The University Interscholastic League
Number Sense Test • HS District 1 • 2016

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) $356 + 817 =$ _____

(2) $815 - 324 =$ _____

(3) $325 \times 7 =$ _____

(4) $1947 \div 3 =$ _____

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

(6) $0.444 =$ _____ % (mixed number)

(7) $8 + 15 - 20 \times 16 \div (6 - 8) =$ _____

(8) $2\frac{5}{8} - \frac{5}{6} =$ _____

(9) $18^2 =$ _____

*(10) $247 + 2126 - 1014 + 4756 =$ _____

(11) $11^3 =$ _____

(12) The arithmetic mean of 20, 16, and _____ is 17

(13) $81547 \div 9$ has a remainder of _____

(14) 21% of 21 = _____ (decimal)

(15) Which is larger, $\frac{5}{6}$ or 0.83? _____

(16) $2\frac{2}{7} + 3\frac{1}{4} =$ _____ (mixed number)

(17) 1 quart + 2 pint + 3 cup = _____ fluid ounces

(18) If 12★'s cost $20.20 then 3★'s cost $ _____

(19) CDLIV = _____ (Arabic numeral)

*(20) $42116 \div 595 =$ _____

(21) The multiplicative inverse of 1.333... is _____

(22) $25^2 + 75^2 =$ _____

(23) $3 - |2 - 4| + |1 - 6| =$ _____

(24) Let $x = -4$. Find $3x - 2$. _____

(25) The sum of three consecutive integers is 132. The largest of the three is integers is _____

(26) 0.2333... = _____ (proper fraction)

(27) Let $\frac{4x}{5} = \frac{2}{3}$. Find x. _____

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

(29) 24% of $433\frac{1}{3} =$ _____

*(30) $32126 \div 15 =$ _____

(31) $235 \times 111 =$ _____

(32) If $6x - 4 = 2$, then $x - 8 =$ _____

(33) The set A = {A,U,S,T,I,N} contains how many proper subsets? _____

(34) $21 \times \frac{23}{25} =$ _____ (mixed number)

(35) Truncate $\sqrt{7}$ to the tenths place. _____

(36) $37 \times 43 =$ _____

(37) 36 base 9 in base 10 is _____

(38) The area of a square is 196 cm^2. The perimeter of the square is _____ cm

(39) $(25 + 35 \times 45) \div 6$ has a remainder of _____

*(40) $\sqrt{32126} =$ _____

(41) $27 \times 33 + 9 =$ _____

(42) The leg opposite the 30° angle in a right triangle is 30 cm. The hypotenuse is _____ cm

(43) $28^2 + 78^2 =$ _____

(44) Find the slope of the line through the points $(-2, -3)$ and $(5, -8)$. _____

(45) The product of the roots of $(2x - 3)^3 = 0$ is _____

(46) How many triangles meet at each vertex of a Platonic icosahedron? _____

(47) $1110_4 \div 3_4 =$ _____ 4

(48) The sum of the integral values of x such that $3 + |x - 2| \leq 5$ is _____

(49) $4\frac{3}{5} \div 3\frac{2}{3} =$ _____ (mixed number)

*(50) $6 \times 7^2 \times 8^3 =$ _____

(51) The midpoint of the segment with endpoints $(-3, -2)$ and $(-8, 5)$ is (x, y). $x + y =$ _____

(52) Let $a^4b^3 \times (ab)^{-2} \div a^{-1} = a^m b^n$. $m + n =$ _____

(53) Let $\frac{6!}{4!} = \frac{(x+1)!}{x!}$. Find x. _____

(54) The odds of selecting a vowel from the letters in the word "fraction" is _____

(55) ${}_6C_4 \times {}_5C_3 =$ _____

(56) The sum of the coefficients of the x^3y term and the xy^3 term of $(x + y)^4$ is _____

