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

Final _____ _____
2nd _____ _____
1st _____ _____
Score Initials

Contestant's Number _____

Read directions carefully before beginning test

DO NOT UNFOLD THIS SHEET UNTIL TOLD TO BEGIN

Directions: Do not turn this page until the person conducting this test gives the signal to begin. This is a ten-minute test. There are 80 problems. Solve accurately and quickly as many as you can in the order in which they appear. ALL PROBLEMS ARE TO BE SOLVED MENTALLY. Make no calculations with paper and pencil. Write only the answer in the space provided at the end of each problem. Problems marked with a (*) require approximate integral answers; any answer to a starred problem that is within five percent of the exact answer will be scored correct; all other problems require exact answers.

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STOP -- WAIT FOR SIGNAL!

(1) $213 + 214 =$ _____

(2) $213 \times 4 =$ _____

(3) $412 - 213 =$ _____

(4) $312 \div 4 =$ _____

(5) $34\% =$ _____ (proper fraction)

(6) $43 \times 21 =$ _____

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

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

(9) $20.13 \div 0.4 =$ _____ (decimal)

*(10) $927 + 1009 + 2013 =$ _____

(11) $1 + 2 \times 3 \div 4 - 5 =$ _____

(12) $63 \times 43 =$ _____

(13) 25% of 25 = _____

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

(15) The GCD of 48 and 84 is _____

(16) 12 feet — 3 yards = _____ inches

(17) DLV = _____ (Arabic Number)

(18) The mean of 1, 4, 9, 16, and 25 is _____

(19) 201314 ÷ 9 has a remainder of _____

*(20) $2013 \times 2014 =$ _____

(21) $3 + 6 \times 10 - 6 \div 3 =$ _____

(22) $6\frac{2}{5} \times 6\frac{3}{5} =$ _____ (mixed number)

(23) 4.555... + 2.777... = _____

(24) $3^{(-1)} - 3^{(-2)} =$ _____

(25) Set A has 6 elements and set B has 8 elements. If $A \cap B$ has 4 elements, then $A \cup B$ has ___ elements

(26) $(26 + 35 - 44) \div 8$ has a remainder of _____

(27) The multiplicative inverse of 3.4 is _____

(28) 30 inches/minute = _____ feet/hour

(29) Find k if $26^2 - 21^2 = 5k$. k = _____

*(30) $14\frac{3}{4} \times 2006 \div 15 =$ _____

(31) $11^3 =$ _____

(32) $1 - \left|3 - \left|6 - 10\right|\right| =$ _____

(33) Find the sales tax on an item costing $90.00 if the sales tax rate is 8%. $ _____

(34) $4 \times 3! + 5 \times 4! =$ _____

(35) If $4 - 3x = 10$, then $3x + 4 =$ _____

(36) 321 base 4 = _____ base 10

(37) If $a = 15$ and $b = 16$, then $a^2 + 2ab + b^2 =$ _____

(38) $\frac{1}{4}(24^2 - 4^2) =$ _____

(39) $\sqrt{54} + \sqrt{24} = \sqrt{x}$. Find x. _____

*(40) 49 x 61 x 73 = _____

(41) 9142013 ÷ 11 has a remainder of _____

(42) The slope of the line containing the points (2, 3) and (5, 7) is _____

(43) If $6^x = 432$ then $6^{(x+1)} =$ _____

(44) $101 \times 108 =$ _____

(45) Let $4x - 2y = 1$ and $3x + 2y = 2$. Find x. _____

(46) The leg opposite the 60° angle in a right triangle is $2\sqrt{3}$ cm. The hypotenuse is _____ cm

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

(48) $\frac{3}{8} - \frac{28}{71} =$ _____

(49) $5^2 \times 2^5 =$ _____

*(50) $8^2 \times 4^3 \div 2^4 =$ _____

(51) $444 \times \frac{4}{37} =$ _____

(52) $235_7 + 146_7 =$ _____ 7

(53) The area of $x^2 + y^2 = 9$ is $k\pi$. $k^2 =$ _____

(54) If $\log_4 8 = x$ then $x =$ _____

(55) ${}_5C_3 + {}_5P_2 =$ _____

(56) The larger root of $7x^2 + 22x + 3 = 0$ is _____

(57) How many 3-element subsets does the set {n, u, m, b, e, r} have? _____

(58) $(2 - 3i)(2 - 3i) = (a + bi)$. Find $a - b$. _____

(59) $24 + 18 + 13\frac{1}{2} + 10\frac{1}{8} + \ldots =$ _____

*(60) $18^2 \times 22^2 =$ _____

(61) $28^2 - 26^2 + 24^2 - 22^2 =$ _____

(62) If $4! + 3! + 2! \cong x \pmod 5$, where $0 \leq x \leq 4$, then $x =$ _____

(63) The sum of the coefficients of $(x + 2y)^3$ is _____

(64) If $f(x) = 4x^3 + 3x^2 - 2x + 1$, then $f''(0) =$ _____

(65) The sum of the first ten terms of the Fibonacci type sequence 3,7,10,17,27,... is _____

(66) Change 0.333... base 6 to a base 6 fraction. _____ 6

(67) How much time has past from 8:30 a.m. to 3:45 p.m. in one day? _____ minutes

(68) $\frac{13}{37} \times 111 =$ _____

(69) $\log_5 8 \div \log_5 4 \times \log_5 2 = \log_5 \sqrt{k}$. Find k. _____

*(70) $\sqrt{956230} =$ _____

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

(72) $2(\sin \frac{\pi}{6})(\cos \frac{\pi}{3}) =$ _____

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

(74) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\frac{\sqrt{5}+1}{2}\right]$. _____

(75) A number is randomly drawn from the set {2,1,3,4,7}. What are the odds that the number drawn is not a prime number? _____

(76) If $\det\begin{bmatrix} 1 & -6 \\ 3 & x \end{bmatrix} = 28$, then $x =$ _____

(77) The 18^{th} triangular number is _____

(78) $\int_0^1 (2 + 3x)\,dx =$ _____

(79) If $x > 0$ and $x^2 = \sqrt{x^3 + x^3 + x^3}$ then $x =$ _____

*(80) 5.5 rods = _____ inches

University Interscholastic League - Number Sense Answer Key HS • SAC • Fall 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) 427

(2) 852

(3) 199

(4) 78

(5) $\frac{17}{50}$

(6) 903

(7) $4\frac{7}{12}$

(8) 540

(9) 50.325

*(10) 3,752 — 4,146

(11) $-2.5, -\frac{5}{2}, -2\frac{1}{2}$

(12) 2,709

(13) $6.25, \frac{25}{4}, 6\frac{1}{4}$

(14) $.875, \frac{7}{8}$

(15) 12

(16) 36

(17) 555

(18) 11

(19) 2

*(20) 3,851,473 — 4,256,891

(21) 61

(22) $42\frac{6}{25}$

(23) $\frac{22}{3}, 7\frac{1}{3}$

(24) $\frac{2}{9}$

(25) 10

(26) 1

(27) $\frac{5}{17}$

(28) 150

(29) 47

*(30) 1,874 — 2,071

(31) 1,331

(32) 0

(33) $ 7.20

(34) 144

(35) — 2

(36) 57

(37) 961

(38) 140

(39) 150

*(40) 207,288 — 229,106

(41) 1

(42) $\frac{4}{3}, 1\frac{1}{3}$

(43) 2,592

(44) 10,908

(45) $\frac{3}{7}$

(46) 4

(47) 6

(48) $-\frac{11}{568}$

(49) 800

*(50) 244 — 268

(51) 48

(52) 414

(53) 81

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

(55) 30

(56) $-\frac{1}{7}$

(57) 20

(58) 7

(59) 96

*(60) 148,976 — 164,656

(61) 200

(62) 2

(63) 27

(64) 6

(65) 781

(66) $\frac{3}{5}$

(67) 435

(68) 39

(69) 8

*(70) 929 — 1,026

(71) $3.5, \frac{7}{2}, 3\frac{1}{2}$

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

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

(74) 1

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

(76) 10

(77) 171

(78) $3.5, \frac{7}{2}, 3\frac{1}{2}$

(79) 3

*(80) 1,035 — 1,143

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

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(1) $2014 - 121 =$ _____

(2) $42 \times 15 =$ _____

(3) $2014 \div 5 =$ _____ (decimal)

(4) $4102 + 2014 =$ _____

(5) $\frac{3}{8} =$ _____ (decimal)

(6) $1.6 \times 2.5 =$ _____

(7) $21^2 =$ _____

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

(9) \$4.80 is 24% of \$ _____

*(10) $4102 + 511 - 115 + 2014 =$ _____

(11) $1200 \div 75 =$ _____

(12) $8 \times \frac{8}{11} =$ _____ (mixed number)

(13) 3 quarts = _____ cups

(14) $52 \times 19 - 19 \times 33 =$ _____

(15) Which is larger $\frac{7}{11}$ or 0.6? _____

(16) $1 \times 4 \div 8 + (12 - 16) =$ _____

(17) $123 \times 14 =$ _____

(18) $3 + 6 + 9 + 12 + ... + 36 + 39 =$ _____

(19) The median of 1, 1, 2, 3, 5, 8, 11, and 13 is _____

*(20) $(4102 + 116) \times 131 =$ _____

(21) $3.636363... =$ _____ (mixed number)

(22) How far will a car travel in 3 hours 20 minutes at a constant rate of 75 mph? _____ miles

(23) 32 ounces is _____ % of a gallon.

