The University Interscholastic League
Number Sense Test • HS Invitational B • 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) $234 \times 5 =$ _____

(2) $66 - 77 + 88 =$ _____

(3) $23 \times 14 =$ _____

(4) $\frac{2}{9} \times \frac{5}{8} =$ _____

(5) $304\% =$ _____ (mixed number)

(6) $MD + DC =$ _____ (Arabic Numeral)

(7) $4800 \div 75 =$ _____

(8) Which is larger, $\frac{3}{5}$ or $\frac{7}{9}$ = _____

(9) $14 + (16 - 9) \times 2 =$ _____

*(10) $2004 - 204 + 402 - 4002 =$ _____

(11) $23^2 =$ _____

(12) $64 \times 1.5 =$ _____

(13) $2.17 \div 0.7 =$ _____ (decimal)

(14) The additive inverse of $-\frac{1}{6}$ is _____

(15) The LCM of 27 and 36 is _____

(16) 60 plus 60% of 60 is _____

(17) $\frac{4}{3} - \frac{3}{4} =$ _____

(18) $2 + 4 + 6 + ... + 28 + 30 =$ _____

(19) 52 is 13% of _____

*(20) $509 \times \sqrt{905} =$ _____

(21) $31 \times \frac{31}{34} =$ _____ (mixed number)

(22) $4.3 \times 2.1 =$ _____

(23) $(15 \times 3 - 6^2) \div 9$ has a remainder of _____

(24) What number times 4 and added to 24, gives the same results? _____

(25) 2.5 centimeters = _____ meter(s)

(26) 2004 base 5 = _____ base 10

(27) 0.2050505... = _____

(28) How many positive integers divide 64? _____

(29) $21 \times 336.7 =$ _____ (decimal)

*(30) $119 \times 120 \times 121 =$ _____

(31) If $3x + 4 = 5$ then $x^2 =$ _____

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

(33) $12.5 \times 480 =$ _____

(34) $\sqrt[3]{125 \times 512} =$ _____

(35) If 8 pens cost \$1.44 then 12 pens cost \$_____

(36) $12^2 + 24^2 =$ _____

(37) $10\frac{4}{5} \times 5\frac{2}{5} =$ _____ (mixed number)

(38) $103 \times 104 =$ _____

(39) $2^4 + 2 =$ _____ base 4

*(40) $29 \times 127 + 31 \times 213 =$ _____

(41) If the area of an equilateral triangle is $9\sqrt{3}$ sq. cm, then its side length is _____ cm.

(42) $45 \times 65 =$ _____

(43) If $5^{3x} = 25^{2+x}$ then $x =$ _____

(44) $404^2 =$ _____

(45) The next term of 2, 2, 4, 6, 10, 16, ... is _____

(46) If $3x - 2 = 2x + 3$ then $x - 6 =$ _____

(47) $18 \times 24 + 9 =$ _____

(48) $38 \times 28 =$ _____

(49) $45 \times 16 - 24 \times 30 =$ _____

*(50) $\sqrt{6420135} =$ _____

(51) $8! \div 6! =$ _____

(52) $(30 + 2)^2 - (30^2 - 2^2) =$ _____

(53) $(3i - 2) \div (3i + 2) = A + Bi$. $B =$ _____

(54) $\frac{2}{3} + \frac{1}{2} + \frac{3}{8} + \frac{9}{32} + \ldots =$ _____

(55) If $4\log_9 k = 2$, then $k =$ _____

(56) $\tan(-45°) =$ _____

(57) 750 pounds is _____% of a ton.

(58) The volume of a cube with an edge length of 12 in. is _____ cubic inches.

(59) The sum of the coefficients of the 2nd and 4th term in the expansion of $(x + y)^4$ is ___

*(60) $23 \times 34 + 43 \times 32 =$ _____

(61) 24 is _____% of 192

(62) $\frac{2}{7} - \frac{7}{29} =$ _____

(63) The slope of the line $4 = 2y - 5x$ is _____

(64) The product of the coefficients of $(a + b)^3$ is _____

(65) $\sin 30°\cos 60° - \sin 60°\cos 30° =$ _____

(66) $408^2 =$ _____

(67) The probability of losing is $44\frac{4}{9}\%$. The odds of winning is _____ (fraction)

(68) $111 \times 345 =$ _____

(69) $345_8 + 67_8 =$ _____ 8

*(70) $72827 \div 266 =$ _____

(71) $14 \times \frac{14}{17} - 14 =$ _____ (mixed number)

(72) If $g(x) = x^4 - 4x + 4$, then $g'(4) =$ _____

(73) If $N \div 3$ has a remainder of 2, then $5N \div 3$ has a remainder of _____

(74) $123 \times 321 =$ _____

(75) Change $\frac{35}{36}$ to a base 6 decimal. _____

(76) If $\cos^{-1}(.8) + \cos^{-1}(.6) = k\pi$, then $k =$ ___

(77) The 4th octagonal number is _____

(78) $\int_1^3 (x^2)\, dx =$ _____

(79) $\frac{1}{12} - \frac{1}{20} - \frac{1}{30} =$ _____

*(80) $571428 \times 34 =$ _____

University Interscholastic League - Number Sense Answer Key HS • Invitation B • 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) 1170

(2) 77

(3) 322

(4) $\frac{5}{36}$

(5) $3\frac{1}{25}$

(6) 2100

(7) 64

(8) $\frac{7}{9}$

(9) 28

*(10) $(-1890) - (-1710)$

(11) 529

(12) 96

(13) 3.1

(14) $\frac{1}{6}$

(15) 108

(16) 96

(17) $\frac{7}{12}$

(18) 240

(19) 400

*(20) 14547 — 16077

(21) $28\frac{9}{34}$

(22) 9.03

(23) 0

(24) 8

(25) .025 or $\frac{1}{40}$

(26) 254

(27) $\frac{203}{990}$

(28) 7

(29) 7070.7

*(30) 1,641,486 — 1,814,274

(31) $\frac{1}{9}$

(32) 9

(33) 6000

(34) 40

(35) 2.16

(36) 720

(37) $58\frac{8}{25}$

(38) 10712

(39) 102

*(40) 9772 — 10800

(41) 6

(42) 2925

(43) 4

(44) 163216

(45) 26

(46) — 1

(47) 441

(48) 1064

(49) 0

*(50) 2408 — 2660

(51) 56

(52) 128

(53) $\frac{12}{13}$

(54) $\frac{8}{3}$ or $2\frac{2}{3}$

(55) 3

(56) — 1

(57) 37.5 or $37\frac{1}{2}$ or $\frac{75}{2}$

(58) 1728

(59) 8

*(60) 2051 — 2265

(61) 12.5 or $12\frac{1}{2}$ or $\frac{25}{2}$

(62) $\frac{9}{203}$

(63) 2.5 or $2\frac{1}{2}$ or $\frac{5}{2}$

(64) 9

(65) $-\frac{1}{2}$ or — .5

(66) 166464

(67) $\frac{5}{4}$

(68) 38295

(69) 434

*(70) 261 — 287

(71) $-2\frac{8}{17}$

(72) 252

(73) 1

(74) 39483

(75) .55

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

(77) 40

(78) $8\frac{2}{3}$ or $\frac{26}{3}$

(79) 0

*(80) 18,457,125 — 20,399,979