The University Interscholastic League
Number Sense Test • HS District 2 • 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) $3205 - 3088 =$ _____

(2) $2080 + 8020 =$ _____

(3) $\frac{5}{7} \div 1\frac{1}{4} =$ _____

(4) $12.3 \times .4 =$ _____ (decimal)

(5) $6 - 5 \times 4 + 3 \div 2 =$ _____

(6) $404 \div 25 =$ _____ (mixed number)

(7) $\frac{3}{80} =$ _____ %

(8) $3443 \div 9$ has a remainder of _____

(9) $16^2 =$ _____

***(10)** $51 \times 551 - 5511 =$ _____

(11) $44 \times 36 =$ _____

(12) The largest prime divisor of 57 is _____

(13) 4.25 is what % of 25? _____ %

(14) If 8 ounces of candy costs $1.47 then 2 pounds of candy will cost $ _____

(15) $(36 \times 18 - 12) \div 5$ has a remainder of _____

(16) The LCM of 11, 18, and 33 is _____

(17) $5\frac{2}{5} - 2\frac{7}{10} =$ _____ (mixed number)

(18) $474 \times 11 =$ _____

(19) MMCDIX — CDI = _____ (Arabic Numeral)

***(20)** $453 + 231 \times 786 =$ _____

(21) 80 has _____ positive prime divisors

(22) $12345 \times 9 + 6 =$ _____

(23) The multiplicative inverse of 2.125 is _____

(24) $2.2 \times 12.5 \times 8.8 =$ _____

(25) If $x - y = 6$ and $x + y = -6$ then $xy =$ _____

(26) If $f(x) = 4x^2 - 4x + 1$ then $f(23)$ is _____

(27) The set {l,i,n,e,a,r} has ____ 4-elements subsets

(28) $24\frac{1}{8} \times 8\frac{1}{8} =$ _____ (mixed number)

(29) If $\frac{3}{4} - \frac{5}{6} = \frac{1}{x}$, then x = _____

***(30)** $\sqrt{346598} =$ _____

(31) $101100111_2 =$ _____ $_8$

(32) Find the smallest digit k such that 26480k is divisible by 6. k = _____

(33) $2345 \times 16 =$ _____

(34) $13 \times 13 \times 13 =$ _____

(35) What number added to 8 and divided by 4 gives the same results? _____

(36) Let x = 3, y = 2x, and z = x — y. Find xyz. ____

(37) 0.2333... = _____ (fraction)

(38) Which of the following is an abundant number, 140, 143, 147? _____

(39) 14 cups is what per cent of a quart? _____ %

*(40) $(249 \times 61)^2 \div (30 \times 126)$ = _____

(41) If $|x| < 4$, then $x^2 - 1 <$ _____

(42) 95×115 = _____

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

(44) $67_9 - 8_9$ = _____ $_9$

(45) The y-intercept of the line $3x = 1 - 2y$ is (h, k). Find h + k. _____

(46) 131×223 = _____

(47) If $13 < b < 85$ are the integral sides of a right triangle then the area of the triangle is _____

(48) If $8^x = 80$ then $8^{(x+2)}$ = _____

(49) 24% of $333\frac{1}{3}$ is _____

*(50) $\sqrt[3]{6860} \times \sqrt{288} \times 15$ = _____

(51) A sector of a circle with radius 8" and central angle $\frac{\pi}{4}$ has arc length $k\pi$". k = _____

(52) $\frac{2}{5} + \frac{1}{3} + \frac{5}{18} + ...$ = _____

(53) If y varies inversely with x and y = 2 when x = — 2, find x when y = — 4. _____

(54) ${}_8P_3$ = _____

(55) $(8 + 4i)(8 - 4i) = a + bi$. Find a + b. _____

(56) $\ln e^{10} \div \log 10^5$ = _____

(57) The odds of losing is $\frac{7}{11}$. The probability of winning is _____

(58) If $\sqrt{98} - \sqrt{32} = \sqrt{x}$ then x = _____

(59) The sum of the coefficients of $(2x + 2y)^5$ is ___

*(60) $(35)^3$ = _____

(61) Let $n^2 = \sqrt{n^3 + n^3 + n^3 + n^3 + n^3}$, where $n > 0$. Find n^2. _____

(62) $1 + 1 + 2 + 3 + 5 + 8 + ... + 34 + 55$ = _____

(63) If $\log_x 4 = .25$ then x = _____

(64) $4^8 \div 10$ has a remainder of _____

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

(66) $\tan \frac{\pi}{3} \times \cot \frac{\pi}{6}$ = _____

(67) $8883 \div 987$ = _____

(68) $84 \times 5! + 26 \times 6!$ = _____

(69) Vector u = (— 2,1) and vector v = (4, — 3). The dot product for u and v is _____

*(70) $3.1\pi \times 2.7e \times 1.6\phi$ = _____

(71) Change .63 base 7 to a base 10 fraction. _____

(72) $\lim_{x \to 4} \frac{x^2 - 1}{x + 1}$ = _____

(73) The rectangular coordinates of the polar coordinate $(\sqrt{3}, \frac{\pi}{3})$ are (x, y). y = _____

(74) Find k, $0 \leq k \leq 6$, if $(4!)(3!) \cong k \pmod 7$. _____

(75) If $f(x) = 1 - 2x^2 - 3x^4$, then $f''(-1)$ = ____

(76) $\frac{1}{56} + \frac{1}{72} + \frac{1}{90} + \frac{1}{110}$ = _____

(77) 203×111 = _____

(78) $\int_1^3 2x^3 \, dx$ = _____

(79) $1 + 2^2 + 3^3 + 4^4$ = _____

*(80) $678 \times 12.5\% \div .5$ = _____

University Interscholastic League - Number Sense Answer Key HS • District 2 • 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) 117

(2) 10100

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

(4) 4.92

(5) $-12.5, -\frac{25}{2}, -12\frac{1}{2}$

(6) $16\frac{4}{25}$

(7) $3.75, \frac{15}{4}, 3\frac{3}{4}$

(8) 5

(9) 256

***(10) 21461 - 23719**

(11) 1584

(12) 19

(13) 17

(14) $5.88

(15) 1

(16) 198

(17) $2\frac{7}{10}$

(18) 5214

(19) 2008

***(20) 172919 – 191119**

(21) 2

(22) 111111

(23) $\frac{8}{17}$

(24) 242

(25) 0

(26) 2025

(27) 15

(28) $196\frac{1}{64}$

(29) — 12

***(30) 560 – 618**

(31) 547

(32) 4

(33) 37520

(34) 2197

(35) $-\frac{32}{3}, -10\frac{2}{3}$

(36) — 54

(37) $\frac{7}{30}$

(38) 140

(39) 350

***(40) 57982 — 64084**

(41) 15

(42) 10925

(43) 144

(44) 58

(45) $.5, \frac{1}{2}$

(46) 29213

(47) 546

(48) 5120

(49) 80

***(50) 4596 — 5078**

(51) 2

(52) $2.4, \frac{12}{5}, 2\frac{2}{5}$

(53) 1

(54) 336

(55) 80

(56) 2

(57) $\frac{11}{18}$

(58) 18

(59) 1024

***(60) 40732 — 45018**

(61) 25

(62) 143

(63) 256

(64) 6

(65) — 2

(66) 3

(67) 9

(68) 28800

(69) — 11

***(70) 176 — 194**

(71) $\frac{45}{49}$

(72) 3

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

(74) 4

(75) — 40

(76) $\frac{4}{77}$

(77) 22533

(78) 40

(79) 288

***(80) 162 — 177**