The University Interscholastic League
Number Sense Test • HS SAC • 2011

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.

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STOP -- WAIT FOR SIGNAL!

(1) $857 - 758 =$ _____

(2) $64 \times 25 =$ _____

(3) $323 \div 9 =$ _____ **(mixed number)**

(4) $964 + 469 =$ _____

(5) $11 \times 412 =$ _____

(6) Which is larger $\frac{5}{8}$ or .624? _____

(7) $16^2 =$ _____

(8) $35 \times 66 - 24 \times 66 =$ _____

(9) $24 \times 6 \div 8 + 10 =$ _____

***(10)** $24242 + 2424 + 242 + 24 + 2 =$ _____

(11) $12 \div 1.5 =$ _____

(12) $\frac{1}{4} - \frac{3}{8} - \frac{5}{24} =$ _____

(13) $321 \times 8 - 1 =$ _____

(14) $14 \times \frac{14}{17} =$ _____ **(mixed number)**

(15) $\frac{1}{16} =$ _____ **% (decimal)**

(16) 15% of $24.00 is $_____

(17) $13 \times 221 =$ _____

(18) $1 + 2 + 3 + 4 + ... + 15 =$ _____

(19) The mean of 20, 34, 22, and 36 is _____

***(20)** $78563 \div 492 =$ _____

(21) $3\frac{1}{3} \times 6\frac{1}{3} =$ _____ **(mixed number)**

(22) If 4 pens cost $1.20 then 6 pens cost $ _____

(23) $1 + 9 + 17 + 25 + 33 + 41 =$ _____

(24) $34 \times 46 =$ _____

(25) $(32 \times 4 - 9) \div 6$ has a remainder of _____

(26) If $k > 0$ and $k^2 = 49$, then $k^3 =$ _____

(27) .252525... = _____ **(proper fraction)**

(28) $5\frac{3}{4} - 4\frac{2}{3} =$ _____ **(mixed number)**

(29) $123_4 =$ _____ **10**

***(30)** $2\frac{9}{10} \times 1511.5 \div 11 =$ _____

(31) 3 quarts = _____ pints

(32) 2.2 is what % of 20 ? _____

(33) $16 \div 0.0625 =$ _____

(34) Round $2\sqrt{2}$ to the tenths place. _____

(35) If x is to 6 as 8 is to 12 then x = _____

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

(37) If x = 9 and y = 11 then $x^2 + 2xy + y^2$ = _____

(38) Let set A = {m,e,n,t,a,l} and set B = {m,a,t,h}. How many unique elements are in $A \cup B$? _____

(39) If the perimeter of a square is 24 cm then the area of the square is _____ sq. cm.

*(40) $\sqrt{75863}$ = _____

(41) If $48^2 - 42^2 = 12k$, then k = _____

(42) Which of the following is a triangular number, 18, 21, or 24? _____

(43) 214×421 = _____

(44) The slope of the line $kx + 4y = 3$ is 2. Find k. _____

(45) $15 \times 4! + 60 \times 3!$ = _____

(46) $\sqrt{32 \times 38 + 9}$ = _____

(47) The sum of the roots of $2x^2 - 5x - 3 = 0$ is _____

(48) If $A > 1$ and $A^2 \div A^3 \times A^4 = A^k$ then k = _____

(49) $246_8 + 135_8$ = _____ 8

*(50) $(10\pi)^3$ = _____

(51) If $(3 + 4i)(3 + 4i) = a + bi$, then a = _____

(52) $1 + 3 + 6 + 10 + 15 + ... + 28$ = _____

(53) $54^2 + 35^2$ = _____

(54) ${}_5P_2$ = _____

(55) $\log_8(x) = 2$ then $\sqrt{x}$ = _____

(56) A triangle has sides of 3, 5, and k. How many integral values of k will form a triangle? _____

(57) $6^7 \div 8$ has a remainder of _____

(58) $\frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} + ... + \frac{1}{28}$ = _____

(59) How many ways can the letters in the word 'white' be arranged in a row? _____

*(60) $4^3 \times 8^2 \div 2^2$ = _____

(61) If $f(x) = x^2 + x - 2$ then $f(f(-2))$ = _____

(62) $(135_7 + 246_7) \div 6$ has a remainder of _____

(63) The harmonic mean of 1, 2, and 4 is _____

(64) $A = \begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 2 \\ 3 & 1 \end{bmatrix}$. Find $|A + B|$. _____

(65) A bag contains golf balls, 5 white, 3 yellow, and 2 pink. The probability of reaching in the bag and randomly selecting a pink golf ball is _____%

(66) 104×108 = _____

(67) $(\sin \frac{\pi}{3})(\cos \frac{\pi}{6})(\tan \frac{\pi}{4})$ = _____

(68) 77° Fahrenheit = _____ ° Celsius

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

*(70) 55 miles per hour = _____ feet per second

(71) The function $\frac{x+3}{x^2+9}$ has _____ asymptotes

(72) $F(x) = x^3 + 3x^2 - 6x - 10$. Find $f'(1)$ = _____

(73) The slope of the line tangent to $f(x) = x^3 + 2x$ at the origin is _____

(74) The polar coordinates of the rectangular coordinates (2, — 2) are $(r, k\pi)$. If $r, k > 0$, then the least value of k is _____

(75) $\sin(\arccos(\frac{\sqrt{3}}{2}))$ = _____

(76) Find k, $0 \leq k \leq 7$, if $3k + 2 \cong 1 \pmod 8$. _____

(77) $\int_0^1 (3 - 2x)\, dx$ = _____

(78) Change $\frac{7}{16}$ to a base 4 decimal. _____

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

*(80) $(1 + 2 + 3 + 4 + 5 + ... + 10)^2$ = _____

University Interscholastic League - Number Sense Answer Key HS ● SAC ● Fall 2011

***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) 99

(2) 1,600

(3) $35\frac{8}{9}$

(4) 1,433

(5) 4,532

(6) .625, $\frac{5}{8}$

(7) 256

(8) 726

(9) 28

***(10) 25,588 — 28,280**

(11) 8

(12) — $\frac{1}{3}$

(13) 2,567

(14) $11\frac{9}{17}$

(15) 6.25

(16) $3.60

(17) 2,873

(18) 120

(19) 28

***(20) 152 — 167**

(21) $21\frac{1}{9}$

(22) $1.80

(23) 126

(24) 1,564

(25) 5

(26) 343

(27) $\frac{25}{99}$

(28) $1\frac{1}{12}$

(29) 27

***(30) 379 — 418**

(31) 6

(32) 11

(33) 256

(34) 2.8

(35) 4

(36) 27

(37) 400

(38) 7

(39) 36

***(40) 262 — 289**

(41) 45

(42) 21

(43) 90,094

(44) — 8

(45) 720

(46) 35

(47) 2.5, $\frac{5}{2}$, $2\frac{1}{2}$

(48) 3

(49) 403

***(50) 29,456 — 32,556**

(51) — 7

(52) 84

(53) 4,141

(54) 20

(55) 8

(56) 5

(57) 0

(58) .75, $\frac{3}{4}$

(59) 120

***(60) 973 — 1,075**

(61) — 2

(62) 3

(63) $\frac{12}{7}$, $1\frac{5}{7}$

(64) 12

(65) 20

(66) 11,232

(67) .75, $\frac{3}{4}$

(68) 25

(69) 3

***(70) 77 — 84**

(71) 1

(72) 3

(73) 2

(74) 1.75, $\frac{7}{4}$, $1\frac{3}{4}$

(75) .5, $\frac{1}{2}$

(76) 5

(77) 2

(78) .13

(79) 33

***(80) 2,874 — 3,176**

The University Interscholastic League
Number Sense Test • HS Invitational A • 2012

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(1) $2012 - 2102 =$ _____

(2) $3.1 \times 3.9 =$ _____ **(decimal)**

(3) $\frac{4}{5} + \frac{5}{12} =$ _____ **(mixed number)**

(4) $538 \div 9$ **has a remainder of** _____

(5) $22^2 =$ _____

(6) $11 \times 246 =$ _____

(7) $1648 \div 8 =$ _____

(8) XCIX = _____ **(Arabic Numeral)**

(9) $\frac{5}{6} - \frac{5}{12} - \frac{5}{18} =$ _____

***(10)** $32 + 322 + 3222 + 32222 =$ _____

(11) $753 + 357 =$ _____

(12) $12.5 \times 15 =$ _____

(13) 35% **of 210 =** k% **of 420. Find k.** _____ **(decimal)**

(14) $14 \times \frac{14}{17} =$ _____ **(mixed number)**

(15) $\frac{1}{12} =$ _____% **(mixed number)**

(16) $1 + 35 \div 7 \times 9 - 11 =$ _____

(17) $13 \times 313 =$ _____

(18) $37 \times 36 + 38 \times 36 =$ _____

(19) **If 12 pencils cost \$1.11 then 8 pencils cost \$**_____

***(20)** $594 \times 248 =$ _____

(21) $(45 \times 30 + 15) \div 7$ **has a remainder of** _____

(22) **36 base 9 =** _____ **base 10**

(23) $\frac{1}{3}$ **of a gallon =** _____ **cubic inches**

(24) $19^2 - 21^2 =$ _____

(25) **The largest prime number less than 37 is** _____

(26) **If** $k^3 = 729$, **then** $k^2 =$ _____

(27) **4 cups =** _____ **fluid ounces**

(28) $2\frac{3}{5} + 6\frac{1}{4} =$ _____ **(mixed number)**

(29) **The sum of three consecutive even integers is 132. The largest integer is** _____

***(30)** $\sqrt{167} + \sqrt{2345} =$ _____

(31) **.242424... =** _____ **(proper fraction)**

(32) **If** $3x - 6 = 9$ **then** $2x + 4 =$ _____

(33) **Let set D = {d,e,c,i,m,a,l} and set P = {p,o,i,n,t}. How many unique elements are in** $D \cap P$? _____

(34) $4^{-2} + 3^0 + 2^2 =$ _____

(35) A bowler won 37.5% of the 40 games he bowled. How many games did he lose? _____

