The University Interscholastic League
Number Sense Test • HS Invitational A • 2004

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) $307 + 703 =$ _____

(2) $404 \div 25 =$ _____ (decimal)

(3) $2004 \times 12 =$ _____

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

(5) $\frac{11}{4} =$ _____ %

(6) $23^2 =$ _____

(7) $16 + 14 \div 7 \times 8 =$ _____

(8) $1 + 3 + 7 + 7 + 11 + 13 =$ _____

(9) $3\frac{1}{2} \times 5\frac{6}{7} =$ _____ (improper fraction)

*(10) $488 + 211 - 135 + 79 =$ _____

(11) $14 \times 44 - 14 \times 30 =$ _____

(12) CXI — CC = _____ (Arabic Numeral)

(13) $4.8 \times 15 =$ _____

(14) $1\frac{3}{8}\% =$ _____ (decimal)

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

(16) $8 + 15 - 22 - 29 + 36 + 43 =$ _____

(17) The LCM of 64 and 20 is _____

(18) $3\frac{1}{4} \times 16 =$ _____

(19) 24% of 24 is _____ (decimal)

*(20) $\sqrt{173468} =$ _____

(21) $62 \times 63 =$ _____

(22) 70 minus 70% of 70 is _____

(23) $(11^2 + 9 \times 7) \div 5$ has a remainder of _____

(24) $3\frac{2}{5} \div \frac{2}{5} =$ _____

(25) If four widgets costs $1.25 then one dozen widgets cost $_____

(26) .414141... = _____ (fraction)

(27) $3 + 5 + 7 + ... + 21 + 23 =$ _____

(28) The number of positive integral divisors of $2^4 \times 3^6 \times 5^{10}$ is _____

(29) $33.67 \times 15 =$ _____ (decimal)

*(30) $148 \times 5 \times 152 =$ _____

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

(32) 10 feet = _____ yards

(33) $(5\frac{2}{5})^2 =$ _____ (mixed number)

(34) $125 \times 320 =$ _____

(35) The sum of the roots of $3x^3 - 2x^2 + x - 4$ is _____

(36) $93 \times 97 =$ _____

(37) If $x = 1$ and $y = 2$ then $x^2 - 2xy + y^2 =$ ____

(38) $(27 \div 216)^{\frac{1}{3}} =$ _____

(39) $3^4 + 3 =$ _____ base 9

*(40) $23 \times 33 \times 43 =$ _____

(41) $14 \times 715 =$ _____

(42) $15 \times 18 + 9 \times 30 =$ _____

(43) The area of a square is 64 sq. cm. The perimeter of the square is _____ cm.

(44) $23 \times 27 + 4 =$ _____

(45) If $16^x = 169$, the $4^x =$ _____

(46) The next term of 1, 2, 6, 24, 120,... is _____

(47) $707^2 =$ _____

(48) If $4 + 3x = -1$ then $6x + 8 =$ _____

(49) $345_8 =$ _____ 2

*(50) $625 \times 648 =$ _____

(51) Find the slope of the line parallel to the line $2x = 4 - \frac{2}{5}y$. _____

(52) $(28 + 2)^2 + (28^2 - 2^2) =$ _____

(53) $1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \ldots =$ _____

(54) ${}_4P_3 \div {}_3P_2 =$ _____

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

(56) $83\frac{1}{3}\%$ of a foot is _____ inches

(57) $\sin(-\pi) =$ _____

(58) If $\log_8 k = \frac{1}{3}$, then $k =$ _____

(59) The number of terms in the expansion of $(2x + 3y)^4$ is _____

*(60) $13^4 =$ _____

(61) The product of the coefficients of $(2a + 2b)^2$ is _____

(62) $33_4 \div 11_4 =$ _____ 4

(63) $(306)^2 =$ _____

(64) $\text{Log}_5 M = 2$ then $\sqrt{M} =$ _____

(65) 50 is 6.25% of _____

(66) $42 \times 429 =$ _____

(67) $\cos^2 30° - \sin^2 30° =$ _____

(68) The graph of $y = 2 - 3\cos 2(x - 5)$ has a horizontal displacement of _____ units

(69) $\frac{9}{46} - \frac{2}{9} =$ _____

*(70) $16667 \times 369 =$ _____

(71) $2\frac{2}{5} \times 4\frac{1}{6} =$ _____

(72) The 6th pentagonal number is _____

(73) $\frac{7}{30} + \frac{7}{20} + \frac{7}{12} =$ _____

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

(75) $2^6 \times 5^4 =$ _____

(76) A pair of dice is thrown. The odds that the sum is a multiple of 5 is _____

(77) $11 \times \frac{11}{14} + 3 =$ _____ (mixed number)

(78) $\int_0^3 \frac{x}{3}\,dx =$ _____

(79) Change .33 base 4 to a base 10 fraction. ____

*(80) $(3\pi)^4 =$ _____

University Interscholastic League - Number Sense Answer Key HS • Invitation A • 2004

*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) 1010

(2) 16.16

(3) 24048

(4) $1\frac{7}{15}$

(5) 275

(6) 529

(7) 32

(8) 42

(9) $\frac{41}{2}$

*(10) 611 – 675

(11) 196

(12) – 89

(13) 72

(14) .01375

(15) $-\frac{11}{30}$

(16) 51

(17) 320

(18) 52

(19) 5.76

*(20) 396 – 437

(21) 3906

(22) 21

(23) 4

(24) $\frac{17}{2}$ or $8\frac{1}{2}$ or 8.5

(25) 3.75

(26) $\frac{41}{99}$

(27) 143

(28) 385

(29) 505.05

*(30) 106856 – 118104

(31) 8

(32) $3\frac{1}{3}$ or $\frac{10}{3}$

(33) $29\frac{4}{25}$

(34) 40000

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

(36) 9021

(37) 1

(38) $\frac{1}{2}$ or .5

(39) 103

*(40) 31006 – 34268

(41) 10010

(42) 540

(43) 32

(44) 625

(45) 13

(46) 720

(47) 499849

(48) – 2

(49) 11100101

*(50) 384750 – 425250

(51) – 5

(52) 1680

(53) $1\frac{1}{2}$ or $\frac{3}{2}$ or 1.5

(54) 4

(55) 24

(56) 10

(57) 0

(58) 2

(59) 5

*(60) 27133 – 29989

(61) 128

(62) 3

(63) 93636

(64) 5

(65) 800

(66) 18018

(67) .5 or $\frac{1}{2}$

(68) 5

(69) $-\frac{11}{414}$

*(70) 5,842,617 – 6,457,629

(71) 10

(72) 51

(73) $\frac{7}{6}$ or $1\frac{1}{6}$

(74) 24

(75) 40000

(76) $\frac{7}{29}$

(77) $11\frac{9}{14}$ or $\frac{163}{14}$

(78) $\frac{3}{2}$ or $1\frac{1}{2}$ or 1.5

(79) $\frac{15}{16}$

*(80) 7496 – 8284