(24) $13^3 =$ _____

(25) The largest positive prime divisor of 210 is _____

(26) $14^2 + 42^2 =$ _____

(27) $4\frac{4}{7} - 2\frac{2}{3} =$ _____ (mixed number)

(28) Which of the following is an abundant number, 27, 36, or 45? _____

(29) $(17 \times 27 - 37) \div 4$ has a remainder of _____

*(30) $(8686 + 646) \div 42 =$ _____

(31) 77 base 10 = _____ base 6

(32) Truncate $\sqrt{7}$ to the hundredth place. _____

(33) If $5x + 4 = 3x - 2$, then $x =$ _____

(34) $1172014 \div 11$ has a remainder of _____

(35) Let P = {p,r,i,m,e} and C = {n,u,m,b,e,r}. $P \cap C$ contains how many elements? _____

(36) P, Q, & R are the real roots of $2x^3 - x^2 - 25x = 12$. Find PQ + PR + QR. _____

(37) If 4 tees cost 25¢ then 4 dozen tees cost $ _____

(38) $4\frac{2}{5} \times 4\frac{3}{5} =$ _____ (mixed number)

(39) $\frac{1}{4}(13^2 - 12^2) =$ _____

*(40) $\sqrt{1162014} =$ _____

(41) If $7^{(x-1)} = 51$ then $7^{(x+1)} =$ _____

(42) $5^6 \times 2^3 =$ _____

(43) $\frac{23}{31} - \frac{4}{5} =$ _____

(44) Let $2x + 3y = 4$ and $x + 2y = 5$. Find y = _____

(45) The smaller leg of a 30-60-90° triangle is 5.5 cm. The hypotenuse is _____ cm

(46) $\frac{10!}{8!\,2!} =$ _____

(47) The slope of the line perpendicular to the line $2x - 3y = 5$ is _____

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

(49) $97 \times 96 =$ _____

*(50) $83.333 \times 1728 =$ _____

(51) The sum of the measures of the interior angles of the faces of a regular tetrahedron is _____ degrees

(52) $2014_8 - 116_8 =$ _____ 8

(53) The integral sides of a triangle are 8, 3, and x. The least value of x is _____

(54) The sum of the first 10 terms of the Lucas sequence 2, 1, 3, 4, 7, 11, 18, ... is _____

(55) The smaller root of $3x^2 + 5x - 2 = 0$ is _____

(56) $\left(\frac{x^2+6x+9}{x-3}\right)\left(\frac{x^2-6x+9}{x^2-9}\right) = x +$ _____

(57) Change 0.555... base 8 to a base 8 fraction. _____ 8

(58) $116 \times 214 =$ _____

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

*(60) $23 \times 34 \times 45 =$ _____

(61) The sum of the coefficients of $(4x + 3)^2$ is _____

(62) The slope of the line $5x - 3y = 1$ is _____

(63) $45_7 \times 6_7 =$ _____ 7

(64) $21^2 - 22^2 + 23^2 - 24^2 =$ _____

(65) $\frac{8}{15} - \frac{39}{76} =$ _____

(66) If $2x^3 - x^2 - 25x - 12 = 0$, then the harmonic mean of the roots is _____

(67) $\sin \frac{5\pi}{3} \times \cos \frac{5\pi}{6} =$ _____

(68) A notepad contains white, blue, yellow, orange, and pink pages. How many different sets of 4 pages can be packaged? _____

(69) Find x, $0 \leq x \leq 10$, if $3x - 5 \cong 2 \pmod{11}$. _____

*(70) $1162014 \div 2013 =$ _____

(71) Let $h(x) = x^2 - 2x - 6$ and $g(x) = 20 - x - 4x^2$. Find $g(h(3)) =$ _____

(72) If $f(x) = \frac{11x+6}{5}$, then $f^{-1}(10) =$ _____

(73) Two numbers are randomly drawn from the set {1,2,3,4,5}. What is the probability that their sum is 6? _____ %

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

(75) The period of $4\sin(3\pi x + 2) - 1$ is _____

(76) Change 0.36 base 8 to a base 10 fraction. _____

(77) Which of the following is an odious number, 25, 15, or 5? _____

(78) $\int_{-1}^{1} (2 - 6x)\,dx =$ _____

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

*(80) $903 \div 18.75\% \times \frac{1}{4} =$ _____

University Interscholastic League - Number Sense Answer Key HS • Invitation A • 2014

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

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

(1) 1,893

(2) 630

(3) 402.8

(4) 6,116

(5) .375

(6) 4

(7) 441

(8) $6\frac{3}{8}$

(9) $20.00

*(10) 6,187 — 6,837

(11) 16

(12) $5\frac{9}{11}$

(13) 12

(14) 361

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

(16) $-3.5, -\frac{7}{2}, -3\frac{1}{2}$

(17) 1,722

(18) 273

(19) 4

*(20) 524,931 — 580,185

(21) $3\frac{7}{11}$

(22) 250

(23) 25

(24) 2,197

(25) 7

(26) 1,960

(27) $1\frac{19}{21}$

(28) 36

(29) 2

*(30) 212 — 233

(31) 205

(32) $2.64, \frac{66}{25}, 2\frac{16}{25}$

(33) −3

(34) 8

(35) 3

(36) $-12.5, -\frac{25}{2}, -12\frac{1}{2}$

(37) $3.00

(38) $20\frac{6}{25}$

(39) $6.25, \frac{25}{4}, 6\frac{1}{4}$

*(40) 1,025 — 1,131

(41) 2,499

(42) 125,000

(43) $-\frac{9}{155}$

(44) 6

(45) 11

(46) 45

(47) $-1.5, -\frac{3}{2}, -1\frac{1}{2}$

(48) 567

(49) 9,312

*(50) 136,800 — 151,199

(51) 720

(52) 1,676

(53) 6

(54) 198

(55) −2

(56) 3

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

(58) 24,824

(59) −12

*(60) 33,431 — 36,949

(61) 49

(62) $\frac{5}{3}, 1\frac{2}{3}$

(63) 402

(64) −90

(65) $\frac{23}{1140}$

(66) $-1.44, -\frac{36}{25}, -1\frac{11}{25}$

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

(68) 70

(69) 6

*(70) 549 — 606

(71) −13

(72) 4

(73) 20

(74) 17

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

(76) $\frac{15}{32}$

(77) 25

(78) 4

(79) 36

*(80) 1,144 — 1,264

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

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(1) $215 + 2014 =$ _____

(2) $36 \times 25 =$ _____

(3) $\frac{8}{9} \div \frac{16}{27} =$ _____

(4) $201.4 - 21.5 =$ _____ (decimal)

(5) $76\% =$ _____ (proper fraction)

(6) $2014 \div 9 =$ _____ (mixed number)

(7) $\frac{5}{16} =$ _____ (decimal)

(8) $13^3 =$ _____

(9) 11 yards = _____ inches

*(10) $4102 + 512 + 215 + 2014 =$ _____

(11) $\frac{14}{15} + \frac{15}{14} =$ _____ (mixed number)

(12) $26 \times 14 + 12 \times 26 =$ _____

(13) The number of positive prime factors of 285 is ___

(14) 2152014 ÷ 6 has a remainder of _____

(15) $1 + 6 + 11 + 16 + \ldots + 51 =$ _____

(16) The GCD of 57 and 76 is _____

(17) MMCCXXII = _____ (Arabic Numeral)

(18) $40 \div 10 - 4 \times 18 + 28 =$ _____

(19) Which is smaller, 0.625 or $\frac{11}{16}$? _____

*(20) $410 \times 25 \times 12 =$ _____

(21) $4\frac{3}{7} \times 4\frac{4}{7} =$ _____

(22) If 16 Sodies cost $12.00 then 5 Sodies cost $_____

(23) $(215 \times 20 + 14) \div 6$ has a remainder of _____

(24) $4^{(-1)} + 4^{(-2)} =$ _____

(25) $0.\overline{142857} + 0.\overline{857142} =$ _____

(26) $21.52 \div 0.8 =$ _____ (decimal)

(27) 135 base 6 = _____ base 10

(28) The arithmetic mean of 46, 51, 45, & 54 is _____

(29) If there are 8 elements in set A, 6 in set B, and 12 in $A \cup B$, then $A \cap B$ has _____ elements

*(30) $\sqrt{361015} =$ _____

(31) $666\frac{2}{3}\%$ of 24 is _____

(32) Round $\sqrt{8}$ to the hundredths place. _____

(33) $1^2 + 2^2 + 3^2 + 4^2 + 5^2 + 6^2 =$ _____

(34) 2.01444... = _____ (mixed number)

(35) $\frac{1}{4}(38^2 - 22^2) =$ _____

(36) The real roots of $x^2 - x - 12 = 0$ are P and Q. Find (PQ)(P + Q). _____

(37) Find k if $34^2 - 38^2 = 8k$. k = _____

(38) 15 miles/hour = _____ feet/second

(39) If $x + 3y = 6$ and $3x - 6y = 8$, then $2x$ = _____

*(40) $8642 \times 5\frac{7}{9} \div 13$ = _____

(41) The slope of the line passing through the points (2, 5) and (— 1, 3) is _____

