# The University Interscholastic League
# Number Sense Test • HS SAC • 2020

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)** $7839 + 651 =$ _____

**(2)** $5\frac{2}{3} - 1\frac{1}{6} =$ _____

**(3)** $\frac{3}{4} \times \frac{5}{6} =$ _____

**(4)** $18.6 \div 0.3 =$ _____

**(5)** $5 + 4 - 3 \times 2 \div 1 =$ _____

**(6)** $12 \times 14 + 16 \times 12 =$ _____

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

**(8)** $11 \times 21 =$ _____

**(9)** $30\%$ **of** $20 + 10 =$ _____

***(10)** $8523 - 3569 + 855 - 602 =$ _____

**(11)** $19^2 =$ _____

**(12)** $48\% =$ _____ **(proper fraction)**

**(13) The GCD of 32, 48, and 72 is** _____

**(14)** $15^2 + 16^2 =$ _____

**(15) The arithmetic mean of 32, 37, and 48 is** _____

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

**(17) 1 yard — 1 foot — 1 inch =** _____ **inches**

**(18) The cost of driving 124 miles at 25¢ a mile is $** ____

**(19)** $16^2 - 15^2 =$ _____

***(20)** $3301 \times 901 \div 35 =$ _____

**(21) If** $4^{(x)} = 5.6$, **then** $4^{(x+1)} =$ _____ **(decimal)**

**(22)** $111 \times \frac{1}{37} =$ _____

**(23) How long is it between the end of Sept. 12, 2020 and the beginning of Oct. 24, 2020?** _____ **days**

**(24) 1643 ÷ 7 has a remainder of** _____

**(25)** $1795 \times 5 + 25 =$ _____

**(26) Let** $\frac{3}{8} = \frac{6}{x}$. **Find** $\frac{x}{18}$. _____ **(proper fraction)**

**(27)** $135_7 =$ _____ **10**

**(28)** $32 \times 48 =$ _____

**(29) There are** _____ **positive integral divisors of 48.**

***(30)** $\sqrt{8336} =$ _____

**(31) If** $\sqrt{8} + \sqrt{18} = \sqrt{k}$, **then k =** _____

**(32) If** $x - 2y = 1$ **and** $x + 2y = 3$, **then x =** _____

**(33) Given: 3, 6, 9, 15, 24, m, 63, n, ... . n =** _____

**(34) If** $(4x - 1)^2 = ax^2 + bx + c$ **then** $a + b + c =$ _____

(35) The product of the roots of $5x^2 + 3x = 4$ is _____

(36) $4\frac{1}{3} \times 4\frac{2}{3}$ = _____

(37) The constant term of $(2x - 3)^3$ is _____

(38) How many subsets containing only 4 elements does the set {e,i,g,h,t} have? _____

(39) 2.4 is what percent of 30? _____ %

*(40) $4 \times 12 \times 20 \times 28$ = _____

(41) 0.121212...= _____ (fraction)

(42) The length of the median to the hypotenuse of a 5-12-13 right triangle is _____

(43) Let (x, y) be the midpoint of a segment with endpoints (2, — 6) and (4, 4). Find $x + y$. _____

(44) $[28 - 13 \times 3 + 17)] \div 6$ has a remainder of _____

(45) $52_6 + 13_6 + 4_6$ = _____ 6

(46) Given: 5, 6, 8, 11, 15, ... 41, k, 60. Find k. _____

(47) If $\sqrt{a^3} \times \sqrt[3]{a^2} = \sqrt[n]{a^k}$, then k = _____

(48) $23^2 + 28^2$ = _____

(49) $(i)^{14} = a\sqrt{b}$, where $a,b \in \{-1, 1\}$. Find ab. _____

*(50) $\sqrt[3]{637204}$ = _____

(51) If $A^{3k} \times A^{-1} \div A^4 = A^2$ and $A > 1$, then k = ___

(52) The measure of an exterior angle of a regular decagon is _____ degrees

(53) $31^3 - 30^3$ = _____

(54) Find the radius of the circle $x^2 + y^2 - 4x - 6y = 3$. _____

(55) $10 + 2 + \frac{2}{5} + \frac{2}{25} + ...$ = _____

(56) The geometric mean of 3, 8 and 9 is _____

(57) 1 cubic foot = _____ cubic inches

(58) Find the smallest composite number k such that $4k + 13$ is a prime number. _____

(59) $\log_3(2) - \log_3(18)$ = _____

*(60) 25 square miles = _____ acres

(61) The shortest distance between (1, — 1) and $4x + 3y = 7$ is _____

(62) $\sin(45°)\cos(45°)$ = _____

(63) How many lines are determined by 5 coplanar points no 3 of which are collinear? _____

(64) $222 \times \frac{1}{27}$ = _____(mixed number)

(65) The determinant of $\begin{bmatrix} -1 & -1 \\ 2 & 3 \end{bmatrix}$ = 5k. k = _____

(66) The sum of the coefficients of $(2x + y)^6$ is _____

(67) The 4th hexagonal number is _____

(68) A jar contains 4 red marbles and x blue ones. The probability of drawing a red one is 40%. x = _____

(69) Truncate $\sqrt{6}$ to the tenths place. _____

*(70) 400 miles per hour = _____ yards per minute

(71) $y = \log_2(2x - 4)$. The domain of y is $x >$ _____

(72) The sum of the reciprocals of all of the positive divisors of 15 is _____

(73) Find x, $2 \leq x \leq 7$, if $2x - 4 \cong 6 \pmod 8$. _____

(74) $4^8 \div 7$ has a remainder of _____

(75) The first four digits of the decimal for $\frac{13}{30}$ base 4 is 0._____ base 4

(76) The intersection of the horizontal and vertical asymptotes of $y = (x - 2)^{-1} + 4$ is (x, y). Find $x + y$. _____

(77) $132_4$ = _____ 2

(78) $\int_0^2 (2x - 3)\,dx$ = _____

(79) 77° Fahrenheit = _____° Celsius

*(80) $0.0101 \times \frac{1}{11} \times 101 \times 1001$ = _____