
2025 UH MATHEMATICS CONTEST

NUMBER SENSE EXAM

Directions: Read the instructions carefully before you begin this exam. You will have 20 minutes to complete this exam. Solve accurately as many problems as you can in the order in which they appear and enter your answers using the panel on your screen. ALL PROBLEMS ARE TO BE SOLVED MENTALLY. Make NO calculations on paper. Enter the answer correctly for each question. You cannot erase anything once the numbers are entered. Five points will be awarded for correct answers and four points will be deducted for each problem not solved correctly and for each problem skipped. No deduction is taken for problems after the last problem attempted. All answers should be either (simplified) fractions, or decimals, or just integers. Mixed numbers are NOT allowed. Answers should be written in the most efficient form possible. 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.

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| (1) $1492 + 1865 =$ _____ | (21) $1\frac{1}{4}\% =$ _____ (fraction) |
| (2) $2002 \times 17 + 6 =$ _____ | (22) $3 + 9 + 15 + 21 + \dots + 33 =$ _____ |
| (3) $1 + 2 \times (5 - 20) \div 15 =$ _____ | (23) $\frac{3}{8} + .431 =$ _____ (decimal) |
| (4) $2025 \div 5 =$ _____ | (24) The sum of the prime factors of 42 is _____ |
| (5) $2.2 \times 2.8 =$ _____ (decimal) | (25) If 1 gram = .04 oz, then 4.8 oz = _____ grams |
| (6) $\text{MMLIX} - \text{LIII} =$ _____ (Arabic Numeral) | (26) 11% of 24 plus 24% of 11 is _____ (fraction) |
| (7) $23 \times 14 =$ _____ | (27) The sum of what number and 15 gives the same result as the positive difference between that number and 33? |
| (8) $2! - 3 \times 4 + 5 \div 6 =$ _____ (fraction) | (28) 231 gallons = _____ cu. inches |
| (9) Which is larger: $\frac{7}{11}$ or .636? _____ | (29) The total number of 1-element subsets and 6-element subsets of the set $\{h, o, u, s, t, o, n\}$ is _____ |
| (10) $3.2 \div .8 =$ _____ | (30) How far can you travel at $33\frac{1}{3}$ mph for 360 minutes? _____ (miles) |
| (11) $322327 \div 9$ has a remainder of _____ | (31) 105 base ten is equivalent to _____ base 5 |
| (12) $75^2 =$ _____ | (32) $x + (x+1) + (x+2) + (x+3) + (x+4) = 50$, then $x+5 =$ _____ |
| (13) $\frac{4}{5} =$ _____ % | (33) $99 \times .232323\dots =$ _____ |
| *(14) $399 \times 121 + 21 =$ _____ | (34) If $A = -4$, $B = -3$, and $C = 2$, then $AB^C =$ _____ |
| (15) $\frac{2}{3} - \frac{2}{9} - \frac{2}{27} =$ _____ | (35) The 3rd hexagonal number is _____ |
| (16) 1 gallon - 1 quart - 1 cup = _____ ounces | (36) Find the simple interest on \$1500 at 4% for 18 months. \$ _____ |
| (17) The sum of the positive integral divisors of 48 is _____ | (37) Two numbers have a sum of 21, a product of 98, and a positive difference of _____ |
| (18) The GCD of 27 and 36 is _____ | |
| (19) The mean of 18 and 26 is _____ | |
| (20) The number of prime numbers greater than 50 and less than 70 is _____ | |

