The University Interscholastic League
Number Sense Test • HS Invitational B • 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) $2.34 + 15.46 =$ _____ (decimal)

(2) $\frac{5}{9} - \frac{9}{14} =$ _____

(3) $32 \times 125 =$ _____

(4) $345 \div 9 =$ _____ (Mixed Number)

(5) $42 \div 3 + 15 \times 6 =$ _____

(6) $3015 \div 6 =$ _____ (decimal)

(7) $31^2 =$ _____

(8) Which is smaller, $\frac{7}{9}$ or $\frac{3}{4}$? _____

(9) $11 \times 303 =$ _____

*(10) $49 + 498 + 4997 + 49996 =$ _____

(11) $3 + 7 + 11 + 15 + ... + 43 =$ _____

(12) The mean of 43, 32, 21 and 10 is _____

(13) $\frac{6}{7} - \frac{3}{14} - \frac{1}{28} =$ _____

(14) $5\frac{5}{6}\% =$ _____ (proper fraction)

(15) If 1 gram = .04 oz., then 1.68 oz. = _____ grams

(16) $5.333... \times 24 =$ _____

(17) 4.25 feet = _____ inches

(18) Find the cost of 66 pens at \$.74 each. \$_____

(19) $3\frac{3}{4} \div 2\frac{1}{2} =$ _____ (decimal)

*(20) $\frac{1}{4} \times 8.16 \times 32 \times 64 =$ _____

(21) The LCM of 24 and 32 is _____

(22) $6\frac{7}{8} - 9 =$ _____ (mixed number)

(23) How much does it cost to drive a car 90 miles at \$.25 per mile? \$ _____

(24) $16^2 + 48^2 =$ _____

(25) The area of a right triangle is 24 in^2 and its base is 4 in. What is the height? _____ in

(26) 48% of 90 is 16% of _____

(27) 44 base 10 = _____ base 5

(28) $(213 \times 4 + 7) \div 11$ has a remainder of _____

(29) The first 4 digits of the decimal of $\frac{47}{99}$ is 0._____

*(30) $30989 \div 5\frac{1}{6} \times 11 =$ _____

(31) $48 \div 0.1875 =$ _____

(32) The simple interest on \$120 at 6% for 3 months is \$ _____

(33) Let B = {b,o,y,s}, G = {g,i,r,l,s} and K = {k,i,d,s}. $(G \cap K) \cup B$ contains _____ unique elements

(34) $5^2 + 4^3 + 3^4 =$ _____

(35) $4\frac{1}{4} \times 4\frac{3}{4} =$ _____ (mixed number)

(36) If x = 16 and y = 9 then $4x^2 + 4xy + y^2 =$ _____

(37) Truncate $4\sqrt{8}$ to a whole number. _____

(38) 1 bushel = _____ pecks

(39) 11312 ÷ 101 = _____

*(40) $\sqrt{21347} + \sqrt{11235} =$ _____

(41) The 21st triangular number is _____

(42) $60 \times 5! - 60 \times 6! =$ _____

(43) If $7x - 21 > 14x$ then $x <$ _____

(44) Find the slope of a line perpendicular to the line containing the points (— 2,3) and (— 5,7). _____

(45) If $A > 1$ and $A^k \div A^{-1} \div A^2 = A^3$ then k = _____

(46) $134_5 \div 4_5 =$ _____ 5

(47) If P, Q, and R are the real roots of $4x^3 + 4x^2 - 29x = 12$ then PQ + QR + PR = _____

(48) $74^2 - 70^2 = 144k$. k = _____

(49) Evaluate x when $3^{(x-1)} = 9^{(x+1)}$. _____

*(50) $\left(\frac{\sqrt{5}+1}{2} + \pi\right)^3 =$ _____

(51) $115 \times 252 =$ _____

(52) $9^{10} \div 11$ has a remainder of _____

(53) $({}_5C_3)({}_5P_2) =$ _____

(54) The simplified coefficient of the x^3y^3 term in the expansion of $(x - y)^6$ is _____

