The University Interscholastic League
Number Sense Test • Regional • 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) $42112 + 21124 =$ _____

(2) $25 \times 214 =$ _____

(3) $421 \div 12 =$ _____ (mixed number)

(4) $2012 - 421 =$ _____

(5) $5 - 10 \times 15 \div 20 + 25 =$ _____

(6) $20\frac{1}{2}\% =$ _____ (proper fraction)

(7) $26^2 =$ _____

(8) $1\frac{2}{3} + 4\frac{5}{6} =$ _____ (mixed number)

(9) $421 \times 11 =$ _____

*(10) $421 + 2012 - 2102 + 241 =$ _____

(11) $77^2 =$ _____

(12) The arithmetic mean of 4, 21, 20, and 12 is _____

(13) $21 \times \frac{21}{25} =$ _____ (mixed number)

(14) $3 + 6 + 9 + 12 + ... + 36 =$ _____

(15) \$9.00 is 15% of \$ _____

(16) $144 \div 0.08333... =$ _____

(17) 4 yards 2 feet 1 inch = _____ inches

(18) The largest prime factor of 124 is _____

(19) If 3 rings cost \$40.20 then 7 rings cost \$_____

*(20) $25 \times 20 \times 10.15 \div \frac{1}{5} =$ _____

(21) $12\frac{1}{6} \times 6\frac{5}{6} =$ _____ (mixed number)

(22) Which is larger $1\frac{7}{12}$ or 1.712? _____

(23) $(34^2 - 26^2) \div 30 =$ _____

(24) 51% of 85 is 17% of _____

(25) $(9 + 18 \times 27) \div 5$ has a remainder of _____

(26) 104 is divisible by how many positive integers? ___

(27) $1214412 \div 12 =$ _____

(28) Let set R = {r,o,u,n,d} and set A = {a,n,s,w,e,r}. How many unique elements are in $R \cap A$? _____

(29) The first 4 digits of the decimal of $\frac{23}{90}$ is 0. _____

*(30) $\sqrt{456789} =$ _____

(31) If $3x + 4 = -5$ then $6x - 7 =$ _____

(32) 1,728 base ten = _____ base twelve

(33) The simple interest on \$900 at 7% for 5 months is \$ _____

(34) $6\frac{7}{8} - 8\frac{9}{10} =$ _____ (mixed number)

(35) 7 pecks = _____ bushels

(36) $3^4 - 4^3 - 5^2 =$ _____

(37) Truncate $(\sqrt{2} + \sqrt{5})$ to the tenths place. ____

(38) If x = 8 and y = — 3 then $x^2 - 2xy + y^2 =$ _____

(39) A quarterback completed $31\frac{1}{4}\%$ of the 48 passes he threw. How many passes did he not complete? ____

*(40) 2134711 ÷ 1123 = _____

(41) 225 × 134 = _____

(42) The 25th triangular number is _____

(43) $234_7 - 156_7 =$ _____ 7

(44) If A, B, and C are the real roots of $4x^3 + 4x^2 - 29x - 12 = 0$, then ABC — A — B — C = _____

(45) $11 \times 4! + 44 \times 3! =$ _____

(46) If $9^{(x)} = 3^{(x-1)}$, then $6^{(x+1)} =$ _____

(47) $7^8 \div 9$ has a remainder of _____

(48) If A > 1 and $A^{-2} \div A^3 \times A^k = A^4$ then k = ____

(49) 40° Celsius = _____ ° Fahrenheit

*(50) $\frac{\sqrt{5}+1}{2} \times 31.4 \times 27.18 =$ _____

(51) How many ways can the letters in the word 'arrange' be arranged in a line? _____

(52) $\frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} + \ldots + \frac{1}{36} =$ _____

(53) If (4 + 3i)(2 — i) = a + bi, then a + b = _____

(54) The simplified coefficient of the x^3y^2 term in the expansion of $(2x + y)^5$ is _____

(55) $({}_5P_3) + ({}_4C_2) + ({}_3P_1) =$ _____

(56) $\sqrt{1 + 8 + 27 + 64 + \ldots + 1331 + 1728} =$ _____

(57) The measure of a central angle of a regular decagon is $k\pi$ radians. Find k. _____