- (38) $4\frac{1}{4} \times 8\frac{1}{4} =$ _____ (decimal)
- (39) The cube root of (-343) is _____
- (40) If $(3x+2)^2 = ax^2 + bx + c$, then $a - c =$ _____
- (41) $[\{p, l, u, s\} \cap \{m, i, n, u, s\}] \cup \{t, i, m, e, s\}$ contains how many elements _____
- *(42) $\sqrt{291} + \sqrt{359} + \sqrt{440} =$ _____
- (43) A CD sells for \$20 plus 8.25% sales tax. The total cost of the CD is \$ _____
- (44) $\frac{x-8}{x+9} + \frac{x+9}{x-8} = A\frac{B}{C}$, a simplified mixed number. Find B . _____
- (45) The sum of three consecutive odd integers is 105. Find the largest integer. _____
- (46) One dozen peaches cost \$12.84, therefore 4 peaches would cost \$ _____
- (47) The units digit of 27^{37} is _____
- (48) Given $2, 1, 3, 4, 7, x, y, 29, \dots$ then $xy =$ _____
- (49) A right triangle with a height of 12 cm. and an area of 30 sq. cm. has a base of _____ cm
- (50) The smaller root of $(2x-3)^2 = 16$ is _____ (fraction)
- (51) $4^{-2} + 4^{-3} =$ _____ (decimal)
- (52) If $18^2 - 15^2 = 11k$, find $k =$ _____
- (53) If $x > 0$ and $2x^2 = \sqrt{4x^3}$ then $x =$ _____
- (54) If $3x + 2y = 7$ and $4x - 2y = 1$, then $x =$ _____ (fraction)
- (55) The product of the roots of $5x^2 + 4x - 3 = 0$ is (fraction) _____
- *(56) $444 \times 33\frac{1}{3} \div 0.444\dots =$ _____
- (57) 12% of $566\frac{2}{3} =$ _____
- (58) $3\frac{3}{8} \div 2\frac{1}{4} =$ _____ (decimal)
- (59) If $5^{(x-1)} = 17.3$, then $5^x =$ _____ (decimal)
- (60) The x -intercept of the line $3x - 4y = 5$ is (h, k) . Find h . _____ (fraction)
- (61) If $x + y = 3$ and $xy = 2$, then $x^3 + y^3 =$ _____
- (62) $234_6 \times 5_6 =$ _____ ₆
- (63) The sum of the roots of $x^2 - 6x + 9 = 0$ is _____
- (64) $104 \times 103 =$ _____
- (65) Set A has 13 elements, set B has 16 elements. $A \cup B$ has 22 elements. $A \cap B$ has _____ elements.
- (66) The number of elements in the Cartesian product of $A = \{T, M, S, C, A\}$ and $B = \{U, I, L\}$ is _____
- (67) 25% of $32 - 75\%$ of 64 is _____
- (68) $242 \div .181818\dots =$ _____
- (69) If $4^x = .0625$, then $x =$ _____
- *(70) The circumference of $x^2 + y^2 = 961$ is _____
- (71) If $\log_4(3x+2) = 1$, then $x =$ _____ (fraction)
- (72) Find the simplified coefficient of the sixth term in the expansion of $(2x-1)^6$. _____
- (73) The integral sides of a triangle are 11, 14, and x . The largest value of x is _____
- (74) A team won $83\frac{1}{3}\%$ of its 36 games. How many games did the team lose? _____
- (75) The largest value of x such that $|3x-4| \leq 7$ is (fraction) _____
- (76) If $44_b = 36$ then $55_b =$ _____
- (77) The coefficient of the third term of the expansion of $(x+3y)^5$ is _____
- (78) If $4^{(x-1)} = 8^{(3x+2)}$, then $x =$ _____ (fraction)
- (79) The line containing the points $(4, 7)$ and $(3, 6)$ has a y -intercept of (x, y) . $y =$ _____
- (80) The vertex of the parabola $x^2 - 8x + 15$ is (h, k) and $h + k =$ _____
- (81) ${}_5C_2 + {}_5P_2 =$ _____
- (82) The probability of winning is 76%. The odds of winning is _____ (fraction)
- (83) How many distinct diagonals can be drawn inside an undecagon? _____
- *(84) 388 miles per hour = _____ feet per second
- (85) The first four digits of the decimal for $\frac{71}{330}$ is 0. _____
- (86) Let $g(x) = 4x + 2$, find $g(g(5))$. _____
- (87) The remainder of $(4x^2 + 2x - 1) \div (x - 3)$ is _____
- (88) If $f(x) = x^2 + 3x - 1$, then $f[f^{-1}(4)] =$ _____
- (89) $\left(\tan \frac{4\pi}{3}\right)^2 =$ _____
- (90) The sum of the first twelve terms of the Fibonacci sequence 1, 2, 3, 5, 8, 13, 21, ... is _____
- (91) How many 2-element subsets does a 6-element set have? _____

- (92) $\sin\left(\frac{5\pi}{6}\right) \div \cos\left(\frac{2\pi}{3}\right) =$ _____
- (93) The shortest distance between $(0, -2)$ and $5x + 12y = 11$ is _____ (fraction)
- (94) $\sin(75^\circ) \cos(75^\circ) =$ _____ (fraction)
- (95) $\sqrt{444889} =$ _____
- (96) $\det\left(\begin{bmatrix} 1 & -2 \\ 3 & -4 \end{bmatrix} + \begin{bmatrix} 1 & 2 \\ -3 & -4 \end{bmatrix}\right) =$ _____
- (97) $9^8 \div 7$ has a remainder of _____
- *(98) $\sqrt[3]{2222222} =$ _____
- (99) Find the slope of the line tangent to $y = 2x^2 + 2x - 3$ at $(2, 9)$. _____
- (100) Two dice are rolled. What is the probability that the sum is divisible by 5? _____
- (101) If $f'(x) = 2$ and $f(3) = 11$, find $f(18)$. _____
- (102) Find x if $\det\begin{vmatrix} 3 & 9 \\ 4 & x \end{vmatrix} = 6$. $x =$ _____
- (103) $1_{12} + 3_{12} + 5_{12} + \dots + 25_{12} =$ _____ 10
- (104) If $f(x) = x^2 - 8x + 15$, then $f'(-1) =$ _____
- (105) The domain of $y = \sqrt[4]{3 - 2x}$ is $x \leq$ _____ (decimal)
- (106) How many positive 3-digit numbers divisible by 5 exist? _____
- (107) How many lines are determined by four points, no three of which are collinear? _____
- (108) Find $x, 6 \leq x \leq 15$, if $2x + 5 \equiv 8 \pmod{7}$. _____
- (109) $\lim_{x \rightarrow \infty} \left(\frac{(2x+1)(x-4)}{(x+3)(3x+1)} \right) =$ _____
- (110) $\int_{-1}^2 (6x - 5) dx =$ _____
- (111) Let $f(x) = \frac{5x-4}{3} - 2$. Find $f^{-1}(-1)$. _____ (decimal)
- *(112) $438 \div 9\frac{1}{11}\% \times 11.1 =$ _____