The University Interscholastic League
Number Sense Test • HS State • 2014

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) $519 + 2014 =$ _____

(2) $124 \times 15 =$ _____

(3) $51.9 - 20.14 =$ _____ (decimal)

(4) $201 \div 4 =$ _____ (decimal)

(5) $6.25\% =$ _____ (proper fraction)

(6) $61 \times 16 =$ _____

(7) $23^2 =$ _____

(8) $5 + 1 \times 9 \div 2^0 - 14 =$ _____

(9) $5\frac{1}{9} + 2\frac{1}{4} =$ _____

*(10) $4102 - 915 + 2014 - 519 =$ _____

(11) 546738 ÷ 11 has a remainder of _____

(12) $7\frac{4}{5} - 4\frac{1}{2} =$ _____

(13) $14^3 =$ _____

(14) Which is smaller, $\frac{5}{12}$ or 0.45? _____

(15) The number of prime factors of 210 is _____

(16) 37.5% of $24.16 is $_____

(17) MCDXCII = _____ (Arabic Number)

(18) The multiplicative inverse of 1.2 is _____

(19) $4 + 7 + 10 + 13 + \ldots 34 + 37 =$ _____

*(20) $210 \times 45 \times 19 =$ _____

(21) $5\frac{2}{5} \times 2\frac{1}{2} =$ _____

(22) 1.242424... = _____(mixed number)

(23) $(76 + 65 - 54) \div 8$ has a remainder of _____

(24) The sum of three consecutive even integers is 222. The smallest of the three integers is _____

(25) 1 gallon 1 quart 1 pint = _____ cups

(26) $52 \times 101 =$ _____

(27) If 18 ♠'s cost $27.00 then 15 ♠'s cost $ _____

(28) Truncate $\sqrt{3}$ to the nearest tenth. _____

(29) The number of positive integral divisors of 76 is __

*(30) $\sqrt{363} \times 189 =$ _____

(31) 123 base 7 = _____ base 10

(32) Set A has 9 elements and set B has 7 elements. If $A \cap B$ has 5 elements, then $A \cup B$ has ___ elements

(33) $2|1 - 3| - 4|7 - 11| + |18 - 29| =$ _____

(34) If $y = x + 3$ and $y = 2 - 3x$ then $x =$ _____

(35) $\frac{1}{4}(46^2 - 54^2) =$ _____

(36) $8\frac{1}{3} \div 2\frac{1}{2} =$ _____

(37) $\frac{8!\,5!}{3!\,6!} =$ _____

(38) If $a = 42$ and $b = 18$, then $a^2 - 2ab + b^2 =$ _____

(39) $256 \times 0.4375 =$ _____

*(40) $5202014 \div 421 =$ _____

(41) $\left(\frac{x^2 - 14x + 49}{x^2 - 49}\right)\left(\frac{x^2 + 14x + 49}{x + 7}\right) = x +$ _____

(42) The larger root of $3x^2 - 10x + 3 = 0$ is _____

(43) $108 \times 107 =$ _____

(44) If $\frac{6x}{7}$ has a remainder of 3 and $\frac{5y}{7}$ has a remainder of 6 then $\frac{xy}{7}$ has a remainder of _____

(45) $14641 \div 2.75 =$ _____

(46) The measure of an exterior angle of a regular nonagon is _____ degrees

(47) $(9 \times 12345 + 6) \div 11 =$ _____

(48) ${}_5C_2 + {}_5P_2 =$ _____

(49) 75 miles per hour = _____ feet per second

*(50) 2014 is 519% of _____

(51) The first 4 digits of the decimal of $\frac{101}{900}$ is 0._____

(52) If $6\log_x(2) = 3$ then $x =$ _____

(53) $44^2 - 48^2 + 52^2 - 56^2 =$ _____

(54) $(7 - 5i)(2 + 3i) = a + bi$. Find $a + b$. _____

(55) The coefficient of the x^3y^3 term of $(2x - y)^6$ is ___

(56) $\frac{11}{12} + \frac{11}{60} + \frac{11}{140} =$ _____ (mixed number)

