The University Interscholastic League
Number Sense Test • HS District 2 • 2012

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) $123.4 + 234.1 =$ _____ (decimal)

(2) $2012 - 2102 =$ _____

(3) $\frac{5}{8} \times \frac{6}{7} =$ _____

(4) $136 \div 9 =$ _____ (mixed number)

(5) $4 - 8 \times 12 \div 16 + 20 =$ _____

(6) $19 \times 34 - 15 \times 19 =$ _____

(7) $12^3 =$ _____

(8) Which is larger $\frac{3}{16}$ or 0.185? _____

(9) $3\frac{2}{5} + \frac{7}{10} =$ _____ (mixed number)

*(10) $11235 - 5321 + 532 - 53 + 5 =$ _____

(11) 16% of 189 = 48% of k. Find k. _____

(12) $17 \times \frac{17}{21} =$ _____ (mixed number)

(13) $4 + 8 + 12 + 16 + ... + 44 =$ _____

(14) The mean of 86, 64, 42 and 20 is _____

(15) $13 \times 245 =$ _____

(16) $2\frac{3}{4}$ yards = _____ inches

(17) 25% of \$16.96 is \$ _____

(18) $\frac{11}{16} =$ _____% (decimal)

(19) The largest prime factor of 273 is _____

*(20) $235711 \div 642 =$ _____

(21) $12\frac{1}{4} \times 8\frac{1}{4} =$ _____ (mixed number)

(22) 75% of 85 is 15% of _____

(23) How many even integers are between 16 & 61? ___

(24) $3282416 \div 8 =$ _____

(25) If 8 cards cost \$14.50 then 12 cards cost \$ _____

(26) Let set S = {s,l,i,d,e} and set R = {r,u,l,e}. How many unique elements are in $R \cap S$? _____

(27) How many positive integers divide 84? _____

(28) Round $3\sqrt{5}$ to the tenths place. _____

(29) $\frac{3}{7}$ of a gallon = _____ cubic inches

*(30) $\sqrt{10601} + \sqrt{908} =$ _____

(31) If $5 - 3x = -13$ then $7 - 2x =$ _____

(32) A bull rider rode 18.75% of the 128 bulls he got on. How many bulls did he not ride? _____

(33) $0.875 \div 14 =$ _____

(34) $7\frac{3}{5} - 5\frac{2}{3} =$ _____ (mixed number)

(35) 2.5 bushels = _____ pecks

(36) $3^4 + 6^3 - 9^2 =$ _____

(37) If $x = 3$ and $y = 5$ then $x^3 + 3x^2y + 3xy^2 + y^3 =$ ___

(38) If $k < 0$ and $k^2 = 169$, then $k^3 =$ _____

(39) The first 4 digits of the decimal of $\frac{131}{990}$ is 0._____

*(40) $100 \div \frac{3}{7} \times 89 \div 0.37589 =$ _____

(41) If $64^2 - 68^2 = 66k$, then $k =$ _____

(42) The sum of the first 4 triangular numbers is _____

(43) $321 \times 235 =$ _____

(44) The sum of the product of the roots taken two at a time of $3x^3 + 4x^2 - 17x - 6 = 0$ is _____

(45) $12 \times 7! - 14 \times 6! =$ _____

(46) $9^8 \div 7$ has a remainder of _____

(47) If $\frac{8x+5}{3} > 2$ then $x >$ _____

(48) If $A > 1$ and $A^{-2} \div A^k \times A^{-4} = A^6$ then $k =$ ___

(49) $358_9 + 235_9 =$ _____ 9

*(50) $(5e)^3 =$ _____

(51) How many ways can the letters in the word 'round' be arranged in a circle? _____

(52) $1 + 3 + 6 + 10 + 15 + ... + 66 + 78 =$ _____

(53) If $7\log_x 2 - 3\log_x 2 = 2$ then $x =$ _____

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

(55) If $(2 + 5i)^2$ is $a + bi$, then $a + b =$ _____

(56) The measure of a central angle of a regular octagon is $k\pi$ radians. Find k. _____

(57) $\sqrt{1^3 + 2^3 + 3^3 + 4^3 + ... + 7^3 + 8^3} =$ _____

(58) $\frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} + ... + \frac{1}{55} + \frac{1}{66} =$ _____