(42) $55 \div 0.625$ = _____

(43) $32_6 + 54_6 + 11_6$ = _____ 6

(44) If $6^{(x+1)} = 402$ then $6^{(x)}$ = _____

(45) $5^4 \times 2^5$ = _____

(46) Let $x - y = -2$ and $xy = 2$. Find $x^3 - y^3$ = _____

(47) The measure of an interior angle of a regular hexagon is _____ degrees

(48) $\left(\frac{x^2+4x+4}{x-2}\right)\left(\frac{x^2-4x+4}{x^2-4}\right) = x +$ _____

(49) Which of the following is considered to be a happy number, 99, 100, or 101? _____

*(50) $215 \times 21^3 \div 15^2$ = _____

(51) $18 + 12 + 8 + 5\frac{1}{3} + \ldots$ = _____

(52) The larger root of $10x^2 + 3x - 1 = 0$ is _____

(53) $555 \times \frac{5}{37}$ = _____

(54) ${}_6P_3$ = _____

(55) The integral sides of a triangle are 12, 13, and x. The greatest value of x is _____

(56) Let $|2x - 3| \leq 4$. The least value of x is _____

(57) 532×312 = _____

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

(59) The radius of the circle $x^2 + 2x + y^2 + 2y = 22$ is $2\sqrt{k}$. Find k. _____

*(60) $21 \times 34 \times 711$ = _____

(61) $38^2 - 40^2 + 42^2 - 44^2$ = _____

(62) How many sets of five items can be put in a bag if the items available include pens, pencils, crayons, and markers? _____

(63) The product of the coefficients of $(x + y)^5$ is _____

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

(65) The sum of the first 11 terms of the Fibonacci sequence 1,1,2,3,5,8,13,... is _____

(66) Change 0.4333... base 5 to a base 5 fraction. _____ 5

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

(68) $\frac{5}{27} \times 111$ = _____ (mixed number)

(69) Let $g(x) = x^2 + 2x + 1$ and $h(x) = (x - 1)(x^2 - 2x + 1)$. Find h(g(1)) = _____

*(70) $(5^2 + 4^3)(3^4 + 2^5)$ = _____

(71) $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{32}$ = _____

(72) $1 - 2(\sin^2(45°))$ = _____

(73) The 3rd hexagonal number is _____

(74) If $f(x) = \frac{3x-6}{10}$, then $f^{-1}(1)$ = _____

(75) If $\det\begin{bmatrix} 2 & -1 \\ x & 4 \end{bmatrix} = 7$, then x = _____

(76) The ratio of x to y is 1 to 3 and $x - y = 6$. x = _____

(77) $\int_0^{10} (x + 1)\, dx$ = _____

(78) 150 degrees = $k\pi$ radians. k = _____

(79) $12 \times 56 = 48 \times$ _____

*(80) The speed of a rocket is 26,400 feet per second. How many miles per hour does it travel? _____

University Interscholastic League - Number Sense Answer Key HS • Invitation B • 2014

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

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

(1) 2,229

(2) 900

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

(4) 179.9

(5) $\frac{19}{25}$

(6) $223\frac{7}{9}$

(7) .3125

(8) 2,197

(9) 396

*(10) 6,501 — 7,185

(11) $2\frac{1}{210}$

(12) 676

(13) 3

(14) 0

(15) 286

(16) 19

(17) 2,222

(18) — 40

(19) .625, $\frac{5}{8}$

*(20) 116,850 — 129,150

(21) $20\frac{12}{49}$

(22) $3.75

(23) 0

(24) .3125, $\frac{5}{16}$

(25) 1

(26) 26.9

(27) 59

(28) 49

(29) 2

*(30) 571 — 630

(31) 160

(32) 2.83, $\frac{283}{100}$, $2\frac{83}{100}$

(33) 91

(34) $2\frac{13}{900}$

(35) 240

(36) — 12

(37) — 36

(38) 22

(39) 8

*(40) 3,649 — 4,032

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

(42) 88

(43) 141

(44) 67

(45) 20,000

(46) — 20

(47) 120

(48) 2

(49) 100

*(50) 8,407 — 9,291

(51) 54

(52) .2, $\frac{1}{5}$

(53) 75

(54) 120

(55) 24

(56) — .5, $-\frac{1}{2}$

(57) 165,984

(58) 8

(59) 6

*(60) 482,272 — 533,036

(61) — 328

(62) 56

(63) 2,500

(64) 6

(65) 232

(66) $\frac{34}{40}$

(67) 4.5, $\frac{9}{2}$, $4\frac{1}{2}$

(68) $20\frac{5}{9}$

(69) 27

*(70) 9,555 — 10,559

(71) .90625, $\frac{29}{32}$

(72) 0

(73) 15

(74) $\frac{16}{3}$, $5\frac{1}{3}$

(75) — 1

(76) — 3

(77) 60

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

(79) 14

*(80) 17,100 — 18,900

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Number Sense Test • HS District 1 • 2014

Final _____ _____
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STOP -- WAIT FOR SIGNAL!

(1) $317 + 322 =$ _____

(2) $44 \times 15 =$ _____

(3) $4102 \div 5 =$ _____ (decimal)

(4) $713 - 223 =$ _____

(5) $\frac{6}{7} \times \frac{49}{50} =$ _____

(6) $22 \times 17 =$ _____

(7) $\frac{3}{16} =$ _____ (decimal)

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

(9) $17^2 =$ _____

*(10) $317 + 2014 + 322 + 201 + 4 =$ _____

(11) $3\frac{5}{12} - 1\frac{3}{4} =$ _____ (mixed number)

(12) 23% of 23 = _____ (decimal)

(13) $3 + 2 \times 2 \div 3 - (1 + 7) =$ _____

(14) 7131402 ÷ 11 has a remainder of _____

(15) 1.5 gallons = _____ pints

(16) 75% of \$36.08 = \$_____

(17) CCCLXXI = _____ (Arabic Number)

(18) LCM of 48 and 84 is _____

(19) $14^3 =$ _____

*(20) $(324 + 329) \times 2014 =$ _____

(21) $3 - \left|1 - |7 - 3| + 2\right| - 2 =$ _____

(22) $(3)^{-1} + (3)^{-2} =$ _____

(23) $(32 \times 23 + 17) \div 6$ has a remainder of _____

(24) The sum of three consecutive integers is —117. The largest of the three integers is _____

(25) $5\frac{2}{3} - 8\frac{3}{5} =$ _____ (mixed number)

(26) 3.222... = _____ (improper fraction)

(27) 2014 base 5 = _____ base 10

(28) If 42 eggs cost \$12.84 then 14 eggs cost \$ _____

(29) Truncate $\sqrt{5}$ to the hundredth place. _____

*(30) $\sqrt{322} \times 317 =$ _____

(31) If $22^2 - 28^2 = 12x$, then x = _____

(32) $833\frac{1}{3}$% of 90 is _____

(33) P, Q, & R are the real roots of $2x^3 - x^2 - 25x = 12$. Find PQR — (P + Q + R). _____

(34) $\frac{6!\,5!}{4!\,3!}$ = _____

(35) 25% of $(73^2 - 37^2)$ = _____

(36) $542_8 - 367_8$ = _____ 8

(37) If a = 6 and b = 5,
then $a^3 + 3a^2b + 3ab^2 + b^3$ = _____

(38) If $3A + B = 7$ and $3A - 2B = 2$ then B = _____

(39) Find the amount of sales tax on an item costing $24.00 if the sales tax rate is 8.25%. $ _____

*(40) $1123 \times 5\frac{8}{13} \div 21$ = _____

(41) If $13^{(x+1)} = 676$ then $13^{(x-1)}$ = _____

(42) The smaller root of $2x^2 - 7x - 15 = 0$ is _____

(43) 0.41666... $\times$ 12 = _____

(44) The first 4 digits of the decimal of $\frac{17}{330}$ is 0._____

(45) $3\frac{3}{8} \times 4\frac{4}{9}$ = _____

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

(47) $\frac{41}{46} - \frac{14}{15}$ = _____

(48) ${}_6P_2 + {}_6C_2$ = _____

(49) $(\frac{x^2+6x+9}{x^2-9})(\frac{x^2-6x+9}{x+3}) = x +$ _____

*(50) $16^4 \div 8^3 \times 4^2$ = _____

(51) $888 \times \frac{8}{37}$ = _____

(52) If $\log_4(5x + 6) = 3$ then x = _____

(53) If $\frac{4x}{7}$ has a remainder of 4 and $\frac{3y}{7}$ has a remainder of 3 then $\frac{xy}{7}$ has a remainder of _____

(54) 322×317 = _____

(55) Let $|4x + 3| \leq 2$. The largest value of x, where x is an integer, is _____

(56) $36^2 - 40^2 + 44^2 - 48^2$ = _____

(57) Change 0.2111... base 4 to a base 4 fraction. _____ 4

(58) $\frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \frac{1}{81}$ = _____

(59) $25 + 20 + 16 + 12.8 + ...$ = _____

*(60) 1,116 feet per second = _____ miles per hour

(61) $79^2 + 79$ = _____

(62) If $x^3 - 8x^2 + 17x - 10 = 0$, then the harmonic mean of the roots is _____