(57) $5 + 9 + 14 + 23 + 37 + ... + 157 + 254 =$ _____

(58) $321 \times 326 =$ _____

(59) $\left(\frac{1}{6}\right)^2 \div \left(\frac{1}{12}\right)^2 \times \left(\frac{1}{24}\right)^2 =$ _____

*(60) $8151947 \div 326 =$ _____

(61) The sum of the reciprocals of all of the positive divisors of 10 is _____

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

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

(64) If $\log_5(4x - 3) = 2$ then $x^3 =$ _____

(65) $9^{11} \div 13$ has a remainder of _____

(66) Change 0.5333... base 6 to a base 10 fraction. _____

(67) The sum of the positive integral divisors of 42 is ___

(68) $\left(2\sin\left(\frac{5\pi}{6}\right)\cos\left(\frac{5\pi}{6}\right)\right)^2 =$ _____

(69) How many lines are determined by five points, no three of which are collinear? _____

*(70) $(3 + 10 + 17 + 24 + ... + 52 + 59)^2 =$ _____

(71) The first four digits of the decimal for $\frac{23}{333}$ is 0.___

(72) The product of the 4th triangular number and the 3rd pentagonal number is _____.

(73) Let $f(x) = 2x^3 + 3x^2 + 2x + 3$. Find $f''(-2) =$ ___

(74) If $f(x) = \frac{2x+3}{5}$, then $f^{-1}(4) =$ _____

(75) $(2 - 3i)(4 - 5i) = (a + bi)$. Find $(a + b)$. _____

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

(77) The smallest element of the domain of $y^2 = 9 - x^2$ is _____

(78) Round $7\sqrt{7}$ to the nearest tenth. _____

(79) The range of the function $y = |2x| - 3$ is $y \geq$ ____

*(80) The simple interest on $4,500.00 at 4.5% for 4.5 years is _____ dollars (integer)

University Interscholastic League - Number Sense Answer Key HS • District 1 • 2016

*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) 1,173

(2) 491

(3) 2,275

(4) 649

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

(6) $44\frac{2}{5}$

(7) 183

(8) $1\frac{19}{24}$

(9) 324

*(10) 5,810 — 6,420

(11) 1,331

(12) 15

(13) 7

(14) 4.41

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

(16) $5\frac{15}{28}$

(17) 88

(18) $5.05

(19) 454

*(20) 68 — 74

(21) .75, $\frac{3}{4}$

(22) 6,250

(23) 6

(24) — 14

(25) 45

(26) $\frac{7}{30}$

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

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

(29) 104

*(30) 2,035 — 2,248

(31) 26,085

(32) — 7

(33) 63

(34) $19\frac{8}{25}$

(35) 2.6, $\frac{13}{5}$, $2\frac{3}{5}$

(36) 1,591

(37) 33

(38) 56

(39) 4

*(40) 171 — 188

(41) 900

(42) 60

(43) 6,868

(44) $-\frac{5}{7}$

(45) $\frac{27}{8}$, $3\frac{3}{8}$

(46) 5

(47) 130

(48) 10

(49) $1\frac{14}{55}$

*(50) 143,002 — 158,054

(51) — 4

(52) 4

(53) 29

(54) .6, $\frac{3}{5}$

(55) 150

(56) 8

(57) 656

(58) 104,646

(59) $\frac{1}{144}$

*(60) 23,756 — 26,256

(61) $1\frac{4}{5}$

(62) 28

(63) 4

(64) 343

(65) 3

(66) $\frac{14}{15}$

(67) 96

(68) .75, $\frac{3}{4}$

(69) 10

*(70) 73,949 — 81,733

(71) 0690

(72) 120

(73) — 18

(74) 8.5, $\frac{17}{2}$, $8\frac{1}{2}$

(75) — 29

(76) 4

(77) — 3

(78) 18.5, $\frac{37}{2}$, $18\frac{1}{2}$

(79) — 3

*(80) 866 — 956