2018 UH Mathematics Contest
Number Sense Exam

Directions: Do not unfold this sheet until you are told to begin. You will have 30 minutes to complete this exam. Solve accurately as many problems as you can in the order in which they appear. ALL PROBLEMS ARE TO BE SOLVED MENTALLY. Make NO calculations on paper. Write only the answer in the space provided at the end of each question. 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. An illegible answer constitutes an incorrect answer. All fractions in test papers must be reduced to lowest terms and improper fractions are allowed unless otherwise stated. Answers should be written in the most efficient form possible (extraneous zeroes are not to be used).

(1) $58^2 = $ _____

(2) $256 \div 2(1 + 7) = $ _____

(3) $323 \times 11 = $ _____

(4) $34761 + 25929 - 17298 = $ _____

(5) $2^{10} - 5^2 + 4^3 = $ _____

(6) $176 \times 174 = $ _____

(7) $\frac{5}{7} + 3\frac{5}{6} = $ _____ (mixed number)

(8) $275 \div 13 - 197 \div 13 = $ _____

(9) 3 ft. $\times$ 4 ft. $\times$ 5 ft. = _____ cubic yards

(10) $247^2 = $ _____

(11) $12^3 = $ _____

(12) $(27 + 36 + 47) \div 3$ has a remainder of _____

(13) $4\frac{2}{3} \div 1\frac{3}{5} = $ _____ (improper fraction)

(14) $6.25\% = $ _____ (proper fraction)

(15) $50 \times 140.4 = $ _____

(16) $|2 - |5 - 8|| = $ _____

(17) $\sqrt{729} = $ _____

(18) $\sqrt[3]{729} = $ _____

(19) $45 \times 60 = $ _____

(20) $(3)^{-2} - (2)^{-3} = $ _____

(21) $MCMVI - MIX = $ _____ (Arabic numeral)

(22) $11 \times 47 + 14 = $ _____

(23) $1^2 + 2^2 + 3^2 + 4^2 + 5^2 = $ _____

(24) $1011_2 + 1110_2 = $ _____ $_2$

(25) $16 \div 1.25 = $ _____

(26) $3^4 \times 18^2 \div 9^2 = $ _____

(27) How many different whole numbers will divide evenly into 36? _____

(28) The surface area of a cube with edge of 6 is _____

(29) 15% of 24 is 20% of _____

(30) $6! \div 3! - 7! \div 5! = $ _____

(31) The geometric mean between 6 and 24 is _____

(32) $0.47777... = $ _____ (proper fraction)

(33) $19 \times 38 = $ _____

(34) $3 + 7 + 11 + 15 + \cdots + 31 = $ _____

(35) $3375^{2/3} = $ _____

(36) $5\frac{3}{4} \times 68 = $ _____

(37) The largest prime factor of 207 is _____

(38) $63 \div 0.375 = $ _____

(39) $543_8 - 246_8 = $ _____ $_8$

(40) $560824 \div 8 = $ _____

(41) Which is larger, $-\frac{7}{18}$ or $-\frac{9}{22}$? _____

(42) The GCD of 51, 68 and 42 is _____

(43) The largest root of $x^3 - 3x^2 - 4x + 12$ is _____

(44) $219^2 - 19^2 = $ _____

(45) $2\sin(15°)\cos(15°) = $ _____

(46) $_{10}C_7 = $ _____

(47) How many proper subsets does a set with 11 elements have? _____

(48) $\sqrt{(12 - 16i)(12 + 16i)} = $ _____

(49) The smallest triangular number greater than 1 which is a perfect square is _____

(50) $243_6 = $ _____ ${}_{10}$

(51) Give the answer to $\sqrt{10} - \sqrt{2}$ rounded to the nearest whole number. _____

(52) $72^2 + 54^2 = $ _____

(53) $2\sin\left(\arctan(1) + \operatorname{arcsec}(\sqrt{2})\right) = $ _____

(54) The harmonic mean of 1, 2 and 6 is _____

(55) Find the slope of the line perpendicular to the line which contains the points $(-2, 6)$ and $(3, -11)$. _____