(63) The frequency of $y = 5 - 3\cos(4\pi x)$ is _____

(64) Find k if $\det\begin{bmatrix} 1 & -3 \\ k & 6 \end{bmatrix} = 15$. k = _____

(65) A money bag contains $1, $5, $10, and $20 bills. How many different gift envelopes containing 3 bills can be made? _____

(66) $\sin\frac{7\pi}{6} + \cos\frac{4\pi}{3}$ = _____

(67) GCD(x, 30) = 6. LCM(x, 30) = 60. x = _____

(68) $7\frac{1}{3} \div 2\frac{2}{3}$ = _____ (mixed number)

(69) $h(x) = 1 - x + x^2$. $h(h(-2))$ = _____

*(70) $(27e + 31\pi)^2$ = _____

(71) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\frac{\sqrt{5}+\sqrt{6}}{4}\right]$. _____

(72) The sum of the first nine terms of the Fibonacci type sequence 2, 5, 7, 12, 19, ... is _____

(73) $f(x) = x^3 - 8x^2 + 17x + 10$. Find $f'(-1)$ = _____

(74) If $f(x) = \frac{5+3x}{2}$, then $f^{-1}(-2)$ = _____

(75) $63 \times 16 = k \times 48$. k = _____

(76) Find x, $0 \leq x \leq 7$, if $5x - 3 \cong 2 (\text{mod} 8)$. _____

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

(78) $\sqrt{17689}$ = _____

(79) The probability of winning is 68%. The odds of losing is _____ (proper fraction)

*(80) $3125 \div \frac{5}{16} \times 1.6$ = _____

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

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

(1) 639

(2) 660

(3) 820.4

(4) 490

(5) .84, $\frac{21}{25}$

(6) 374

(7) .1875

(8) $5\frac{17}{21}$

(9) 289

*(10) 2,716 — 3,000

(11) $1\frac{2}{3}$

(12) 5.29

(13) $-\frac{11}{3}, -3\frac{2}{3}$

(14) 3

(15) 12

(16) $27.06

(17) 371

(18) 336

(19) 2,744

*(20) 1,249,385 — 1,380,899

(21) 0

(22) $\frac{4}{9}$

(23) 3

(24) — 38

(25) $-2\frac{14}{15}$

(26) $\frac{29}{9}$

(27) 259

(28) $4.28

(29) 2.23

*(30) 5,404 — 5,972

(31) — 25

(32) 750

(33) 5.5, $\frac{11}{2}, 5\frac{1}{2}$

(34) 600

(35) 990

(36) 153

(37) 1,331

(38) $\frac{5}{3}, 1\frac{2}{3}$

(39) $1.98

*(40) 286 — 315

(41) 4

(42) $-1.5, -\frac{3}{2}, -1\frac{1}{2}$

(43) 5

(44) 0515 **
(** 0 is required)

(45) 15

(46) 40

(47) $-\frac{29}{690}$

(48) 45

(49) — 3

*(50) 1,946 — 2,150

(51) 192

(52) 11.6, $\frac{58}{5}, 11\frac{3}{5}$

(53) 1

(54) 102,074

(55) — 1

(56) — 672

(57) $\frac{13}{30}$

(58) $\frac{40}{81}$

(59) 125

*(60) 723 — 798

(61) 6,320

(62) $\frac{30}{17}, 1\frac{13}{17}$

(63) 2

(64) 3

(65) 20

(66) — 1

(67) 12

(68) $2\frac{3}{4}$

(69) 43

*(70) 27,709 — 30,625

(71) 1

(72) 338

(73) 36

(74) — 3

(75) 21

(76) 1

(77) — 6

(78) 133

(79) $\frac{8}{17}$

*(80) 15,200 — 16,800

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STOP -- WAIT FOR SIGNAL!

(1) $923 - 324 =$ _____

(2) $28 \times 15 =$ _____

(3) $324 \div 8 =$ _____ **(mixed number)**

(4) $32.4 + 3.29 =$ _____ **(decimal)**

(5) $24\% =$ _____ **(proper fraction)**

(6) $32432 \div 9$ **has a remainder of** _____

(7) $31^2 =$ _____

(8) $3 - 2 \times 9 \div 3 \times (2 - 9) =$ _____

(9) **11 feet =** _____ **inches**

*(10) $923 + 4102 + 410 + 232 + 4 =$ _____

(11) $3\frac{2}{9} - 4\frac{2}{3} =$ _____ **(mixed number)**

(12) $24 \times 29 =$ _____

(13) **Which is larger 3.24 or** $3\frac{2}{9}$**?** _____

(14) $4 + 9 + 14 + 19 + \ldots + 54 + 59 =$ _____

(15) **GCD of 52 and 91 is** _____

(16) **The mean of 2,1,3,4,7, and 11 is** _____

(17) $\frac{5}{9} + \frac{5}{18} + \frac{5}{27} =$ _____

(18) $324 \times 14 =$ _____

(19) $13^3 =$ _____

*(20) $3292014 \div 324 =$ _____

(21) $5\frac{4}{9} \times 5\frac{5}{9} =$ _____

(22) $(12 + 24 \times 48) \div 7$ **has a remainder of** _____

(23) $3.242424\ldots =$ _____ **(mixed number)**

(24) **423 base 5 =** _____ **base 10**

(25) **If** $f(x) = 4x^2 - 20x + 25$ **then f(19) is** _____

(26) **The multiplicative inverse of 2.2 is** _____

(27) **If 14 ∇s cost $8.00 then 35 ∇s cost $** _____

(28) **45 has** _____ **positive integral divisors**

(29) **Round** $\sqrt{8}$ **to the nearest tenth.** _____

*(30) $\sqrt{324329} =$ _____

(31) **If** $2x + 3y = 5$ **and** $5x - 3y = 2$ **then** $xy =$ _____

(32) $11 - \left|10 - \left|9 + 8\right|\right| =$ _____

(33) $4\frac{2}{3} + 2\frac{1}{4} =$ _____ **(mixed number)**

(34) How far will a car travel in 2 hours 45 minutes at a rate of 72 mph? _____ miles

(35) $\frac{1}{4}(32^2 - 48^2) =$ _____

(36) $\sqrt[3]{2197} =$ _____

(37) A rectangle has a length of 14 cm and a width of 7 cm. The ratio of its area to its perimeter is _____

(38) $4! \times 3 + 5! \times 4 =$ _____

(39) $324_6 + 423_6 =$ _____ 6

*(40) $58 \times 65 \times 72 =$ _____

(41) The slope of the line containing the points $(-2, 0)$ and $(-1, -4)$ is _____

(42) $48 \times 0.1875 =$ _____

(43) $4\frac{3}{5} + 5\frac{3}{4} =$ _____ (mixed number)

(44) $103 \times 109 =$ _____

(45) $2^6 \times 5^9 =$ _____

(46) The number of distinct diagonals in a regular decagon is _____

(47) Given 5, 10, 26, 50, 122, k, 290, ... Find k. _____

(48) 12 miles per hour = _____ feet per second

(49) The first 4 digits of the decimal of $\frac{221}{900}$ is 0._____

*(50) $27^4 \div 9^3 \times 3^2 =$ _____

(51) Find the 12th term of the arithmetic sequence 5, 13, 21, 29, 37, ... _____

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

(53) The larger root of $3x^2 + 5x - 2 = 0$ is _____

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

(55) If $\frac{x}{8}$ has a remainder of 7 and $\frac{3y}{8}$ has a remainder of 3 then $\frac{xy}{8}$ has a remainder of _____

(56) ${}_6C_3 \div {}_6C_4 =$ _____

(57) $324 \times 423 =$ _____

(58) $\frac{4\pi}{5}$ radians = _____ degrees

(59) Change 0.1333... base 5 to a base 5 fraction. ____ 5

*(60) $42 \times 55 \times 68 =$ _____

(61) Let $f(x) = 2x + 1$, $g(x) = x^2 - 1$ and $h(x) = 2 - x^2$. Find $f(g(h(3)))$. _____

(62) If $(4!) + (3!) + (2!) \cong x \pmod 5$, where $0 \leq x \leq 4$, then $x =$ _____

(63) The slope of the line perpendicular to the line $5x - 3y = 1$ is _____

(64) $41^2 - 46^2 + 51^2 - 56^2 =$ _____

(65) The sum of the first ten terms of the Fibonacci type sequence 0,4,4,8,12,20,... is _____

(66) $4\frac{3}{5} \div 5\frac{3}{4} =$ _____

(67) $69^2 + 69 =$ _____

(68) GCD(15, x) = 3. LCM(15, x) = 165. x = _____

(69) The harmonic mean of the roots of $x^3 + Bx^2 + 6x + D = 0$ is 5. Find D. _____

*(70) $(314\pi - 271e)^2 =$ _____

(71) How many different 3-scoop ice cream cones can be made if there are 6 flavors to choose from? ____

(72) $12(\sin \frac{5\pi}{12})(\cos \frac{5\pi}{12}) =$ _____

(73) $f(x) = 3x^3 + 9x^2 + 9x + 3$. Find $f'(2) =$ _____

(74) Which of the following is an evil number, 73, 43, 13? _____

(75) $\frac{2}{3} + \frac{2}{15} + \frac{2}{35} + \frac{2}{63} =$ _____

(76) $\int_{-2}^{2} (4x - 1)\, dx =$ _____

(77) The odds of winning is $\frac{5}{8}$. The probability of losing is _____%

(78) $32_9 \times 4_9 =$ _____ 9

(79) Round $(\sqrt{5} + \sqrt{8})$ to the nearest tenth. _____

*(80) 5.5 rods + 3 yards + 12 feet = _____ inches

University Interscholastic League - Number Sense Answer Key HS • District 2 • 2014

