The University Interscholastic League
Number Sense Test • HS District 1 • 2013

Final _____ _____

Contestant's Number _____ 2nd _____ _____

1st _____ _____

Score **Initials**

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) $323 + 2013 =$ _____

(2) $2013 - 323 =$ _____

(3) $318 \times 9 =$ _____

(4) $2013 \div 6 =$ _____ (decimal)

(5) $18^2 =$ _____

(6) $2357 \div 9$ has a remainder of _____

(7) $2\frac{1}{3} + 4\frac{2}{5} =$ _____ (mixed number)

(8) $3 - 2 \times 3 + 20 \div (1 - 3) =$ _____

(9) $4\frac{3}{4}\% =$ _____(proper fraction)

***(10)** $1123 - 58 + 1321 =$ _____

(11) $323 \times 13 =$ _____

(12) $\frac{16}{21} \times 16 =$ _____ (mixed number)

(13) 22 is what % 40? _____%

(14) $4\frac{1}{5} - 2\frac{2}{3} =$_____ (mixed number)

(15) $3 + 8 + 13 + 18 + ... + 33 + 38 =$ _____

(16) The GCF of 57, 76, and 95 is _____

(17) One-fourth of a gallon is _____ fluid ounces

(18) MCDLXIV = _____ (Arabic Number)

(19) $2013 \div 25 =$ _____ (decimal)

***(20)** $321 \times 2013 =$ _____

(21) $1\frac{4}{7} \times 1\frac{1}{6} =$_____ (mixed number)

(22) $4884 \div 111 =$ _____

(23) The total number of 1-element subsets and 3-element subsets of the set {m,a,t,h} is _____

(24) $13^2 + 39^2 =$ _____

(25) $6.08333... - 12.1666... =$ _____

(26) Truncate $100\sqrt{3}$ to a whole number _____

(27) How many prime numbers, P, exist such that $30 < P < 50$? _____

(28) 70% of 70 minus 70 = _____

(29) $4 + 5 + 9 + 14 + 23 + ... + 97 + 157 =$ _____

***(30)** $222 \times 88 + 92 \times 218 =$ _____

(31) $72^2 + 13^2 =$ _____

(32) $51_6 - 42_6 + 33_6 =$ _____ 6

(33) If $1\frac{1}{2}$ FRACS cost \$1.20 then 9 FRACS cost \$ ____

(34) If $x - y = 5$ and $x + y = -8$ then $x^2 - y^2 =$ _____

(35) $4! - 3! - 2! - 1! - 0! =$ _____

(36) How many distinct elements are in $\{e,v,i,l\} \cup (\{p,r,i,m,e\} \cap \{n,u,m,b,e,r\})$? _____

(37) If $f(x) = 4x^2 - 12x + 9$ then $f(24)$ is _____

(38) The next term of the geometric sequence, ... 4.5, 1.5, 0.5, ... is _____

(39) $3\frac{1}{5} \div 2\frac{2}{15}$ = _____ (mixed number)

*(40) $\sqrt{1361015}$ = _____

(41) $777\frac{7}{9}\%$ of 27 = _____

(42) The slope of a line perpendicular to the line $6 = 5x - 4y$ is _____

(43) $A^6 \times A^{-2} \div A^{-5} = A^k$ and $A > 1$. Find k. _____

(44) The angle supplementary to an interior angle of a regular pentagon has a measure of _____ degrees

(45) If $16^{(x+4)} = 64$ then x = _____

(46) If $\frac{4-x}{x+7} + \frac{x+7}{4-x}$ is written as the mixed number $A\frac{B}{C}$ then B = _____

(47) The roots of $x^3 + x^2 - 5x + 3 = 0$ are P, Q, & R. Find $(P + Q + R)(PQ + QR + PR)(PQR)$. _____

(48) $\frac{1}{10} + \frac{1}{40} + \frac{1}{88}$ = _____

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

*(50) $\left(27\pi + 31e\right)^2$ = _____

(51) How many distinct 7 letter words, real or imaginary, can be made using the letters from the word "letters"? _____

(52) 48 miles per hour = _____feet per second

(53) 543×123 = _____

(54) $\frac{13}{15} + \frac{15}{13} - 2$ = _____

(55) If P varies inversely with Q and P = 12 when Q = 3, find P when Q = 9. _____

