The University Interscholastic League
Number Sense Test • HS SAC • 2009

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) $2010 + 2009 =$ _____

(2) $2009 \times 11 =$ _____

(3) $9002 - 2010 =$ _____

(4) $2010 \div 25 =$ _____ (decimal)

(5) $\frac{3}{5} \div \frac{8}{15} =$ _____

(6) $4 \times 2\frac{2}{3} =$ _____ (mixed number)

(7) $16\ \% =$ _____ (proper fraction)

(8) $3 + (4 \times 5 - 6) \div 7 =$ _____

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

*(10) $2009 + 2010 + 2910 =$ _____

(11) $12^2 =$ _____

(12) $12^3 =$ _____

(13) 24 is what % of 60? _____%

(14) $32 \times 23 =$ _____

(15) $1 + 3 + 5 + \ldots + 23 =$ _____

(16) Which is larger, $\frac{11}{13}$ or $\frac{13}{16}$? _____

(17) $2010 \div 9$ has a remainder of _____

(18) MCDLXIV = _____ (Arabic Number)

(19) $\frac{1}{4}$ ton is equivalent to _____ ounces

*(20) $235 \times 146 =$ _____

(21) $0.323232\ldots =$ _____ (proper fraction)

(22) Which of the following is both a happy and a perfect number, 7, 28, or 42? _____

(23) $30603 \div 101 =$ _____

(24) How many positive integral divisors does 64 have? _____

(25) If $f(x) = x^2 - 10x + 25$ then $f(37)$ is _____

(26) If $4x + 3 = 2$ then $2x - 2 =$ _____

(27) 86 base ten is equivalent to _____ base 5

(28) The sum of the roots of $2x^2 + 3x = 5$ is _____

(29) The area of a square is $12\frac{1}{4}$ square inches. The perimeter of this square is _____ inches

*(30) $\sqrt{488} \times 221 =$ _____

(31) $(15 + 16 \times 17) \div 7$ has a remainder of _____

(32) The multiplicative inverse of -1.25 is _____

(33) $|-1-1| + |-2+3| - |5-8| =$ _____

(34) $4 \times 4! - 12 \times 3! =$ _____

(35) $2\frac{3}{5} \times 2\frac{2}{5} =$ _____ (mixed number)

(36) The set {L, U, C, A, S} has ____ proper subsets

(37) $4^2 + 3^3 + 2^4 =$ _____

(38) $\sqrt{243} - \sqrt{75} = \sqrt{x}$. Find x. _____

(39) If set A has 6 elements, set B has 5 elements, and $A \cap B$ has 4 elements, then $A \cup B$ has _____ elements.

*(40) $224488 \div 111 =$ _____

(41) If P is 20% of Q and Q is 25% of R, then P is what percent of R? _____%

(42) $113 \times 212 =$ _____

(43) If $x + y = 2$ and $xy = 2$ then $x^3 + y^3 =$ _____

(44) $\frac{3}{4} - \frac{10}{13} =$ _____

(45) $..., -1\frac{1}{3}, -\frac{2}{3}, x, y, ...$ is an arithmetic sequence. Find the value of y. _____

(46) $\frac{7}{40} =$ _____ % (decimal)

(47) Find the harmonic mean of 2 and 5. _____

(48) The least integer x such that $3 - 5x < 2$ is ____

(49) 95 °F = _____ °C

*(50) $125 \times 37.5 \div \frac{5}{8} =$ _____

(51) The probability of drawing a Queen or a King from a standard 52 card deck is _____

(52) ${}_5P_3 + {}_5P_2 =$ _____

(53) 45 degrees = $\frac{\pi}{k}$ radians. Find k. _____

(54) $(2 + 7i)(2 - 7i) = a + bi$. Find $a + b$. _____

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

(56) The vertex of the parabola $y = x^2 - 6x + 3$ is (h, k). Find h. _____

(57) The eleventh term of 6, 11, 16, 21,... is _____

(58) The largest number of regions created by five intersecting lines is _____

(59) $1 - 4 + 9 - 16 + 25 - 36 + ... - 64 =$ _____

*(60) $e^{(e)} \times \pi^{(\pi)} =$ _____

(61) $44_8 \times 4_8 =$ _____ 8

(62) How much time has passed from 3:45 p.m. to 11:15 p.m. the same day? _____ hours

