The University Interscholastic League
Number Sense Test • HS Invitational A • 2007

Contestant's Number _____

	Score	Initials
Final	_____	_____
2nd	_____	_____
1st	_____	_____

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) $7002 + 2007 =$ _____

(2) $\frac{3}{4} \times \frac{8}{9} =$ _____

(3) $20.07 - 2.007 =$ _____(decimal)

(4) $64 \div 25 =$ _____

(5) $2007\% =$ _____ (mixed number)

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

(7) $\frac{5}{6} + \frac{7}{8} =$ _____ (improper fraction)

(8) $297 \div 11 =$ _____

(9) $31 \times 13 =$ _____

*(10) $975 - 468 + 123 =$ _____

(11) $11 \times 11 \times 11 \times 11 =$ _____

(12) $2\frac{3}{4} - 6\frac{7}{8} =$ _____ (mixed number)

(13) The additive inverse of -2.7 is _____

(14) $18^2 =$ _____

(15) 34 is 85 % of what? _____

(16) Which is larger, $-.27$ or $-\frac{2}{7}$? = _____

(17) MIII + MIV = _____ (Arabic Numeral)

(18) $3 + 9 + 15 + ... + 33 =$ _____

(19) The GCD of 27 and 36 is _____

*(20) $7532 \times 1468 =$ _____

(21) $27 \times \frac{27}{32} =$ _____ (mixed number)

(22) If 4 rulers cost \$1.50 then 14 rulers cost \$___

(23) $214365 \div 8$ has a remainder of _____

(24) What number divided by 5 and added to 20, gives the same results? _____

(25) $.111... - .333... - .666... =$ _____

(26) $21^2 + 7^2 =$ _____

(27) 4 pints is what per cent of a gallon? _____%

(28) $15 \times 25 \times 16 =$ _____

(29) Which of the following is a perfect number, 14, 28, or 42? _____

*(30) 87% of 789 = _____

(31) $385 \times 13 =$ _____

(32) $54^2 - 55^2 =$ _____

(33) 24% of 16 is _____ % of 48

(34) The number of distinct elements in $\{M, E, N, T, A, L\} \cap \{M, A, T, H\}$ is _____

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

(36) How many positive integers less than 9×8 are relatively prime to 9×8? _____

(37) The product of the roots of $x^2 + 3x = 7$ is ___

(38) $2^4 + 1 =$ _____ base 8

(39) $25\frac{2}{5} \times 5\frac{2}{5} =$ _____

*(40) $\sqrt[3]{730} \times \sqrt{80} \times 9 =$ _____

(41) $35 \times 85 =$ _____

(42) $(6)(5)(4!) - 5! =$ _____

(43) A tetrahedron has _____ vertices

(44) If A is 10% more than B and B is 10% less than C, then A is what % less than C? ____%

(45) If $2^{(x+1)} = 32$ then $x - 1 =$ _____

(46) The sum of the roots of $3x^3 + 2x^2 = 9$ is ____

(47) $..., -2\frac{1}{4}, 1\frac{1}{2}, x, \frac{2}{3}, ...$ is a geometric sequence. Find the value of x. _____

(48) $72 \times .08333... =$ _____

(49) If the height of an equilateral triangle is 12", then its area is $4k\sqrt{3}$ sq. in. Find k. _____

*(50) $24^2 \times 21^2 \div 3^4 =$ _____

(51) The largest integer x such that $3x + 4 < -5$ is _____

(52) 12 degrees = $\frac{\pi}{k}$ radians. Find k. _____

(53) $62 \times 68 - 16 =$ _____

(54) If $\log_k 32 = 5$ then $k =$ _____

(55) $(3 - 5i)(3 - 5i) = a + bi$. Find $a + b$. ____

(56) The hypotenuse of a 30°-60° right triangle is 3 inches long. The shortest leg _____ inches

(57) $\sin(-\frac{\pi}{6}) \times \cos(\frac{\pi}{3}) =$ _____

(58) $311 \times 122 =$ _____

(59) If the power set for A contains 32 elements, then A contains _____ elements.

*(60) $48 \times 49 \times 50 =$ _____

(61) $22_7 \times 4_7 =$ _____ 7

(62) $\frac{7}{15} - \frac{27}{61} =$ _____

(63) The product of the coefficients of $(a - b)^2$ is _____

(64) If $\cos\theta = -.25$, then $\sec\theta =$ _____

(65) The slope of the line parallel to the line $2x - 3y = -4$ is _____

(66) $(\sin 75°)(\cos 75°) =$ _____

(67) Find x, $0 \leq x \leq 4$, if $x + 3 \cong 9 (\text{mod} 5)$. ____

(68) $22^2 - 23^2 + 24^2 - 25^2 =$ _____

(69) How many minutes are there from 8:00 a.m. to 3:45 p.m. in one day? _____

*(70) $1^3 + 2^3 + 3^3 + ... + 6^3 =$ _____

(71) The sum of the first eight terms of the Fibonacci sequence 2, 5, 7, 12, 19, ... is _____

(72) The amplitude of $y = 2 - 3\cos 4(x + 5)$ is ___

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

(74) Change .44 base 8 to a base 10 fraction. ___

(75) If $f(x) = \frac{4x}{5}$, then $f^{-1}(2) =$ _____

(76) $\log_3[\log_2(\log_2 256)] =$ _____

(77) $2 \times 3 \times 5 \times 7 \times 11 =$ _____

(78) $111 \times \frac{7}{27} =$ _____ (mixed number)

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

*(80) $456 \div 18.75\% \times \frac{1}{4} =$ _____

University Interscholastic League - Number Sense Answer Key HS • Invitation A • 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) 9009

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

(3) 18.063

(4) 2.56

(5) $20\frac{7}{100}$

(6) $15.5, 15\frac{1}{2}, \frac{31}{2}$

(7) $\frac{41}{24}$

(8) 27

(9) 403

*(10) 599 - 661

(11) 14641

(12) $-4\frac{1}{8}$

(13) $2.7, 2\frac{7}{10}, \frac{27}{10}$

(14) 324

(15) 40

(16) $-.27, -\frac{27}{100}$

(17) 2007

(18) 108

(19) 9

*(20) 10,504,128 – 11,609,824

(21) $22\frac{25}{32}$

(22) 5.25

(23) 5

(24) – 25

(25) $-\frac{8}{9}$

(26) 490

(27) 50

(28) 6000

(29) 28

*(30) 653 – 720

(31) 5005

(32) – 109

(33) 8

(34) 3

(35) – 9

(36) 24

(37) – 7

(38) 21

(39) $137.16, 137\frac{4}{25}, \frac{3429}{25}$

*(40) 689 – 761

(41) 2975

(42) 600

(43) 4

(44) 1

(45) 3

(46) $-\frac{2}{3}$

(47) – 1

(48) 6

(49) 12

*(50) 2980 – 3292

(51) – 4

(52) 15

(53) 4200

(54) 2

(55) – 46

(56) $1.5, 1\frac{1}{2}, \frac{3}{2}$

(57) $-.25, -\frac{1}{4}$

(58) 37942

(59) 5

*(60) 111720 - 123480

(61) 121

(62) $\frac{22}{915}$

(63) – 2

(64) – 4

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

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

(67) 1

(68) – 94

(69) 465

*(70) 419 – 463

(71) 207

(72) 3

(73) 18

(74) $\frac{9}{16}$

(75) $2.5, 2\frac{1}{2}, \frac{5}{2}$

(76) 1

(77) 2310

(78) $28\frac{7}{9}$

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

*(80) 578 – 638