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

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

(1) 599

(2) 420

(3) $40\frac{1}{2}$

(4) 35.69

(5) $\frac{6}{25}$

(6) 5

(7) 961

(8) 45

(9) 132

*(10) 5,388 — 5,954

(11) $-1\frac{4}{9}$

(12) 696

(13) 3.24, $\frac{81}{25}$, $3\frac{6}{25}$

(14) 378

(15) 13

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

(17) $\frac{55}{54}$, $1\frac{1}{54}$

(18) 4,536

(19) 2,197

*(20) 9,653 — 10,668

(21) $\frac{2450}{81}$, $30\frac{20}{81}$

(22) 2

(23) $3\frac{8}{33}$

(24) 113

(25) 1,089

(26) $\frac{5}{11}$

(27) $20.00

(28) 6

(29) 2.8

*(30) 542 — 597

(31) 1

(32) 4

(33) $6\frac{11}{12}$

(34) 198

(35) —320

(36) 13

(37) $\frac{7}{3}$, $2\frac{1}{3}$

(38) 552

(39) 1151

*(40) 257,868 — 285,012

(41) —4

(42) 9

(43) $10\frac{7}{20}$

(44) 11,227

(45) 125,000,000

(46) 35

(47) 170

(48) 17.6, $\frac{88}{5}$, $17\frac{3}{5}$

(49) 2,455

*(50) 6,233 — 6,889

(51) 93

(52) 7

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

(54) 10

(55) 7

(56) $\frac{4}{3}$, $1\frac{1}{3}$

(57) 137,052

(58) 144

(59) $\frac{12}{40}$ (not reducible base 5)

*(60) 149,226 — 164,934

(61) 97

(62) 2

(63) —.6, $-\frac{3}{5}$

(64) —970

(65) 352

(66) .8, $\frac{4}{5}$

(67) 4,830

(68) 33

(69) —10

*(70) 59,283 — 65,523

(71) 56

(72) 3

(73) 81

(74) 43

(75) $\frac{8}{9}$

(76) —4

(77) $\frac{800}{13}$, $61\frac{7}{13}$

(78) 138

(79) 5.1

*(80) 1,274 — 1,408

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STOP -- WAIT FOR SIGNAL!

(1) $41914 + 13 + 50314 =$ _____

(2) $25 \times 41 =$ _____

(3) $531.4 - 41.35 =$ _____ (decimal)

(4) $2014 \div 5 =$ _____ (decimal)

(5) $\frac{5}{8} =$ _____ % (mixed number)

(6) $51232014 \div 11$ has a remainder of _____

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

(8) $18 \times 15 + 15 \times 32 =$ _____

(9) $5 \times (3 - 20 + 1) \div 4 =$ _____

*(10) $5314 + 531 + 53 + 5 =$ _____

(11) 2 gallons + 3 quarts + 1 pint = _____ cups

(12) 31% of 31 = _____

(13) $7 \times \frac{7}{11} =$ _____ (mixed number)

(14) $8\frac{3}{5} - 5\frac{3}{8} =$ _____ (mixed number)

(15) $63 \times 44 =$ _____

(16) MMCDXV = _____ (Arabic Numeral)

(17) $\left(\frac{9}{11}\right)^3 =$ _____

(18) \$18.00 is 40% of \$_____

(19) The multiplicative inverse of $-1\frac{5}{7}$ is _____

*(20) $532014 \div 415 =$ _____

(21) Set A has 5 elements and set B has 6 elements. If $A \cup B$ has 8 elements, then $A \cap B$ has ___ elements

(22) $(43 + 61 \times 8) \div 7$ has a remainder of _____

(23) $532 \times 14 =$ _____

(24) $0.1666... + 0.08333... =$ _____

(25) If 8 [A]s cost \$16.40 then 12 [A]s cost \$ _____

(26) If $f(x) = x^3 + 3x^2 + 3x + 1$ then f(11) is _____

(27) The sum of three consecutive even integers is 732. The largest of the three is _____

(28) $2\frac{3}{4} \times 2\frac{7}{11} =$ _____ (mixed number)

(29) Truncate $\sqrt{6}$ to the nearest thousandth. _____

*(30) $\sqrt{5180} \times 68 =$ _____

(31) 5.3222... = _____ (improper fraction)

(32) $214_5 \times 4_5 =$ _____ $_5$

(33) $1 + 5 + 6 + 11 + 17 + ... + 118 + 191 =$ _____

(34) $(5! \div 3!) - (4! \div 2!) =$ _____

(35) The number of positive integral divisors of 54 is ___

(36) $\frac{1}{4}(35^2 - 15^2) =$ _____

(37) Find k if $72^2 - 76^2 = 8k$. k = _____

(38) $4\frac{1}{3} \div 3\frac{1}{4} =$ _____ (mixed number)

(39) 214 base 10 = _____ base 5

*(40) $3195 \times 18.75 \div 6 =$ _____

(41) If $x + 3y = 2$ and $3x - y = 1$ then x = _____

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

(43) $36 \times 0.41666... =$ _____

(44) If $8^{(x-1)} = 2$ then $8^{(x+1)} =$ _____

(45) The number of sides of a regular polygon with an exterior angle measure of 36° is _____

(46) $\frac{17}{22} - \frac{35}{43} =$ _____

(47) $5^2 \times 2^5 =$ _____

(48) $(6 + 7i)(3 - 2i) = a + bi$. Find $a + b$. _____

(49) $(\frac{x^2 + 10x + 25}{x - 5})(\frac{x^2 - 10x + 25}{x^2 - 25}) = x +$ _____

*(50) $\frac{\sqrt{5} - 1}{2} \times e \times 10^3 =$ _____

(51) The first 4 digits of the decimal of $\frac{313}{333}$ is 0._____

(52) If $\log_4(x) = 2.5$ then x = _____

(53) The sum of the coefficients of $(5x + 4y)^3$ is _____

(54) ${}_8P_2 =$ _____

(55) $\frac{1}{5} + \frac{1}{10} + \frac{1}{15} + \frac{1}{20} =$ _____

(56) The larger root of $2x^2 + 7x - 15 = 0$ is _____

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

(58) Change $0.313131..._4$ to a base 4 fraction. _____ 4

(59) $514 \times 415 =$ _____

*(60) $25^3 \div 5^4 \times 5^5 =$ _____

(61) $53^2 - 50^2 + 47^2 - 44^2 =$ _____

(62) $f(x) = 1 - x^2$ and $g(x) = 2x - 1$. $f(g(2)) =$ _____

(63) $444 \times \frac{4}{37} =$ _____

(64) The frequency of $y = 1 - 2\sin(\frac{3\pi}{4}\theta + 5)$ is _____

(65) A box of beads contains 8 different solid color beads. How many different 5 bead strings can be created? _____

(66) $\csc(30°) \times \sec(60°) \times \cot(45°) =$ _____

(67) GCD(k, 35) = 7. LCM(k, 35) = 70. k = _____

(68) Find C if $\det\begin{bmatrix} C & -3 \\ 1 & 6 \end{bmatrix} = -9$. C = _____

(69) If $x^3 - 3x^2 + 3x - 1 = 0$, then the harmonic mean of the roots is _____

*(70) $\sqrt{5032014} =$ _____

(71) $F(x) = (2x + 1)^4$. Find $F'(-1) =$ _____

(72) If $x > 0$ and $x^3 = \sqrt{3x^4 + 3x^4 + 3x^4}$ then x = ___

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

(74) What is the first *abundant* number? _____

(75) $\int_0^{\frac{\pi}{3}} \cos(\frac{x}{2})\,dx =$ _____

(76) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\frac{\sqrt{7} + \sqrt{6}}{5}\right]$. _____

(77) The 33rd triangular number is _____

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

(79) $77 \times 44 = k \times 22$. k = _____

*(80) $11^5 \div 5 =$ _____

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

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

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

(1) 92,241

(2) 1,025

(3) 490.05

(4) 402.8

(5) $62\frac{1}{2}$

(6) 9

(7) $7\frac{11}{12}$

(8) 750

(9) — 20

*(10) 5,608 — 6,198

(11) 46

(12) 9.61, $\frac{961}{100}$, $9\frac{61}{100}$

(13) $4\frac{5}{11}$

(14) $3\frac{9}{40}$

(15) 2,772

(16) 2,415

(17) $\frac{729}{1331}$

(18) $45.00

(19) $-\frac{7}{12}$

*(20) 1,218 — 1,346

(21) 3

(22) 6

(23) 7,448

(24) .25, $\frac{1}{4}$

(25) $24.60

(26) 1,728

(27) 246

(28) $7\frac{1}{4}$

(29) 2.449

*(30) 4,650 — 5,138

(31) $\frac{479}{90}$

(32) 1,421

(33) 495

(34) 8

(35) 8

(36) 250

(37) — 74

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

(39) 1324

*(40) 9,486 — 10,483

(41) .5, $\frac{1}{2}$

(42) $-\frac{5}{3}, -1\frac{2}{3}$

(43) 15

(44) 128

(45) 10

(46) $-\frac{39}{946}$

(47) 800

(48) 41

(49) 5

*(50) 1,596 — 1,763

(51) 9399

(52) 32

(53) 729

(54) 56

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

(56) 1.5, $\frac{3}{2}$, $1\frac{1}{2}$

(57) 1

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

(59) 213,310

*(60) 74,219 — 82,031

(61) 582

(62) — 8

(63) 48

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

(65) 792 omit

(66) 4

(67) 14

(68) — 2

(69) 1

*(70) 2,132 — 2,355

(71) — 8

(72) 3

(73) 5.5, $\frac{11}{2}$, $5\frac{1}{2}$

(74) 12

(75) 1

(76) 1

(77) 561

(78) 68.75

(79) 154

*(80) 30,600 — 33,820

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

Final _____ _____
2nd _____ _____
1st _____ _____
Score Initials

Contestant's Number _____

Read directions carefully before beginning test

DO NOT UNFOLD THIS SHEET UNTIL TOLD TO BEGIN

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STOP -- WAIT FOR SIGNAL!

