The University Interscholastic League
Number Sense Test • HS Invitational B • 2006

Contestant's Number _____

Final _____ _____
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) $2006 + 6002 =$ _____

(2) $\frac{1}{2} + \frac{3}{4} =$ _____

(3) $1 + 2 \times 3 - 4 \div 5 =$ _____

(4) $600.2 - 200.6 =$ _____ (decimal)

(5) $24^2 =$ _____

(6) $37.5\% =$ _____ (proper fraction)

(7) $2006 \div 6$ has a remainder of _____

(8) $246 \times 11 =$ _____

(9) MMLIX − LIII = _____ (Arabic Numeral)

*(10) $6002 + 602 + 206 - 2006 =$ _____

(11) Which is larger, $\frac{8}{9}$ or $\frac{22}{25}$ = _____

(12) $12 \times 12 \times 12 =$ _____

(13) $3 + 6 + 9 + \ldots + 27 + 30 =$ _____

(14) The multiplicative inverse of -2.6 is _____

(15) $\frac{1}{4} - \frac{1}{8} - \frac{1}{12} =$ _____ (proper fraction)

(16) $33 \times 44 =$ _____

(17) $\frac{3^3}{(2^2)(5^2)} =$ _____ (decimal)

(18) $6\frac{7}{8} - 5\frac{3}{4} =$ _____

(19) The LCM of 54 and 48 is _____

*(20) $774447 \div 111 =$ _____

(21) A rectangle has a length of 2.4 in and a width of 1.5 in. Its area is _____ sq. in.

(22) 2.6 meters = _____ millimeters

(23) $(20 + 4 \times 6^2) \div 8$ has a remainder of _____

(24) .2141414... = _____ (proper fraction)

(25) The sum of the positive integral divisors of 20 is _____

(26) $210_4 =$ _____$_6$

(27) 2.5 pints = _____ cups

(28) $1.25 - .75 - .25 =$ _____ (proper fraction)

(29) $29 \times \frac{29}{34} =$ _____ (mixed number)

*(30) $52 \times 48 + 49 \times 51 =$ _____

(31) What number divided by 5 and subtracted from 24, gives the same results? _____

(32) $143 \times 77 =$ _____

(33) If $x = 1$ and $y = 2$ then $(x - y)(x^2 + xy + y^2) =$ _____

(34) $(81)^{\frac{1}{2}} \div (729)^{\frac{1}{3}} =$ _____

(35) $3^3 + 3^2 + 3^0 =$ _____ base 3

(36) If 4 notepads cost 18 cents then 18 notepads cost $ _____

(37) 12% of 200 is _____ % of 50.

(38) $96 \times 103 =$ _____

(39) Set A has 32 subsets. How many elements are in set A? _____

*(40) $\sqrt{81818} =$ _____

(41) $35\frac{5}{7}\ \% =$ _____ (proper fraction)

(42) The perimeter of a square whose diagonal is $2\sqrt{2}$ inches is _____ inches

(43) $4! - 6! =$ _____

(44) If $4x - 3 = 3x + 2$ then $2x - 1 =$ _____

(45) An octahedron has _____ vertices

(46) $27 \times 33 - 11 \times 81 =$ _____

(47) $33 \div 3.75 =$ _____ (decimal)

(48) $432_8 =$ _____ 2

(49) If the hypotenuse of a 30° - 60° right triangle is 15 cm, then the leg opposite the 30° angle is _____ cm

*(50) $15^3 \times 5^3 =$ _____

(51) 33% of $466\frac{2}{3}$ is _____

(52) $72 \times 78 + 9 =$ _____

(53) $\frac{3}{8} - \frac{26}{73} =$ _____

(54) $3 - 1 - \frac{1}{3} - \frac{1}{9} - \frac{1}{27} - \ldots =$ _____

(55) The smallest integer such that $4x + 3 > -2$ is _____

(56) $\cos(-5\pi) =$ _____

(57) $\frac{6 \times 7! - 7 \times 6!}{6!} =$ _____

(58) $38^2 + (30 + 8)(30 - 8) =$ _____

(59) $131 \times 212 =$ _____

*(60) The surface area of a regular octahedron whose edges are 20 cm is _____ cm^2

