The University Interscholastic League
Number Sense Test ● HS B ● 2019

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) $215 + 316 + 19 =$ _____

(2) $2019 - 1516 - 3 =$ _____

(3) $15 \times 16 + 19 =$ _____

(4) $1516201 \div 9$ has a remainder of _____

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

(6) $\frac{5}{14} + \frac{3}{7} - 1 =$ _____

(7) $17 + 21 + 25 + 29 + 33 =$ _____

(8) $3\frac{2}{9} - 1\frac{2}{3} =$ _____ (mixed number)

(9) The multiplicative inverse of 1.7 is _____

*(10) $2153 + 1620 + 1921 + 5316 =$ _____

(11) The median of 2,1,5,3,1,2,0,1 and 9 is _____

(12) $15 \times 16 + 19 \times 15 =$ _____

(13) The largest prime divisor of 352 is _____

(14) $53 \times 47 =$ _____

(15) 4 gallons $-$ 2 quarts $-$ 1 pint $=$ _____ pints

(16) $15 - 16 \times 2^0 \div (1 + 9) =$ _____

(17) MDXVI $=$ _____ (Arabic Numeral)

(18) The smallest prime number larger than 67 is _____

(19) $2.40 is _____% tax on $30.00

*(20) $316 \times 215 =$ _____

(21) $1691 \times 9 + 81 =$ _____

(22) $0.4666... =$ _____ (proper fraction)

(23) $151_6 =$ _____ $_{10}$

(24) Find the simple interest on $3200.00 at 5.25% for two years. $_____

(25) $6\frac{1}{3} \times 9\frac{2}{3} =$ _____ (mixed number)

(26) Let n = $\sqrt[3]{3375}$. Find n^2. _____

(27) $\frac{12}{13} - \frac{13}{12} =$ _____

(28) 12% of 24 is 48% of _____

(29) $\frac{4}{5}$ is what percent more than $\frac{1}{2}$? _____%

*(30) $215316 \div 2019 =$ _____

(31) Let $(2x + 3)(4x - 1) = ax^2 + bx + c$. Find $a + b + c$. _____

(32) $4^{-2} + 4^{-3} =$ _____

(33) The smallest root of $8x^2 + 10x - 3 = 0$ is _____

(34) Set A has 12 elements, set B has 8 elements, and $A \cap B$ has 4 elements. $A \cup B$ has _____ elements

(35) Find k, if $kx^2 - x - 12 = 0$ and the product of the roots is $- 2$. k = _____

(36) The angle complementary to 32° measures _____°

(37) 1101_2 = _____ 4

(38) The 4-digit number 215k is divisible by 8. k = ____

(39) The LCM of 12, 18 and 20 is _____

*(40) 16^3 = _____

(41) If $4^x = 24$, then $4^{(x+1)}$ = _____

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

(43) The area of a circle is 24π in^2. The diameter of this circle is $a\sqrt{b}$ in., where a > 1. Find a + b. _____

(44) $74^2 - 66^2$ = _____

(45) The coefficient of the x^2y^2 term in the expansion of $(3x - 2y)^4$ is _____

(46) 132×111 = _____

(47) $(i)^{16} = a\sqrt{b}$, where a,b $\in \{- 1, 1\}$. Find b. _____

(48) $(316_7) \div (4_7)$ = _____ 7

(49) $\frac{3}{5} + \frac{3}{25} + \frac{3}{125} + \frac{3}{625} + ...$ = _____

*(50) $\sqrt{1516} \times \sqrt{2019}$ = _____

(51) $\log 4 - \log 400$ = _____

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

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

(54) The vertex of the parabola $x^2 - 6x - 12$ is (h, k) and k = _____

(55) If 3P = 4Q and 2Q = 5R then P = _____ R

(56) Given: 4,6,10,14,22,26,34,k,46,... . k = _____

(57) $7 \times \frac{11}{13}$ = _____ (mixed number)

