The University Interscholastic League
Number Sense Test • HS District • 2019

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) $329 + 330 + 2019 =$ _____

(2) $16 \times 75 =$ _____

(3) $910 + 203 - 923 =$ _____

(4) $32930 \div 9$ has a remainder of _____

(5) $79 \div 8 - 31 \div 8 =$ _____

(6) $\frac{4}{7} - \frac{7}{8} =$ _____ (proper fraction)

(7) $17 + 24 + 53 + 29 + 36 =$ _____

(8) Which is larger, 0.59 or $\frac{9}{14}$ = _____

(9) The multiplicative inverse of 2.9 is _____

***(10)** $329 + 2019 + 9102 + 923 =$ _____

(11) CCCXXIX = _____ (Arabic Numeral)

(12) The LCM of 18 and 72 is _____

(13) $4\frac{2}{3} - 1\frac{1}{12} =$ _____ (mixed number)

(14) $62 \times 58 =$ _____

(15) 10 is what percent of 8? _____%

(16) The number of prime numbers less than 100 and greater than 80 is _____

(17) $33\frac{1}{3}$% of a yard = _____ inches

(18) $3\frac{1}{2} + 6\frac{2}{3} =$ _____

(19) 6.5% tax on $20.00 is $ _____

***(20)** $329 \times 330 + 2019 =$ _____

(21) $1793 \times 7 + 49 =$ _____

(22) 16% of 36 is 12% of _____

(23) 330 base 10 is _____ base 7

(24) Find the simple interest on $1500.00 at 4% for 18 months. $ _____

(25) If $f(x) = x^2 - 16x + 64$ then $f(25) =$ _____

(26) 0.181818... = _____ (proper fraction)

(27) If $f(x) = 3x^2 + 2x + 9$ then $f(-1) =$ _____

(28) $\frac{3^3}{(2^4)(5^2)} =$ _____ (decimal)

(29) The largest root of $2x^2 + 3x - 2 = 0$ is _____

***(30)** $\sqrt{329330} =$ _____

(31) If $(2x - 9)^2 = ax^2 + bx + c$ then $a + b + c =$ _____

(32) Given: 2, 9, 11, 20, 31, p, q, r, 215, ... r = _____

(33) 40% of 60 minus 80 = _____

(34) If $|x + 18| = 4x$ and $x > 0$ then x = _____

(35) Set A has 14 elements, set B has 11 elements and $A \cup B$ has 15 elements. $A \cap B$ has _____ elements.

(36) $\frac{1}{8}$ is _____ % more than $\frac{1}{10}$

(37) 10110_2 = _____ 4

(38) $8\frac{1}{6} \div 3\frac{1}{2}$ = _____ (mixed number)

(39) The smallest root of $(3x - 1)^2 = \frac{1}{9}$ is _____

*(40) $\left(10\left(\frac{\sqrt{5}+1}{2}\right)\right)^3$ = _____

(41) If $2.5^x = 360$, then $2.5^{(x-1)}$ = _____

(42) If $2x + y = 8$ and $2x - y = 4$, then xy = _____

(43) The area of a circle is 32π in^2. The diameter of this circle is $a\sqrt{b}$ in., where $a > 1$. Find $a + b$. _____

(44) 34×43 = _____

(45) $56^2 + 55^2$ = _____

(46) 32×1111 = _____

(47) $(i)^{22} = a\sqrt{b}$, where $a,b \in \{-1, 1\}$. Find a. _____

(48) A string 3 yards 2 feet long is cut into 3 equal pieces. How long is each piece? _____ inches

(49) $5 + 10 + 15 + 20 \ldots + 70 + 75$ = _____

*(50) $28 \times 21 \times 14 \times 7$ = _____

(51) The integral sides of a right triangle are x, y & 25, where $x < y < 25$ and GCF(x,y) = 1. Find xy. ____

(52) The roots of $x^3 - 6x^2 - x + 1 = 0$ are d, e, and f. Find $(d + e)(e + f)(f + d)$. _____