(59) ${}_5P_3 - {}_5C_3 =$ _____

*(60) $12 \times 34 \times 56 \times 78 =$ _____

(61) $A = \begin{bmatrix} 2 & -1 \\ -4 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 \\ 3 & -4 \end{bmatrix}$. $|A + B| =$ ___

(62) $(136_7) + (235_7) \div 6$ has a remainder of _____

(63) If $g(x) = 3x^2 + 2x - 1$, then $g(g(-1)) =$ _____

(64) The harmonic mean of 1, 3, and 9 is _____

(65) There are 8 pens with black ink, 7 with blue, and 3 with red in a package. The odds of randomly selecting a red ink pen is _____

(66) $113 \times 107 =$ _____

(67) 120 miles per hour = _____ feet per second

(68) $-10°$ Celsius = _____ ° Fahrenheit

(69) An equilateral based prism has a height of $2\sqrt{3}$ " and a base side length of 2". The volume of the prism is _____ cubic inches

*(70) $(1 + 5 + 9 + 13 + 17 + ... + 37 + 41)^2 =$ _____

(71) $\left(\cos\left(\arcsin\left(-\frac{\sqrt{2}}{2}\right)\right)\right)^2 =$ _____

(72) If $f(x) = x^3 + 5x^2 + 12x + 22$ then $f'(-2) =$ ____

(73) The function $\frac{x^2+2x+3}{x^3}$ has _____ asymptotes

(74) Change $\frac{15}{32}$ to a base 8 decimal. _____ 8

(75) The polar coordinates of the rectangular coordinates $(\frac{1}{2}, \frac{\sqrt{3}}{2})$ are $(r, k\pi)$. Find k where $0 < k < 2$. _____

(76) $\int_{-1}^{1} (3x^2 - 2)\, dx =$ _____

(77) Find k, $1 < k < 7$, if $5k \cong 2 \pmod 3$. _____

(78) $4! \div 5! + 3! \div 4! + 1! \div 2! =$ _____

(79) Given the sequence 1,2,6,12,25,48,k,168,... . k = ___

*(80) 3025 yards = _____ rods

University Interscholastic League - Number Sense Answer Key HS • District 2 • 2012

*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) 357.5

(2) — 90

(3) $\frac{15}{28}$

(4) $15\frac{1}{9}$

(5) 18

(6) 361

(7) 1,728

(8) $\frac{3}{16}$

(9) $4\frac{1}{10}$

*(10) 6,079 — 6,717

(11) 63

(12) $13\frac{16}{21}$

(13) 264

(14) 53

(15) 3,185

(16) 99

(17) $4.24

(18) 68.75

(19) 13

*(20) 349 — 385

(21) $101\frac{1}{16}$

(22) 425

(23) 22

(24) 410,302

(25) $21.75

(26) 2

(27) 12

(28) 6.7

(29) 99

*(30) 127 — 139

(31) — 5

(32) 104

(33) .0625, $\frac{1}{16}$

(34) $1\frac{14}{15}$

(35) 10

(36) 216

(37) 512

(38) — 2,197

(39) 1,323

*(40) 52,485 — 58,008

(41) — 8

(42) 20

(43) 75,435

(44) $-\frac{17}{3}, -5\frac{2}{3}$

(45) 50,400

(46) 4

(47) .125, $\frac{1}{8}$

(48) — 12

(49) 604

*(50) 2,386 — 2,636

(51) 24

(52) 364

(53) 4

(54) 216

(55) — 1

(56) .25, $\frac{1}{4}$

(57) 36

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

(59) 50

*(60) 1,693,037 — 1,871,251

(61) 0

(62) 2

(63) — 1

(64) $\frac{27}{13}, 2\frac{1}{13}$

(65) .2, $\frac{1}{5}$

(66) 12,091

(67) 176

(68) 14

(69) 6

*(70) 50,693 — 56,029

(71) .5, $\frac{1}{2}$

(72) — 4

(73) 2

(74) .36

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

(76) — 2

(77) 4

(78) .95, $\frac{19}{20}$

(79) 91

*(80) 523 — 577