(36) $12 \div 0.08333... =$ _____

(37) If x = 13 and y = 19 then $x^2 + 2xy + y^2 =$ _____

(38) Round $10\sqrt{5}$ to the tenths place. _____

(39) The simple interest on $400 at 6% for 8 months is $ _____

*(40) $\frac{1}{6} \times 35.79 \times 216 =$ _____

(41) $24_6 + 15_6 + 33_6 =$ _____ 6

(42) If $A > 1$ and $A^k \div A^2 \times A = A^4$ then k = _____

(43) $(20 \times 5!) \div (80 \times 3!) =$ _____

(44) Find k, so that 917k is the largest 4-digit number divisible by 6. _____

(45) If $31^2 - 37^2 = 34k$, then k = _____

(46) $\sqrt{44 \times 56 + 36} =$ _____

(47) If $3^{(x)} = 6561$ then $3^{(x-2)} =$ _____

(48) The slope of the line 6x − ky = 9 is 12. Find k. ____

(49) Which of the following is a triangular number, 66, 76, or 86? _____

*(50) $(10 \times \pi \times e)^2 =$ _____

(51) The sum of the first 10 triangular numbers is ____

(52) A triangle has sides of 7, 11, and k. How many integral values of k will form a triangle? _____

(53) $\frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} + ... + \frac{1}{55} =$ _____

(54) Let (3 − 6i) (6 − 3i) = a + bi. Find a + b. _____

(55) $54^2 + 35^2 =$ _____

(56) If $\log_x 32 + \log_x 2 = 3$ then x = _____

(57) How many different groups of 5 songs can be made from 7 different songs? _____

(58) $7^9 \div 11$ has a remainder of _____

(59) $235 \times 112 =$ _____

*(60) $18^4 =$ _____

(61) The harmonic mean of 2, 3, and 5 is _____

(62) 95° Fahrenheit = _____ ° Celsius

(63) $(\sin \frac{4\pi}{3})(\cos \frac{5\pi}{6}) - (\tan \frac{\pi}{4}) =$ _____

(64) The $\det\left(\begin{bmatrix} 2 & -2 \\ 3 & -5 \end{bmatrix} \times \begin{bmatrix} 2 & 3 \\ -2 & -5 \end{bmatrix}\right)$ is = _____

(65) A single die is rolled. The odds that the top face is a composite number is _____

(66) If $f(x) = x^3 + 3x^2 + 3x + 1$, then f(8) = _____

(67) $103 \times 98 =$ _____

(68) $(112_9 + 358_9) \div 8$ has a remainder of _____

(69) If log 4 = .8 and log x = .4 then x = _____

*(70) 70 miles per hour = _____ feet per minute

(71) The radius of the base of a right cylinder is 5 cm and its height is 4 cm. If the volume of the cylinder is $k\pi$ cm^3 then k is _____

(72) The function $\frac{x^3 + 3x + 9}{-20x^2 - 8x}$ has _____ asymptotes

(73) $111 \times 505 =$ _____

(74) The polar coordinates of the rectangular coordinates $(1, \sqrt{3})$ are $(r, k\pi)$. The smallest positive value of k is _____

(75) Find k, $0 \leq k \leq 6$, if $5k - 3 \cong 2 \pmod 7$. _____

(76) The y-intercept of the line tangent to $f(x) = x^3 + 2x$ (1, 3) is (0, y). y = _____

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

(78) Given the sequence 5,6,7,9,12,17,k,38, ... k = ____

(79) The first 4 digits of the decimal of $\frac{23}{99}$ is 0. _____

*(80) $(1 + 2 + 3 + 4 + 5 + ... + 15)^2 =$ _____

University Interscholastic League - Number Sense Answer Key HS ● Invitation A ● 2012

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NOTE: If an answer is of the type like $\frac{2}{3}$ it cannot be written as a repeating decimal

(1) — 90

(2) 12.09

(3) $1\frac{13}{60}$

(4) 7

(5) 484

(6) 2,706

(7) 206

(8) 99

(9) $\frac{5}{36}$

***(10) 34,009 – 37,587**

(11) 1,110

(12) 187.5, $\frac{375}{2}$, $187\frac{1}{2}$

(13) 17.5

(14) $11\frac{9}{17}$

(15) $8\frac{1}{3}$

(16) 35

(17) 4,069

(18) 2,700

(19) $.74

***(20) 139,947 – 154,677**

(21) 0

(22) 33

(23) 77

(24) — 80

(25) 31

(26) 81

(27) 32

(28) $8\frac{17}{20}$

(29) 46

***(30) 59 – 64**

(31) $\frac{8}{33}$

(32) 14

(33) 1

(34) 5.0625, $\frac{81}{16}$, $5\frac{1}{16}$

(35) 25

(36) 144

(37) 1,024

(38) 22.4

(39) $16.00

***(40) 1,225 – 1,352**

(41) 120

(42) 5

(43) 5

(44) 4

(45) — 12

(46) 50

(47) 729

(48) .5, $\frac{1}{2}$

(49) 66

***(50) 6,929 – 7,657**

(51) 220

(52) 13

(53) $\frac{9}{11}$

(54) — 45

(55) 4,141

(56) 4

(57) 21

(58) 8

(59) 26,320

***(60) 99,728 – 110,224**

(61) $\frac{90}{31}$, $2\frac{28}{31}$

(62) 35

(63) — .25, — $\frac{1}{4}$

(64) 16

(65) .5, $\frac{1}{2}$

(66) 729

(67) 10,094

(68) 4

(69) 2

***(70) 5,852 – 6,468**

(71) 100

(72) 3

(73) 56,055

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

(75) 1

(76) — 2

(77) 2

(78) 25

(79) 2323

***(80) 13,680 – 15,120**

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(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 × 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 × 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 × 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 = _____

University Interscholastic League - Number Sense Answer Key HS ● Invitation B ● 2012

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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**

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

Final _____ _____

Contestant's Number _____ 2nd _____ _____

1st _____ _____

Score **Initials**

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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 $3\frac{1}{3} + 2 + 1\frac{1}{5} + \frac{18}{25} + ...$ 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) $1 + 4 + 7 + 10 + 13 + ... + 28 =$ _____

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

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

(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 $-7, -1, 5, 11, ...$ 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**

The University Interscholastic League
Number Sense Test ● HS District 2 ● 2012

Final _____ _____

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STOP -- WAIT FOR SIGNAL!

(1) $123.4 + 234.1 =$ _____ **(decimal)**

(2) $2012 - 2102 =$ _____

(3) $\frac{5}{8} \times \frac{6}{7} =$ _____

(4) $136 \div 9 =$ _____ **(mixed number)**

(5) $4 - 8 \times 12 \div 16 + 20 =$ _____

(6) $19 \times 34 - 15 \times 19 =$ _____

(7) $12^3 =$ _____

(8) Which is larger $\frac{3}{16}$ or 0.185? _____

(9) $3\frac{2}{5} + \frac{7}{10} =$ _____ **(mixed number)**

***(10)** $11235 - 5321 + 532 - 53 + 5 =$ _____

(11) 16% of 189 = 48% of k. Find k. _____

(12) $17 \times \frac{17}{21} =$ _____ **(mixed number)**

(13) $4 + 8 + 12 + 16 + ... + 44 =$ _____

(14) The mean of 86, 64, 42 and 20 is _____

(15) $13 \times 245 =$ _____

(16) $2\frac{3}{4}$ yards = _____ inches

(17) 25% of \$16.96 is \$ _____

(18) $\frac{11}{16} =$ _____% (decimal)

(19) The largest prime factor of 273 is _____

***(20)** $235711 \div 642 =$ _____

(21) $12\frac{1}{4} \times 8\frac{1}{4} =$ _____ **(mixed number)**

(22) 75% of 85 is 15% of _____

(23) How many even integers are between 16 & 61? ___

(24) $3282416 \div 8 =$ _____

(25) If 8 cards cost \$14.50 then 12 cards cost \$ _____

(26) Let set S = {s,l,i,d,e} and set R = {r,u,l,e}. How many unique elements are in $R \cap S$? _____

(27) How many positive integers divide 84?_____

(28) Round $3\sqrt{5}$ to the tenths place. _____

(29) $\frac{3}{7}$ of a gallon = _____ cubic inches

***(30)** $\sqrt{10601} + \sqrt{908} =$ _____

(31) If $5 - 3x = -13$ then $7 - 2x =$ _____

(32) A bull rider rode 18.75% of the 128 bulls he got on. How many bulls did he not ride? _____

(33) $0.875 \div 14 =$ _____

(34) $7\frac{3}{5} - 5\frac{2}{3}$ = _____ (mixed number)

(35) 2.5 bushels = _____ pecks

(36) $3^4 + 6^3 - 9^2$ = _____

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

(38) If $k < 0$ and $k^2 = 169$, then k^3 = _____

(39) The first 4 digits of the decimal of $\frac{131}{990}$ is 0._____

*(40) $100 \div \frac{3}{7} \times 89 \div 0.37589$ = _____

(41) If $64^2 - 68^2 = 66k$, then k = _____

(42) The sum of the first 4 triangular numbers is _____

(43) 321×235 = _____

(44) The sum of the product of the roots taken two at a time of $3x^3 + 4x^2 - 17x - 6 = 0$ is _____

(45) $12 \times 7! - 14 \times 6!$ = _____

(46) $9^8 \div 7$ has a remainder of _____

(47) If $\frac{8x+5}{3} > 2$ then x > _____

(48) If $A > 1$ and $A^{-2} \div A^k \times A^{-4} = A^6$ then k = ___

(49) $358_9 + 235_9$ = _____ 9

*(50) $(5e)^3$ = _____

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

(52) $1 + 3 + 6 + 10 + 15 + ... + 66 + 78$ = _____

(53) If $7\log_x 2 - 3\log_x 2 = 2$ then x = _____

(54) The simplified coefficient of the x^3y term in the expansion of $(3x + 2y)^4$ is _____

(55) If $(2 + 5i)^2$ is a + bi, then a + b = _____

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

(57) $\sqrt{1^3 + 2^3 + 3^3 + 4^3 + ... + 7^3 + 8^3}$ = _____

(58) $\frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} + ... + \frac{1}{55} + \frac{1}{66}$ = _____

(59) ${}_5P_3 - {}_5C_3$ = _____

*(60) $12 \times 34 \times 56 \times 78$ = _____

(61) $A = \begin{bmatrix} 2 & -1 \\ -4 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 \\ 3 & -4 \end{bmatrix}$. $|A + B|$ = ___

