The University Interscholastic League
Number Sense Test • HS District 2 • 2011

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) $2134 - 1123 =$ _____

(2) $711 + 1829 =$ _____

(3) $2.011 \div 0.4 =$ _____ (decimal)

(4) $\frac{9}{10} \times \frac{14}{15} =$ _____

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

(6) $2011 \times 18 - 18 =$ _____

(7) $8\frac{1}{3}\%$ of $14.4 =$ _____ (mixed number)

(8) $(24)^2 =$ _____

(9) CXI + CDXLIV = _____ (Arabic Numeral)

*(10) $1235 - 81321 + 34 =$ _____

(11) 17 pints = _____ gallons

(12) $351 \times 25 =$ _____

(13) $(13)^3 =$ _____

(14) $2\frac{3}{5} + 4\frac{5}{6} =$ _____ (mixed number)

(15) The number of positive integral divisors of 64 is _____

(16) $82 + 77 - 72 - 67 + 62 + 57 =$ _____

(17) $97 \times 96 =$ _____

(18) Which is smaller $1\frac{5}{12}$ or 1.417? _____

(19) The negative reciprocal of .375 is _____

*(20) $2357 \times 1468 =$ _____

(21) $3\frac{2}{5} - 5\frac{2}{3} =$ _____ (mixed number)

(22) How far will a car travel in 5 hours 25 minutes at a constant rate of 60 mph? _____ miles

(23) $\frac{3}{4}$ gallon = _____ ounces

(24) $(4)^{-1} - (4)^0 + (4)^1 =$ _____

(25) The largest positive prime divisor of 65^2 is ___

(26) $(54)^2 + (18)^2 =$ _____

(27) 2.727272... = _____ (mixed number)

(28) Which of the following is not an abundant number, 24, 32, or 36? _____

(29) 15% of 51 is 17% of _____

*(30) $(8642 + 357) \div 19 =$ _____

(31) $200 is the simple interest on $625 invested for 4 years. What is the interest rate? _____ %

(32) $47^2 - 45^2 =$ _____

(33) 0.44888... = _____ (fraction)

(34) $35_8 + 46_8 + 13_8 =$ _____$_8$

(35) $(6^2 - 2^3 + 4 \times 5) \div 7$ has a remainder of ____

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

(37) If $f(x) = 4x^2 + 4x + 1$ then $f(32)$ is _____

(38) 66 feet is equivalent to _____ rods

(39) The product of 6 and some number gives the same results as the sum of that number and 24. What is the number? _____

*(40) $\sqrt{1220} \times \sqrt{580} =$ _____

(41) The set {p,o,i,n,t,s} has _____ proper subsets.

(42) If $5x - 8 > 13x$ then $x <$ _____

(43) Let $A^7 \div A^k \times A^3 = A^2$. If $A > 1$, then $k =$ ___

(44) $243 \div 0.272727... =$ _____

(45) $235_6 \div 5_6 =$ _____$_6$

(46) A triangle has sides of 8, 13, and x. What is the least integral value of x? _____

(47) If $4^{(x+2)} = 16^{(2x-1)}$ then $x =$ _____

(48) P, Q, and R are the real roots of $8x^3 + 2x^2 = x$. Find $PQ + QR + PR$. _____

(49) Find the slope of a line perpendicular to the line containing the points (2,3) and (5,7). ____

*(50) $\left(\frac{\sqrt{5}+1}{2} \times \pi\right)^3 =$ _____

(51) $241 \times 412 =$ _____

(52) How many distinct 8 letter words, real or imaginary, can be made using the letters from the set {p, a, r, a, l, l, e, l}? _____

(53) If $77^2 + k^2 = 9898$ then $k =$ _____

(54) $({}_5C_4)! =$ _____

(55) If $\log_9(3x) = 1.5$ then $x =$ _____

(56) The simplified coefficient of the x^3y^2 term in the expansion of $(2x - y)^5$ is _____

(57) The reciprocal of $2 - i$ is $a + bi$. Find a. ____

(58) $17^2 - 16^2 + 15^2 - 14^2 + ... - 2^2 + 1^2 =$ ___

(59) The number of the positive integral divisors of $9 \times 16 \times 25$ is _____

