The University Interscholastic League
Number Sense Test • HS District 1 • 2012

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) $2012 + 2102 =$ _____

(2) $\frac{5}{8} - \frac{4}{7} =$ _____

(3) $17 \times 17 =$ _____

(4) $631.2 \div 6 =$ _____ (decimal)

(5) $136 \times 11 =$ _____

(6) $23 \times 17 + 17 \times 17 =$ _____

(7) CDLXIV = _____ (Arabic Numeral)

(8) Which is smaller, $\frac{8}{11}$ or $\frac{10}{13}$? _____

(9) $18 + 9 \div 6 \times 3 =$ _____

*(10) $34543 + 3454 + 345 + 34 + 3 =$ _____

(11) If 4 books cost \$12.75 then 12 books cost \$ _____

(12) 4.666... feet = _____ inches

(13) $\frac{1}{5} + \frac{4}{15} - \frac{7}{30} =$ _____

(14) $16 \times 235 =$ _____

(15) $1 + 2 + 3 + 4 + ... + 25 =$ _____

(16) 15% of \$17.00 is \$ _____

(17) $4.125 \times 16 =$ _____

(18) 24% of 48 = k% of 144. Find k. _____

(19) $15^3 =$ _____

*(20) $\frac{1}{3} \times 9.18 \times 36 \times 72 =$ _____

(21) $\frac{8}{15} - \frac{15}{31} =$ _____

(22) The simple interest on \$480.00 at 12% for 9 months is \$_____

(23) The LCM of 42 and 48 is _____

(24) $5^3 - 4^2 + 2^0 =$ _____

(25) Evaluate f(3) if $f(x) = 16x^2 - 24x + 9$. _____

(26) $(42 + 26 \times 18) \div 8$ has a remainder of _____

(27) $135 \times 321 =$ _____

(28) $9\frac{7}{8} - 6\frac{4}{5} =$ _____ (mixed number)

(29) $17 + 5 - 27 + 15 - 37 + 25 =$ _____

*(30) $\sqrt{1155} \times \sqrt{678} =$ _____

(31) 0.2777... = _____ (proper fraction)

(32) The first 4 digits of the decimal of $\frac{29}{90}$ is 0. _____

(33) $144 \div 0.08333... =$ _____

(34) Truncate $\sqrt{3} + \sqrt{7}$ to the tenths place. _____

(35) If $6x + 5 = 4$ then $3x - 2 =$ _____

(36) $23^2 - 25^2 =$ _____

(37) If $x = 5$ and $y = 4$ then $3x^2 + 2xy + y^2 =$ _____

(38) Let set A = {m,a,y}, set M = {j,u,n,e} and set J = {j,u,l,y}. How many unique elements are in $(A \cup J) \cap M$? _____

(39) $235_6 =$ _____ 10

*(40) $123 \times \frac{1}{11} \times 0.0625 \times 1757 =$ _____

(41) If $68^2 - 62^2 = 12k$, then $k =$ _____

(42) Which of the following is NOT a triangular number, 105, 114, or 120? _____

(43) The sum of the roots of $4x^2 + 4x = 15$ is _____

(44) If $8^{-2} \times 8^k \div 8^{-4} = 8$, then $k =$ _____

(45) $16 \times 5! + 20 \times 4! =$ _____

(46) The slope of the line $4x - 5y = 6$ is _____

(47) A, B, & C are the roots of $x^3 + 2x^2 - 23x - 60 = 0$. Find $A + B + C - A \times B \times C$. _____

(48) $1204_6 \div 4_6 =$ _____ 6

(49) If a triangle has side lengths of 6, 6, and x then the largest integral value of x is _____

*(50) $(5\pi)^3 =$ _____

(51) $7^9 \div 11$ has a remainder of _____

(52) The geometric series $3\frac{1}{3} + 2 + 1\frac{1}{5} + \frac{18}{25} + \ldots$ has a sum of _____

(53) $77^2 + 63^2 =$ _____

(54) If A is 40% more than B and C is 60% less than B, then C is what fraction part of A? _____

