s cost \$ _____

(23) $1\frac{2}{3} \times 2\frac{3}{4} =$ _____ (mixed number)

(24) Change 526 base 10 to base 5. _____ 5

(25) $\sqrt{54} - \sqrt{24} = \sqrt{x}$. Find x. _____

(26) $26^2 + 78^2 =$ _____

(27) $0.2666... =$ _____ (proper fraction)

(28) Find the ratio of the perimeter of a 5" x 8" rectangular note card to its area. _____

(29) $6! \div 2! + 5! =$ _____

*(30) $\sqrt{6255102} =$ _____

(31) $26^2 - 25^2 =$ _____

(32) $76_8 + 54_8 - 32_8 =$ _____ 8

(33) How many subsets containing only 2 or 3 elements does the set {T,M,S,C,A} have? _____

(34) $5\frac{1}{2} \div 4\frac{2}{5} =$ _____ (mixed number)

(35) If $x + (x + 5) + (x + 10) + (x + 15) + \ldots + (x + 45) + (x + 50) = 341$, then $(x + 25) =$ _____

(36) The number of positive integral divisors of 48 is ___

(37) Let $3^x = 243$. Find x^3. _____

(38) If $x = 6$ and $y = 7$, then $x^3 + 3x^2y + 3xy^2 + y^3 =$ _____

(39) Round $\sqrt{3} + \sqrt{6}$ to the tenths place. _____

*(40) $5^4 \div 2^3 \times 6^2 =$ _____

(41) $11 \times \frac{14}{17} =$ _____ (mixed number)

(42) The ratio of the sum of the roots to the product of the roots of $3x^2 + 2x - 1 = 0$ is _____

(43) $\frac{1}{15} + \frac{1}{35} + \frac{1}{63} + \frac{1}{99} =$ _____

(44) 18% of 188.888... = _____

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

(46) Find the slope of a line containing the points $(-2, 3)$ and $(5, -7)$. _____

(47) $(5 + 2i)(6 - 15i) = a + bi$. Find $a + b$. _____

(48) $42^2 - 52^2 + 62^2 - 72^2 =$ _____

(49) A triangle has sides of 7, 24, and x. What is the greatest integral value of x? _____

*(50) $33 \times 66 \times 99 =$ _____

(51) ${}_6P_2 \div {}_5C_3 =$ _____

(52) Let $\frac{9!}{11!} = \frac{(x-3)!}{(x-2)!}$. Find x. _____

(53) $6250_8 \div 6_8 =$ _____ 8

(54) $1 + 8 + 9 + 17 + \ldots + 69 + 112 =$ _____

(55) If $2\log_4(2x) = 4$ then $x =$ _____

(56) $(0.0625)^2 \div (0.125)^2 \times (0.25)^2 =$ _____

(57) How much time has passed from 6:45 a.m. to 5:10 p.m. the same day? _____ minutes

(58) $526 \times 215 =$ _____

(59) The odds of randomly selecting a square number from the set of the first 20 natural numbers is ____

*(60) $510^2 \div 26^2 \times 25^2 =$ _____

(61) How many positive integers less than 54 are relatively prime to 54? _____

(62) $6\sin(165°)\cos(165°) =$ _____

(63) If $\ln(108) = \ln(4) + 3\ln(k)$, then $k =$ _____

(64) $22^2 + 24^2 =$ _____

(65) The perimeter of a square is increased from 12" to 16". Find the corresponding increase in the area of the square. _____ sq. in.

(66) The simplified coefficient of the x^2y^2 term in the expansion of $(3x + 5y)^4$ is _____

(67) $0.4111\ldots_8 =$ _____ 8 (proper fraction)

(68) If $f(x) = \frac{5x-2}{6}$, then $f^{-1}(-2) =$ _____

(69) If $f(x) = 5x^3 + x^2 - 2$, then $f''(0) =$ _____

*(70) The surface area of a sphere with a diameter of 26 cm is _____ sq. cm

(71) Change $0.5222\ldots_6$ to a base 10 fraction. _____

(72) Find k if $\begin{vmatrix} 2k & -1 \\ 3 & 4 \end{vmatrix} = 5$. $k =$ _____

(73) $\lim_{x \to 5} \frac{x^2 - 25}{x - 5} =$ _____

(74) $9^3 + 11^3 =$ _____

(75) The graph of $y = \frac{x^3 + 1}{x^2 - 1}$ has _____ asymptote(s)

(76) Write using numbers: five million two hundred sixty-two thousand fifteen. _____

(77) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\sqrt{2} + \sqrt{5} + \sqrt{8}\right]$. _____

(78) $143 \times 567 = 1001 \times$ _____

(79) $120021_3 + 21002112_3 =$ _____ 9

*(80) $1875 \div 0.3125 \times \frac{7}{16} =$ _____

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*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) 2,541

(2) 296

(3) 390

(4) 4.03

(5) $11\frac{1}{9}$

(6) 676

(7) $\frac{5}{12}$

(8) 2.5, $\frac{5}{2}$, $2\frac{1}{2}$

(9) $23\frac{1}{30}$

*(10) 100,164 — 110,706

(11) 24

(12) 1,666

(13) 1,350

(14) 301

(15) .9, $\frac{9}{10}$

(16) 210

(17) 16.5, $\frac{33}{2}$, $16\frac{1}{2}$

(18) 1,035

(19) 2,197

*(20) 32,300 — 35,698

(21) 5

(22) $21.25

(23) $4\frac{7}{12}$

(24) 4101

(25) 6

(26) 6,760

(27) $\frac{4}{15}$

(28) .65, $\frac{13}{20}$

(29) 480

*(30) 2,376 — 2,626

(31) 51

(32) 120

(33) 20

(34) $1\frac{1}{4}$

(35) 31

(36) 10

(37) 125

(38) 2,197

(39) 4.2, $\frac{21}{5}$, $4\frac{1}{5}$

*(40) 2,672 — 2,953

(41) $9\frac{1}{17}$

(42) 2

(43) $\frac{4}{33}$

(44) 34

(45) 2

(46) $-\frac{10}{7}$, $-1\frac{3}{7}$

(47) — 3

(48) — 2,280

(49) 30

*(50) 204,841 — 226,403

(51) 3

(52) 112

(53) 1034

(54) 285

(55) 8

(56) .015625, $\frac{1}{64}$

(57) 625

(58) 113,090

(59) .25, $\frac{1}{4}$

*(60) 228,454 — 252,500

(61) 18

(62) — 1.5, $-\frac{3}{2}$, $-1\frac{1}{2}$

(63) 3

(64) 1,060

(65) 7

(66) 1,350

(67) $\frac{35}{70}$ (not reducible)

(68) — 2

(69) 2

*(70) 2,018 — 2,229

(71) $\frac{9}{10}$

(72) .25, $\frac{1}{4}$

(73) 10

(74) 2,060

(75) 2

(76) 5,262,015

(77) 6

(78) 81

(79) 7583

*(80) 2,494 — 2,756