(61) $402^2 =$ _____

(62) $888 \times \frac{4}{37} =$ _____

(63) $59^2 + 59 =$ _____

(64) $24^2 - 22^2 + 20^2 - 18^2 =$ _____

(65) $222_3 \times 2_3 =$ _____ 3

(66) The slope of the line perpendicular to the line $5x - 4y = 3$ is _____

(67) If $\text{Log}_5 X^2 = 4$, then $\sqrt{X} =$ _____

(68) If $\cos\theta = 0.08333...$, then $\sec\theta =$ _____

(69) $2^5 \times 3^4 \times 5^3 =$ _____

*(70) $4.9^3 \times 3.3^3 =$ _____

(71) $666 \times \frac{1}{27} =$ _____ (mixed number)

(72) If $f(x) = 2(x + 3)$, then $f^{-1}(-4) =$ _____

(73) $\frac{1}{6} + \frac{1}{10} + \frac{1}{15} + \frac{1}{21} =$ _____

(74) $14 \times \frac{14}{17} - 14 =$ _____ (mixed number)

(75) The sum of the first nine terms of the Fibonacci sequence 3, 5, 8, 13, 21, ... is _____

(76) If $g(x) = x^3 - 3x - 3$, then $g'(-3) =$ _____

(77) The graph $y = \frac{x^2 + x - 6}{3x + 12}$ has a vertical asymptote at $x =$ _____

(78) A pair of dice is thrown. The odds that the sum is 7 is _____

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

*(80) 300 log 600 = _____

University Interscholastic League - Number Sense Answer Key HS • Invitation B • 2006

*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) 8008

(2) $\frac{5}{4}$, $1\frac{1}{4}$, 1.25

(3) $\frac{31}{5}$, $6\frac{1}{5}$, 6.2

(4) 399.6

(5) 576

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

(7) 2

(8) 2706

(9) 2006

*(10) 4564 – 5044

(11) $\frac{8}{9}$

(12) 1728

(13) 165

(14) $-\frac{5}{13}$

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

(16) 1452

(17) .27

(18) $\frac{9}{8}$, $1\frac{1}{8}$, 1.125

(19) 432

*(20) 6629 – 7325

(21) $\frac{18}{5}$, $3\frac{3}{5}$, 3.6

(22) 2600

(23) 4

(24) $\frac{106}{495}$

(25) 42

(26) 100

(27) 5

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

(29) $24\frac{25}{34}$

*(30) 4746 – 5244

(31) 20

(32) 11011

(33) – 7

(34) 1

(35) 1101

(36) $ .81

(37) 48

(38) 9888

(39) 5

*(40) 272 – 300

(41) $\frac{5}{14}$

(42) 8

(43) – 696

(44) 9

(45) 6

(46) 0

(47) 8.8

(48) 100011010

(49) $\frac{15}{2}$, $7\frac{1}{2}$, 7.5

*(50) 400782 – 442968

(51) 154

(52) 5625

(53) $\frac{11}{584}$

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

(55) – 1

(56) – 1

(57) 35

(58) 2280

(59) 27772

*(60) 1317 – 1454

(61) 161604

(62) 96

(63) 3540

(64) 168

(65) 1221

(66) $-\frac{4}{5}$, – .8

(67) 5

(68) 12

(69) 324000

*(70) 4017 – 4439

(71) $24\frac{2}{3}$

(72) – 5

(73) $\frac{8}{21}$

(74) $-2\frac{8}{17}$

(75) 372

(76) 24

(77) – 4

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

(79) 9

*(80) 792 – 875