(62) $(136_7) + (235_7) \div 6$ has a remainder of _____

(63) If $g(x) = 3x^2 + 2x - 1$, then $g(g(-1))$ = _____

(64) The harmonic mean of 1, 3, and 9 is _____

(65) There are 8 pens with black ink, 7 with blue, and 3 with red in a package. The odds of randomly selecting a red ink pen is _____

(66) 113×107 = _____

(67) 120 miles per hour = _____ feet per second

(68) $-10°$ Celsius = _____° Fahrenheit

(69) An equilateral based prism has a height of $2\sqrt{3}$ " and a base side length of 2". The volume of the prism is _____ cubic inches

*(70) $(1 + 5 + 9 + 13 + 17 + ... + 37 + 41)^2$ = _____

(71) $\left(\cos\left(\arcsin\left(-\frac{\sqrt{2}}{2}\right)\right)\right)^2$ = _____

(72) If $f(x) = x^3 + 5x^2 + 12x + 22$ then $f'(-2)$ = ____

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

(74) Change $\frac{15}{32}$ to a base 8 decimal. _____ 8

(75) The polar coordinates of the rectangular coordinates $(\frac{1}{2}, \frac{\sqrt{3}}{2})$ are $(r, k\pi)$. Find k where $0 < k < 2$. _____

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

(77) Find k, $1 < k < 7$, if $5k \cong 2 \pmod 3$. _____

(78) $4! \div 5! + 3! \div 4! + 1! \div 2!$ = _____

(79) Given the sequence 1,2,6,12,25,48,k,168,.. . k = ___

*(80) 3025 yards = _____ rods

University Interscholastic League - Number Sense Answer Key HS ● District 2 ● 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) 357.5

(2) — 90

(3) $\frac{15}{28}$

(4) $15\frac{1}{9}$

(5) 18

(6) 361

(7) 1,728

(8) $\frac{3}{16}$

(9) $4\frac{1}{10}$

***(10) 6,079 — 6,717**

(11) 63

(12) $13\frac{16}{21}$

(13) 264

(14) 53

(15) 3,185

(16) 99

(17) $4.24

(18) 68.75

(19) 13

***(20) 349 — 385**

(21) $101\frac{1}{16}$

(22) 425

(23) 22

(24) 410,302

(25) $21.75

(26) 2

(27) 12

(28) 6.7

(29) 99

***(30) 127 — 139**

(31) — 5

(32) 104

(33) .0625, $\frac{1}{16}$

(34) $1\frac{14}{15}$

(35) 10

(36) 216

(37) 512

(38) — 2,197

(39) 1,323

***(40) 52,485 — 58,008**

(41) — 8

(42) 20

(43) 75,435

(44) — $\frac{17}{3}$, — $5\frac{2}{3}$

(45) 50,400

(46) 4

(47) .125, $\frac{1}{8}$

(48) — 12

(49) 604

***(50) 2,386 — 2,636**

(51) 24

(52) 364

(53) 4

(54) 216

(55) — 1

(56) .25, $\frac{1}{4}$

(57) 36

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

(59) 50

***(60) 1,693,037 — 1,871,251**

(61) 0

(62) 2

(63) — 1

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

(65) .2, $\frac{1}{5}$

(66) 12,091

(67) 176

(68) 14

(69) 6

***(70) 50,693 — 56,029**

(71) .5, $\frac{1}{2}$

(72) — 4

(73) 2

(74) .36

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

(76) — 2

(77) 4

(78) .95, $\frac{19}{20}$

(79) 91

***(80) 523 — 577**

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Final _____ _____

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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 25^{th} 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 × 4! + 44 × 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) $\frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} + ... + \frac{1}{36}$ = _____

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

(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 $\frac{2}{3}$ 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**

The University Interscholastic League
Number Sense Test • HS State • 2012

Final _____ _____

Contestant's Number _____ 2nd _____ _____

1st _____ _____

Score **Initials**

Read directions carefully before beginning test

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STOP -- WAIT FOR SIGNAL!

(1) $52112 + 2012 - 521 =$ _____

(2) $\frac{3}{4} \times \frac{8}{9} =$ _____

(3) $52.1 \div 8 =$ _____ **(decimal)**

(4) $32 \times 18 + 18 \times 18 =$ _____

(5) $521 \times 11 =$ _____

(6) **Which is smaller** $\frac{9}{13}$ **or** $\frac{13}{19}$**?** _____

(7) **DXXI =** _____ **(Arabic Numeral)**

(8) $(34)^2 =$ _____

(9) $1 + 3 \times 6 - 10 \div 15 =$ _____

***(10)** $1123 + 5813 + 2134 + 5589 =$ _____

(11) **45% of 540 =** _____

(12) $\frac{2}{5} - \frac{4}{25} - \frac{6}{75} =$ _____

(13) **4.444... yards =** _____ **inches**

(14) $3 + 7 + 11 + 15 + ... + 35 =$ _____

(15) $\frac{11}{40} =$ _____**% (decimal)**

(16) $531 \times 8 - 6 =$ _____

(17) $\left(\frac{7}{9}\right)^3 =$ _____

(18) **The largest prime factor of 741 is** _____

(19) $24 \times 0.96 =$ _____ **(mixed number)**

***(20)** $5212012 \div 136 =$ _____

(21) $\frac{11}{21} - \frac{21}{43} =$ _____

(22) **If 15 links cost $3.60 then 9 links cost $** _____

(23) **0.44777... =** _____ **(proper fraction)**

(24) $246_8 =$ _____ **10**

(25) **2.375 gallons =** _____ **pints**

(26) $234 \times 532 =$ _____

(27) **Let set A = {a,c,u,t,e}, set T = {t,r,i,a,n,g,l,e}, and set S = {s,h,a,p,e}. How many unique elements are in** $(A \cap S) \cup (T \cap S)$**?** _____

(28) $3\frac{4}{5} - 6\frac{7}{8} =$ _____ **(mixed number)**

(29) **The sum of three consecutive odd integers is 369. The smallest integer is** _____

***(30)** $1\frac{1}{2} \times 3581.3 \div 21 =$ _____

(31) $\sqrt{27 \times 31 + 4} =$ _____

(32) **Truncate** $\sqrt{2} \times \sqrt{3}$ **to the tenths place.** _____

(33) $48 \div 0.1875 =$ _____

(34) If x is to 8 as 12 is to 20 then x = _____ (decimal)

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

(36) $(5)^2 - (3)^0 - (2)^{-1}$ = _____

(37) If x = 6 and y = 3 then $9x^2 - 6xy + y^2$ = _____

(38) A pitcher lost $16\frac{2}{3}\%$ of the 30 games he pitched. How many games did he win? _____

(39) The first 4 digits of the decimal of $\frac{38}{45}$ is 0. _____

*(40) $\sqrt{65748}$ = _____

(41) The slope of the line $4x - ky = 8$ is $-\frac{1}{4}$. Find k. ___

(42) If $A > 1$ and $\left(A^2 \times A^k\right)^{-1} = A^3$ then k = _____

(43) A, B, & C are the roots of $x^3 + 2x^2 - 9x - 18 = 0$. Find ABC — AB — BC — AC. _____

(44) If $33^2 - 39^2 = 3k$, then k = _____

(45) $12 \times 5! + 40 \times 4!$ = _____

(46) $43_7 + 61_7 + 25_7$ = _____ 7

(47) If a triangle has side lengths of x, 12, and 5 then the smallest integral value of x is _____

(48) Which of the following is a triangular number, 136, 148, or 152? _____

(49) $83^2 + 22^2$ = _____

*(50) $31.4 \times \pi + 27.1 \times e + 16.1 \times \Phi$ = _____

(51) ${}_7C_4 + {}_6P_3$ = _____

(52) $1 + 3 + 6 + 10 + 15 + ... + 78$ = _____

(53) The geometric series $5.333... + 4 + 3 + 2.25 + ...$ has a sum of _____

(54) How many ways can the letters in the word 'around' be arranged around a circle? _____

(55) $(235_8 \times 136_8) \div 7$ has a remainder of _____

(56) The harmonic mean of 1, 3, and 6 is _____

(57) $8^{10} \div 12$ has a remainder of _____

(58) $\frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} + ... + \frac{1}{78}$ = _____

(59) If $(3 - 4i) \div (3 + 4i) = a + bi$, then $a + b$ = _____

*(60) 321 miles per hour = _____ feet per second

(61) $\sin(240°) \times \cos(330°) - \tan(135°)$ = _____

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

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

(64) Given the sequence 0, 5, 8, 17, 24, 37, 48,..., 145, k, 197,..., find k. _____

(65) 1003×1007 = _____

(66) A golfer has 8 brown tees, 5 red tees, 9 white tees, and 2 pink tees. The probability that the golfer randomly selects a red or pink tee is _____%

(67) If $f(x) = 5x - 2$, then $f^{-1}(8)$ = _____

(68) If $\log_b(9) = 0.5$ and $\log_b(x) = 0.25$ then x = _____

(69) $(805)^2$ = _____

*(70) A pyramid has a 33 cm by 55 cm rectangular base and a height of 22 cm. The volume of the pyramid is _____ cm^3

(71) $\frac{7}{8} + \frac{7}{24} + \frac{7}{48} + \frac{7}{80} + \frac{7}{120}$ = _____

(72) Change $\frac{14}{25}$ to a base 5 decimal. _____

(73) $F(x) = (x - 3)^{-2}$ has _____ horizontal asymptotes

(74) The rectangular coordinates of the polar coordinates $(-2, -\frac{\pi}{2})$ are (x, y). $x + y$ = _____

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

(76) Find k, $0 \leq k \leq 8$, if $3! + k \cong 2 \pmod 9$. _____

(77) $F(x) = x^3 + 3x^2 + 3x + 1$. Find $f''(3)$ = _____

(78) $\lim_{x \to 1} \left(\frac{x^3 - 1}{x - 1}\right)$ = _____

(79) $1^2 - 2^2 + 3^2 - 4^2 + 5^2 - ... + 15^2$ = _____

*(80) 714.285 x 857.142 = _____

University Interscholastic League - Number Sense Answer Key HS ● State ● 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) 53,603

