The University Interscholastic League
Number Sense Test • HS SAC • 2008

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) $2009 - 2080 =$ _____

(2) $2090 + 8002 =$ _____

(3) $2008 \div 25 =$ _____ (decimal)

(4) $2008 \times 9 =$ _____

(5) $7\frac{1}{2}\% =$ _____ (proper fraction)

(6) $15^2 =$ _____

(7) $2.25 \div (-1.5) =$ _____ (decimal)

(8) $2\frac{3}{4} - 3\frac{4}{5} =$ _____ (mixed number)

(9) $20 \times 80 + 20 \times 90 =$ _____

*(10) $282 - 9292 + 89 =$ _____

(11) $20 + 24 \times 16 \div 8 - 12 =$ _____

(12) $37 \times 33 =$ _____

(13) The sum of the prime divisors of 42 is _____

(14) The GCD of 92 and 29 is _____

(15) The median of 8, 29, 20, and 9 is _____

(16) 25% of 3 pounds 4 ounces = _____ ounces

(17) $12\frac{1}{4}$ is 35 % of _____

(18) Which is larger, $-\frac{3}{8}$ or $-\frac{5}{13}$? _____

(19) MMVIII ÷ IX = _____ (Arabic Numeral)

*(20) $951 + 842 \times 763 =$ _____

(21) $9\frac{1}{3} \times 3\frac{1}{3} =$ _____ (mixed number)

(22) $1.08333... - 1.1666... =$ _____

(23) Find the simple interest on \$600.00 at 5% for 4 years. \$ _____

(24) $(5)^{-1} + (5)^{-2} =$ _____

(25) 18 inches is what per cent of a foot? _____%

(26) If $x + 5 = 4$, then $x - 3 =$ _____

(27) $12^3 =$ _____

(28) {p,l,u,s} ∪ {m,i,n,u,s} has ____ distinct elements

(29) If $\frac{5}{8} = \frac{x}{5}$, then x = _____ (decimal)

*(30) $109 \times 129 + 21 \times 131 =$ _____

(31) $28_9 + 21_9 =$ _____ $_9$

(32) Which of the following is a pentagonal number, 20, 21, or 22? _____

(33) $1^2 + 1^2 + 2^2 + 3^2 + 5^2 =$ _____

(34) $(6^3 + 4^2 \times 2^1) \div 8$ has a remainder of _____

(35) If $x > 0$ and $2x^2 = \sqrt{4x^3}$ then x = _____

(36) $72^2 + 13^2 =$ _____

(37) $\left|12 - 9\left|6 - 3\right|\right| =$ _____

(38) $5 \times 4! + 8 \times 3! =$ _____

(39) If a = 4 and b = 3, then $(a - b)(a^2 + ab + b^2) =$ _____

*(40) $\sqrt[3]{1329} \times \sqrt{123} \times 11 =$ _____

(41) If $8^x = 102$ then $8^{(x+1)} =$ _____

(42) The slope of the line $2x + 3y = 4$ is _____

(43) If $x + y = 5$ and $xy = 1$ then $x^3 + y^3 =$ _____

(44) $12_5 + 23_5 + 34_5 =$ _____$_5$

(45) $5^4 \times 2^3 =$ _____

(46) $64 \div .125 =$ _____

(47) $\frac{3}{4} - \frac{8}{13} =$ _____

(48) The smallest integer x such that $x - 5 > -6$ is _____

(49) 16% of $333\frac{1}{3}$ is _____(mixed number)

*(50) $364 \times 16^3 \div 4^3 =$ _____

(51) $12 \times 7 + 2 =$ _____

(52) The integral sides of a triangle are 3, 4, and x. The least value of x is _____

(53) $222 \times \frac{2}{37} =$ _____

(54) The least value of k such that ${}_4P_k = 24$ is _____

(55) The smaller root of $7x^2 + 15x + 2 = 0$ is _____

(56) The simplified coefficient of the xy term in the expansion of $(2x - y)^2$ is _____

(57) The radius of the circle $x^2 + y^2 = 25$ is _____

(58) Let $|3x - 2| \leq 5$. The least value of x is _____

(59) $48 + 24 + 12 + 6 + 3 + \ldots =$ _____

*(60) $32^3 =$ _____

(61) $52^2 =$ _____

(62) $34 + 13 + 5 + 2 + 1 =$ _____

(63) $\det \begin{vmatrix} 1 & 3 \\ 2 & 4 \end{vmatrix} =$ _____

(64) A square based prism has a base side length of 2' and a height 5'. Its volume is _____ cu. ft

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

(66) $3x^2 + 2x + 1$ divided by $x - 4$ has a remainder of _____

(67) $\sin \frac{\pi}{4} \div \cos \frac{\pi}{4} =$ _____

(68) $50^2 - 48^2 + 46^2 - 44^2 =$ _____

(69) $45^2 + 46^2 =$ _____

*(70) $31.4 \times 27.2 \times 16.2 =$ _____

(71) If $f(x) = \frac{2x+1}{3x+4}$, then $f'(-1) =$ _____

(72) Change .12 base 3 to a base 10 fraction. _____

(73) Find x, $0 \leq x < 5$, if $\frac{(4!)(3!)}{(2!)} \cong x \pmod 5$. _____

(74) $\lim_{x \to 2} \frac{x^2 - 4}{x - 2} =$ _____

(75) The horizontal asymptote of $y = \frac{x+1}{x-3}$ is _____

(76) $(4, \frac{\pi}{3})$ are polar coordinates for (x,y). x = _____

(77) The set {a,b,c} has _____ 2-element subsets

(78) $\int_{-1}^{1} x^2 \, dx =$ _____

(79) $\frac{1}{3} + \frac{1}{6} + \frac{1}{10} =$ _____

*(80) $875 \times 62.5 \div \frac{3}{8} =$ _____

University Interscholastic League - Number Sense Answer Key HS • SAC • Fall 2008

*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) -71

(2) 10092

(3) 80.32

(4) 18072

(5) $\frac{3}{40}$

(6) 225

(7) -1.5

(8) $-1\frac{1}{20}$

(9) 3400

*(10) $-9367 - -8474$

(11) 56

(12) 1221

(13) 12

(14) 1

(15) 14.5, $\frac{29}{2}$, $14\frac{1}{2}$

(16) 13

(17) 35

(18) $-.375, -\frac{3}{8}$

(19) $223\frac{1}{9}$, $\frac{2008}{9}$

*(20) 611228 – 675566

(21) $31\frac{1}{9}$

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

(23) $ 120.00

(24) .24, $\frac{6}{25}$

(25) 150

(26) -4

(27) 1728

(28) 7

(29) 3.125

*(30) 15972 – 17652

(31) 50

(32) 22

(33) 40

(34) 0

(35) 1

(36) 5353

(37) 15

(38) 168

(39) 37

*(40) 1275 – 1408

(41) 816

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

(43) 110

(44) 124

(45) 5000

(46) 512

(47) $\frac{7}{52}$

(48) 0

(49) $53\frac{1}{3}$

*(50) 22132 – 24460

(51) 86

(52) 2

(53) 12

(54) 3

(55) -2

(56) -4

(57) 5

(58) -1

(59) 96

*(60) 31130 – 34406

(61) 2704

(62) 55

(63) -2

(64) 20

(65) 0

(66) 57

(67) 1

(68) 376

(69) 4141

*(70) 13145 – 14527

(71) 5

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

(73) 2

(74) 4

(75) 1

(76) 2

(77) 3

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

(79) .6, $\frac{3}{5}$

*(80) 138542 – 153125