(55) The reciprocal of 3 + i is a + bi. Find a. _____

(56) If $\log_4(8x) = 2.5$ then x = _____

(57) $1^3 + 2^3 + 3^3 + 4^3 + 5^3 + 6^3 =$ _____

(58) How many distinct 8 letter words, real or imaginary, can be made using the letters from the word "distinct" ? _____

(59) $\frac{1 + 8 + 27 + 64 + 125}{15^2} =$ _____

*(60) $6^5 \div 3^4 \times 9^2 =$ _____

(61) $111 \times 603 =$ _____

(62) If $g(x) = 2x^2 + x - 3$, then $g(g(-\frac{1}{2})) =$ _____

(63) A box contains 10 blue pens and k red pens. Find k if the probability of randomly drawing a red pen is 37.5%. _____

(64) $\sin(135°) \times \cos(315°) - \tan(225°) =$ _____

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

(66) $112 \times 88 =$ _____

(67) $(532_8 + 641_8) \div 7$ has a remainder of _____

(68) 60° Celsius = _____ ° Fahrenheit

(69) If log 3 = .5 and log x = 1.5 then x = _____

*(70) 875 feet per second = _____ miles per hour

(71) Find k, $0 \leq k \leq 10$, if $4! - 2 \cong k \pmod{11}$. _____

(72) $\sqrt{169744} =$ _____

(73) $6! \div 4! + 5! \div 3! + 2! \div 0! + 1! =$ _____

(74) The surface area of a cube with a base area of $36cm^2$ is _____ cm^2

(75) Given the sequence 2,3,6,12,22,37,k,86,... . k = _____

(76) The function $\frac{x^3}{x^2 - 1}$ has _____ asymptotes

(77) $\int_1^5 x^{-2}\, dx =$ _____

(78) $\frac{1}{8} + \frac{1}{24} + \frac{1}{48} + \frac{1}{80} =$ _____

(79) The 8th term of the geometric sequence — 27, 9, — 3, 1, ... is _____

*(80) 416.678 x 119 = _____

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*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) 17.8

(2) $-\frac{11}{126}$

(3) 4,000

(4) $38\frac{1}{3}$

(5) 104

(6) 502.5

(7) 961

(8) .75, $\frac{3}{4}$

(9) 3,333

*(10) 52,763 – 58,317

(11) 253

(12) 26.5, $\frac{53}{2}$, $26\frac{1}{2}$

(13) $\frac{17}{28}$

(14) $\frac{7}{120}$

(15) 42

(16) 128

(17) 51

(18) $48.84

(19) 1.5

*(20) 3,970 – 4,386

(21) 96

(22) $-2\frac{1}{8}$

(23) $22.50

(24) 2,560

(25) 12

(26) 270

(27) 134

(28) 1

(29) 4747

*(30) 62,678 – 69,275

(31) 256

(32) $1.80

(33) 5

(34) 170

(35) $20\frac{3}{16}$

(36) 1,681

(37) 11

(38) 4

(39) 112

*(40) 240 – 264

(41) 231

(42) – 36,000

(43) – 3

(44) .75, $\frac{3}{4}$

(45) 4

(46) 21

(47) – 7.25, $-\frac{29}{4}$, $-7\frac{1}{4}$

(48) 4

(49) – 3

*(50) 103 – 113

(51) 28,980

(52) 1

(53) 200

(54) – 20

(55) .3, $\frac{3}{10}$

(56) 4

(57) 441

(58) 10,080

(59) 1

*(60) 7,388 – 8,164

(61) 66,933

(62) 12

(63) 6

(64) – .5, $-\frac{1}{2}$

(65) – 1

(66) 9,856

(67) 0

(68) 140

(69) 27

*(70) 567 – 626

(71) 0

(72) 412

(73) 53

(74) 216

(75) 58

(76) 3

(77) .8, $\frac{4}{5}$

(78) .2, $\frac{1}{5}$

(79) $\frac{1}{81}$

*(80) 47,106 – 52,063