# The University Interscholastic League
## Number Sense Test • HS Invitational B • 2008

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) $2008 - 288 + 28 =$ _____

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

(3) $2357 \div 9 =$ _____ (mixed number)

(4) $2 + (-6) + 4 + (-8) =$ _____

(5) $14 \times 3 + 16 \div 4 =$ _____

(6) $25 \times 2.8 =$ _____

(7) $31^2 =$ _____

(8) $18.75\% =$ _____ (proper fraction)

(9) Which is smaller, $-\frac{11}{13}$ or $-\frac{9}{11}$ ? _____

*(10) $55 \times 555 - 5555 =$ _____

(11) The LCM of 9, 15, and 18 is _____

(12) 34 is what % of 85? _____%

(13) The mean of 2, 8, 4, 8, 2, 4, 8, 4, & 8 is _____

(14) $(23 \times 19 - 15) \div 4$ has a remainder of _____

(15) If 6 apples cost $1.32 then 11 apples cost $ ____

(16) The product of the first 4 prime numbers is ___

(17) MCXI + DLI = _____ (Arabic Numeral)

(18) If 1 gram = .04 oz., then 4 oz. = _____ grams

(19) The sum of the positive integral divisors of 48 is _____

*(20) $\sqrt{959} \times \sqrt{1091} =$ _____

(21) If $3^x + 3 = 30$, then x = _____

(22) The discriminant of $2x^2 - 5x + 3 = 0$ is ____

(23) $|1 - 3| - 2|3 - 1| - 3| - 1 - 1| =$ _____

(24) $(13)^3 =$ _____

(25) Which of the following is a square number, 8, 27, or 64? _____

(26) $4^5 \div 11$ has a remainder of _____

(27) 130 base ten is equivalent to _____ base 5

(28) If $5x - y = 4$ and $x + 2y = 3$ then $y =$ _____

(29) Find the largest digit k such that 37195k is divisible by 6. k = _____

*(30) 2 days 7 hours 12 minutes = _____ minutes

(31) If P=2, Q= − 2, and R=4, then PQ + R = ____

(32) If $\frac{2}{3} + \frac{4}{5} = \frac{1}{x}$ , then x = _____

(33) Picture A is 3" by 6" and B is 9" by 18". The ratio of A's perimeter to B's perimeter is _____

(34) The set {s,l,o,p,e} has _____ 3-elements subsets

(35) Solve for x: $\frac{2x-1}{3} - 4 = 5$. x = _____

(36) 2.8333... − 1.58333... = _____

(37) The area of an equilateral triangle is $16\sqrt{3}$ sq. cm. The perimeter of the triangle is _____ cm

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

(39) $2 + 1 + 3 + 4 + 7 + 11 + ... + 29 + 47 =$ _____

*(40) $(375 \times 79)^2 \div (40 \times 124) =$ _____

(41) The hypotenuse of an isosceles right triangle is $5\sqrt{2}$ cm. The area is _____ $cm^2$

(42) $404^2 =$ _____

(43) The measure of each of the interior angles of a regular pentagon is _____ degrees

(44) $35 \times 85 =$ _____

(45) Let $(k^4)^2 \div k^{(-1)} \times k^3 = k^x$, where k>0. Find x. _____

(46) $54 \times 6! - 24 \times 5! =$ _____

(47) The point (2, 7) is reflected across the y-axis to point (h,k). Find h. _____

(48) $\frac{5}{11} - \frac{29}{67} =$ _____

(49) The hypotenuse of a right triangle with integral sides is 41 in. The shortest leg is _____ in

*(50) $2142.857 \times 213 =$ _____

(51) A sector of a circle radius 12", central angle 30°, and arc length $k\pi$". Find k. _____

(52) If x varies directly with $y^3$ and x = 2 when y = 2, find x when y = 4. _____

