

The University Interscholastic League
Number Sense Test • HS District • 2021

Contestant's Number _____

Read directions carefully
before beginning test

**DO NOT UNFOLD THIS SHEET
UNTIL TOLD TO BEGIN**

Final _____

2nd _____

1st _____

Score _____

Initials _____

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) $5080 + 911 =$ _____
- (2) $2.5 \times 1.6 =$ _____
- (3) $1141 - 393 =$ _____
- (4) $\frac{4}{5} \div \frac{9}{10} =$ _____
- (5) $5.07 - 26.5 =$ _____ (decimal)
- (6) $\frac{5}{16} =$ _____ % (mixed number)
- (7) $23^2 =$ _____
- (8) $55 \times 6 \div 20 + 4 =$ _____
- (9) Which is larger, 0.8 or $\frac{9}{11}$? _____
- *(10) $721 - 904 + 2919 - 2029 =$ _____
- (11) $43^2 =$ _____
- (12) 30% of 40 - 30 = _____
- (13) $152^2 \div 8$ has a remainder of _____
- (14) The arithmetic mean of 41, 46, and 57 is _____
- (15) $MDCIX + DLXX =$ _____ (Arabic Numeral)
- (16) $54^2 =$ _____
- (17) 72% of $77\frac{7}{9}$ = _____
- (18) 2 gallons - 3 quarts + 2 pints = _____ pints
- (19) $(23 + 23 \times 25 - 28) \div 8$ has a remainder of _____
- *(20) $528 \times 1930 \div 731 =$ _____
- (21) $1\frac{4}{5}$ is the square root of _____ (decimal)
- (22) $555 \times \frac{5}{37} =$ _____
- (23) How long is it between the beginning of Mar. 22, 2021 and the end of May 1, 2021? _____ days
- (24) An angle complementary to 43° measures _____ $^\circ$
- (25) $21^2 + 23^2 =$ _____
- (26) Let $\frac{3}{8} = \frac{4}{x}$. Find $6x$. _____
- (27) $214 \times 15 =$ _____
- (28) $|3 - 2| - 6 + |6 - 20 + 22| =$ _____
- (29) Let $(71x - 16)^2 = ax^2 + bx + c$. $a + b + c =$ _____
- *(30) $(67 \div 5 \times 43 \div 6)^2 =$ _____
- (31) $GCD(21, 49) \times LCM(21, 49) =$ _____
- (32) $1.2444\dots =$ _____ (improper fraction)
- (33) Given: m, 4, 9, 13, 22, n, 57, Find m + n. _____

- (34) The larger root of $(x + 1)^2 = \frac{256}{441}$ is _____
- (35) If $2.444\dots \times k = 1$, then $k =$ _____
- (36) Find the smallest integer k , where $k < 11$, such that $7k + 4$ is a perfect square. _____
- (37) The linear term of $(x - 4)^3$ is _____
- (38) If $(3x - 5)(4x - 2) = ax^2 + bx + c$, then $a + b + c =$ _____
- (39) $(12)^3 - (13)^3 =$ _____
- *(40) $38\frac{4}{5} \times 49330 \div 16 =$ _____
- (41) $0.\overline{0141414\dots} =$ _____ (fraction)
- (42) Let $5 \times 25^2 \div 125^3 = 5^k$. $k =$ _____
- (43) $(204)^3 =$ _____
- (44) $994 \times 997 =$ _____
- (45) $33_6 \times 3_6 - 33_6 =$ _____ 6
- (46) If $\sqrt[3]{a^8} \times \sqrt[4]{a^7} = \sqrt[n]{a^k}$, then $n + k =$ _____
- (47) The sum of the roots of $(4x - 7)^3 = 0$ is _____
- (48) The sum of the product of the roots taken two at a time of $4x^3 - 17x^2 + 16x - 3 = 0$ is _____
- (49) The diameter of a sphere is 9 inches. The volume is $k\pi$ cubic inches. $k =$ _____
- *(50) $(\sqrt[3]{559242})^2 =$ _____
- (51) If $2x - y = 6$ and $x + 2y = -3$ then $5y =$ _____
- (52) The distance between $(-1, 5)$ and $(-3, -9)$ is d . Find d^2 . _____
- (53) $25^3 - 24^3 =$ _____
- (54) The first 4 digits of the decimal of $\frac{7}{22}$ is 0._____
- (55) $8 + 5 + 3\frac{1}{8} + 1\frac{61}{64} + \dots =$ _____
- (56) The vertex of the parabola $y = 40 + 6x - x^2$ is (h, k) and $h + k =$ _____
- (57) If 5, 9, and x are the integral sides of a triangle, then the least value of x is _____
- (58) $\log_6(x - 3)$ equals 3 when x equals _____
- (59) $444 \times \frac{4}{37} = 4 \times$ _____
- *(60) $\sqrt{37 \times 40 \times 43} =$ _____
- (61) Find the sum of all positive integers x such that $15 - 3x \geq 5$. _____
- (62) The radius of the inscribed circle of a 8-15-17 right triangle is _____ units
- (63) How many lines are determined by 9 coplanar points no 3 of which are collinear? _____
- (64) $4143 \times 14 =$ _____
- (65) $13 \times \frac{16}{17} =$ _____ (mixed number)
- (66) $\frac{3}{8} - \frac{14}{41} =$ _____
- (67) How many positive integers less than 60 are relatively prime to 60? _____
- (68) A box contains 18 blue chips and x red chips. The probability of selecting a blue chip is 60%. The odds of a red being selected is _____
- (69) $(54_9 \times 63_9 - 72_9) \div 8_9$ has a remainder of _____
- *(70) 78 miles per hour = _____ inches per second
- (71) $y = \log_3(4x + 5)$. The domain of y is $x >$ _____
- (72) The first four digits of the decimal for $\frac{14}{33}$ base 7 is 0._____ base 7
- (73) $\sin^3(\frac{7\pi}{6}) =$ _____
- (74) If $f(x) = \frac{2-3x}{4}$, then $f^{-1}(5) =$ _____
- (75) If $f(x) = \frac{2-3x}{4}$, then $f[f^{-1}(5)] =$ _____
- (76) Find the sum of the squares of the roots of $6x^2 + x - 5 = 0$. _____
- (77) $132_8 =$ _____ 4
- (78) $\int_{-3}^3 (2x - 1) dx =$ _____
- (79) $\frac{11}{30} - \frac{11}{20} - \frac{11}{12} =$ _____
- *(80) $1234 + 2345 + 3456 + 4567 + 5678 =$ _____