(57) Let $|5 - 2x| > 10$. The largest value of x, where x is an integer less than zero, is _____

(58) $753_9 - 268_9 =$ _____ $_9$

(59) Given 1, 2, 6, 12, 25, 48, k, 168, ... Find k. _____

*(60) $888 \times 7272 \div 4 =$ _____

(61) Change 0.4111... base 8 to a base 8 fraction. ____ $_8$

(62) The frequency of $y = 2 + 3\sin(\frac{\pi}{4}x)$ is _____

(63) $90^2 + 90 =$ _____

(64) $\frac{7\pi}{15}$ radians = _____ degrees

(65) If $6x^3 - 17x^2 + 11x - 2 = 0$, then the harmonic mean of the roots is _____

(66) If $A = \begin{bmatrix} 1 & 3 \\ k & 6 \end{bmatrix}$ and $|A| = 18$, then $k =$ _____

(67) $521 \times 214 =$ _____

(68) A store has a box of blue pens, red pens, and black pens. How many different sets of 6 pens can he package? _____

(69) The set {n,u,m,b,e,r} has _____ 4-elements subsets

*(70) $\frac{\sqrt{5}+1}{2} \times 10^3 =$ _____

(71) $f(x) = 5x^3 - 15x^2 + 15x - 5$. Find $f'(-1) =$ _____

(72) $\int_{-1}^{1} \left(\frac{x+1}{2}\right) dx =$ _____

(73) $g(x) = 3x^2 + 2$ and $h(x) = 3 - 2x^2$. $h(g(1)) =$ _____

(74) The maximum value of $4 - 3\sin(2x)$ is = _____

(75) $54 \times 18 = 36 \times k$. $k =$ _____

(76) $\frac{15}{16} + \frac{16}{15} =$ _____

(77) If GCD(63, x) = 7 and LCM(63, x) = 126, then $x =$ _____

(78) $2^4 + 3^3 + 4^2 =$ _____

(79) $\frac{6}{125} =$ _____% (decimal)

*(80) $(24\% \text{ of } 87.5)^2 =$ _____

University Interscholastic League - Number Sense Answer Key HS • State • 2014

*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) 2,533

(2) 1,860

(3) 31.76

(4) 50.25

(5) $\frac{1}{16}$

(6) 976

(7) 529

(8) 0

(9) $\frac{265}{36}, 7\frac{13}{36}$

*(10) 4,448 — 4,916

(11) 5

(12) 3.3, $\frac{33}{10}, 3\frac{3}{10}$

(13) 2,744

(14) $\frac{5}{12}$

(15) 4

(16) $9.06

(17) 1,492

(18) $\frac{5}{6}$

(19) 246

*(20) 170,573 — 188,527

(21) 13.5, $\frac{27}{2}, 13\frac{1}{2}$

(22) $1\frac{8}{33}$

(23) 7

(24) 72

(25) 22

(26) 5,252

(27) $22.50

(28) 1.7

(29) 6

*(30) 3,421 — 3,780

(31) 66

(32) 11

(33) — 1

(34) — .25, $-\frac{1}{4}$

(35) — 200

(36) $\frac{10}{3}, 3\frac{1}{3}$

(37) 1,120

(38) 576

(39) 112

*(40) 11,739 — 12,974

(41) — 7

(42) 3

(43) 11,556

(44) 2

(45) 5,324

(46) 40

(47) 10,101

(48) 30

(49) 110

*(50) 369 — 407

(51) 1122

(52) 4

(53) — 800

(54) 40

(55) — 160

(56) $1\frac{5}{28}$

(57) — 3

(58) 474

(59) 91

*(60) 1,533,665 — 1,695,103

(61) $\frac{35}{70}$

(62) $\frac{1}{8}$

(63) 8,190

(64) 84

(65) $\frac{6}{11}$

(66) — 4

(67) 111,494

(68) 28

(69) 15

*(70) 1,538 — 1,698

(71) 60

(72) 1

(73) — 47

(74) 7

(75) 27

(76) $2\frac{1}{240}$

(77) 14

(78) 59

(79) 4.8

*(80) 419 — 463