(53) $\frac{2}{3} + \frac{1}{2} + \frac{3}{8} + ... =$ _____

(54) If $(\sqrt[3]{a^4})(\sqrt[5]{a^k}) = \sqrt[15]{a^{26}}$, then k = _____

(55) $(5 - 7i)(5 + 7i) = a + bi$. Find a + b. _____

(56) If $\log_4(3x + 2) = 1$ then x = _____

(57) $({}_7C_3)({}_7C_4) =$ _____

(58) $1234 \times 9 + 5 =$ _____

(59) If $\sqrt{12 - \sqrt{9 + \sqrt{6 - x}}} = 3$ then x = _____

*(60) The area of $11x^2 + 36y^2 = 396$ is _____

(61) When two dice are rolled, what is the probability that the sum is 2 or 12? _____

(62) The simplified coefficient of the $x^2y$ term in the expansion of $(x - 4y)^3$ is _____

(63) $\cos|\sin^{-1}(\frac{\sqrt{3}}{2})| =$ _____

(64) $3^6 \div 5$ has a remainder of _____

(65) The greatest integer function $f(x) = [3x + 1]$ has a value of _____ for $f(e)$

(66) $66\frac{7}{10} \times 66\frac{7}{10} =$ _____

(67) The dot product for $u = (3,3)$ and $v = (1,1)$ is ___

(68) The smaller root of $12x^2 - 11x - 15 = 0$ is ___

(69) The eleventh term of 3, 8, 13, 18,... is _____

*(70) $2152008 \div 3579 =$ _____

(71) If the initial point of a vector is (5, − 2) and the terminal point is (1,1), then $\|v\| =$ _____

(72) Find x, if $\det \begin{vmatrix} 1 & -2 \\ x & 4 \end{vmatrix} = 5$. _____

(73) Change $\frac{3}{25}$ to a base 5 decimal. _____ 5

(74) $\lim_{x \to \infty} \frac{3x}{x - 1} =$ _____

(75) The polar coordinates of the rectangular coordinate $(3,\sqrt{3})$ are $(r, \theta)$. $\theta =$ _____°

(76) If $f(x) = 3x^4 - 2x^3 + x$, then $f''(-2) =$ ____

(77) The horizontal asymptote of $y = 4^x + 2$ is ____

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

(79) $\frac{1}{20} + \frac{1}{30} + \frac{1}{42} + \frac{1}{56} =$ _____

*(80) $779 \div 77\frac{7}{9}\% \times .75 =$ _____

**University Interscholastic League - Number Sense Answer Key HS • Invitation B • 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) 1748

(2) $\frac{4}{9}$

(3) $261\frac{8}{9}$

(4) – 8

(5) 46

(6) 70

(7) 961

(8) $\frac{3}{16}$

(9) $-\frac{11}{13}$

*(10) 23722 – 26218

(11) 90

(12) 40

(13) $\frac{16}{3}$, $5\frac{1}{3}$

(14) 2

(15) $2.42

(16) 210

(17) 1662

(18) 100

(19) 124

*(20) 972 – 1074

(21) 3

(22) 1

(23) – 8

(24) 2197

(25) 64

(26) 1

(27) 1010

(28) 1

(29) 8

*(30) 3147 – 3477

(31) 0

(32) $\frac{15}{22}$

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

(34) 10

(35) 14

(36) 1.25, $\frac{5}{4}$, $1\frac{1}{4}$

(37) 24

(38) 2.5, $\frac{5}{2}$, $2\frac{1}{2}$

(39) 122

*(40) 168097 – 185790

(41) 12.5, $\frac{25}{2}$, $12\frac{1}{2}$

(42) 163216

(43) 108

(44) 2975

(45) 12

(46) 36000

(47) – 2

(48) $\frac{16}{737}$

(49) 9

*(50) 433608 – 479249

(51) 2

(52) 16

(53) $\frac{8}{3}$, $2\frac{2}{3}$

(54) 2

(55) 74

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

(57) 1225

(58) 11111

(59) 6

*(60) 60 – 65

(61) $\frac{1}{18}$

(62) – 12

(63) .5, $\frac{1}{2}$

(64) 4

(65) 9

(66) 4448.89, $\frac{444889}{100}$, $4448\frac{89}{100}$

(67) 6

(68) $-\frac{3}{4}$

(69) 53

*(70) 572 – 631

(71) 5

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

(73) .03

(74) 3

(75) 30

(76) 168

(77) 2

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

(79) .125, $\frac{1}{8}$

*(80) 714 – 788