The University Interscholastic League
Number Sense Test • HS Invitational B • 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) $2007 \times 6 + 2007 =$ _____

(2) $\$20.02 - \$70.07 = \$$ _____

(3) $63 \div \frac{3}{4} =$ _____

(4) $21 \times 12 =$ _____

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

(6) $\frac{6}{7} - \frac{7}{8} =$ _____

(7) $18 + 15 \div 5 \times 9 =$ _____

(8) $264 \div 22 =$ _____

(9) $64 \times 75 =$ _____

*(10) $2007 - 207 + 702 - 7002 =$ _____

(11) $11^4 \div 11 =$ _____

(12) $3\frac{4}{5} - 8\frac{9}{10} =$ _____ (mixed number)

(13) The multiplicative inverse of -7.2 is _____

(14) $6 + 12 + 18 + \ldots + 66 =$ _____

(15) 25% of 25 is _____ (decimal)

(16) $22^2 =$ _____

(17) DCCII ÷ IX = _____ (Arabic Numeral)

(18) The LCM of 27 and 36 is _____

(19) .3222... = _____ (proper fraction)

*(20) $\sqrt{272727} =$ _____

(21) $8\frac{2}{3} \times 8\frac{1}{3} =$ _____ (mixed number)

(22) What number subtracted from 7 and multiplied by 6, gives the same results? _____

(23) $2057 \div 17 =$ _____

(24) 2 quarts is what per cent of a pint? _____%

(25) 423156 ÷ 12 has a remainder of _____

(26) Which of the following is an abundant number, 14, 28, or 42? _____

(27) $.777... - .333... + .555... =$ _____

(28) $15 \times 25 \times 36 =$ _____

(29) The square root of 27×48 is _____

*(30) 106% of 319 = _____

(31) $5\frac{1}{5} \times 25\frac{1}{5} =$ _____ (mixed number)

(32) $48^2 - 49^2 =$ _____

(33) 42% of 35 is 70% of _____

(34) The number of distinct elements in $[\{t,w,o\} \cup \{f,o,u,r\}] \cap \{e,i,g,h,t\}$ is _____

(35) If $f(x) = 4x^2 - 4x + 1$ then $f(13)$ is _____

(36) $539 \times 13 =$ _____

(37) The product of the positive divisors of 6 is ___

(38) The ratio of the sides of a rectangle is 3:5. The perimeter is 32. The shorter side is ____

(39) $5^4 \div 11$ has a remainder of _____

*(40) $33 \times 44 \times 55 =$ _____

(41) If $4x + 5 > 20$ then $x >$ _____

(42) 123 base 4 equals _____ base 2

(43) A pentagon has _____ distinct diagonals.

(44) If $4^x = .0625$ then $x =$ _____

(45) $32 \times 38 + 9 =$ _____

(46) $911 \div .090909... =$ _____

(47) Let R, S, and T be the roots of $2x^3 + 4x = 5$. $R \times S \times T$ equals _____

(48) A is 10% less than B and B is 20% more than C. A is what % more than C?_____%

(49) The perimeter of an equilateral triangle is 12 cm. Its area is $k\sqrt{3}$ cm^2. Find k. _____

*(50) $80520 \div 131 =$ _____

(51) $(2 - 5i)(3 + 5i) = (a + bi)$. Find a. _____

(52) $412 \times 112 =$ _____

(53) An acute triangle has integer sides of 4, x, and 9. The largest value of x is _____

(54) How many ordered pairs are in the Cartesian product of (a,b,c) and (d, e,)? ____

(55) The smallest integer x such that $3 - 4x < 5$ is _____

(56) $\frac{\pi}{18}$ radians = _____ degrees

(57) $\sin(-\frac{\pi}{3}) \times \sin(\frac{\pi}{3}) =$ _____

(58) If $\log_4(.5) = k$ then $k =$ _____

(59) Find $k > 0$, so that the four digit number 567k is divisible by 6. _____

*(60) $(75 \times 75) \div (25 \times 25 \times 25) \times 150 =$ _____

(61) $31^2 - 33^2 + 35^2 - 37^2 =$ _____

(62) $33_6 \times 3_6 =$ _____ 6

(63) How much time has past from 2:15 p.m. to 11:30 p.m. in one day? _____ hours

(64) $666 \times \frac{2}{37} =$ _____

(65) $2(\cos 30°)(\cos 30°) - 1 =$ _____

(66) The sum of the coefficients of $(x - y)^3$ is___

(67) $\frac{8}{9} - \frac{31}{37} =$ _____

(68) $\log_5[\log_4(\log_3 81)] =$ _____

(69) The slope of the line containing the points $(-4, 3)$ and $(3, -2)$ is _____

*(70) $5^5 + 4^4 + 3^3 + 2^2 + 1^1 =$ _____

(71) The sum of the first eleven terms of the Fibonacci sequence 2,4,6,10,16,26,... is _____

(72) The period of $y = 5\cos\frac{1}{4}(x + 3\pi) + 2$ is $k\pi$ radians. Find k. _____

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

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

(75) $3 \times 5 \times 7 \times 11 =$ _____

(76) Change .33 base 6 to a base 10 fraction. ___

(77) $\frac{5}{6} + 1\frac{1}{5} - 2 =$ _____

(78) $111 \times 35 =$ _____

(79) $\int_0^4 \sqrt{x}\, dx =$ _____

*(80) $797 \div 87.5\% \times \frac{7}{10} =$ _____

University Interscholastic League - Number Sense Answer Key HS • Invitation B • 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) 14049

(2) – 50.05

(3) 84

(4) 252

(5) 220

(6) $-\frac{1}{56}$

(7) 45

(8) 12

(9) 4800

*(10) (– 4725) – (– 4275)

(11) 1331

(12) $-5\frac{1}{10}$

(13) $-\frac{5}{36}$

(14) 396

(15) 6.25

(16) 484

(17) 78

(18) 108

(19) $\frac{29}{90}$

*(20) 497 – 548

(21) $72\frac{2}{9}$

(22) 1

(23) 121

(24) 400

(25) 0

(26) 42

(27) 1

(28) 13500

(29) 36

*(30) 322 – 355

(31) $131\frac{1}{25}$

(32) – 97

(33) 21

(34) 1

(35) 625

(36) 7007

(37) 36

(38) 6

(39) 9

*(40) 75867 – 83853

(41) $3.75, 3\frac{3}{4}, \frac{15}{4}$

(42) 11011

(43) 5

(44) – 2

(45) 1225

(46) 10021

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

(48) 8

(49) 4

*(50) 584 – 645

(51) 31

(52) 46144

(53) 9

(54) 6

(55) 0

(56) 10

(57) $-.75, -\frac{3}{4}$

(58) $-.5, -\frac{1}{2}$

(59) 6

*(60) 52 – 56

(61) – 272

(62) 143

(63) $9.25, 9\frac{1}{4}, \frac{37}{4}$

(64) 36

(65) $.5, \frac{1}{2}$

(66) 0

(67) $\frac{17}{333}$

(68) 0

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

*(70) 3243 – 3583

(71) 750

(72) 8

(73) $\frac{1}{3}$

(74) 2

(75) 1155

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

(77) $\frac{1}{30}$

(78) 3885

(79) $5\frac{1}{3}, \frac{16}{3}$

*(80) 606 – 669