(58) .25 + .45 + .65 + .85 + ... + 1.45 = _____

(59) $67^2 + 64^2 =$ _____

*(60) 21 × 43 × 65 × 87 = _____

(61) $\sin(150°) - \tan(225°) - \cos(300°) =$ _____

(62) $(357_8)(246_8) \div 7$ has a remainder of _____

(63) Let $h(x) = 4x^2 + 4x + 1$, then h(h(— 1)) = _____

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

(65) 154 feet per second = _____ miles per hour

(66) 115 × 118 = _____

(67) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\sqrt{6} + \sqrt{7} + \sqrt{8}\right]$. _____

(68) A box contains 9 blue chips and k white chips. How many chips are in the box if the odds of randomly drawing a blue chip is $\frac{3}{4}$? _____

(69) $\sqrt{9.8596} =$ _____ (decimal)

*(70) $(8! \div 6!)(7! \div 5!)(6! \div 4!) =$ _____

(71) The graph of $y = \pm 2\sqrt{\frac{x}{x-2}}$ has ____ asymptotes

(72) Find k, $0 \leq k \leq 8$, if $3! + k \cong 1 \pmod 9$. _____

(73) $\int_{-1}^{1} (4x - 3)\, dx =$ _____

(74) If $f(x) = x^3 - 6x^2 + 9x + 1$, then $f''(1) =$ _____

(75) If $\arccos(\sin(\frac{\pi}{6})) = k\pi$, then k = _____

(76) $\frac{1}{18} + \frac{1}{54} + \frac{1}{108} + \frac{1}{180} =$ _____

(77) 23 × 1111 = _____

(78) Change $\frac{11}{25}$ to a base 5 decimal. _____

(79) Given the sequence 2,6,15,28,55,k,119,... . k = _____

*(80) 1 square mile = _____ square rods

University Interscholastic League - Number Sense Answer Key HS • Regional • 2012

*number) x — y means an integer between x and y inclusive

NOTE: If an answer is of the type like $\frac{2}{5}$ it cannot be written as a repeating decimal

(1) 63,236

(2) 5,350

(3) $35\frac{1}{12}$

(4) 1,591

(5) 22.5, $\frac{45}{2}$, $22\frac{1}{2}$

(6) $\frac{41}{200}$

(7) 676

(8) $6\frac{1}{2}$

(9) 4,631

*(10) 544 — 600

(11) 5,929

(12) 14.25, $\frac{57}{4}$, $14\frac{1}{4}$

(13) $17\frac{16}{25}$

(14) 234

(15) $ 60.00

(16) 1,728

(17) 169

(18) 31

(19) $93.80

*(20) 24,107 — 26,643

(21) $83\frac{5}{36}$

(22) 1.712, $\frac{214}{125}$, $1\frac{89}{125}$

(23) 16

(24) 255

(25) 0

(26) 8

(27) 101,201

(28) 2

(29) 2555

*(30) 643 — 709

(31) — 25

(32) 1000

(33) $26.25

(34) $-2\frac{1}{40}$

(35) 1.75, $\frac{7}{4}$, $1\frac{3}{4}$

(36) — 8

(37) 3.6, $\frac{18}{5}$, $3\frac{3}{5}$

(38) 121

(39) 33

*(40) 1,806 — 1,995

(41) 30,150

(42) 325

(43) 45

(44) 4

(45) 528

(46) 1

(47) 4

(48) 9

(49) 104

*(50) 1,312 — 1,449

(51) 1,260

(52) $\frac{7}{9}$

(53) 13

(54) 80

(55) 69

(56) 78

(57) .2, $\frac{1}{5}$

(58) 5.95, $\frac{119}{20}$, $5\frac{19}{20}$

(59) 8,585

*(60) 4,851,142 — 5,361,788

(61) — 1

(62) 5

(63) 9

(64) 5

(65) 105

(66) 13,570

(67) 7

(68) 21

(69) 3.14

*(70) 67,032 — 74,088

(71) 3

(72) 4

(73) — 6

(74) — 6

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

(76) $\frac{4}{45}$

(77) 25,553

(78) .21

(79) 78

*(80) 97,280 — 107,520