The University Interscholastic League
Number Sense Test • HS Regional • 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) $7020 - 2070 =$ _____

(2) $11 \times 72 =$ _____

(3) $200.7 + 70.02 =$ _____ (decimal)

(4) $72 \div 27 =$ _____ (mixed number)

(5) $2\frac{3}{5}\% =$ _____ (proper fraction)

(6) $\frac{1}{16} =$ _____ %

(7) $23^2 =$ _____

(8) $9 - 7 \times 5 \div 3 + 1 =$ _____

(9) $\frac{4}{9} \div \frac{8}{15} =$ _____

*(10) $789 - 3120 + 645 =$ _____

(11) $11^3 - 11^2 =$ _____

(12) $4\frac{7}{8} - 12\frac{23}{24} =$ _____ (mixed number)

(13) The reciprocal of -1.0625 is _____

(14) 31% of 31 is _____ (decimal)

(15) $7 + 14 + 21 + \ldots + 77 =$ _____

(16) Which is larger, $-\frac{6}{11}$ or $-\frac{5}{9}$? _____

(17) $MC + DL + XIV =$ _____ (Arabic Numeral)

(18) 63 is _____ % of 105

(19) The GCD of 132 and 156 is _____

*(20) $\sqrt{32323} =$ _____

(21) 112358 ÷ 6 has a remainder of _____

(22) 430 base 10 equals _____ base 5

(23) If 30 pens cost $3.50 then 9 pens cost $ _____

(24) $.75 - .25 - .0625 =$ _____ (proper fraction)

(25) 3 pints is what per cent of a gallon? _____%

(26) Which of the following is a happy prime number, 13, 11, or 9? _____

(27) $33^2 + 11^2 =$ _____

(28) $75 \times 15 \times 48 =$ _____

(29) What number multiplied by 8 and taken away from 36, gives the same results? _____

*(30) 63% of 7191 = _____

(31) 4,320 cubic inches = _____ cubic feet

(32) $(6 + 5 - 4 \times 3^2) \div 7$ has a remainder of ___

(33) $7\frac{1}{7} \times 14\frac{1}{7} =$ _____ (mixed number)

(34) If $f(x) = x^2 - 10x + 25$ then f(23) is _____

(35) The number of distinct elements in $[\{z,e,r,o\} \cap \{o,n,e\}] \cup \{t,w,o\}$ is _____

(36) $143 \times 77 =$ _____

(37) The sum of the positive integral divisors of $3 \times 5 \times 7$ is _____

(38) $8! \div 6! - 4! =$ _____

(39) $72^2 - 78^2 =$ _____

*(40) $42 \times 45 \times 48 =$ _____

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

(42) ..., .25, $-$ .15, .09, x, .0324, ... is a geometric sequence. The value of x is _____

(43) A dodecahedron is a Platonic solid with 30 edges and _____ vertices

(44) If $9^x = 243$ then x = _____

(45) $13 \times 77 + 91 \times 11 =$ _____

(46) If A is 25% more than B and B is $\frac{1}{3}$ of C, then C is what % of A? _____%

(47) $363 \div .272727... =$ _____

(48) $\frac{13}{15} + \frac{2}{13} =$ _____ (mixed number)

(49) The sum of the roots of $4x^2 + 3x = 2$ is ____

*(50) $21^3 \times 18^2 \div 9^3 =$ _____

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

(52) $223 \times 112 =$ _____

(53) $\frac{5\pi}{8}$ radians equals _____ degrees

(54) $23_6 + 45_6 - 50_6 =$ _____ $_6$

(55) If $\log_4 8 = k$ then k = _____

(56) $\cos(-\frac{2\pi}{3}) \times \cos(\frac{4\pi}{3}) =$ _____

(57) An acute triangle has integer side lengths of 7, 11, and x. The smallest value of x is _____

(58) Find k, so that the seven digit number 377337k is divisible by 11. k = _____

