The University Interscholastic League
Number Sense Test ● HS District ● 2018

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) $319 + 2420 + 18 =$ _____

(2) $2.8 - 7.5 =$ _____ **(decimal)**

(3) $24 \times 25 =$ _____

(4) $\frac{1}{9} \div \frac{1}{8} =$ _____

(5) $3 \times 1 \div 9 + 2 - 4 =$ _____

(6) $2418 \div 9 =$ _____ **(mixed number)**

(7) $15^2 =$ _____

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

(9) The negative reciprocal of 1.1 is _____

***(10)** $293 \times 392 =$ _____

(11) The arithmetic mean of 19, 24, and 18 = _____

(12) The GCD of 45 and 36 is _____

(13) $3\frac{1}{4} + 4\frac{1}{3} =$ _____ **(mixed number)**

(14) The LCM of 36 and 45 is _____

(15) If 6 Qs cost $20.18, then 9 Qs cost $ _____

(16) If 1 gram = .04 oz, then 4.8 oz = _____ grams

(17) 30% of 50 less 70 is _____

(18) $2\frac{1}{4} \times 4\frac{1}{2} =$ _____ **(mixed number)**

(19) $11 \times 319 =$ _____

***(20)** $32418 \div 319 =$ _____

(21) The largest prime divisor of 187 is _____

(22) 48% = _____ **(proper fraction)**

(23) Given the set {4, 6, 8, 9, 10, p, 14, 15, q, 18,...}. Find $p + q$. _____

(24) $(3 \times 19 + 24) \div 9$ has a remainder of _____

(25) $4^{-1} - 4^{-2} =$ _____

(26) $15^3 =$ _____

(27) $324 \times 18 =$ _____

(28) 0.0181818... = _____ **(proper fraction)**

(29) $(1991 \times 9 + 81) \div 3 =$ _____

***(30)** $\sqrt{7} \times 498 =$ _____

(31) A septagon has how many vertices? _____

(32) Let $(5x - 2)^2 = ax^2 + bx + c$. Find b. _____

(33) The sum of the positive integral divisors of 24 is __

(34) If $x - 3y = 5$ and $x - 2y = 4$ then $y =$ _____

(35) 2 gallon jugs hold _____ cubic inches of water

(36) 130 base 10 is written as _____base 5

(37) Find the simple interest on $400.00 at a rate of 6% for 8 months. $ _____

(38) Given: 319B4 is divisible by 6. Find B $>$ 5. _____

(39) $3\frac{3}{4}$ is _____ % less than 5

*(40) $24^4 \div 24^2 \times 2^3$ = _____

(41) $31^2 - 26^2$ = _____

(42) $3 + 7 + 11 + 15 + \ldots + 31 + 35$ = _____

(43) ${}_8C_3$ = _____

(44) 75% of a gallon is _____ cups

(45) Let $(ab) \div (a^{-2}b^2) \times (a^3b^{-3}) = a^mb^n$. mn = ____

(46) The 5th pentagonal number is _____

(47) If $3^{(x+y)} = 243$ then $2^{(x+y)}$ = _____

(48) The vertex of $y = 3x^2 + 6x - 9$ is (h, k). h = ____

(49) The largest root of $(x - 2)^2 = \frac{1}{16}$ is _____

*(50) 31924×0.876 = _____

(51) 324×201 = _____

(52) $i \times i \times i \times i$ = _____

(53) $\log_4(8) - \log_4(2)$ = _____

(54) $324_5 \times 11_5$ = _____ 5

(55) (k)(23)(91) = 232,323. k = _____

(56) $\frac{3}{5} + \frac{6}{25} + \frac{12}{125} + \ldots$ = _____

(57) If 1, 9, and x are the integral sides of a triangle, then the least value of x is _____

(58) The sum of the reciprocals of all of the positive integral divisors of 35 is _____