(53) $\log_4(64) = \log_3($_____$)$

(54) The vertex of $3x^2 + 4x - 5$ is (h, k). h = _____

(55) 2,442 ÷ 111 = _____

(56) Given: 0,2,5,9,14,20,k,35,44... . k = _____

(57) The simplified coefficient of the x^3y^3 term in the expansion of $(x + 2y)^6$ is _____

(58) 1111001_2 = _____ 8

(59) $222 \times \frac{5}{37}$ = _____

*(60) $(28)^5 \div (14)^3$ = _____

(61) How many ways can 3 people be seated in a row of 5 chairs? _____

(62) $12345 \times 8 + 5$ = _____

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

(64) The first four digits of the decimal for $\frac{21}{40}$ base 5 is 0._____ base 5

(65) Let $18^9 \div 9 = (2^x)(9^y)$. Find x - y = _____

(66) 60° C = _____ ° F

(67) If 4 workers can do a job in 12 days, how many can do it in 8 days working at the same rate? _____

(68) $\begin{bmatrix} 1 & 2 \\ -4 & -3 \end{bmatrix} \times \begin{bmatrix} 3 & 4 \\ -2 & -1 \end{bmatrix} = \begin{bmatrix} a & c \\ b & d \end{bmatrix}$. bd = ____

(69) The harmonice mean of the roots of $3x^2 - 14x + 8 = 0$ is _____

*(70) $4167 \div 0.0833 \times \frac{1}{2}$ = _____

(71) Let g(x) = 5x - 1. Find g(g(1)). _____

(72) Find x, $0 \leq x \leq 6$, if $x + 5 \equiv 4 \pmod 7$. _____

(73) If $33_b = 24$ then 42_b = _____

(74) Let $f(x) = (5x - 7)^2$. Find $f'(-3)$. _____

(75) $\lim_{x \to 5} \frac{3x^2}{x+5}$ = _____

(76) $\begin{vmatrix} -1 & 5 \\ -12 & -22 \end{vmatrix}$ = _____

(77) 0.262626... base 8 = _____ base 8 (fraction)

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

(79) 231×101 = _____

*(80) $2222 \times 333 \div 44$ = _____

DO NOT DISTRIBUTE TO STUDENTS BEFORE OR DURING THE CONTEST

University Interscholastic League - Number Sense Answer Key HS • District • 2019
***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) 2,678

(2) 1,200

(3) 190

(4) 8

(5) 6

(6) $-\frac{17}{56}$

(7) 159

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

(9) $\frac{10}{29}$

***(10) 11,755 — 12,991**

(11) 329

(12) 72

(13) $3\frac{7}{12}$

(14) 3,596

(15) 125

(16) 3

(17) 12

(18) $\frac{61}{6}$, $10\frac{1}{6}$

(19) $1.30

***(20) 105,060 — 116,118**

(21) 12,600

(22) 48

(23) 651

(24) $90.00

(25) 289

(26) $\frac{2}{11}$

(27) 10

(28) .0675

(29) .5, $\frac{1}{2}$

***(30) 546 — 602**

(31) 49

(32) 133

(33) — 56

(34) 6

(35) 10

(36) 25

(37) 112

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

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

***(40) 4,025 — 4,447**

(41) 144

(42) 6

(43) 10

(44) 1,462

(45) 6,161

(46) 35,552

(47) — 1

(48) 44

(49) 600

***(50) 54,743 — 60,505**

(51) 168

(52) — 5

(53) 27

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

(55) 22

(56) 27

(57) 160

(58) 171

(59) 30

***(60) 5,959 — 6,585**

(61) 60

(62) 98,765

(63) 3

(64) 2333

(65) 1

(66) 140

(67) 6

(68) 78

(69) $\frac{8}{7}$, $1\frac{1}{7}$

***(70) 23,762 — 26,262**

(71) 19

(72) 6

(73) 30

(74) — 220

(75) 7.5, $\frac{15}{2}$, $7\frac{1}{2}$

(76) 82

(77) $\frac{26}{77}$

(78) — 2

(79) 23,331

***(80) 15,976 — 17,657**