The University Interscholastic League
Number Sense Test ● HS SAC ● 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) $2020 - 202 =$ _____

(2) $2019 + 9102 =$ _____

(3) $9 \times 20.2 =$ _____ **(decimal)**

(4) $2020 \div 5 =$ _____

(5) $\frac{2}{3} + \frac{5}{6} =$ _____ **(improper fraction)**

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

(7) $13 \times 14 + 14 \times 17 =$ _____

(8) $11 \times 19 =$ _____

(9) $3 + 6 \div 9 \times 12 - 15 =$ _____

***(10)** $1947 + 1974 + 1978 + 1948 =$ _____

(11) $64\% =$ _____ **(proper fraction)**

(12) $19^2 =$ _____

(13) The LCM of 15 and 9 is _____

(14) The arithmetic mean of 14, 28, and 33 is _____

(15) 8 is what percent of 12? _____%

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

(17) $2019 \div 9$ has a remainder of _____

(18) 2 yards — 2 feet = _____ inches

(19) 9% of $133\frac{1}{3} =$ _____

***(20)** $91 \times 20 \div 9 =$ _____

(21) $1497 \times 3 + 9 =$ _____

(22) If 6 pens cost \$4.80, then 7 pens cost \$ _____

(23) $43 \times 37 =$ _____

(24) The cube root of (-343) is _____

(25) How many subsets containing only 3 elements does the set {e,i,g,h,t} have? _____

(26) $0.242424... =$ _____ **(proper fraction)**

(27) $141_6 =$ _____ $_{10}$

(28) $1 + |3 - 6| - |10 - 15| =$ _____

(29) $(111)(91)(k) = 70{,}707$. $k =$ _____

***(30)** $(48 \div 2 \div 4 \times 11)^2 =$ _____

(31) Let $(23x - 17)^2 = ax^2 + bx + c$. $a + b + c =$ ____

(32) $(15 \times 16 + 17 \times 18) \div 9$ has a remainder of _____

(33) If $x - y = 10$ and $x + y = 6$, then $x =$ _____

(34) Find the smallest positive integer k such that $4k + 17$ is a prime number. _____

(35) The largest root of $(x + 1)^2 = \frac{1}{4}$ is _____

(36) Given: 2, 1, 3, 4, 7, m, 18, n, ... $m + n =$ _____

(37) Find the simple interest on \$600.00 at a rate of 6% for 6 years. \$_____

(38) Let $\frac{4}{5} = \frac{6}{x}$. Find $\frac{1}{x} =$ _____

(39) $1\frac{2}{3}$ is _____ % less than 5

*(40) $\sqrt{15161718} =$ _____

(41) $(104)^3 =$ _____

(42) If $4^{(x+1)} = 6\frac{2}{3}$, then $4^{(x)} =$ _____

(43) If a non-primitive right triangle with integral sides has a base of 9", then the altitude is _____ "

(44) How many lines exist given five coplanar points such that no three points are collinear? _____

(45) $(32)^3 - (31)^3 =$ _____

(46) $17_8 + 35_8 - 62_8 =$ _____ 8

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

(48) $35^2 + 47^2 =$ _____

(49) $(i)^{10} = a\sqrt{b}$, where $a,b \in \{-1, 1\}$. Find $a + b$. ___

*(50) $8 \times 16 \times 24 \times 32 =$ _____

(51) If $44_b = 36$ then $55_b =$ _____

(52) $\frac{4\pi}{9}$ radians = _____ degrees

(53) If $\log_6(216) = x$, then $\log_x(729) =$ _____

(54) $312_4 =$ _____ 2

(55) $\frac{2}{3} + \frac{4}{9} + \frac{8}{27} + \ ... =$ _____

(56) $1 + 4 + 5 + 9 + 14 + 23 + 37 + 60 =$ _____

(57) ${}_6P_3 =$ _____

(58) $213 \times 232 =$ _____

(59) The odds of selecting a prime number from the set of digits is _____

*(60) $(19)^4 = 20 \times$ _____

(61) The shortest distance between (0, — 2) and $5x + 12y = 11$ is _____

(62) Find the sum of the reciprocals of the first four triangular numbers. _____

(63) The 17th term in the sequence 5, 11, 17, 23, ... is ___

(64) $\cos(\frac{10\pi}{3}) =$ _____

(65) $12 \times \frac{13}{14} =$ _____ (mixed number)

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

(67) Find the sum of all positive integers x such that $3x + 5 \leq 15$. _____

(68) $(x^3 + 2x^2 + x + 4) \div (x + 1)$ has remainder _____

(69) 0.1232323... base 4 = _____ base 10 (fraction)

*(70) $719 \div 33\frac{1}{3}\% \times .375 =$ _____

(71) The first four digits of the decimal for $\frac{23}{33}$ base 4 is 0._____ base 4

(72) The sum of the reciprocals of all of the positive divisors of 12 is _____

(73) Let $f'(x) = 2$ and $f(3) = 5$. Find $f(1)$. _____

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

(75) Find k, if $\begin{vmatrix} k & 3 \\ 2 & k \end{vmatrix} = 115$, $k > 0$. _____

(76) $11^9 \div 7$ has a remainder of _____

(77) $(8, \frac{2\pi}{3})$ are polar coordinates for the Cartesian coordinates (x, y). x = _____

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

(79) Find the sum of the squares of the roots of $2x^2 - 9x - 5 = 0$. _____

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

University Interscholastic League - Number Sense Answer Key HS ● SAC ● Fall 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) 1,818

(2) 11,121

(3) 181.8

(4) 404

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

(6) .625

(7) 420

(8) 209

(9) — 4

***(10) 7,455 — 8,239**

(11) $\frac{16}{25}$

(12) 361

(13) 45

(14) 25

(15) $\frac{200}{3}$, $66\frac{2}{3}$

(16) 10

(17) 3

(18) 48

(19) 12

***(20) 193 — 212**

(21) 4,500

(22) $5.60

(23) 1,591

(24) — 7

(25) 10

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

(27) 61

(28) — 1

(29) 7

***(30) 4,139 — 4,573**

(31) 36

(32) 6

(33) 8

(34) 3

(35) — .5, $-\frac{1}{2}$

(36) 40

(37) $216.00

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

(39) $\frac{200}{3}$, $66\frac{2}{3}$

***(40) 3,700 — 4,088**

(41) 1,124,864

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

(43) 40

(44) 10

(45) 2,977

(46) — 6

(47) 2.25, $\frac{9}{4}$, $2\frac{1}{4}$

(48) 3,434

(49) 0

***(50) 93,389 — 103,219**

(51) 45

(52) 80

(53) 6

(54) 110110

(55) 2

(56) 153

(57) 120

(58) 49,416

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

***(60) 6,191 — 6,841**

(61) $\frac{35}{13}$, $2\frac{9}{13}$

(62) 1.6, $\frac{8}{5}$, $1\frac{3}{5}$

(63) 101

(64) — .5, $-\frac{1}{2}$

(65) $11\frac{1}{7}$

(66) 32

(67) 6

(68) 4

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

***(70) 769 — 849**

(71) 2323

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

(73) 1

(74) 0

(75) 11

(76) 1

(77) — 4

(78) 4.2

(79) 25.25, $\frac{101}{4}$, $25\frac{1}{4}$

***(80) 1,121 — 1,238**