(63) The slope of the line containing the points $(-1, -2)$ and $(3, 4)$ is _____

(64) The simplified coefficient of the xy^2 term in the expansion of $(2x + 3y)^3$ is _____

(65) The greatest integer function $g(x) = [2x - 3]$ has a value of _____ for $g(\pi)$

(66) If $\log_x 8 + \log_x 8 = 3$ then $x =$ _____

(67) $\sqrt{2809} =$ _____

(68) $(67_9 + 84_9) \div 8$ has a remainder of _____

(69) If A is 125% of B and B is 120% of C then A is _____% greater than C.

*(70) The area of $20x^2 + 45y^2 = 900$ is _____

(71) The sum of the first 9 terms of the Fibonacci characteristic sequence 1,4,5,9,14,23,... is _____

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

(73) If $\det \begin{vmatrix} -1 & -2 \\ 3 & x \end{vmatrix} = 5$, then $x =$ _____

(74) $\lim_{x \to 3} \left(\frac{x^2 - 3x}{x - 3}\right) =$ _____

(75) The graph of $f(x) = 2^{(x-2)}$ has a horizontal asymptote at $y =$ _____

(76) If $f(x) = \frac{3x - 1}{2x + 1}$, then $f'(1) =$ _____

(77) $1(1!) + 2(2!) + 3(3!) + 4(4!) =$ _____

(78) $\int_2^3 x^2\,dx =$ _____

(79) Given $5966 \div 38 = 157$. Find $5966 \div 9\frac{1}{2}$. _____

*(80) 3210 miles/hour = _____ feet/second

University Interscholastic League - Number Sense Answer Key HS • SAC • Fall 2009

*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) 4019

(2) 22099

(3) 6992

(4) 80.4

(5) 1.125, $\frac{9}{8}$, $1\frac{1}{8}$

(6) $10\frac{2}{3}$

(7) $\frac{4}{25}$

(8) 5

(9) .375

*(10) 6583 - 7275

(11) 144

(12) 1728

(13) 40

(14) 736

(15) 144

(16) $\frac{11}{13}$

(17) 3

(18) 1464

(19) 8000

*(20) 32595 – 36025

(21) $\frac{32}{99}$

(22) 28

(23) 303

(24) 7

(25) 1024

(26) $-2.5, -\frac{5}{2}, -2\frac{1}{2}$

(27) 321

(28) $-1.5, -\frac{3}{2}, -1\frac{1}{2}$

(29) 14

*(30) 4638 – 5126

(31) 0

(32) $-.8, -\frac{4}{5}$

(33) 0

(34) 24

(35) $6\frac{6}{25}$

(36) 31

(37) 59

(38) 48

(39) 7

*(40) 1922 – 2123

(41) 5

(42) 23956

(43) – 4

(44) $-\frac{1}{52}$

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

(46) 17.5

(47) $\frac{20}{7}, 2\frac{6}{7}$

(48) 1

(49) 35

*(50) 7125 – 7875

(51) $\frac{2}{13}$

(52) 80

(53) 4

(54) 53

(55) .75, $\frac{3}{4}$

(56) 3

(57) 56

(58) 16

(59) – 36

*(60) 525 – 580

(61) 220

(62) 7.5, $\frac{15}{2}, 7\frac{1}{2}$

(63) 1.5, $\frac{3}{2}, 1\frac{1}{2}$

(64) 54

(65) 3

(66) 4

(67) 53

(68) 1

(69) 50

*(70) 90 – 98

(71) 250

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

(73) 1

(74) 3

(75) 0

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

(77) 119

(78) $\frac{19}{3}, 6\frac{1}{3}$

(79) 628

*(80) 4473 – 4943