The University Interscholastic League
Number Sense Test • HS District 2 • 2009

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.

The person conducting this contest should explain these directions to the contestants.

STOP -- WAIT FOR SIGNAL!

(1) $2909 + 2090 =$ _____

(2) $824 \div 8 =$ _____

(3) $\frac{3}{4} \times \frac{14}{15} =$ _____

(4) 20% of 30 plus 40% of 50 is _____

(5) The GCD of 68 and 85 is _____

(6) $22 \times 22 =$ _____

(7) $4\frac{1}{4}\% =$ _____ (proper fraction)

(8) $15 + 10 \div 5 \times 10 - 15 =$ _____

(9) $2012 \times 25 =$ _____

*(10) $45 \times 55 - 65 =$ _____

(11) The sum of the prime divisors 105 is _____

(12) $44 \times 46 =$ _____

(13) 3 cubic yards = _____ cubic feet

(14) CXLIV × XII = _____ (Arabic Numeral)

(15) $(44 + 55 \times 66) \div 7$ has a remainder of _____

(16) 22 is what % less than 88? _____ %

(17) Which is smaller $\frac{5}{11}$ or $\frac{11}{23}$? _____

(18) $23 \times 45 =$ _____

(19) The median of 17, 22, 19, 12, & 25 is _____

*(20) $2134711 \div 111 =$ _____

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

(22) $0.8111... =$ _____ (proper fraction)

(23) The 3rd triangular number is _____

(24) $(5)^{-2} \times (5)^{0} \div 5^{2} =$ _____

(25) 21 inches is what per cent of a foot? _____ %

(26) If $x + 5 = 4$, then $x - 3 =$ _____

(27) If A=1, B= — A, and C=A—B, then ABC = _____

(28) Let $f(x) = 4x^2 - 12x + 9$. Find f(17). _____

(29) $1^2 + 2^2 + 3^2 + 5^2 + 8^2 =$ _____

*(30) 3 gals — 3 qts — 3 pts — 3 fl.oz. = _____ fl. oz.

(31) Find the simple interest on $400.00 at 4% for 4 years. $ _____

(32) $44^2 + 36^2$ _____

(33) $3 + 7 + 10 + 17 + ... + 44 + 71 =$ _____

(34) If $\sqrt{4 + \sqrt{4 + 4\sqrt{x}}} = 4$ then x = _____

(35) $10 \times 4! + 8 \times 5! =$ _____

(36) $8^3 =$ _____

(37) 44 base 10 is equivalent to _____ base 4

(38) The set {m,i,n,u,t,e} has ____ 3-element subsets

(39) $\left|-(2-4)-|6-8|\right| =$ _____

*(40) $\sqrt[3]{1332} \times \sqrt{141} \times 13 =$ _____

(41) $120 \div 8.333... =$ _____

(42) The point (— 4, 5) is reflected across the origin to point (h,k). Find k. _____

(43) If $x - y = 1$ and $xy = 2$ then $x^3 - y^3 =$ _____

(44) 19% of $666\frac{2}{3}$ is _____(mixed number)

(45) $5^3 \times 2^5 =$ _____

(46) Let $a^2 \div a^{-4} \div a^6 = a^k$, where $a > 1$. k =____

(47) $\frac{9}{11} - \frac{71}{89} =$ _____

(48) The distance between the points (1 , — 5) and (— 4 , 7) is _____

(49) $40_5 - 12_5 - 11_5 =$ _____ 5

*(50) $3^9 \div 6^6 \times 9^3 =$ _____

(51) $1234 \times 7 + 4 =$ _____

(52) If the odds of losing the game is 35%, then the probability of winning the game is _____