(1) $519 + 2014 =$ _____

(2) $124 \times 15 =$ _____

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

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

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

(6) $61 \times 16 =$ _____

(7) $23^2 =$ _____

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

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

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

(11) 546738 ÷ 11 has a remainder of _____

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

(13) $14^3 =$ _____

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

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

(16) 37.5% of $24.16 is $_____

(17) MCDXCII = _____ (Arabic Number)

(18) The multiplicative inverse of 1.2 is _____

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

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

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

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

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

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

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

(26) $52 \times 101 =$ _____

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

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

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

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

(31) 123 base 7 = _____ base 10

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

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

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

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

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

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

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

(39) $256 \times 0.4375 =$ _____

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

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

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

(43) $108 \times 107 =$ _____

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

(45) $14641 \div 2.75 =$ _____

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

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

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

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

*(50) 2014 is 519% of _____

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(67) $521 \times 214 =$ _____

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(1) 2,533

(2) 1,860

(3) 31.76

(4) 50.25

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

(6) 976

(7) 529

(8) 0

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

*(10) 4,448 — 4,916

(11) 5

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

(13) 2,744

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

(15) 4

(16) $9.06

(17) 1,492

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

(19) 246

*(20) 170,573 — 188,527

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

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

(23) 7

(24) 72

(25) 22

(26) 5,252

(27) $22.50

(28) 1.7

(29) 6

*(30) 3,421 — 3,780

(31) 66

(32) 11

(33) — 1

(34) — .25, $-\frac{1}{4}$

(35) — 200

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

(37) 1,120

(38) 576

(39) 112

*(40) 11,739 — 12,974

(41) — 7

(42) 3

(43) 11,556

(44) 2

(45) 5,324

(46) 40

(47) 10,101

(48) 30

(49) 110

*(50) 369 — 407

(51) 1122

(52) 4

(53) — 800

(54) 40

(55) — 160

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

(57) — 3

(58) 474

(59) 91

*(60) 1,533,665 — 1,695,103

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

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

(63) 8,190

(64) 84

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

(66) — 4

(67) 111,494

(68) 28

(69) 15

*(70) 1,538 — 1,698

(71) 60

(72) 1

(73) — 47

(74) 7

(75) 27

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

(77) 14

(78) 59

(79) 4.8

*(80) 419 — 463

2013-14 TMSCA High School Number Sense Test 6

Final _____ _____

Contestant's Number _____ 2nd _____ _____

1st _____ _____

Score Initials

Read directions carefully before beginning test

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STOP -- WAIT FOR SIGNAL!

(1) $127 + 2013 =$ _____

(2) $32 \times 25 =$ _____

(3) $246 \div 8 =$ _____ (mixed number)

(4) $7021 - 1207 =$ _____

(5) $\frac{12}{13} \times 12 =$ _____ (mixed number)

(6) $18 \times 24 + 24 \times 32 =$ _____

(7) $\frac{22}{25} =$ _____ %

(8) $20.13 \div 0.3 =$ _____ (decimal)

(9) $3\frac{4}{5} - 1\frac{2}{3} =$ _____ (mixed number)

*(10) $4111 + 411 + 41 + 4 =$ _____

(11) $16^2 =$ _____

(12) $(12 - 10) \div 8 \times 6 + 4 =$ _____

(13) $1 + 2 + 3 + 4 + 5 + ... + 19 + 20 =$ _____

(14) Which is larger, $\frac{9}{14}$ or $\frac{7}{12}$? _____

(15) $34 \times 43 =$ _____

(16) 15% of \$24.00 is \$ _____

(17) 4 gallons — 8 quarts = _____ pints

(18) The mean of 12, 27, and 33 is _____

(19) $\frac{3}{4} + \frac{7}{8} + \frac{15}{16} =$ _____

*(20) $127 \times 3102 =$ _____

(21) $22 \times \frac{22}{25} =$ _____ (mixed number)

(22) $(120 \times 620 - 13) \div 7$ has a remainder of _____

(23) $126 \times 13 =$ _____

(24) $2^4 + 3^3 - 4^2 = k^3$. k = _____

(25) If 6 ★s cost \$12.00 then 15 ★s cost \$_____

(26) 90 has _____ positive integral divisors

(27) 55 base 10 is equivalent to _____ base 5

(28) The set {p,r,i,m,e} has _____ 3-elements subsets

(29) 201312k is divisible by 11. Find $k > 0$. _____

*(30) $12 \times 48 + 36 \times 24 =$ _____

(31) Round $\sqrt{2} \times \sqrt{3}$ to the tenths place. _____

(32) $4 + 7 + 11 + 18 + 29 + ... + 199 + 322 =$ _____

(33) $9! \div 7! - 4! =$ _____

(34) A rectangle has a length of 9" and a width of 6". The ratio of its perimeter to its area is _____

(35) $4\frac{1}{2} \div 2\frac{1}{4} =$ _____

(36) If $4 - 3x = 2$, then $2x + 3 =$ _____

(37) $1/4(81^2 - 19^2) =$ _____

(38) $1206_8 + 2013_8 =$ _____ 8

(39) If $A \cup B$ has 11 elements, set A has 7 elements, and $A \cap B$ has 4 elements, then set B has ____ elements.

*(40) $\sqrt{3760} \times \sqrt{1090} =$ _____

(41) The smallest leg of a right triangle is 9" long and the hypotenuse is 41" long. Find the perimeter of the triangle. _____ inches

(42) Let $3x - 2y = 1$ and $x - 2y = 3$. Find y. _____

(43) The measure of a central angle of a regular hexagon is _____ degrees

(44) The smaller root of $x^2 + 5x - 24 = 0$ is _____

(45) $\left(\frac{x^2 + 8x + 16}{x + 4}\right)\left(\frac{x^2 - 8x + 16}{x^2 - 16}\right) = x +$ _____

(46) $1331 \div 1.8333... =$ _____

(47) $100 \times 3! + 25 \times 4! =$ _____

(48) $235_6 \times 4_6 =$ _____ 6

(49) If $\left(\sqrt[3]{a^4}\right)\left(\sqrt[4]{a^k}\right) = \sqrt[12]{a^{25}}$, and $a > 1$, then k = _____

*(50) 350 is 240% of = _____

(51) If y varies directly with x and $x = 3$ when $y = 6$, find x when $y = 4$. _____

(52) If $(4 - 5i)(4 + 5i) = a + bi$. Find $a + b =$ _____

(53) $3\frac{1}{2} - 2\frac{1}{3} + 1\frac{5}{9} - 1\frac{1}{27} + ... =$ _____

(54) $\frac{11}{20} - \frac{43}{81} =$ _____

(55) If $\log_3(4x + 5) = 2$ then $x =$ _____

(56) $126 \times 213 =$ _____

(57) The sum of the coefficients of $(3x + y)^5$ is _____

(58) Change 0.444... base 8 to a base 8 fraction. _____ 8

(59) The odds of winning is 1 to 8. The probability of losing is _____ %

*(60) $666 \times 5454 \div 33 =$ _____

(61) $39 + 39^2 =$ _____

(62) $999 \times \frac{3}{37} =$ _____

(63) $g(x) = 3x^2 - 1$ and $h(x) = 1 + 2x$. $g(h(-1)) =$ ____

(64) The amplitude of $y = 4 - 3\cos(2x - 1)$ is _____

(65) The first 4 digits of the decimal of $\frac{7}{33}$ is 0._____

(66) If $4x^3 + 3x^2 + 2x + 1 = 0$, then the harmonic mean of the roots is _____

(67) If $\log_8 x = -2$, then $\sqrt[3]{x} =$ _____

(68) If $\frac{5x}{6}$ has a remainder of 3 and $\frac{5y}{6}$ has a remainder of 2 then $\frac{xy}{6}$ has a remainder of _____

(69) A bag contains red, brown, green, blue, and yellow M&M's. How many different sets of 4 M&M's can be put in smaller bags? _____

*(70) $11^4 \times 7^2 =$ _____

(71) $34^2 - 31^2 + 28^2 - 25^2 =$ _____

(72) If $A = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$, then $|A| =$ _____