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

(3) 6.5125

(4) 900

(5) 5,731

(6) $\frac{13}{19}$

(7) 521

(8) 1,156

(9) $\frac{55}{3}$, $18\frac{1}{3}$

***(10) 13,927 — 15,391**

(11) 243

(12) .16, $\frac{4}{25}$

(13) 160

(14) 171

(15) 27.5

(16) 4,242

(17) $\frac{343}{729}$

(18) 19

(19) $23\frac{1}{25}$

***(20) 36,408 — 40,239**

(21) $\frac{32}{903}$

(22) $2.16

(23) $\frac{403}{900}$

(24) 166

(25) 19

(26) 124,488

(27) 2

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

(29) 121

***(30) 244 — 268**

(31) 29

(32) 2.4

(33) 256

(34) 4.8

(35) 23

(36) 23.5, $\frac{47}{2}$, $23\frac{1}{2}$

(37) 225

(38) 25

(39) 8444

***(40) 244 — 269**

(41) — 16

(42) — 5

(43) 27

(44) — 144

(45) 2,400

(46) 162

(47) 8

(48) 136

(49) 7,373

***(50) 189 — 208**

(51) 155

(52) 364

(53) $\frac{64}{3}$, $21\frac{1}{3}$

(54) 120

(55) 2

(56) 2

(57) 4

(58) $\frac{11}{13}$

(59) — 1.24, $-\frac{31}{25}$, $-1\frac{6}{25}$

***(60) 448 — 494**

(61) .25, $\frac{1}{4}$

(62) 1

(63) 625

(64) 168

(65) 1,010,021

(66) $\frac{175}{6}$, $29\frac{1}{6}$

(67) 2

(68) 3

(69) 648,025

***(70) 12,645 — 13,975**

(71) $\frac{35}{24}$, $1\frac{11}{24}$

(72) .24

(73) 1

(74) 2

(75) 4

(76) 5

(77) 24

(78) 3

(79) 120

***(80) 581,632 — 642,855**

The University Interscholastic League
Number Sense Test • HS SAC • 2012

Final _____ _____

Contestant's Number _____ 2nd _____ _____

1st _____ _____

Score **Initials**

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STOP -- WAIT FOR SIGNAL!

(1) $2012 + 2013 =$ _____

(2) $2012 \times 6 =$ _____

(3) $2102 - 2012 =$ _____

(4) $2012 \div 5 =$ _____ **(decimal)**

(5) $3\frac{4}{5} =$ _____ **%**

(6) $16^2 =$ _____

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

(8) $20 \times 12 + 20 \times 13 =$ _____

(9) $5.6 \div (-1.25) =$ _____ **(decimal)**

***(10)** $136 - 1015 + 2128 =$ _____

(11) 48 is 16 % of _____

(12) $42 \times 48 =$ _____

(13) The GCD of 51 and 85 is _____

(14) $35 + 30 \times 25 \div 15 - 10 =$ _____

(15) MCII = _____ **(Arabic Number)**

(16) 20 pounds 12 ounces = _____ **ounces**

(17) Which is larger, $\frac{11}{15}$ or $\frac{9}{13}$? _____

(18) The sum of the prime divisors of 110 is _____

(19) The mean of 1, 3, 6, 10, and 15 is _____

***(20)** $2012 + 201 \times 210 =$ _____

(21) 0.656565... = _____ **(proper fraction)**

(22) $|2 - 1| + |3 - 4| + |7 - 8| =$ _____

(23) Truncate $\sqrt{2}$ to the $\frac{1}{1000}$ place. _____ **(decimal)**

(24) If 12 WEEs cost $9.60 then 8 WEEs cost $_____

(25) If $f(x) = x^2 - 10x + 25$ then f(35) is _____

(26) The seven digit number 112358k is divisible by 8. Find k. _____

(27) How many prime numbers, P, exist such that $40 < P < 50$? _____

(28) $5! + 4! =$ _____

(29) 112 base 3 equals _____ base 10

***(30)** $1369 \times 248 =$ _____

(31) The perimeter of a square is 10 inches. The area of this square is _____square inches

(32) Find k if $29^2 - 23^2 = 12k$. k = _____

(33) $0.111... + 0.222... + 0.333... =$ _____

(34) $(9 + 18 \times 27) \div 4$ has a remainder of _____

(35) Set A has 3 elements, B has 4 elements, and $A \cup B$ has 5 elements. $A \cap B$ has _____ elements

(36) The sum of the roots of $3x^2 + 8x - 3 = 0$ is _____

(37) $17^2 + 51^2$ = _____

(38) $\sqrt{48} - \sqrt{12} = \sqrt{x}$. Find x. _____

(39) $8\frac{3}{5} \times 8\frac{2}{5}$ = _____ (mixed number)

*(40) $\sqrt{15100}$ = _____

(41) Let $A^7 \div A^5 \times A^3 = A^k$. If $A > 1$, then k = _____

(42) The slope of a line perpendicular to the line $y = 3x - 4$ is _____

(43) $123_6 + 45_6$ = _____ 6

(44) 123×231 = _____

(45) A triangle has sides of 5, 7, and x. What is the least integral value of x? _____

(46) If $\frac{x-2}{x+3} + \frac{x+3}{x-2}$ is written as the mixed number $A\frac{B}{C}$ then B = _____

(47) If $3x - 5 > 8$ then $x >$ _____

(48) $\frac{1}{4}(35^2 - 5^2)$ = _____

(49) If $4^{(5)} = 2^{(3x)}$ then x = _____

*(50) $(\pi + e)^4$ = _____

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

(52) $10^2 - 9^2 + 8^2 - 7^2 + \ldots + 2^2 - 1^2$ = _____

(53) If $66^2 + 54^2$ = _____

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

(55) 60 miles per hour = _____ feet per second

(56) The number of positive integral divisors of $4 \times 5 \times 9$ is _____

(57) If $\log_8(4x) = 2$ then x = _____

(58) $(1 - 2i)(2 - i) = a + bi$. Find a. _____

(59) ${}_5C_3$ = _____

*(60) 57 radians = _____ degrees

(61) Given the sequence 8, 11, 16, 19, 24, 27, k, 35,..., find k. _____

(62) A box contains 12 red chips, 5 white chips, and 8 blue chips. The probability of randomly selecting a blue chip is _____%

(63) $(603)^2$ = _____

(64) $\sin(45°) \times \cos(45°) \times \tan(45°)$ = _____

(65) If $f(x) = x^3 + 3x^2 + 3x + 1$, then f(3) = _____

(66) $4! \div 6!$ = _____

(67) If $f(x) = \frac{x-2}{3}$, then $f^{-1}(4)$ = _____

(68) 992×996 = _____

(69) If $A = \begin{bmatrix} 1 & 3 \\ 6 & 10 \end{bmatrix}$, then $|A|$ = _____

*(70) The perimeter of $16x^2 + 9y^2 = 144$ is P. P^2 = ____

(71) Find k, $2 \leq k \leq 6$, if $6k \cong 2 \pmod 8$. _____

(72) $F(x) = x^3 + 3x^2 + 3x + 1$. Find $f'(-1)$ = _____

(73) The horizontal asymptote of $f(x) = \frac{x}{1-2x}$ is _____

(74) Change 0.56 to a base 5 decimal. _____

(75) $\lim_{x \to \infty} \left(\frac{3x-2}{x}\right)$ = _____

(76) The radius of the circumscribed circle around a 6,8,10-right triangle is _____

(77) $\frac{4}{7} + \frac{7}{4} - 2$ = _____

(78) $\int_1^2 (2x)\ dx$ = _____

(79) $\frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30} + \frac{1}{42}$ = _____

*(80) $13^{(4)}$ = _____

University Interscholastic League - Number Sense Answer Key HS ● SAC ● Fall 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) 4,025

(2) 12,072

(3) 90

(4) 402.4

(5) 380

(6) 256

(7) $4\frac{7}{20}$

(8) 500

(9) — 4.48

***(10) 1,187 — 1,311**

(11) 300

(12) 2,016

(13) 17

(14) 75

(15) 1,102

(16) 332

(17) $\frac{11}{15}$

(18) 18

(19) 7

***(20) 42,011 — 46,433**

(21) $\frac{65}{99}$

(22) 3

(23) 1.414

(24) $6.40

(25) 900

(26) 4

(27) 3

(28) 144

(29) 14

***(30) 322,537 — 356,487**

(31) 6.25, $\frac{25}{4}$, $6\frac{1}{4}$

(32) 26

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

(34) 3

(35) 2

(36) $-\frac{8}{3}, -2\frac{2}{3}$

(37) 2,890

(38) 12

(39) $72\frac{6}{25}$

***(40) 117 — 129**

(41) 5

(42) $-\frac{1}{3}$

(43) 212

(44) 28,413

(45) 3

(46) 25

(47) $\frac{13}{3}$, $4\frac{1}{3}$

(48) 300

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

***(50) 1,121 — 1,238**

(51) 1,260

(52) 55

(53) 7,272

(54) — 6

(55) 88

(56) 18

(57) 16

(58) 0

(59) 10

***(60) 3,103 — 3,429**

(61) 32

(62) 32

(63) 363,609

(64) .5, $\frac{1}{2}$

(65) 64

(66) $\frac{1}{30}$

(67) 14

(68) 988,032

(69) — 8

***(70) 460 — 507**

(71) 3

(72) 0

(73) — .5, $-\frac{1}{2}$

(74) .24

(75) 3

(76) 5

(77) $\frac{9}{28}$

(78) 3

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

***(80) 27,133 — 29,989**

The University Interscholastic League
Number Sense Test • HS A • 2013

Final _____ _____

Contestant's Number _____ 2nd _____ _____

1st _____ _____

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STOP -- WAIT FOR SIGNAL!