(59) If $x^2 + y^2 = 170$, $x > y > 1$ and both x and y are positive integers, then $x + y$ = _____

*(60) $15 \times 30 \times 45 \times 60$ = _____

(61) Find the sum of all positive integers x such that $3x - 1 \leq 9$. _____

(62) $\begin{bmatrix} 0 & 4 \\ 6 & 8 \end{bmatrix} + \begin{bmatrix} 1 & -3 \\ 6 & -10 \end{bmatrix} = \begin{bmatrix} a & c \\ b & d \end{bmatrix}$. ac — bd = _____

(63) $(3x^2 + x - 9) \div (x - 2)$ has a remainder of _____

(64) 0.2444... base 8 = _____ base 10 (fraction)

(65) Let $f(x) = x^2 - 6x + 9$. Find f(f(3)). _____

(66) cos(240°) = _____

(67) $\sin(\frac{7\pi}{6})$ = _____

(68) The 5th triangular number plus the 3rd pentagonal number is _____

(69) If $20^5 \div 16 = (4^x)(5^y)$, then $x + y$ = _____

*(70) $[(\sqrt{5} + 1) \div 2] \times 100\pi$ = _____

(71) If $4.5^x = 50$ then $4.5^{(x+1)}$ = _____

(72) Find x, $0 \leq x \leq 8$, if $32 + x \equiv 4 \pmod 9$. x = _____

(73) $f'(x) = 3$, $f(2) = 1$, find f(9). _____

(74) The minimum value of $y = x^2 - 4x + 4$ is _____

(75) If $x < 0$ and $|3x + 2| = 4$ then x = _____

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

(77) $9^{11} \div 13$ has a remainder of _____

(78) (0.428571428571428571...) ÷ (0.333...) = _____

(79) 24×1111 = _____

*(80) $3\frac{1}{9} \times 32420 \div 18$ = _____

DO NOT DISTRIBUTE TO STUDENTS BEFORE OR DURING THE CONTEST

University Interscholastic League - Number Sense Answer Key HS ● District ● 2018

***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) 2,757

(2) — 4.7

(3) 600

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

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

(6) $268\frac{2}{3}$

(7) 225

(8) 1,646

(9) $-\frac{10}{11}$

***(10) 109,114 — 120,598**

(11) $\frac{61}{3}, 20\frac{1}{3}$

(12) 9

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

(14) 180

(15) $30.27

(16) 120

(17) — 55

(18) $10\frac{1}{8}$

(19) 3,509

***(20) 97 — 106**

(21) 17

(22) $\frac{12}{25}$

(23) 28

(24) 0

(25) .1875, $\frac{3}{16}$

(26) 3,375

(27) 5,832

(28) $\frac{1}{55}$

(29) 6,000

***(30) 1,252 — 1,383**

(31) 7

(32) — 20

(33) 60

(34) — 1

(35) 462

(36) 1010

(37) $16.00

(38) 7

(39) 25

***(40) 4,378 — 4,838**

(41) 285

(42) 171

(43) 56

(44) 12

(45) — 24

(46) 35

(47) 32

(48) — 1

(49) 2.25, $\frac{9}{4}, 2\frac{1}{4}$

***(50) 26,568 — 29,363**

(51) 65,124

(52) 1

(53) 1

(54) 4114

(55) 111

(56) 1

(57) 9

(58) $\frac{48}{35}, 1\frac{13}{35}$

(59) 18

***(60) 1,154,250 — 1,275,750**

(61) 6

(62) 25

(63) 5

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

(65) 9

(66) — .5, $-\frac{1}{2}$

(67) — .5, $-\frac{1}{2}$

(68) 27

(69) 8

***(70) 483 — 533**

(71) 225

(72) 8

(73) 22

(74) 0

(75) — 2

(76) — 2

(77) 3

(78) $\frac{9}{7}, 1\frac{2}{7}$

(79) 26,664

***(80) 5,324 — 5,883**