(56) The number of positive integral divisors of $8 \times 10 \times 25$ is _____

(57) If $\log_6(9x) = 3$ then x = _____

(58) If $\frac{3x}{8}$ has a remainder of 4 and $\frac{3y}{8}$ has a remainder of 2 then $\frac{xy}{8}$ has a remainder of _____

(59) ${}_7P_2 \div {}_7C_2$ = _____

*(60) 64 radians = _____ degrees

(61) The first 4 digits of the decimal of $\frac{31}{99}$ is 0. _____

(62) $(567_8) + (432_8) \div 7$ has a remainder of _____

(63) The radius of the circumscribed circle around a 9,40,41-right triangle is _____

(64) $\sin(120°) \times \cos(150°) \times \tan(135°)$ = _____

(65) $g(x) = 2x + 3$ and $h(x) = 4 - 5x$. $h(g(-2))$ = _____

(66) $\frac{6\pi}{5}$ radians = _____ degrees

(67) If A is 30 less than B and B is 20 more than C, then A is how much less than C? _____

(68) A bag contains ♣s, ♥s, ♠s, ★s, and ●s. How many different sets of 4 of these can be formed? _____

(69) Given the sequence 2, 6, 12, 20, 30, ... 110, k, 156,..., find k. _____

*(70) The area of $7x^2 + 14y^2 = 98$ is A. A^2 = _____

(71) $f(x) = x^4 + 4x^3 + 6x^2 + 4x + 1$. Find $f'(1)$ = _____

(72) $(4! + 5!) \div 6!$ = _____

(73) Change $\frac{44}{125}$ to a base 5 decimal. _____

(74) $\sqrt{55225}$ = _____

(75) The side of a cube with a lateral surface area of 324 cm^2 is _____ cm

(76) If $\sqrt{108} + \sqrt{75} = \sqrt{x}$ then x = _____

(77) $\lim_{x \to -\infty} \left(\frac{x+7}{3x+5}\right)$ = _____

(78) $\int_0^{\pi} \sin(x)\,dx - \int_{\pi}^{2\pi} \sin(x)\,dx$ = _____

(79) The 4th triangular number plus the 4th pentagonal number is _____

*(80) 4 bushels + 32 pecks + 64 quarts = _____ pints

University Interscholastic League - Number Sense Answer Key HS ● District 1 ● 2013

***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) 2,336

(2) 1,690

(3) 2,862

(4) 335.5

(5) 324

(6) 8

(7) $6\frac{11}{15}$

(8) — 13

(9) $\frac{19}{400}$

***(10) 2,267 — 2,505**

(11) 4,199

(12) $12\frac{4}{21}$

(13) 55

(14) $1\frac{8}{15}$

(15) 164

(16) 19

(17) 32

(18) 1,464

(19) 80.52

***(20) 613,865 — 678,481**

(21) $1\frac{5}{6}$

(22) 44

(23) 8

(24) 1,690

(25) $-\frac{73}{12}, -6\frac{1}{12}$

(26) 173

(27) 5

(28) — 21

(29) 406

***(30) 37,613 — 41,571**

(31) 5,353

(32) 42

(33) $7.20

(34) — 40

(35) 14

(36) 6

(37) 2,025

(38) $\frac{1}{6}$

(39) $1\frac{1}{2}$

***(40) 1,109 — 1,224**

(41) 210

(42) — .8, $-\frac{4}{5}$

(43) 9

(44) 72

(45) — 2.5, $-\frac{5}{2}, -2\frac{1}{2}$

(46) 121

(47) — 15

(48) $\frac{3}{22}$

(49) 200

***(50) 27,162 — 30,020**

(51) 1,260

(52) 70.4, $\frac{352}{5}$, $70\frac{2}{5}$

(53) 66,789

(54) $\frac{4}{195}$

(55) 4

(56) 20

(57) 24

(58) 0

(59) 2

***(60) 3,484 — 3,850**

(61) 3131

(62) 6

(63) 20.5, $\frac{41}{2}$, $20\frac{1}{2}$

(64) .75, $\frac{3}{4}$

(65) 9

(66) 216

(67) 10

(68) 70

(69) 132

***(70) 919 — 1,015**

(71) 32

(72) .2, $\frac{1}{5}$

(73) .134

(74) 235

(75) 9

(76) 363

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

(78) 4

(79) 32

***(80) 852 — 940**