(1) $511 - 115 =$ _____

(2) $88 \times 25 =$ _____

(3) $2013 \div 9 =$ _____ **(mixed number)**

(4) $115 + 2013 =$ _____

(5) $\frac{3}{5} =$ _____**%** **(decimal)**

(6) $2.4 \div 1.5 =$ _____

(7) $14^2 =$ _____

(8) $5\frac{3}{4} - 4\frac{2}{3} =$ _____ **(mixed number)**

(9) **11% of $12.00 is $** _____

***(10)** $115 + 2013 - 511 + 3102 =$ _____

(11) **Which is larger** $\frac{7}{9}$ **or 0.8?** _____

(12) $40 \times 23 - 17 \times 23 =$ _____

(13) **2 bushels =** _____ **pecks**

(14) $19 \times \frac{19}{23} =$ _____ **(mixed number)**

(15) $115 \div 25 =$ _____

(16) **The mean of 1, 5, 12, 22, and 35 is** _____

(17) $115 \times 13 =$ _____

(18) $2 + 4 + 6 + 8 + ... + 22 + 24 =$ _____

(19) $32 - 16 \div 8 + 4 \times 2 =$ _____

***(20)** $(115 + 2013) \times 511 =$ _____

(21) **A 6-element set has** _____ **subsets**

(22) $\left| 2 - 3 - 4\left|5 - 6\right| + 7\right| =$ _____

(23) **123 base 6 is equivalent to** _____ **base 10**

(24) **The multiplicative inverse of** $-1.111...$ **is** _____

(25) **If** $\frac{1}{x} - \frac{4}{5} = \frac{9}{10}$ **, then x =** _____

(26) **If 6 Qtees cost $1.50 then 21 Qtees cost $** _____

(27) $0.41666... - 0.08333... =$ _____

(28) $66^2 + 54^2 =$ _____

(29) **The length of a diagonal of a square is** $3\sqrt{5}$ **cm. The area of the square is** _____ **sq. cm.**

***(30)** $141 \times 72 + 67 \times 138 =$ _____

(31) $36_7 + 25_7 + 14_7 =$ _____ $_7$

(32) $3 + 7 + 11 + 15 + 19 + ... + 43 + 47 =$ _____

(33) $24^2 + 72^2 =$ _____

(34) **The product of the roots of** $5x^2 + 4x - 3 = 0$ **is** _____

(35) $13 \times 13 \times 13 =$ _____

(36) Let P = {t,h,e}, Q = {n,e,x,t}, and R = {t,e,r,m}. The number of distinct elements in $P \cup Q \cup R$ is _____

(37) If $\sqrt{44} + \sqrt{99} = \sqrt{x}$, then x = _____

(38) The next term of the geometric sequence, ... $\frac{1}{3}$, $\frac{1}{4}$, $\frac{3}{16}$, ... is _____

(39) If a = 5 and b = 3 then $(a + b)(a^2 - ab + b^2)$ = ___

*(40) $\sqrt{887766}$ = _____

(41) $\frac{(1+4+9+16+25)}{(1+3+6+10+15)}$ = _____

(42) If $\frac{x-5}{x+4} + \frac{x+4}{x-5}$ is written as the mixed number $A\frac{B}{C}$ then B = _____

(43) $\frac{4}{11} - \frac{19}{56}$ = _____

(44) If P is $\frac{2}{3}$ of Q and Q is $33\frac{1}{3}\%$ of R, then P is what percent of R? _____%

(45) An exterior angle of a regular hexagon has a measure of _____ degrees

(46) $\frac{1}{4}(30^2 - 8^2)$ = _____

(47) If $x + y = -3$ and $xy = -4$ then $x^3 + y^3$ = _____

(48) 12% of $466\frac{2}{3}$ = _____

(49) The absolute value difference between the sum of the roots and the product of the roots of $x^3 + x^2 - 5x + 3 = 0$ is _____

*(50) 654 log 987 = _____

(51) 44 feet per second = _____ miles per hour

(52) Given the sequence 3, 8, 11, 19, ..., 79, k, 207. Find k. _____

(53) $\frac{7\pi}{4}$ radians = _____ degrees

(54) $\log_5 \sqrt{125}$ = _____

(55) A convex hexagon has _____ distinct diagonals.

(56) The legs of a right triangle are 3 and 4. The length of the altitude to the hypotenuse is _____

(57) $(35_9 + 48_9) \div 8$ has a remainder of _____

(58) $(4 + i)^2 = a + bi$. Find a. _____

(59) 243 × 151 = _____

*(60) $3.14e \times 2.72\pi \div \frac{\sqrt{5}-1}{2}$ = _____

(61) A golf store has white balls, yellow balls, pink balls, and orange balls. How many different packs of 3 balls can the store package? _____

(62) $\frac{7}{11} + \frac{11}{7} - 2$ = _____

(63) $[2\sin(\frac{\pi}{6})\cos(\frac{\pi}{6})] \times [\tan(\frac{\pi}{6})]$ = _____

(64) The $\det\left(\begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix} \times \begin{bmatrix} 4 & 3 \\ 1 & 2 \end{bmatrix}\right)$ is _____

(65) 1111 × 52 = _____

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

(67) The first 4 digits of the decimal of $\frac{17}{90}$ is 0. _____

(68) $f(x) = x^2 + 2x + 1$ and $g(x) = x^3$. f(g(−2)) = _____

(69) The odds of winning a medal is $\frac{3}{16}$. The probability of not winning a medal is _____

*(70) 48 miles per hour = _____ feet per minute

(71) The volume of a sphere with a radius of 3 inches is $k\pi$ cubic inches. Find k _____

(72) Find k, $0 < k < 5$, if $4k - 1 \cong 1 \pmod 6$. _____

(73) If $\log_b 3 = .6$ and $\log_b x = 1.8$ then x = _____

(74) Given 2, 6, 12, 20, 30, ..., 90, k, 132, ... Find k ____

(75) The slope of the line tangent to $f(x) = x^2 - 5x + 4$ at (−1, 10) is _____

(76) The polar coordinates of the rectangular coordinates $(1, \sqrt{3})$ are $(r, k\pi)$. r = _____

(77) $\int_0^1 (2 - 3x)\,dx$ = _____

(78) The function $\frac{2x^2+5x+11}{x+1}$ has _____ asymptotes

(79) The fifth pentagonal number is _____

*(80) 28.5714 x 4285.71 = _____

University Interscholastic League - Number Sense Answer Key HS ● Invitation A ● 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) 396

(2) 2,200

(3) $223\frac{2}{3}$

(4) 2,128

(5) 60

(6) 1.6, $\frac{8}{5}$, $1\frac{3}{5}$

(7) 196

(8) $1\frac{1}{12}$

(9) $1.32

***(10) 4,484 — 4,954**

(11) .8, $\frac{4}{5}$

(12) 529

(13) 8

(14) $15\frac{16}{23}$

(15) 4.6, $\frac{23}{5}$, $4\frac{3}{5}$

(16) 15

(17) 1,495

(18) 156

(19) 38

***(20) 1,033,038 — 1,141,778**

(21) 64

(22) 2

(23) 51

(24) — .9, — $\frac{9}{10}$

(25) $\frac{10}{17}$

(26) $5.25

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

(28) 7,272

(29) 22.5, $\frac{45}{2}$, $22\frac{1}{2}$

***(30) 18,429 — 20,367**

(31) 111

(32) 300

(33) 5,760

(34) — .6, — $\frac{3}{5}$

(35) 2,197

(36) 7

(37) 275

(38) .140625, $\frac{9}{64}$

(39) 152

***(40) 896 — 989**

(41) $\frac{11}{7}$, $1\frac{4}{7}$

(42) 81

(43) $\frac{15}{616}$

(44) $\frac{200}{9}$, $22\frac{2}{9}$

(45) 60

(46) 209

(47) — 63

(48) 56

(49) 2

***(50) 1,861 — 2,056**

(51) 30

(52) 128

(53) 315

(54) 1.5, $\frac{3}{2}$, $1\frac{1}{2}$

(55) 9

(56) 2.4, $\frac{12}{5}$, $2\frac{2}{5}$

(57) 4

(58) 15

(59) 36,693

***(60) 113 — 123**

(61) 20

(62) $\frac{16}{77}$

(63) .5, $\frac{1}{2}$

(64) 25

(65) 57,772

(66) 27

(67) 1888

(68) 49

(69) $\frac{16}{19}$

***(70) 4,013 — 4,435**

(71) 36

(72) 2

(73) 27

(74) 110

(75) — 7

(76) 2

(77) .5, $\frac{1}{2}$

(78) 2

(79) 35

***(80) 116,327 — 128,571**

The University Interscholastic League
Number Sense Test • HS B • 2013

Final _____ _____

Contestant's Number _____ 2nd _____ _____

1st _____ _____

Score **Initials**

Read directions carefully before beginning test

DO NOT UNFOLD THIS SHEET UNTIL TOLD TO BEGIN

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STOP -- WAIT FOR SIGNAL!

(1) $2013 - 3102 =$ _____

(2) $28 \times 15 =$ _____

(3) $310.2 + 20.13 =$ _____ **(decimal)**

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

(5) $0.875 =$ _____ **(proper fraction)**

(6) $544536 \div 9 =$ _____

(7) $6543 \times 9 - 2 =$ _____

(8) $25 \times 20 - 15 + 10 \div 5 =$ _____

(9) **2.5 gallons =** _____ **quarts**

***(10)** $21347 + 1118 + 2947 + 76 =$ _____

(11) **The GCD of 54, 48, and 32 is** _____

(12) **2013 ÷ 11 has a remainder of** _____

(13) **CMLXIV =** _____ **(Arabic Numeral)**

(14) $32 \times 17 + 15 \times 32 =$ _____

(15) $3 + 7 + 11 + 15 + ... + 31 =$ _____

(16) $\frac{15}{19} \times 15 =$ _____ **(mixed number)**

(17) **The largest prime factor of 285 is** _____

(18) $\frac{7}{12} - \frac{7}{24} - \frac{7}{36} =$ _____

(19) **Which is smaller,** -0.45 **or** $-\frac{4}{9}$**?** _____

***(20)** $8 \times 15 \times 1947 =$ _____

(21) **If 9 ★s cost $6.30 then a dozen ★s cost $** _____

(22) $37^2 + 67^2 =$ _____

(23) $\left|-9 + \left|-6 + 3\right| + 1\right| =$ _____

(24) $(21 + 34 \times 7) \div 11$ **has a remainder of** _____

(25) $9.111... - 3.333... =$ _____

(26) $253 \times 14 =$ _____

(27) $(8)^{-1} \div (4)^{-2} \times (2)^{-3} =$ _____

(28) **The sum of x and 5 gives the same result as the product of x and 5. Find x.** _____

