The University Interscholastic League
Number Sense Test • HS SAC • 2006

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) $7002 - 2007 =$ _____

(2) $63 \times 11 =$ _____

(3) $20.06 + 2.007 =$ _____ (decimal)

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

(5) $14 \times 41 =$ _____

(6) $2006 \div 9 =$ _____ (mixed number)

(7) $64\ \% =$ _____ (proper fraction)

(8) $27 \times 25 =$ _____

(9) $9 + 6 \div 3 - 3 \times 6 =$ _____

*(10) $135 + 246 + 789 =$ _____

(11) $15^2 =$ _____

(12) $11^3 =$ _____

(13) $7\ \frac{8}{9} - 1\ \frac{2}{3} =$ _____ (mixed number)

(14) $4\ \frac{5}{6} + 2\ \frac{3}{4} =$ _____ (mixed number)

(15) $23 \times 45 =$ _____

(16) 26 is 65 % of what? _____

(17) Which is smaller, $\frac{2}{7}$ or .27 ? = _____

(18) $4 + 8 + 12 + ... + 44 =$ _____

(19) $MMVII \div IX =$ _____ (Arabic Numeral)

*(20) $1357 \times 2468 =$ _____

(21) $246531 \div 4$ has a remainder of _____

(22) .343434... = _____ (proper fraction)

(23) 3 cups is what per cent of a quart? _____%

(24) $200_7 =$ _____ $_{10}$

(25) $.222... + .333... + .444... =$ _____

(26) $(-27)^{\frac{1}{3}} =$ _____

(27) If 6 pens cost 96¢ then 11 pens cost $ _____

(28) $14 \times 25 \times 36 =$ _____

(29) Which of the following is a prime number, 51 or 67 ? _____

*(30) 83% of 667 = _____

(31) $13 \times 154 =$ _____

(32) 48% of _____ is 16% of 24

(33) $4\frac{1}{4} \times 16\frac{1}{4} =$ _____ (mixed number)

(34) The number of distinct elements in $\{M, A, T, H\} \cup \{F, U, N\}$ is _____

(35) If $f(x) = x^2 - 4x + 4$ then $f(27)$ is _____

(36) 2 gallons equals _____ cubic inches

(37) $(23 \times 5 + 4) \div 7$ has a remainder of _____

(38) $44^2 - 45^2 =$ _____

(39) If 8 is to 15 as x is to 22.5, then x = _____

*(40) $\sqrt{172839} =$ _____

(41) If $5x + 12 = 2$ then $2 - 12x =$ _____

(42) If the side of an equilateral triangle is 12 cm, then its area is $k\sqrt{3}$ cm^2. Find k. _____

(43) ..., — 2.25, — 1, x, 1.5, 2.75, ... is an arithmetic sequence. Find the value of x. ___

(44) A hexagon has _____ distinct diagonals.

(45) $24 \times 11 + 33 \times 8 =$ _____

(46) The sum of the roots of $3x^2 + 6x = 9$ is ____

(47) If $8^{(x+1)} = 512$ then $8^{(x-1)} =$ _____

(48) $64 \div .125 =$ _____

(49) If A is 20% less than B and B is 20% less than C, then A is what % less than C? ____%

*(50) $21^3 \times 15^2 \div 9^4 =$ _____

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

(52) $(3 - 5i)(2 + 4i) = (a + bi)$. Find b. _____

(53) $\cos(-\frac{\pi}{3}) \times \cos(\frac{\pi}{3}) =$ _____

(54) $123 \times 301 =$ _____

(55) Find k, so that the four digit number 31k8 is divisible by 9. _____

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

(57) An obtuse triangle has integer sides of 5, x, and 9. The smallest value of x is _____

(58) $71 \times 79 - 9 =$ _____

(59) If $\log_4 2 = k$ then k = _____

*(60) $58333 \div 777 \times 75 =$ _____

(61) The sum of the coefficients of $(a - b)^2$ is __

(62) The slope of the line $6x - 4y = -2$ is ____

(63) $22_7 \times 2_7 =$ _____$_7$

(64) $19^2 - 18^2 + 17^2 - 16^2 =$ _____

(65) $\frac{8}{11} - \frac{23}{34} =$ _____

(66) If $\sin\theta = -.5$, then $\csc\theta =$ _____

(67) $2 \sin\frac{5\pi}{12} \cos\frac{5\pi}{12} =$ _____

(68) How many minutes are there from 3:45 a.m. to 6:15 p.m. in one day? _____

(69) Find x, $0 \leq x \leq 6$, if $x + 2 \cong 9 \pmod 7$. ____

*(70) $323502 \div 1238 =$ _____

(71) The sum of the first eight terms of the Fibonacci sequence 3, 4, 7, 11, 18, ... is _____

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

(73) A number is randomly drawn from the set {1,2,3,4,5}. What is the probability that the number drawn is a prime number? _____%

(74) If $f(x) = 3x^4 - 5x + 6$, then $f'(1) =$ _____

(75) The amplitude of $4\cos 3(x + 1) - 2$ is ____

(76) Change .22 base 7 to a base 10 fraction. ___

(77) $111 \times \frac{4}{27} =$ _____ (mixed number)

(78) $\int_0^1 3x - 1\ dx =$ _____

(79) $2 \times 3 \times 5 \times 7 =$ _____

*(80) $863 \div 6.25\% \times \frac{1}{2} =$ _____

University Interscholastic League - Number Sense Answer Key HS • SAC • Fall 2006

*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) 4995

(2) 693

(3) 22.067

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

(5) 574

(6) $222\frac{8}{9}$

(7) $\frac{16}{25}$

(8) 675

(9) — 7

*(10) 1112 — 1228

(11) 225

(12) 1331

(13) $6\frac{2}{9}$

(14) $7\frac{7}{12}$

(15) 1035

(16) 40

(17) .27 or $\frac{27}{100}$

(18) 264

(19) 223

*(20) 3,181,623 — 3,516,529

(21) 3

(22) $\frac{34}{99}$

(23) 75

(24) 98

(25) 1

(26) — 3

(27) $1.76

(28) 12600

(29) 67

*(30) 526 — 581

(31) 2002

(32) 8

(33) $69\frac{1}{16}$

(34) 7

(35) 625

(36) 462

(37) 0

(38) — 89

(39) 12

*(40) 395 — 436

(41) 26

(42) 36

(43) .25 or $\frac{1}{4}$

(44) 9

(45) 528

(46) — 2

(47) 8

(48) 512

(49) 36

*(50) 302 — 333

(51) — 4

(52) 2

(53) .25 or $\frac{1}{4}$

(54) 37023

(55) 6

(56) 6

(57) 5

(58) 5600

(59) .5 or $\frac{1}{2}$

*(60) 5350 — 5912

(61) 0

(62) 1.5, $\frac{3}{2}$, $1\frac{1}{2}$

(63) 44

(64) 70

(65) $\frac{19}{374}$

(66) — 2

(67) .5 or $\frac{1}{2}$

(68) 870

(69) 0

*(70) 249 — 274

(71) 195

(72) 1

(73) 60

(74) 7

(75) 4

(76) $\frac{16}{49}$

(77) $16\frac{4}{9}$

(78) .5 or $\frac{1}{2}$

(79) 210

*(80) 6559 — 7249