(58) $\frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} + ... \frac{1}{78} + \frac{1}{91}$ = _____

(59) Let $(a - 5i)^2 = - 9 - 40i$. Find a. _____

*(60) $(31)^6 \div (21)^5$ = _____

(61) How many ways can 4 people be seated in a circle of 6 chairs? _____

(62) $1234 \times 8 + 4$ = _____

(63) The odds of passing the test is $\frac{13}{15}$. The probability of failing the test is _____ (proper fraction)

(64) $\sin(\text{Arcsin}(\frac{3}{5}))$ = _____

(65) The first four digits of the decimal for $\frac{13}{30}$ base 7 is 0._____ base 7

(66) 95° F = _____ ° C

(67) If 3 workers can do a job in 18 days, how many days would it take 5 workers working at the same rate? _____ days

(68) $50^2 - 48^2 + 46^2 - 44^2$ = _____

(69) The sum of the product of the roots taken 3 at a time of $2x^4 - 13x^3 + 28x^2 - 23x + 6 = 0$ is ____

*(70) $6 \times 12 \times 18 \times 24$ = _____

(71) Let $g(x) = x^2 - 9$. Find g(g(- 3)). _____

(72) How many positive 3-digit numbers divisible by 5 exist? _____

(73) If $122_b = 50$ then 221_b = _____

(74) Let $f(x) = (3x + 4)^2$. Find $f'(2)$. _____

(75) The horizontal asymptote of $y = 4^x$ is _____

(76) $\begin{vmatrix} - 1 & 6 \\ 3 & - 10 \end{vmatrix}$ = _____

(77) If x > 0 and $|3x + 16| = 20$ then x = _____

(78) $\frac{6 \times 5! - 5 \times 4!}{3!}$ = _____

(79) 215×101 = _____

*(80) $714.285 \div 14.2857 \times 8.57142$ = _____

DO NOT DISTRIBUTE TO STUDENTS BEFORE OR DURING THE CONTEST

University Interscholastic League - Number Sense Answer Key HS ● Invitation B ● 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) 550

(2) 500

(3) 259

(4) 7

(5) 62.5

(6) $-\frac{3}{14}$

(7) 125

(8) $1\frac{5}{9}$

(9) $\frac{10}{17}$

*(10) 10,460 − 11,560

(11) 2

(12) 525

(13) 11

(14) 2,491

(15) 27

(16) 13.4, $\frac{67}{5}$, $13\frac{2}{5}$

(17) 1,516

(18) 71

(19) 8

*(20) 64,543 − 71,337

(21) 15,300

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

(23) 67

(24) $336.00

(25) $61\frac{2}{9}$

(26) 225

(27) $-\frac{25}{156}$

(28) 6

(29) 60

*(30) 102 − 111

(31) 15

(32) .078125, $\frac{5}{64}$

(33) $-1.5, -\frac{3}{2}$, $-1\frac{1}{2}$

(34) 16

(35) 6

(36) 58

(37) 31

(38) 2

(39) 180

*(40) 3,892 − 4,300

(41) 96

(42) 15

(43) 10

(44) 1,120

(45) 216

(46) 14,652

(47) 1

(48) 55

(49) .75, $\frac{3}{4}$

*(50) 1,663 − 1,836

(51) − 2

(52) 2

(53) 144

(54) − 21

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

(56) 38

(57) $5\frac{12}{13}$

(58) $\frac{6}{7}$

(59) 4

*(60) 207 − 228

(61) 60

(62) 9,876

(63) $\frac{15}{28}$

(64) .6, $\frac{3}{5}$

(65) 3222

(66) 35

(67) 10.8, $\frac{54}{5}$, $10\frac{4}{5}$

(68) 376

(69) 11.5, $\frac{23}{2}$, $11\frac{1}{2}$

*(70) 29,549 − 32,659

(71) − 9

(72) 180

(73) 85

(74) 60

(75) 0

(76) − 8

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

(78) 100

(79) 21,715

*(80) 408 − 449