(53) $333 \times \frac{9}{37} =$ _____

(54) $(3 + 5i)(5 - 3i) = (a + bi)$. Find $a + b$. _____

(55) The smaller root of $5x^2 - 7x - 6 = 0$ is _____

(56) If $\log_3 (\frac{1}{27}) = x$ then x = _____

(57) $54 + 18 + 6 + 2 + ... =$ _____

(58) The area of $x^2 + (y-2)^2 = 2$ is $k\pi$. k = ____

(59) ${}_6P_4 + {}_6P_2 =$ _____

*(60) $11235 \times 111 =$ _____

(61) $57^2 =$ _____

(62) $1^2 + 1^2 + 2^2 + 3^2 + 5^2 + 8^2 + 13^2 =$ _____

(63) $\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix} \times \begin{vmatrix} 4 & 3 \\ 2 & 1 \end{vmatrix} = \begin{vmatrix} a & c \\ b & d \end{vmatrix}$. Find d. _____

(64) $\sqrt[6]{1771561} =$ _____

(65) The greatest integer function $f(x) = [2x + 3]$ has a value of _____ for $f(e)$

(66) The line of symmetry of the parabola $y = x^2 - 4x + 5$ is $x =$ _____

(67) $\left(\tan \frac{5\pi}{6}\right)^2 =$ _____

(68) $44^2 - 47^2 + 50^2 - 53^2 =$ _____

(69) $\sum_{k=1}^{4} (k)^2 - k =$ _____

*(70) $2718281 \div 3141 =$ _____

(71) If $f(x) = \frac{2 + 5x}{3 + 4x}$, then $f'(2) =$ _____

(72) If the initial point of a vector is (2, 5) and the terminal point is (— 1, 1), then $\|v\| =$ _____

(73) Find x, $0 \leq x < 7$, if $\frac{(5!)(3!)}{(4!)} \cong x \pmod 7$. _____

(74) If $f(x) = x^3 - x^2 - x - 1$, then $f''(-1) =$ ____

(75) How many asymptotes does the function $f(x) = \frac{2x^2 - 3x}{x + 1}$ have? _____

(76) $(3, \frac{\pi}{6})$ are polar coordinates for (x,y). y = ____

(77) $\frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30} =$ _____

(78) $\int_2^4 (3x)\, dx =$ _____

(79) If $f(x) = \frac{3x}{4} + 2$ then $f^{-1}(1) =$ _____

*(80) $106\frac{1}{4}\% \times 799 \times .125 =$ _____

University Interscholastic League - Number Sense Answer Key HS • District 2 • 2009

*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) 4999

(2) 103

(3) .7, $\frac{7}{10}$

(4) 26

(5) 17

(6) 484

(7) $\frac{17}{400}$

(8) 20

(9) 50300

*(10) 2290 — 2530

(11) 15

(12) 2024

(13) 81

(14) 1728

(15) 6

(16) 75

(17) $\frac{5}{11}$

(18) 1035

(19) 19

*(20) 18271 — 20193

(21) $35\frac{1}{16}$

(22) $\frac{73}{90}$

(23) 6

(24) $\frac{1}{625}$

(25) 175

(26) — 4

(27) — 2

(28) 961

(29) 103

*(30) 226 — 248

(31) $ 64.00

(32) 3232

(33) 179

(34) 1225

(35) 1200

(36) 512

(37) 230

(38) 20

(39) 0

*(40) 1614 — 1783

(41) 14.4, $\frac{72}{5}$, $14\frac{2}{5}$

(42) — 5

(43) 7

(44) $126\frac{2}{3}$

(45) 4000

(46) 0

(47) $\frac{20}{979}$

(48) 13

(49) 12

*(50) 293 — 322

(51) 8642

(52) $\frac{20}{27}$

(53) 81

(54) 46

(55) — .6, — $\frac{3}{5}$

(56) — 3

(57) 81

(58) 2

(59) 390

*(60) 1184731 — 1309439

(61) 3249

(62) 273

(63) 13

(64) 11

(65) 8

(66) 2

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

(68) — 582

(69) 20

*(70) 823 — 908

(71) $\frac{7}{121}$

(72) 5

(73) 2

(74) — 8

(75) 2

(76) 1.5, $\frac{3}{2}$, $1\frac{1}{2}$

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

(78) 18

(79) — $\frac{4}{3}$, — $1\frac{1}{3}$

*(80) 101 — 111