(73) $\frac{1}{15} + \frac{1}{30} + \frac{1}{48} + \frac{1}{80} =$ _____

(74) $\int_1^4 (x)\, dx =$ _____

(75) If GCD(4, x) = 2 and LCM(4, x) = 20, then $x =$ ____

(76) If $f(x) = 2x + 1$, then $f^{-1}(3) =$ _____

(77) $2\left(\frac{7}{11} + \frac{11}{7}\right) =$ _____

(78) If $f(x) = -x^2 + 3x + 4$ then $f'(5) =$ _____

(79) $\frac{7}{40} =$ _____ % (decimal)

*(80) $0.2444... \times 4.5 \times 10^3 =$ _____

2013-14 TMSCA High School Number Sense Test 6 - Answer Key

*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) 2,140

(2) 800

(3) $30\frac{3}{4}$

(4) 5,814

(5) $11\frac{1}{13}$

(6) 1,200

(7) 88

(8) 67.1

(9) $2\frac{2}{15}$

*(10) 4,339 — 4,795

(11) 256

(12) 5.5, $\frac{11}{2}$, $5\frac{1}{2}$

(13) 210

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

(15) 1,462

(16) $3.60

(17) 16

(18) 24

(19) 2.5625, $\frac{41}{16}$, $2\frac{9}{16}$

*(20) 347,257 — 413,651

(21) $19\frac{9}{25}$

(22) 5

(23) 1,638

(24) 3

(25) $30.00

(26) 12

(27) 210

(28) 10

(29) 1

*(30) 1,368 — 1,512

(31) 2.4

(32) 836

(33) 48

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

(35) 2

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

(37) 1,550

(38) 3221

(39) 8

*(40) 1,924 — 2,125

(41) 90

(42) —2

(43) 60

(44) —8

(45) —4

(46) 726

(47) 1,200

(48) 1432

(49) 3

*(50) 139 — 153

(51) 2

(52) 41

(53) 2.1, $\frac{21}{10}$, $2\frac{1}{10}$

(54) $\frac{31}{1620}$

(55) 1

(56) 26,838

(57) 1,024

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

(59) $\frac{800}{9}$, $88\frac{8}{9}$

*(60) 104,569 — 115,575

(61) 1,560

(62) 81

(63) 2

(64) 3

(65) 2121

(66) $-1.5, -\frac{3}{2}, -1\frac{1}{2}$

(67) .25, $\frac{1}{4}$

(68) 0

(69) 70

*(70) 681,539 — 753,279

(71) 354

(72) 5

(73) $\frac{2}{15}$

(74) 7.5, $\frac{15}{2}$, $7\frac{1}{2}$

(75) 10

(76) 1

(77) $\frac{340}{77}$, $4\frac{32}{77}$

(78) —7

(79) 17.5

*(80) 1,045 — 1,155

2013-14 TMSCA High School Number Sense Test 12

Final _____ _____

Contestant's Number _____ 2nd _____ _____

1st _____ _____

Score Initials

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STOP -- WAIT FOR SIGNAL!

(1) $3614 - 4163 =$ _____

(2) $314 \div 7 =$ _____ (mixed number)

(3) $1.234 + 5.67 =$ _____ (decimal)

(4) $1\frac{2}{9} \times \frac{9}{11} =$ _____

(5) $76\% =$ _____ (proper fraction)

(6) $312014 \div 11$ has a remainder of _____

(7) MDCLXIV = _____ (Arabic Numeral)

(8) $22 \times 47 - 25 \times 22 =$ _____

(9) $241608 \div 8 =$ _____

*(10) $31 + 314 + 3142 + 31428 =$ _____

(11) $\frac{7}{200} =$ _____ % (decimal)

(12) 1 yard + 2 feet = _____ inches

(13) $49 \times 75 =$ _____

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

(15) $4 + 8 + 12 + 16 + \ldots + 40 =$ _____

(16) The LCM of 42 and 63 is _____

(17) The largest prime factor of 78 is _____

(18) $36 - 20 \div 14 \times 7 + 5 =$ _____

(19) Which is smaller, $-\frac{3}{7}$ or $-.41$? _____

*(20) $31 \times 42 \times 857 =$ _____

(21) $|3 - 1| - |4 - 2| - 8 + |5 - 7| =$ _____

(22) The multiplicative inverse of 4.125 is _____

(23) $314 \times 101 =$ _____

(24) If 4 PIs cost \$9.00 then 6 PIs cost \$_____

(25) If $f(x) = x^3 - 3x^2 + 3x - 1$ then $f(13)$ is _____

(26) $\frac{1}{4}(32^2 - 28^2) =$ _____

(27) $0.2777\ldots =$ _____ (proper fraction)

(28) $6\frac{5}{6} \times 6\frac{1}{6} =$ _____ (mixed number)

(29) 31428K is divisible by 6 and 5. K is _____

*(30) $47 \times 13 + 24 \times 36 =$ _____

(31) $21 \times 4! - 4 \times 3! =$ _____

(32) If $24^2 - 28^2 = 8x$, then $x =$ _____

(33) $235_7 - 66_7 =$ _____ $_7$

(34) Round $\sqrt{7}$ to the tenths place. _____

(35) R and S are the roots of $5x^2 + 24x - 5 = 0$. Find $R + S - RS$. _____

(36) $(17 \times 13 - 11) \div 9$ has a remainder of _____

(37) Let $2x + y = 3$ and $x + 3y = 2$. Find $y =$ _____

(38) Set A has 11 elements, B has 8 elements, and $A \cap B$ has 5 elements. $A \cup B$ has _____ elements

(39) $\sqrt{32} + \sqrt{50} = \sqrt{x}$. Find x. _____

*(40) $345345 \div 111 =$ _____

(41) The y-intercept of the line containing the points $(1, -2)$ and $(5, 2)$ is (x, y). $y =$ _____

(42) $602^2 =$ _____

(43) The larger root of $3x^2 + 5x - 2 = 0$ is _____

(44) $16 \times 0.4375 =$ _____

(45) $235_6 \times 5_6 =$ _____ 6

(46) The sum of the measures of the interior angles of a convex septagon is _____°

(47) Given 2, 1, 3, 4, 7, ... 47, k, 123, ... Find k. _____

(48) $(9 \times 1234 + 5) \div 11 =$ _____ (mixed number)

(49) $36 \times 4! =$ _____

*(50) $9^4 \div 18^2 \times 4^3 =$ _____

(51) $\left(\frac{x^2 - 6x + 9}{x + 3}\right)\left(\frac{x^2 + 6x + 9}{x^2 - 9}\right) = x +$ _____

(52) If $4\log_x 2 = 0.5$ then $x =$ _____

(53) Point (x, y) is the vertex of the parabola $y = x^2 - 4x + 7$. Find $x + y$. _____

(54) The first 4 digits of the decimal of $\frac{229}{990}$ is 0._____

(55) The sides of a triangle are 5, 10 and x. The greatest value of x, where x is a natural number, is _____

(56) ${}_5C_3 \div {}_5C_2 = {}_5C_k$. Find $k > 0$. _____

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

(58) $323 \times 212 =$ _____

(59) Change 0.1444... base 5 to a base 5 fraction. ____ 5

*(60) $(22)^3 =$ _____

(61) $33^2 - 31^2 + 29^2 - 27^2 =$ _____

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

(63) If $2x^3 - 3x^2 + 4x - 5 = 0$, then the harmonic mean of the roots is _____

(64) Tye Gerr has white, yellow, pink, and orange golf balls. How many different sets of 4 golf balls can he package? _____

(65) $g(x) = 2x^3 - 4$ and $h(x) = 1 + 3x^2$. $h(g(1)) =$ _____

(66) $F(x) = 2x^3 - 3x^2 + 4x + 5$. Find $f'(-1) =$ _____

(67) $\frac{5}{8} + \frac{5}{24} + \frac{5}{48} =$ _____

(68) The sum of the first nine terms of the Fibonacci characteristic sequence 1, 5, 6, 11, 17, 28, ... is _____