(29) $3 + 7 + 10 + 17 + ... + 71 + 115 =$ _____

***(30)** $88 \times 42 - 64 \times 42 =$ _____

(31) $15 \times 15 \times 15 =$ _____

(32) $15^2 + 45^2 =$ _____

(33) **If** $x - y = -5$ **and** $x + y = -3$ **then** $x^2 - y^2 =$ __

(34) $f(x) = 9x^2 + 6x + 1$. $f(7) =$ _____

(35) **If** $2x^3 + 3x^2 - 11x - 6 = 0$ **and P, Q, and R are the real roots, then** $PQ + QR + PR$ **is** _____

(36) 134 base 7 is equivalent to _____ base 10

(37) $5 \times 4! - 4 \times 3! - 3 \times 2!$ = _____

(38) The next term of the arithmetic sequence, ... $\frac{2}{3}$, $\frac{7}{6}$, $\frac{5}{3}$, ... is _____

(39) If $\sqrt{150} - \sqrt{54} = \sqrt{x}$, then x = _____

*(40) 201213 ÷ 748 = _____

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

(42) $101_2 + 102_3 + 103_4$ = _____ 10

(43) $\frac{5}{8} - \frac{31}{47}$ = _____

(44) 18% of $466\frac{2}{3}$ = _____

(45) An interior angle of a regular decagon has a measure of _____ degrees

(46) The sum of the product of the roots taken two at a time of $2x^3 - 3x^2 - 4x + 5 = 0$ is _____

(47) $\frac{1}{4}(28^2 - 4^2)$ = _____

(48) The y-intercept of the line going through (2, 3) and (5, 9) is (x, y). y = _____

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

*(50) 44^2 = _____

(51) $\sqrt{17424}$ = _____

(52) If two dice are rolled, the probability that the sum of the faces is greater than 10 is _____

(53) $87^2 + 62^2$ = _____

(54) ${}_5C_3 + {}_4C_2$ = _____

(55) $(6 - 5i)(5 - 6i) = (a + bi)$. Find $a + b$. _____

(56) $\sin(\frac{5\pi}{3}) \times \sin(\frac{5\pi}{3})$ = _____

(57) Let $\log_9(x^3) = \frac{3}{2}$, where $x > 0$. Find x. _____

(58) 90 miles per hour = _____ feet per second

(59) 215×152 = _____

*(60) $10e \times 10\pi \times 10\phi$ = _____

(61) $6 + 12 + 18 + 24 + ... + 48$ = _____

(62) $(333_5) + (222_5) \div 4$ has a remainder of _____

(63) A box contains black pens, red pens, blue pens, and green pens. How many different sets of 3 pens can be packaged? _____

(64) The diameter of the circumscribed circle around a 7,24,25-right triangle is _____

(65) The $\det\left(\begin{bmatrix} 1 & -2 \\ 3 & -4 \end{bmatrix} + \begin{bmatrix} 1 & 2 \\ -3 & -4 \end{bmatrix}\right)$ is = _____

(66) $18 \times \frac{19}{20}$ = _____ mixed number

(67) $\sin(\arctan(\frac{7}{24}))$ = _____

(68) $\frac{3}{8} + \frac{8}{3} - 2$ = _____

(69) If $f(x) = x^5 + 5x^4 + 10x^3 + 10x^2 + 5x + 1$, then $f(-2)$ = _____

*(70) $94 \times 96 \times 102 \times 104$ = _____

(71) 101×808 = _____

(72) $6! \div 4! + 5! \div 3! - 2! \div 1!$ = _____

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

(74) The slope of the line tangent to $f(x) = 2x^2 - x - 1$ at the point (— 1, 2) is _____

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

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

(77) $\frac{1}{30} + \frac{1}{42} + \frac{1}{56} + \frac{1}{72}$ = _____

(78) Change .111, base 2, to a base 10 fraction. _____

(79) The next term of 5, 6, 7, 9, 12, 17, ... is _____

*(80) 47.2 miles = _____ feet

University Interscholastic League - Number Sense Answer Key HS ● Invitation B ● 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) — 1,089

(2) 420

(3) 330.33

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

(5) $\frac{7}{8}$

(6) 60,504

(7) 58,885

(8) 487

(9) 10

***(10) 24,214 — 26,762**

(11) 2

(12) 0

(13) 964

(14) 1,024

(15) 136

(16) $11\frac{16}{19}$

(17) 19

(18) $\frac{7}{72}$

(19) — .45, — $\frac{9}{20}$

***(20) 221,958 — 245,322**

(21) $8.40

(22) 5,858

(23) 5

(24) 6

(25) $\frac{52}{9}$, $5\frac{7}{9}$

(26) 3,542

(27) .25, $\frac{1}{4}$

(28) 1.25, $\frac{5}{4}$, $1\frac{1}{4}$

(29) 294

***(30) 958 — 1,058**

(31) 3,375

(32) 2,250

(33) 15

(34) 484

(35) — 5.5, — $\frac{11}{2}$, — $5\frac{1}{2}$

(36) 74

(37) 90

(38) $\frac{13}{6}$, $2\frac{1}{6}$

(39) 24

***(40) 256 — 282**

(41) 95

(42) 35

(43) — $\frac{13}{376}$

(44) 84

(45) 144

(46) — 2

(47) 192

(48) — 1

(49) 121

***(50) 1,840 — 2,032**

(51) 132

(52) $\frac{1}{12}$

(53) 11,413

(54) 16

(55) — 61

(56) .75, $\frac{3}{4}$

(57) 3

(58) 132

(59) 32,680

***(60) 13,127 — 14,508**

(61) 216

(62) 3

(63) 20

(64) 25

(65) — 16

(66) $17\frac{1}{10}$

(67) .28, $\frac{7}{25}$

(68) $\frac{25}{24}$, $1\frac{1}{24}$

(69) — 1

***(70) 90,940,263 — 100,512,921**

(71) 81,608

(72) 48

(73) — 17

(74) — 5

(75) — 6

(76) 2

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

(78) $\frac{7}{8}$

(79) 25

***(80) 236,756 — 261,676**

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

Final _____ _____

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1st _____ _____

Score **Initials**

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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**

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Number Sense Test • HS District 2 • 2013

Final _____ _____

Contestant's Number _____ 2nd _____ _____

1st _____ _____

Score **Initials**

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STOP -- WAIT FOR SIGNAL!

(1) $2013 - 330 =$ _____

(2) $2013 + 330 =$ _____

(3) $325 \div 9 =$ _____ **(mixed number)**

(4) $2013 \times 4 =$ _____

(5) $5\frac{3}{5} =$ _____%

(6) $6\frac{2}{7} - 3\frac{1}{8} =$ _____ **(mixed number)**

(7) $3 - 10 \times 2 + 5 \div (2 + 3) =$ _____

(8) $12^3 =$ _____

(9) $13610 \div 6$ has a remainder of _____

***(10)** $34711 - 1829 + 4776 =$ _____

(11) $331 \times 13 =$ _____

(12) $5\frac{4}{5} + 3\frac{3}{4} =$ _____ **(mixed number)**

(13) $54 + 45 + 36 + 50 + 41 + 32 =$ _____

(14) The largest prime factor of 399 is _____

(15) 5 yards + 5 feet + 5 inches = _____ inches

(16) MCDLXIV = _____ **(Arabic Number)**

(17) $2013 \div 5 =$ _____ **(decimal)**

(18) The arithmetic mean of 3, 30, 20, and 13 is _____

(19) The LCM of 105 and 180 is _____

***(20)** $33120 \div 13 =$ _____

(21) $2\frac{7}{10} \div \frac{12}{25} =$ _____ **(mixed number)**

(22) $|1 + 2| - |3 - 4| + |7 - 11| =$ _____

(23) 175 base 10 is equivalent to _____ base 8

(24) $27 \times \frac{27}{31} =$ _____ **(mixed number)**

(25) A nonagon has _____ distinct diagonals

(26) The next term of the arithmetic sequence, ... $2\frac{1}{4}, \frac{3}{4}, -\frac{3}{4}, -2\frac{1}{4}$, ... is _____

(27) If 4.5 DECIS cost $15.90 then 6 DECIS cost $ ____

(28) Five less than a number has the same value as the number divided by 3. What is the number? _____

(29) $(85 \times 32 - 11) \div 7$ has a remainder of _____

***(30)** $1000\sqrt{5} + 100\sqrt{3} =$ _____

(31) $21^2 + 63^2 =$ _____

(32) $213_9 - 47_9 - 11_9 =$ _____ 9

(33) 0.1666... + 0.666... + 1.666... = _____

(34) R_1 and R_2 are the roots of $3x^2 - 2x - 21 = 0$. Find $(R_1 + R_2)(R_1 \times R_2)$. _____

(35) If $x = 12$ and $y = -10$ then $x^2 - 2xy + y^2 =$ _____

(36) How many distinct elements are in $(\{t,e,x,a,s\} \cup \{u,n,i,v\}) \cap \{a,u,s,t,i,n\}$? _____

(37) 75 miles per hour = _____ feet per second

(38) $2 + 7 + 9 + 16 + 25 + \ldots + 107 + 173 =$ _____

(39) $5\frac{1}{4} \times 3\frac{5}{7} =$ _____ (mixed number)

***(40)** $678 \times 54 + 46 \times 786 =$ _____

(41) If $8^{(4)} = 4^{(2x)}$ then x = _____

(42) An interior angle of a regular hexagon has a measure of $k\pi$ radians. Find k. _____

(43) $\frac{29}{43} - \frac{7}{11} =$ _____

(44) $\frac{1}{4}(45^2 - 15^2) =$ _____

(45) A triangle has sides of 11, 14, and x. What is the greatest integral value of x? _____

(46) $67^2 + 64^2 =$ _____

(47) The slope of the line going through the points (2, 3) and (5, 9) is _____

(48) If $\frac{x+9}{x-8} + \frac{x-8}{x+9}$ is written as the mixed number $A\frac{B}{C}$ then B = _____

(49) $\sqrt{6889} =$ _____

***(50)** 345 log 9876 = _____

(51) The product of the simplified coefficients of the x^3y and xy^3 terms in the expansion of $(x + y)^4$ is _____