(59) $(2 + 7i)(2 - 7i) = a + bi$. Find $a + b$. _____

*(60) $75^4 \div 50^3 \times 25^2 =$ _____

(61) The product of the coefficients of $(a + b)^5$ is _____

(62) $5^1 - 5^0 + 5^{-1} - 5^{-2} + ... =$ _____

(63) If $f(x) = x^3 - 3x^2 + 5x$, then $f''(2) =$ _____

(64) Find k, $0 \leq k \leq 8$, if $\frac{(5!)(4!)}{(3!)} \cong k \pmod 9$. ___

(65) $\frac{11}{16} - \frac{32}{49} =$ _____

(66) $(707)^2 =$ _____

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

(68) $\log_4[\log_3(\log_5 125)] =$ _____

(69) The sum of the first eleven terms of the Fibonacci sequence 2,5,7,12,19,31, ... is ____

*(70) $7142.85 \times 34.2 =$ _____

(71) $\frac{1}{12} + \frac{1}{20} + \frac{1}{30} + \frac{1}{42} =$ _____

(72) $(\sin\frac{\pi}{6} - \cos\frac{\pi}{6})(\sin\frac{\pi}{6} + \cos\frac{\pi}{6}) =$ _____

(73) The odds of randomly drawing a prime number from the set {1,2,3,4,5} is _____

(74) If $f(x) = \frac{x^3}{3} + 3$ then $f^{-1}(-6) =$ _____

(75) Change .55 base 6 to a base 10 fraction. ____

(76) $2 \times 3 \times 5 \times 7 \times 11 =$ _____

(77) The 8th octagonal number is _____

(78) $\int_1^e \frac{-3}{x}\,dx =$ _____

(79) $3^3 - 4^3 - 2^3 + 5^3 =$ _____

*(80) $8888 \times 62.5\% \times \frac{5}{11} =$ _____

University Interscholastic League - Number Sense Answer Key HS • Regional • 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) 4950

(2) 792

(3) 270.72

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

(5) $\frac{13}{500}$

(6) 6.25, $6\frac{1}{4}$, $\frac{25}{4}$

(7) 529

(8) $-1\frac{2}{3}$, $-\frac{5}{3}$

(9) $\frac{5}{6}$

*(10) $(-1770) - (-1602)$

(11) 1210

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

(13) $-\frac{16}{17}$

(14) 9.61

(15) 462

(16) $-\frac{6}{11}$

(17) 1664

(18) 60

(19) 12

*(20) 171 — 188

(21) 2

(22) 3210

(23) 1.05

(24) $\frac{7}{16}$

(25) 37.5, $37\frac{1}{2}$, $\frac{75}{2}$

(26) 13

(27) 1210

(28) 54000

(29) 4

*(30) 4304 — 4756

(31) 2.5, $2\frac{1}{2}$, $\frac{5}{2}$

(32) $-4, 3$

(33) $101\frac{1}{49}$

(34) 324

(35) 4

(36) 11011

(37) 192

(38) 32

(39) — 900

*(40) 86184 — 95256

(41) — 21

(42) — .054, $-\frac{27}{500}$

(43) 20

(44) 2.5, $2\frac{1}{2}$, $\frac{5}{2}$

(45) 2002

(46) 240

(47) 1331

(48) $1\frac{4}{195}$

(49) — .75, $-\frac{3}{4}$

*(50) 3911 — 4321

(51) 3

(52) 24976

(53) 112.5, $112\frac{1}{2}$, $\frac{225}{2}$

(54) 22

(55) 1.5, $1\frac{1}{2}$, $\frac{3}{2}$

(56) .25, $\frac{1}{4}$

(57) 9

(58) 4

(59) 53

*(60) 150293 - 166113

(61) 2500

(62) $4\frac{1}{6}$, $\frac{25}{6}$

(63) 6

(64) 3

(65) $\frac{27}{784}$

(66) 499849

(67) 1

(68) 0

(69) 893

*(70) 232072 - 256499

(71) $\frac{4}{21}$

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

(73) 1.5, $1\frac{1}{2}$, $\frac{3}{2}$

(74) — 3

(75) $\frac{35}{36}$

(76) 2310

(77) 176

(78) — 3

(79) 80

*(80) 2399 — 2651