(69) If $\text{Log}_x 64 = 2$, then $\sqrt[3]{x} =$ _____

*(70) The area of the ellipse $121x^2 + 45y^2 = 5445$ is _____

(71) A pair of dice is tossed. The probability that the sum is 7 or 11 is _____

(72) $999 \times \frac{11}{27} =$ _____

(73) $11_2 \times 22_3 =$ _____ 4

(74) If GCD(k, 40) = 4 and LCM(k, 40) = 120, then k = _____

(75) $y = \frac{x^2 - 4x}{x + 1}$ has a how many asymptotes? _____

(76) Let $f(x) = \sqrt{x + 1}$. Find $f^{-1}(2)$. _____

(77) $\int_1^3 (1 - x^2)\, dx =$ _____

(78) The minimum value of $2 - 3\cos(4x)$ is _____

(79) $2^4 + 3^4 + 4^4 =$ _____

*(80) 16% of $(312.5 \div \frac{5}{32}) =$ _____

2013-14 TMSCA High School Number Sense Test 12 - Answer Key

***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) — 549

(2) $44\frac{6}{7}$

(3) 6.904

(4) 1

(5) $\frac{19}{25}$

(6) 10

(7) 1,664

(8) 484

(9) 30,201

*(10) 33,170 — 36,660

(11) 3.5

(12) 60

(13) 3,675

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

(15) 220

(16) [redacted]126

(17) 13

(18) 31

(19) $-\frac{3}{7}$

*(20) 1,060,024 — 1,171,604

(21) — 6

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

(23) 31,714

(24) $13.50

(25) 1,728

(26) 60

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

(28) $42\frac{5}{36}$

(29) 0

*(30) 1,402 — 1,548

(31) 480

(32) — 26

(33) 136

(34) 2.6

(35) $-3.8, -\frac{19}{5}, -3\frac{4}{5}$

(36) 3

(37) .2, $\frac{1}{5}$

(38) 14

(39) 162

*(40) 2,956 — 3,266

(41) — 3

(42) 362,404

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

(44) 7

(45) 2111

(46) 900

(47) 76

(48) $1010\frac{1}{11}$

(49) 864

*(50) 1,232 — 1,360

(51) — 3

(52) 256

(53) 5

(54) 2,313

(55) 14

(56) 5

(57) 1

(58) 68,476

(59) $\frac{2}{10}$

*(60) 10,116 — 11,180

(61) 240

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

(63) 3.75, $\frac{15}{4}, 3\frac{3}{4}$

(64) 35

(65) 13

(66) 16

(67) $\frac{15}{16}$

(68) 304

(69) 2

*(70) 221 — 243

(71) $\frac{2}{9}$

(72) 407

(73) 120

(74) 12

(75) 2

(76) 3

(77) $-6\frac{2}{3}$

(78) — 1

(79) 353

*(80) 304 — 336

2013-14 TMSCA High School State Meet

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) $31514 + 4102 - 513 =$ _____

(2) $2014 \times 11 =$ _____

(3) $315 \div 8 =$ _____ (decimal)

(4) $31 \times 15 + 15 \times 19 =$ _____

(5) $\frac{21}{25} \times \frac{5}{6} =$ _____

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

(7) $246 \times 3 - 5 =$ _____

(8) $(27)^2 =$ _____

(9) $8 + 11 \times 10 - 15 \div 3 =$ _____

*(10) $32214 + 32914 + 50314 + 51914 =$ _____

(11) 35% of 35 = _____

(12) $\frac{3}{4} - \frac{5}{16} + \frac{7}{32} =$ _____

(13) $24 \times 31 =$ _____

(14) $6 + 11 + 16 + 21 + \ldots + 56 =$ _____

(15) Which is smaller $\frac{17}{18}$ or $\frac{7}{8}$? _____

(16) MCXI = _____ (Arabic Numeral)

(17) $\left(\frac{11}{12}\right)^3 =$ _____

(18) The sum of the prime factors of 315 is _____

(19) 2.375 tons = _____ pounds

*(20) $4102531 \div 315 =$ _____

(21) $5\frac{4}{9} \times 5\frac{5}{9} =$ _____ (mixed number)

(22) 3152014 ÷ 11 has a remainder of _____

(23) $44 \times 101 =$ _____

(24) $2^5 + 3^3 - 4 = 5k$. k = _____

(25) If $f(x) = 9x^2 - 12x + 4$ then f(8) is _____

(26) $|1 - 2| - 3|5 - 8| + |13 - 21| =$ _____

(27) If 24★'s cost $8.88 then a half dozen ★'s cost $___

(28) The sum of three consecutive integers is 948. The smallest of the three is _____

(29) 4.5666... = _____ (mixed number)

*(30) $\sqrt{531} \times 315 =$ _____

(31) $(15 \times 25 - 35) \div 4$ has a remainder of _____

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

(33) How many positive integral divisors does 57 have? _____

(34) $\frac{8!\,5!}{7!\,6!} =$ _____

(35) Let $3x - 5 = 2$ then $2x + 7 =$ _____

(36) 25% of $(48^2 - 2^2) =$ _____

(37) $111001_2 =$ _____ 8

(38) $\sqrt{48} + \sqrt{75} = \sqrt{x}$. Find x. _____

(39) A rectangle's perimeter is 50". If its width is 5" less than its length, then the area is _____ sq. in

*(40) $17 \times 51 + 24 \times 72 =$ _____

(41) $0.6875 \times 16 =$ _____

(42) What percent of $333\frac{1}{3}$ is 60? _____%

(43) The x-intercept of the line $3x - 1 = 2y$ is (h, k). Find $h + k$. _____

(44) $\left(\frac{x^2 + 10x + 25}{x - 5}\right)\left(\frac{x^2 - 10x + 25}{x^2 - 25}\right) = x +$ _____

(45) $85 \times 125 =$ _____

(46) If $6^x = 72$ then $6^{(x-3)} =$ _____

(47) If 85, 13, and b are the integral sides of a right triangle then b = _____

(48) ${}_9P_2 =$ _____

(49) The measure of an interior angle of a regular nonagon is _____ degrees

*(50) $333 \times 16\frac{2}{3} \div 0.222... =$ _____

(51) $(3 + 4i)(4 - 3i) = a + bi$. Find $a + b$. _____

(52) The next term of the geometric series $\frac{4}{9}, -\frac{2}{3}, 1, ...$ is _____

(53) The sum of the coefficients of $(3x - 5y)^5$ is _____

(54) $315 \times 224 =$ _____

(55) $\frac{4}{7} - \frac{43}{78} =$ _____

(56) The first 4 digits of the decimal of $\frac{417}{999}$ is 0._____

(57) The probability of losing is 24%. The odds of winning is _____

(58) If $\frac{2x}{7}$ has a remainder of 4 and $\frac{4y}{7}$ has a remainder of 6 then $\frac{3xy}{7}$ has a remainder of _____

(59) If y varies directly with x and $y = 4$ when $x = 12$, find x when $y = 9$. _____

*(60) $(33)^2 + (22)^3 =$ _____

(61) $89^2 + 89 =$ _____

(62) Change $0.\overline{32}$ base 4 to a base 4 fraction. _____ 4

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

(64) $777 \times \frac{21}{37} =$ _____

(65) $54^2 - 57^2 + 60^2 - 63^2 =$ _____

(66) The slope of the line $3x - 5y = 7$ is _____

(67) If $x^3 - 9x^2 + 23x - 15 = 0$, then the harmonic mean of the roots is _____

(68) $\frac{1}{10} + \frac{1}{15} + \frac{1}{21} + \frac{1}{28} =$ _____

(69) If $\log_5 625 = x$ then $3^{-x} =$ _____

*(70) $(2.3e)^2(2.9\pi)^2 =$ _____

(71) If $\cos\theta = \frac{\sqrt{2}}{2}$, where $\frac{3\pi}{2} < \theta < 2\pi$, then $\sin^2\theta =$ _____

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

(73) A bank has \$1, \$5, \$10, \$20, \$50, and \$100 bills. How many packets of 4 bills can be made? _____

(74) The sum of the first eleven terms of the Fibonacci type sequence 1, 4, 5, 9, 14, 23, 37, ... is _____

(75) $\int_1^4 (2x + 1)\,dx =$ _____

(76) If GCD(14, x) = 2 and LCM(14, x) = 56 then x = __

(77) If $\det\begin{bmatrix} -1 & 6 \\ 3 & x \end{bmatrix} = -16$, then x = _____

(78) The frequency of $y = 3\sin(5\pi x + 1) - 2$ is _____

(79) $14 \times 72 = 56 \times$ _____

*(80) 1 mile + 1 yard + 1 foot = _____ feet

2013-14 TMSCA High School State Meet Number Sense - Answer Key

*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) 35,103

(2) 22,154

(3) 39.375

(4) 750

(5) .7, $\frac{7}{10}$

(6) 6.25

(7) 733

(8) 729

(9) 113

*(10) 158,989 — 175,723

(11) 12.25, $\frac{49}{4}$, $12\frac{1}{4}$

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

(13) 744

(14) 341

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

(16) 1,111

(17) $\frac{1331}{1728}$

(18) 15

(19) 4,750

*(20) 12,373 — 13,675

(21) $30\frac{20}{81}$

(22) 8

(23) 4,444

(24) 11

(25) 484

(26) 0

(27) $2.22

(28) 315

(29) $4\frac{17}{30}$

*(30) 6,896 — 7,621

(31) 0

(32) 1.8, $\frac{9}{5}$, $1\frac{4}{5}$

(33) 4

(34) $\frac{4}{3}$, $1\frac{1}{3}$

(35) $\frac{35}{3}$, $11\frac{2}{3}$

(36) 575

(37) 71

(38) 243

(39) 150

*(40) 2,466 — 2,724

(41) 11

(42) 18

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

(44) 5

(45) 10,625

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

(47) 84

(48) 72

(49) 140

*(50) 23,727 — 26,223

(51) 31

(52) -1.5, $-\frac{3}{2}$, $-1\frac{1}{2}$

(53) -32

(54) 70,560

(55) $\frac{11}{546}$

(56) 4,174

(57) $\frac{19}{6}$, $3\frac{1}{6}$

(58) 2

(59) 27

*(60) 11,151 — 12,323

(61) 8,010

(62) $\frac{32}{33}$

(63) 99

(64) 441

(65) -702

(66) .6, $\frac{3}{5}$

(67) $\frac{45}{23}$, $1\frac{22}{23}$

(68) .25, $\frac{1}{4}$

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

*(70) 3,083 — 3,406

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

(72) 96

(73) 126

(74) 661

(75) 18

(76) 8

(77) -2

(78) 2.5, $\frac{5}{2}$, $2\frac{1}{2}$

(79) 18

*(80) 5,020 — 5,548