DO NOT DISTRIBUTE TO STUDENTS BEFORE OR DURING THE CONTEST

University Interscholastic League - Number Sense Answer Key HS • District • 2021

*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) 5,991 | (18) 12 | (34) $-\frac{5}{21}$ | (58) 219 |
| (2) 4 | (19) 2 | (35) $\frac{9}{22}$ | (59) 12 |
| (3) 748 | *(20) 1,325 — 1,463 | (36) 3 | *(60) 240 — 264 |
| (4) $\frac{8}{9}$ | (21) 3.24 | (37) 48 | (61) 6 |
| (5) — 21.43 | (22) 75 | (38) — 4 | (62) 3 |
| (6) $31\frac{1}{4}$ | (23) 41 | (39) — 469 | (63) 36 |
| | (24) 47 | *(40) 113,644 — 125,606 | (64) 58,002 |
| (7) 529 | (25) 970 | | (65) $12\frac{4}{17}$ |
| (8) $20.5, \frac{41}{2}, 20\frac{1}{2}$ | (26) 64 | (41) $\frac{7}{495}$ | (66) $\frac{11}{328}$ |
| (9) $\frac{9}{11}$ | (27) 3,210 | (42) — 4 | (67) 16 |
| *(10) 672 — 742 | (28) 3 | (43) 8,489,664 | (68) $\frac{2}{3}$ |
| (11) 1,849 | (29) 3,025 | (44) 991,018 | (69) 0 |
| (12) — 18 | *(30) 8,762 — 9,683 | (45) 110 | *(70) 1,305 — 1,441 |
| (13) 0 | (31) 1,029 | (46) 65 | |
| (14) 48 | (32) $\frac{56}{45}$ | (47) $5.25, \frac{21}{4}, 5\frac{1}{4}$ | (71) $-\frac{5}{4}$ |
| (15) 2,179 | (33) 40 | (48) 4 | (72) 3131 |
| (16) 2,916 | | (49) $121.5, \frac{243}{2}, 121\frac{1}{2}$ | (73) $-.125, -\frac{1}{8}$ |
| (17) 56 | | *(50) 6,449 — 7,127 | (74) — 6 |
| | | (51) — 12 | (75) 5 |
| | | (52) 200 | |
| | | (53) 1,801 | |
| | | (54) 3181 | |
| | | (55) $\frac{64}{3}, 21\frac{1}{3}$ | (76) $\frac{61}{36}, 1\frac{25}{36}$ |
| | | (56) 52 | (77) 1122 |
| | | | (78) — 6 |
| | | | (79) $-1.1, -\frac{11}{10},$ $-1\frac{1}{10}$ |
| | | (57) 5 | *(80) 16,416 — 18,144 |