(52) 21% of $666\frac{2}{3} =$ _____

(53) ${}_6C_4 \div {}_6C_2 =$ _____

(54) $(123_8 + 456_8) \div 7$ has a remainder of _____

(55) $(3 - 2i)(2 + 3i) = a + bi$. Find $a + b$. _____

(56) The 8th triangular number is _____

(57) $15^6 \div 12$ has a remainder of _____

(58) If P varies directly with Q and P = 18 when Q = 4, find P when Q = 3. _____

(59) $245 \times 331 =$ _____

***(60)** $23^2 \times 32^2 =$ _____

(61) If $\frac{2x}{5}$ has a remainder of 4 and $\frac{2y}{5}$ has a remainder of 1 then $\frac{xy}{5}$ has a remainder of _____

(62) $21 \times \frac{22}{23} =$ _____ mixed number

(63) $g(x) = (x! - 3)$ and $h(x) = x \div 7$. $h(g(4)) =$ _____

(64) The odds of losing the game is $\frac{5}{8}$. The probability of winning a the game is _____

(65) If A is 75% of B and B is $66\frac{2}{3}$% of C, then C is what percent of A? _____%

(66) The first 4 digits of the decimal of $\frac{39}{90}$ is 0. _____

(67) $(802)^2 =$ _____

(68) The diameter of the circumscribed circle around a right triangle with legs of 11" and 60" is _____"

(69) Given the sequence 1, 3, 7, 13, 21, ... 57, k, 91,..., find k. _____

***(70)** 24 days + 60 hrs + 60 min = _____ seconds

(71) A teacher has blue pens, black pencils, red markers, and white chalk. How many different sets of 4 of these items can the teacher pass out? _____

(72) $F(x) = (x + 1)^5$. Find $f'(-2) =$ _____

(73) $F(x) = x + \frac{2}{(x+3)}$ has how many asymptotes? ____

(74) $53 \times 1111 =$ _____

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

(76) Change $\frac{15}{16}$ to a base 4 decimal. _____ 4

(77) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\sqrt{6} + \sqrt{3}\right]$. _____

(78) $\int_{\pi}^{2\pi} \sin(3x)\,dx =$ _____

(79) $\sqrt{24025} =$ _____

***(80)** 14,320 degrees = _____ radians

University Interscholastic League - Number Sense Answer Key HS ● District 2 ● 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) 1,683

(2) 2,343

(3) $36\frac{1}{9}$

(4) 8,052

(5) 560

(6) $3\frac{9}{56}$

(7) — 16

(8) 1,728

(9) 2

***(10) 35,776 — 39,540**

(11) 4,303

(12) $9\frac{11}{20}$

(13) 258

(14) 19

(15) 245

(16) 1,464

(17) 402.6

(18) 16.5, $\frac{33}{2}$, $16\frac{1}{2}$

(19) 1,260

***(20) 2,421 — 2,675**

(21) $5\frac{5}{8}$

(22) 6

(23) 257

(24) $23\frac{16}{31}$

(25) 27

(26) $-3.75, -\frac{15}{4}, -3\frac{3}{4}$

(27) $21.20

(28) 7.5, $\frac{15}{2}$, $7\frac{1}{2}$

(29) 0

***(30) 2,289 — 2,529**

(31) 4,410

(32) 144

(33) 2.5, $\frac{5}{2}$, $2\frac{1}{2}$

(34) $-\frac{14}{3}, -4\frac{2}{3}$

(35) 484

(36) 6

(37) 110

(38) 446

(39) $19\frac{1}{2}$

***(40) 69,130 — 76,406**

(41) 3

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

(43) $\frac{18}{473}$

(44) 450

(45) 24

(46) 8,585

(47) 2

(48) 289

(49) 83

***(50) 1,310 — 1,447**

(51) 16

(52) 140

(53) 1

(54) 0

(55) 17

(56) 36

(57) 9

(58) 13.5, $\frac{27}{2}$, $13\frac{1}{2}$

(59) 81,095

***(60) 514,612 — 568,780**

(61) 1

(62) $20\frac{2}{23}$

(63) 3

(64) $\frac{8}{13}$

(65) 200

(66) 4333

(67) 643,204

(68) 61

(69) 73

***(70) 2,178,540 — 2,407,860**

(71) 35

(72) 5

(73) 2

(74) 58,883

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

(76) .33

(77) 4

(78) $-\frac{2}{3}$

(79) 155

***(80) 238 — 262**

The University Interscholastic League
Number Sense Test • HS Regional • 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.

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STOP -- WAIT FOR SIGNAL!

(1) $41813 + 31914 =$ _____

(2) $25 \times 64 =$ _____

(3) $3181 - 1913 =$ _____

(4) $1819 \div 4 =$ _____ (decimal)

(5) $4192013 \div 9$ has a remainder of _____

(6) $25^2 =$ _____

(7) $7\frac{5}{6} - 5\frac{3}{4} =$ _____ (mixed number)

(8) $4 \times (8 - 12) \div 16 + 20 =$ _____

(9) $8\frac{3}{8}\% =$ _____(proper fraction)

***(10)** $41718 - 1920 + 13 =$ _____

(11) $313 \times 13 =$ _____

(12) $\frac{14}{17} \times 14 =$ _____ (mixed number)

(13) The LCM of 48 and 84 is _____

(14) $6\frac{7}{8} + 4\frac{5}{6} =$ _____ (mixed number)

(15) How many positive integers divide 108? _____

(16) MMCDLXXVII = _____ (Arabic Number)

(17) Three-eighths of a gallon is _____ fluid ounces

(18) 44 is what % 80? _____%

(19) The average of 45, 87 and 61 is _____

***(20)** $1942013 \div 123 =$ _____

(21) The multiplicative inverse of $-2\frac{3}{4}$ is _____

(22) $(11 + 23 \times 5) \div 8$ has a remainder of _____

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

(24) $75^2 + 25^2 =$ _____

(25) 60% of 70 minus 80 is _____

(26) $0.434343... - 0.101010... =$ _____

(27) 147 base 10 is equivalent to _____ base 9

(28) $1\frac{3}{5} \div 1\frac{1}{15} =$ _____ (mixed number)

(29) If 4 ♦s cost \$16.20 then 10 ♦s cost \$ _____

***(30)** $\sqrt{4490} \times 63 =$ _____

(31) If $a = 7$ and $b = 6$ then $(a + b)(a^2 + 2ab + b^2) =$ _____

(32) $123_4 \div 3_4 =$ _____ 4

(33) $2\frac{1}{3} \times 3\frac{1}{2} =$ _____ (mixed number)

(34) $(5! + 3! + 1!) - (4! + 2! + 0!) =$ _____

(35) Find k if $89^2 - 83^2 = 3k$. $k =$ _____

(36) The area of a square is 10.24 cm^2. The perimeter of this square is _____ cm

(37) $1 + 5 + 6 + 11 + 17 + ... + 118 + 191 =$ _____

(38) Let R = {r,i,g,h,t}, S = {s,q,u,a,r,e}, and T = {t,r,i,a,n,g,l,e}. The number of distinct elements in $(R \cap T) \cup S$ is _____

(39) The next term of the arithmetic sequence, ... $2\frac{1}{4}, \frac{3}{4}, -\frac{3}{4}, -2\frac{1}{4}$ ... is _____

***(40)** $\sqrt{918273} =$ _____

(41) $\frac{1}{4}(17^2 - 43^2) =$ _____

(42) $\frac{4}{7} - \frac{21}{34} =$ _____

(43) If $\frac{x-12}{x+15} + \frac{x+15}{x-12}$ is written as the mixed number $A\frac{B}{C}$ then B = _____

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

(45) The number of sides of a regular polygon with an interior angle measure of 144° is _____

(46) Point P(— 1, k) lies on the line going through (2, 3) and (5, 9). k = _____

(47) 18% of $466\frac{2}{3} =$ _____

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

(49) 105 miles per hour = _____ feet per second

***(50)** $\frac{1+\sqrt{5}}{2} \times \pi \times 10^4 =$ _____

(51) $\left(\frac{7}{11} + \frac{11}{7}\right) \div 2 =$ _____

(52) If $\log_9(x) = 1.5$ then x = _____

(53) $75^2 + 43^2 =$ _____

(54) ${}_8C_4 =$ _____

(55) The number of positive integral divisors of $32 \times 81 \times 64$ is _____

(56) $14^6 \div 8$ has a remainder of _____

(57) If A is 40 more than B and C is 60 less than A, then C is how much less than B? _____

(58) A box of colored pencils contains 6 red, 9 black, and 3 green. The probability of randomly selecting a red or a green pencil is _____%

(59) $(4 - 5i)(3 + 2i) = a + bi$. Find $a + b$. _____

***(60)** 42.5 radians = _____ degrees

(61) If $\frac{3x}{5}$ has a remainder of 2 and $\frac{3y}{5}$ has a remainder of 1 then $\frac{xy}{5}$ has a remainder of _____

(62) $241 \times 352 =$ _____

(63) The first 4 digits of the decimal of $\frac{427}{990}$ is 0._____

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

(65) A bank contains pennies, nickels, dimes, quarters and half-dollars. How many different sets of three coins can be formed? _____

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

(67) $g(x) = -x^2$ and $h(x) = 1 - 2x$. $g(h(2)) =$ _____

(68) The diameter of the circumscribed circle around a 5,12,13-right triangle is _____

(69) $4! \times 5! \div 6! =$ _____

***(70)** $11^{(4)} =$ _____

(71) $72 \times 1111 =$ _____

(72) $F(x) = (x - 1)^6$. Find $F'(3) =$ _____

(73) $|3 - 2| - |5 - 7| - |12 - 19| =$ _____

(74) Change 0.102 base 3 to a base 10 fraction. _____

(75) $\int_0^{\frac{\pi}{4}} \cos(2x)\,dx =$ _____

(76) Given: 1,3,3,5,7,11,...,43,k,111,... . Find k. _____

(77) The sixth hexagonal number is _____

(78) $49 \times \frac{50}{51} =$ _____ mixed number

(79) $\sqrt{1234321} =$ _____

***(80)** 16 gallons + 8 quarts + 4 pints = _____ cups

University Interscholastic League - Number Sense Answer Key HS ● Regional ● 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) 73,727