(56) Find $4x$ if $\log_x 0.008 = 3$. _____

(57) $54^2 \div 27^2 \times 13.5^2 = $ _____

(58) $5\frac{3}{8} \div 3\frac{5}{8} = $ _____ (mixed number)

(59) Give the maximum value of the function $f(x) = 2x^2 - 3x + 10$ _____

(60) The largest value of x which satisfies $\left|x^2 - 5x - 6\right| \leq 0$ is _____

(61) 24% of $76\frac{1}{6}$ is _____

(62) Solve for x: $\sqrt{x} + \sqrt{12} = \sqrt{75}$ _____

(63) $|7 - 24i| = $ _____

(64) The multiplicative inverse of -3.4 is _____

(65) The arithmetic mean of 45, 72 and _____ is 68.

(66) $56_9 = $ _____ ${}_7$

(67) $< -1, 4 > \cdot < 3, -2 > = $ _____

(68) $\begin{vmatrix} -12 & 6 \\ 13 & 8 \end{vmatrix} = $ _____

(69) $144 \times 361 = $ _____

(70) Find $f^{-1}(4\pi)$ if $f(x) = \sin(x) + 2x$ _____

(71) Give the tens digit of 8^4 _____

(72) $1 + 3 + 5 + 7 + \cdots + 63 + 65 = $ _____

(73) $_5P_3 \times _6P_2 = $ _____

(74) Find $f(f(-2))$ for $f(x) = \dfrac{x - 1}{x^2 + x + 1}$ _____

(75) $12 \times 18 - 14 \div 21 \times 6 = $ _____

(76) $16^{10} \div 5$ has a remainder of _____

(77) CCLXXVI $\div$ XII $= $ _____ (Arabic numeral)

(78) $|(3 - 7i)(5 + 2i)|^2 = $ _____

(79) The product of the solutions to $\left|x^2 - 9\right| = 12$ is _____

(80) $\tan\left(\frac{2\pi}{3}\right) = $ _____ (round to tenths place)

(81) $\frac{10!}{7!} - \frac{12!}{9!} = $ _____

(82) The sum of the prime factors of 2310 is _____

(83) $\lim\limits_{x \to 3} \dfrac{x - 3}{x^2 - 9} = $ _____

(84) The sum of the first 3 hexagonal numbers is _____

(85) $238_9 + 42_7 = $ _____ ${}_{10}$

(86) If $13x + 7 \equiv 6 \pmod 8$, the smallest positive integer value of x is _____

(87) $\cos\left(\arcsin\left(\frac{7}{25}\right)\right) = $ _____

(88) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\tan\left(-\frac{5\pi}{6}\right)\right]$ _____

(89) $\sqrt{74529} = $ _____

(90) The x-value of the rectangular coordinates for $\left(3, \frac{2\pi}{3}\right)$ is _____

(91) If $xy = -3$ and $x + y = 2$, then $x^2 + y^2 = $ _____

(92) $\sqrt{17 \times 21 + 4} = $ _____

(93) Solve for x: $\log_x 135 - \log_x 5 = 3$ _____

(94) If $f(x) = x^3 - 3x^2 + 2x - 1$, then $f''(2) = $ _____

(95) If $(2 + 5i)(5 - i) = a + bi$, then $a + b = $ _____

(96) $\cos^2\left(\frac{5\pi}{6}\right) = $ _____

(97) If $g(x) = \sqrt{x} - 3x^2$, $g'(16) = $ _____

(98) The graph of $y = \dfrac{x^2 - 6x + 5}{x^2 - 1}$ has how many vertical asymptotes? _____

(99) $\lim\limits_{x \to \infty} \arctan(2x) = $ _____

(100) $\displaystyle\int_{-1}^{2} x^3\,dx = $ _____