*(60) 115 radians = _____ degrees

(61) If $f(x) = x^4 + 4x^3 + 6x^2 + 4x + 1$, then $f(3) =$ _____

(62) $(321_6)(123_6) \div 5$ has a remainder of _____

(63) The harmonic mean of 3, 6, and 10 is _____

(64) How many minutes are there from 3:20 a.m. to 2:30 p.m. the same day? _____ minutes

(65) $4 + 8 + 12 + 16 + ... + 64 =$ _____

(66) $16 \times \frac{17}{18} =$ _____ mixed number

(67) $\sin(\arctan(0.41666...)) =$ _____

(68) A pair of standard dice are rolled. The odds that the sum of the top faces is a 5 or a 9 is ____

(69) The $\det\left(\begin{bmatrix} 1 & -3 \\ 5 & -7 \end{bmatrix} \times \begin{bmatrix} 1 & 5 \\ -3 & -7 \end{bmatrix}\right)$ is = ____

*(70) $92 \times 97 \times 103 \times 108 =$ _____

(71) $111 \times 707 =$ _____

(72) The slope of the line tangent to $f(x) = \frac{x^2}{3} - 4$ at the point $(3, -1)$ is _____

(73) How many asymptotes does the function $f(x) = \frac{4x + 12}{x^2 + x - 6}$ have? _____

(74) $\frac{1}{15} + \frac{1}{20} + \frac{1}{24} + \frac{1}{42} + \frac{1}{56} =$ _____

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

(76) Change .46, base 8, to a base 10 fraction. _____

(77) The next term of 6, 8, 9, 12, 16, 23, ... is _____

(78) $\int_{-2}^{2} (x^2 - 4)\,dx =$ _____

(79) $6! \div (5! \times 4!) + 3! \div (2! \times 1!) =$ _____

*(80) 398 square miles = _____ acres

University Interscholastic League - Number Sense Answer Key HS • District 2 • 2011

*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) 1011

(2) 2540

(3) 5.0275

(4) .84, $\frac{21}{25}$

(5) 18.75

(6) 36180

(7) $1\frac{1}{5}$

(8) 576

(9) 555

*(10) — 84054 — — 76049

(11) 2.125, $\frac{17}{8}$, $2\frac{1}{8}$

(12) 8775

(13) 2197

(14) $7\frac{13}{30}$

(15) 7

(16) 139

(17) 9312

(18) $1\frac{5}{12}$

(19) $-\frac{8}{3}$, $-2\frac{2}{3}$

*(20) 3,287,073 — 3,633,079

(21) $-2\frac{4}{15}$

(22) 325

(23) 96

(24) 3.25, $\frac{13}{4}$, $3\frac{1}{4}$

(25) 13

(26) 3240

(27) $2\frac{8}{11}$

(28) 32

(29) 45

*(30) 450 — 497

(31) 8

(32) 184

(33) $\frac{101}{225}$

(34) 116

(35) 6

(36) 5.2

(37) 4225

(38) 4

(39) 4.8, $\frac{24}{5}$, $4\frac{4}{5}$

*(40) 800 — 883

(41) 63

(42) — 1

(43) 8

(44) 891

(45) 31

(46) 6

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

(48) — .125, $-\frac{1}{8}$

(49) — .75, $-\frac{3}{4}$

*(50) 125 — 137

(51) 99292

(52) 3360

(53) 63

(54) 120

(55) 9

(56) 80

(57) .4, $\frac{2}{5}$

(58) 153

(59) 45

*(60) 6260 — 6918

(61) 256

(62) 1

(63) 5

(64) 670

(65) 544

(66) $15\frac{1}{9}$

(67) $\frac{5}{13}$

(68) $\frac{2}{7}$

(69) 64

*(70) 94,387,048 — 104,234,104

(71) 78477

(72) 2

(73) 2

(74) .2, $\frac{1}{5}$

(75) 22

(76) $\frac{19}{32}$

(77) 34

(78) $-10\frac{2}{3}$

(79) 3.25, $\frac{13}{4}$, $3\frac{1}{4}$

*(80) 241,984 — 267,456