(55) $\log_2(4x) = 8$ then $\sqrt{x} =$ _____

(56) $1 + 4 + 7 + 10 + 13 + \ldots + 28 =$ _____

(57) If $(3 - 4i)(5 - 2i) = a + bi$, then $a + b =$ _____

(58) $\frac{1+4+9+16+\ldots+49+64}{1+3+6+10+\ldots+28+36} =$ _____

(59) $({}_6C_4)({}_5P_3) =$ _____

*(60) 200 miles per hour = _____ feet per second

(61) A pair of standard dice are rolled. The probability that the sum of the dots on the top faces is a triangular number is _____

(62) $\sin(30°) - \cos(150°) \times \tan(300°) =$ _____

(63) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\sqrt{2} + \sqrt{3} + \sqrt{5}\right]$. _____

(64) $A = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 4 \\ 1 & 7 \end{bmatrix}$. Find $|A - B|$. _____

(65) $89 \times 98 =$ _____

(66) If $f(x) = x^4 + 4x^3 + 6x^2 + 4x + 1$, then $f(4) =$ _____

(67) Given the sequence 0, 2, 6, 12, 20, ..., 72, k, 110, ... find k. _____

(68) 104° Fahrenheit = _____ ° Celsius

(69) If $\log_b 5 = 2$ and $\log_b x = 4$ then $x =$ _____

*(70) The radius of the base of a cylinder is 8". Find the volume if its height is 9.5". _____ cu. inches

(71) The function $\frac{2x^4}{3x^2+1}$ has _____ asymptotes

(72) $\frac{1}{15} + \frac{1}{35} + \frac{1}{63} + \frac{1}{99} =$ _____

(73) $F(x) = x^3 - 3x^2 + x - 2$. Find $f''(-\frac{1}{3}) =$ _____

(74) $\lim_{x \to 0} \left(\frac{\sin(5x)}{3x}\right) =$ _____

(75) A line tangent to $f(x) = x^2 - 9x + 7$ with a slope of -3 has a y-intercept of (0, y). $y =$ _____

(76) Find k, $0 \leq k \leq 8$, if $4k - 3 \cong 5 \pmod 9$. _____

(77) $\int_{-1}^{1} (3x^2 + 2x + 1)\, dx =$ _____

(78) $\sqrt{499849} =$ _____

(79) The 10th term of the arithmetic sequence $-7, -1, 5, 11, \ldots$ is _____

*(80) 583.385 x 239 = _____

University Interscholastic League - Number Sense Answer Key HS • District 1 • 2012

*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) 4,114

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

(3) 289

(4) 105.2

(5) 1,496

(6) 680

(7) 464

(8) $\frac{8}{11}$

(9) 22.5, $\frac{45}{2}$, $22\frac{1}{2}$

*(10) 36,461 — 40,297

(11) $38.25

(12) 56

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

(14) 3,760

(15) 325

(16) $2.55

(17) 66

(18) 8

(19) 3,375

*(20) 7,535 — 8,328

(21) $\frac{23}{465}$

(22) $43.20

(23) 336

(24) 110

(25) 81

(26) 6

(27) 43,335

(28) $3\frac{3}{40}$

(29) —2

*(30) 841 — 929

(31) $\frac{5}{18}$

(32) 3,222

(33) 1,728

(34) 4.3

(35) $-2.5, -\frac{5}{2}, -2\frac{1}{2}$

(36) —96

(37) 131

(38) 2

(39) 95

*(40) 1,167 — 1289

(41) 65

(42) 114

(43) —1

(44) —1

(45) 2,400

(46) .8, $\frac{4}{5}$

(47) —62

(48) 201

(49) 11

*(50) 3,682 — 4,069

(51) 8

(52) $\frac{25}{3}$, $8\frac{1}{3}$

(53) 9,898

(54) $\frac{2}{7}$

(55) 8

(56) 145

(57) —19

(58) 1.7, $\frac{17}{10}$, $1\frac{7}{10}$

(59) 900

*(60) 279 — 308

(61) $\frac{5}{18}$

(62) —1

(63) 5

(64) 4

(65) 8,722

(66) 625

(67) 90

(68) 40

(69) 25

*(70) 1,815 — 2,005

(71) 0

(72) $\frac{4}{33}$

(73) —8

(74) $\frac{5}{3}$, $1\frac{2}{3}$

(75) —2

(76) 2

(77) 4

(78) 707

(79) 47

*(80) 132,458 — 146,400