(2) 1,600

(3) 1,268

(4) 454.75

(5) 2

(6) 625

(7) $2\frac{1}{12}$

(8) 19

(9) $\frac{67}{800}$

***(10) 37,821 — 41,801**

(11) 4,069

(12) $11\frac{9}{17}$

(13) 336

(14) $11\frac{17}{24}$

(15) 12

(16) 2,477

(17) 48

(18) 55

(19) $\frac{193}{3}$, $64\frac{1}{3}$

***(20) 15,000 — 16,578**

(21) $-\frac{4}{11}$

(22) 6

(23) — 1

(24) 6,250

(25) — 38

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

(27) 173

(28) $1\frac{1}{2}$

(29) $40.50

***(30) 4,011 — 4,432**

(31) 2,197

(32) 21

(33) $8\frac{1}{6}$

(34) 100

(35) 344

(36) 12.8, $\frac{64}{5}$, $12\frac{4}{5}$

(37) 495

(38) 9

(39) $-3.75, -\frac{15}{4}, -3\frac{3}{4}$

***(40) 911 — 1,006**

(41) — 390

(42) $-\frac{11}{238}$

(43) 729

(44) $\frac{1}{12}$

(45) 10

(46) — 3

(47) 84

(48) 2.25, $\frac{9}{4}$, $2\frac{1}{4}$

(49) 154

***(50) 48,291 — 53,373**

(51) $\frac{85}{77}$, $1\frac{8}{77}$

(52) 27

(53) 7,474

(54) 70

(55) 60

(56) 0

(57) 20

(58) 50

(59) 15

***(60) 2,314 — 2,556**

(61) 3

(62) 84,832

(63) 4313

(64) — 221

(65) 35

(66) .5, $\frac{1}{2}$

(67) — 9

(68) 13

(69) 4

***(70) 13,909 — 15,373**

(71) 79,992

(72) 192

(73) — 8

(74) $\frac{11}{27}$

(75) .5, $\frac{1}{2}$

(76) 69

(77) 66

(78) $48\frac{2}{51}$

(79) 1,111

***(80) 282 — 310**

The University Interscholastic League
Number Sense Test • HS State • 2013

Final _____ _____

Contestant's Number _____ 2nd _____ _____

1st _____ _____

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STOP -- WAIT FOR SIGNAL!

(1) $521 - 20 + 13 =$ _____

(2) $156 \times 25 =$ _____

(3) $3102 \div 5 =$ _____ **(decimal)**

(4) $2013 - 521 =$ _____

(5) $\frac{3}{16} =$ _____ **% (decimal)**

(6) $5 - 21 \times 20 \div (1 + 3) =$ _____

(7) $10\frac{11}{12} - 4\frac{5}{6} =$ _____ **(mixed number)**

(8) $20 \times 13 + 20 \times 14 =$ _____

(9) $17^2 =$ _____

***(10)** $3102 - 125 + 520 =$ _____

(11) $521 \times 13 =$ _____

(12) $23 \times \frac{23}{25} =$ _____ **(mixed number)**

(13) **MMCDLIX =** _____ **(Arabic Numeral)**

(14) **2.5 bushels =** _____ **pints**

(15) **72 is 18% of** _____

(16) $6\frac{2}{3} + 5\frac{9}{10} =$ _____ **(mixed number)**

(17) $7 + 12 + 17 + 22 + ... + 52 + 57 =$ _____

(18) $521 \div 25 =$ _____ **(decimal)**

(19) $\frac{5}{11} - \frac{7}{22} - \frac{9}{44} =$ _____

***(20)** $520 \times 521 + 2013 =$ _____

(21) **The multiplicative inverse of** $5\frac{6}{7}$ **is** _____

(22) $|-1-3| + |6-10| - |-15+21| =$ _____

(23) **The total number of 2-element subsets and 4-element subsets of the set {e,i,g,h,t} is** _____

(24) $23^2 + 69^2 =$ _____

(25) **If** $\frac{2}{x} + \frac{3}{5} = \frac{7}{10}$ **, then x =** _____

(26) **0.777... — 0.444... =** _____

(27) **55% of 60 minus 65 =** _____

(28) **The** 15^{th} **triangular number is** _____

(29) $3 + 6 + 9 + 12 + 15 + ... + 36 + 39 =$ _____

***(30)** $132 \times 57 + 65 \times 129 =$ _____

(31) **If a = 6 and b = 9 then** $(a + b)(a^2 + 2ab + b^2) =$ _____

(32) $52_7 - 120_7 + 13_7 =$ _____ $_7$

(33) $6! \div 5! + 4! \div 3! - 2! \div 1! =$ _____

(34) $f(x) = 16x^2 - 24x + 9$. $f(7) =$ _____

(35) **If a dozen tees cost 84¢ then 30 tees cost $** _____

(36) How many distinct elements are in $(\{e,x,t,r,a\} \cap \{c,r,e,d,i,t\}) \cup \{p,o,i,n,t,s\}$? _____

(37) $4\frac{2}{3} \div 2\frac{3}{4} =$ _____

(38) The next term of the arithmetic sequence, ... $\frac{3}{8}$, $\frac{31}{40}$, $1\frac{7}{40}$, ... is _____

(39) 1.0454545... = _____ (mixed number)

***(40)** $\sqrt{52113} =$ _____

(41) 33% of $609\frac{1}{11} =$ _____

(42) $\frac{31}{47} - \frac{5}{8} =$ _____

(43) The angle supplementary to an interior angle of a regular decagon has a measure of _____ degrees

(44) If $8^{(6)} = 4^{(3x+2)}$ then x = _____

(45) $3102_6 \times 5_6 =$ _____ 6

(46) If $\frac{x-16}{x+15} + \frac{x+15}{x-16}$ is written as the mixed number $A\frac{B}{C}$ then B = _____

(47) The sum of roots minus the product of the roots of $2x^3 - 3x^2 - 11x + 6 = 0$ is _____

(48) $\frac{1}{4}(44^2 - 16^2) =$ _____

(49) An interior angle of a regular hexagon has a measure of $k\pi$ radians. Find k. _____

***(50)** $(27\pi)(31e) =$ _____

(51) $93^2 + 21^2 =$ _____

(52) If two dice are rolled, the probability that the sum of the faces is less than 5 is _____%

(53) ${}_6P_4 \div {}_6C_4 =$ _____

(54) $(2+i)^2 = a + bi$. Find a − b. _____

(55) If P varies directly with Q and P = 15 when Q = 6, find Q when P = 20. _____

(56) $9\sin(\frac{\pi}{12})\cos(\frac{\pi}{12}) =$ _____

(57) Given the sequence 2, 6, 12, 20, ..., 110, k, 156. Find k. _____

(58) $521 \times 213 =$ _____

(59) 132 feet per second = _____ miles per hour

***(60)** 2013 log 1001 = _____

(61) If $\frac{3x}{8}$ has a remainder of 5 and $\frac{5y}{8}$ has a remainder of 3 then $\frac{xy}{8}$ has a remainder of _____

(62) The first 4 digits of the decimal of $\frac{617}{990}$ is 0._____

(63) $323 \times 111 =$ _____

(64) A store has pens, pencils, markers, and crayons. How many different pairs of these items can be packaged? _____

(65) If A is 40% of B and B is $\frac{3}{8}$ of C, then A is what percent of C? _____%

(66) $\frac{11\pi}{12}$ radians = _____ degrees

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

(68) $4! \times 6! \div 8! =$ _____

(69) $\sqrt{14641} =$ _____

***(70)** 1760 yards + 3 feet + 12 inches = _____ inches

(71) $g(x) = 3x^2 + 1$ and $h(x) = 1 - 2x^3$. $g(h(-1)) =$ ____

(72) $F(x) = x^3 - 3x^2 + 3x - 1$. Find $f'(2) =$ _____

(73) If $\sqrt{72} + \sqrt{98} = \sqrt{x}$ then x = _____

(74) $\int_1^3 (x^{-2})\,dx =$ _____

(75) $97 \times \frac{98}{99} =$ _____ mixed number

(76) The 7th term of the arithmetic sequence 5, 3.5, 2, 0.5,... is _____

(77) $(\frac{5}{8} + \frac{8}{5}) \div 2 =$ _____

(78) Change $\frac{11}{16}$ to a base 4 decimal. _____ 4

(79) $(543_6)(123_6) \div 5$ has a remainder of _____

***(80)** $33 \times 33033 =$ _____

University Interscholastic League - Number Sense Answer Key HS • State • 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) 514

(2) 3,900

(3) 620.4

(4) 1,492

(5) 18.75

(6) — 100

(7) $6\frac{1}{12}$

(8) 540

(9) 289

***(10) 3,323 — 3,671**

(11) 6,773

(12) $21\frac{4}{25}$

(13) 2,459

(14) 160

(15) 400

(16) $12\frac{17}{30}$

(17) 352

(18) 20.84

(19) $-\frac{3}{44}$

***(20) 259,287 — 286,579**

(21) $\frac{7}{41}$

(22) 2

(23) 15

(24) 5,290

(25) 20

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

(27) — 32

(28) 120

(29) 273

***(30) 15,114 — 16,704**

(31) 3,375

(32) — 22

(33) 8

(34) 625

(35) $2.10

(36) 8

(37) $1\frac{23}{33}$

(38) 1.575, $\frac{63}{40}$, $1\frac{23}{40}$

(39) $1\frac{1}{22}$

***(40) 217 — 239**

(41) 201

(42) $\frac{13}{376}$

(43) 36

(44) $\frac{7}{3}$, $2\frac{1}{3}$

(45) 23514

(46) 961

(47) 4.5, $\frac{9}{2}$, $4\frac{1}{2}$

(48) 420

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

***(50) 6,791 — 7,505**

(51) 9,090

(52) $\frac{50}{3}$, $16\frac{2}{3}$

(53) 24

(54) — 1

(55) 8

(56) 2.25, $\frac{9}{4}$, $2\frac{1}{4}$

(57) 132

(58) 110,973

(59) 90

***(60) 5,738 — 6,341**

(61) 1

(62) 6232

(63) 35,853

(64) 10

(65) 15

(66) 165

(67) 5

(68) $\frac{3}{7}$

(69) 121

***(70) 60,238 — 66,578**

(71) 28

(72) 3

(73) 338

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

(75) $96\frac{2}{99}$

(76) — 4

(77) 1.1125, $\frac{89}{80}$, $1\frac{9}{80}$

(78) .23

(79) 2

***(80) 1,035,585 — 1,144,593**