The University Interscholastic League
Number Sense Test • HS State • 2007

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) $2007 \times 5 - 2008 =$ _____

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

(3) $200.2 - 700.7 =$ _____ (decimal)

(4) $77 \div 22 =$ _____ (mixed number)

(5) $3\frac{5}{8} =$ _____ % (decimal)

(6) $2 - 4 \times 6 \div 8 + 10 =$ _____

(7) $34^2 =$ _____

(8) $96 \div 75 =$ _____

(9) $18 \times 81 =$ _____

*(10) $323 - 5445 + 7667 =$ _____

(11) $11^5 \div 121 =$ _____

(12) $4\frac{5}{6} - 10\frac{11}{12} =$ _____ (mixed number)

(13) The multiplicative inverse of -1.4 is _____

(14) $102 \times 108 =$ _____

(15) $24 \times 35 =$ _____

(16) Which is larger, .622 or $\frac{5}{8}$? _____

(17) .818181... = _____ (proper fraction)

(18) $121 + 110 + 99 + ... + 11 =$ _____

(19) The LCM of 57 and 95 is _____

*(20) $753461 \div 289 =$ _____

(21) $1324354 \div 4$ has a remainder of _____

(22) 540 base 10 equals _____ base 6

(23) $5\frac{1}{5} \times 10\frac{1}{5} =$ _____ (mixed number)

(24) What number added to 15 and multiplied by 4 gives the same results? _____

(25) Which of the following is an extravagant number, 2, 3, or 4? _____

(26) $8^2 + 24^2 =$ _____

(27) .333... — .666... — .999... = _____

(28) $21 \times 15 \times 14 =$ _____

(29) The median of 13, 2, 10, 5, 17, and 8 is _____

*(30) 123% of 882 = _____

(31) $76^2 - 74^2 =$ _____

(32) $(8^2 + 4 \times 6 - 10) \div 3$ has a remainder of ___

(33) The number of distinct elements in $[\{m,e,d,i,a,n\} \cap \{m,e,a,n\}] \cap \{m,o,d,e\}$ is ___

(34) If $f(x) = (x + 7)(x^2 - 7x + 49)$ then $f(7) =$ _____

(35) $243 + 27 + 3 =$ _____ base 9

(36) How many positive integers less than 16×25 are relatively prime to 16×25? ___

(37) $143 \times 63 =$ _____

(38) The sum of the roots of $x^3 - 13x = 12$ is ___

(39) 5 gallons equals _____ cubic inches

*(40) $52 \times 55 \times 58 =$ _____

(41) A decagon has _____ distinct diagonals.

(42) $\frac{(5!)(4!)}{6!} =$ _____

(43) If $5x - 3 = 4 + 2x$, then $6x + 1 =$ _____

(44) If A is 12.5% of B and B is $\frac{4}{5}$ of C, then C is what % of A? _____%

(45) $12 \times 90 + 72 \times 15 =$ _____

(46) $1.21 \div .090909... =$ _____(decimal)

(47) The ratio of the area of a circle with a radius of 5 cm to its circumference is _____ cm

(48) $55 \times 95 =$ _____

(49) 101011 base 2 can be written as _____ base 4

*(50) $24^2 \times 18^3 \div 6^4 =$ _____

(51) The largest integer x such that $5x + 3 < -1$ is _____

(52) $114 \times 121 =$ _____

(53) Find $k > 4$, so that the six digit number 3576k2 is divisible by 12. k = _____

(54) If $\log_4(.125) = k$ then k = _____

(55) 1.25π radians equals _____ degrees

(56) $23_5 \times 4_5 - 10_5 =$ _____$_5$

(57) $21 - 83 \times 87 =$ _____

(58) An obtuse triangle has integer side lengths of 8, 15, and x. The smallest value of x is ___

(59) The sum of the coefficients of $(a + b)^5$ is ___

*(60) $\sqrt[3]{3380} \times \sqrt{223} \times 16 =$ _____

(61) $48^2 - 44^2 + 40^2 - 36^2 =$ _____

(62) $33 \times 1111 =$ _____

(63) The slope of the line $6 = 7y + 8x$ is _____

(64) Find k, $0 \leq k \leq 7$, if $(5!)(3!) \cong k \pmod 8$. ___

(65) The sum of the first nine terms of the Fibonacci sequence 3,8,11,19, ... is _____

(66) $(\sin 105°)(\cos 105°) =$ _____

(67) $\frac{8}{11} - \frac{87}{122} =$ _____

(68) If $g(x) = 2 - \frac{3x}{4}$, then $g^{-1}(5) =$ _____

(69) How many minutes are there from 6:54 a.m. to 4:56 p.m. in one day? _____

*(70) $85714.2 \div 714.285 =$ _____

(71) The ratio of x to y is 4 to 9. If $x - y = -15$, then $x + y =$ _____

(72) The period of $y = 2 - 3\cos(4\pi x + 2\pi)$ is ___

(73) If $f(x) = 4x^3 - 3x^2 + 2x$, then $f''(1) =$ ___

(74) $888 \times \frac{16}{37} \times \frac{18}{27} =$ _____

(75) Change .444 base 5 to a base 10 fraction. ___

(76) The 5th pentagonal number is _____

(77) $\frac{1}{72} + \frac{1}{90} + \frac{1}{110} + \frac{1}{132} =$ _____

(78) $5^3 - 4^3 + 3^3 - 2^3 =$ _____

(79) $\int_0^3 (2x + 1)\, dx =$ _____

*(80) $8333 \times 12\frac{1}{2}\% \times .12 =$ _____

University Interscholastic League - Number Sense Answer Key HS • State • 2007

*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) 8027

(2) $1\frac{7}{15}, \frac{22}{15}$

(3) -500.5

(4) $3\frac{1}{2}$

(5) 362.5

(6) 9

(7) 1156

(8) $1.28, 1\frac{7}{25}, \frac{32}{25}$

(9) 1458

*(10) 2418 — 2672

(11) 1331

(12) $-6\frac{1}{12}$

(13) $-\frac{5}{7}$

(14) 11016

(15) 840

(16) $.625, \frac{5}{8}$

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

(18) 726

(19) 285

*(20) 2477 — 2737

(21) 2

(22) 2300

(23) $53\frac{1}{25}$

(24) 5

(25) 4

(26) 640

(27) $-1\frac{1}{3}, -\frac{4}{3}$

(28) 4410

(29) 9

*(30) 1031 — 1139

(31) 300

(32) 0

(33) 2

(34) 686

(35) 333

(36) 160

(37) 9009

(38) 0

(39) 1155

*(40) 157586 – 174174

(41) 35

(42) 4

(43) 15

(44) 1000

(45) 2160

(46) 13.31

(47) $2.5, 2\frac{1}{2}, \frac{5}{2}$

(48) 5225

(49) 223

*(50) 2463 — 2721

(51) -1

(52) 13794

(53) 7

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

(55) 225

(56) 142

(57) -7200

(58) 8

(59) 32

*(60) 3407 — 3765

(61) 672

(62) 36663

(63) $-1\frac{1}{7}, -\frac{8}{7}$

(64) 0

(65) 534

(66) $-.25, -\frac{1}{4}$

(67) $\frac{19}{1342}$

(68) -4

(69) 602

*(70) 114 — 126

(71) 39

(72) $.5, \frac{1}{2}$

(73) 18

(74) 256

(75) $\frac{124}{125}$

(76) 35

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

(78) 80

(79) 12

*(80) 119 — 131