# The University Interscholastic League
# Number Sense Test • HS SAC • 2021

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)** $283 + 382 =$ _____

**(2)** $3\frac{4}{5} - 1\frac{1}{2} =$ _____ **(mixed number)**

**(3)** $0.9 \times 1.8 =$ _____ **(decimal)**

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

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

**(6)** $9 \times 87 + 23 \times 9 =$ _____

**(7)** $\frac{3}{8} =$ _____ **(decimal)**

**(8)** $36 \times 25 =$ _____

**(9)** $16^2 =$ _____

***(10)** $918 + 1023 + 2021 =$ _____

**(11)** Which is greater, $\frac{7}{11}$ or $\frac{11}{13}$? _____

**(12)** The GCD of 48 and 80 is _____

**(13)** $33\frac{1}{3}\%$ of 108 is _____

**(14)** The arithmetic mean of 27, 36, and 45 is _____

**(15)** $1023 \div 9$ has a remainder of _____

**(16)** If 6 pens cost $4.88, then 9 pens will cost $_____

**(17)** The number of prime numbers less than 20 is ____

**(18)** $34 \times 26 =$ _____

**(19)** $\frac{7}{10} + \frac{10}{7} =$ _____ **(mixed number)**

***(20)** $918 \times 1023 =$ _____

**(21)** If $2x - 7 = 5$, then $3 - x =$ _____

**(22)** How long is it between the beginning of Sept. 18, 2021 and the end of Oct. 23, 2021? _____days

**(23)** If $6^{(x)} = 4\frac{1}{2}$, then $6^{(x+1)} =$ _____

**(24)** The additive inverse of $-7$ is _____

**(25)** $|1 - 3| - 6 + |10 - 15| =$ _____

**(26)** Let $\frac{3}{4} = \frac{10}{x}$. Find $\frac{5}{x}$. _____

**(27)** $\left(\sqrt[3]{3375}\right)^2 =$ _____

**(28)** Let A ={2, 1, 3, 4, 7} and B = {2, 3, 5, 7, 11}. How many unique elements are in $A \cap B$? _____

**(29)** $246_8 =$ _____ 10

***(30)** $101821 \div 23 =$ _____

**(31)** If $3x + 2y = 5$ and $5x - 2y = 3$, then $y =$ _____

**(32)** $0.424242... =$ _____ **(proper fraction)**

**(33)** $[10 + 18 \times 11 - 23] \div 4$ has a remainder of _____

(34) The perimeter of a rectangle with length 7" is 26". The area of the rectangle is _____sq. in

(35) Given: 3, 6, 9, 15, 24, p, 63, q, r, ... . r = _____

(36) The sum of the roots minus the product of the roots of $x^3 - 3x^2 - 13x + 15 = 0$ is _____

(37) $37 \times 77$ = _____

(38) $24^2 + 38^2$ = _____

(39) $\frac{3}{14}$ = _____% (mixed number)

*(40) $\sqrt{182321}$ = _____

(41) The product of the coefficients of $(3x + y)^2$ is ____

(42) If $A^5 \times A^{-3} \div A = A^k$ and $A > 1$, then k = _____

(43) The length of the median to the hypotenuse of a 7-24-25 right triangle is _____

(44) Let (x, y) be the midpoint of a segment with endpoints (8, — 1) and (— 2, 5). Find x + y. _____

(45) The perimeter of a regular pentagon is 20". The length of a side of the perimeter is _____"

(46) $27^7 \div 7$ has a remainder of _____

(47) $29^2 + 29$ = _____

(48) The measure of an inscribed angle is 38°. Find the measure of its intercepted arc. _____°

(49) Let $5\frac{3}{m} \times n\frac{1}{2} = 19$, where m, n are natural numbers. Find m + n. _____

*(50) (0.444...)(1823) = _____

(51) $47^2 - 48^2$ = _____

(52) $132_4 + 23_4 \times 3_4$ = _____ 4

(53) $10 - 2 + \frac{2}{5} - \frac{2}{25} + ...$ = _____

(54) ${}_6C_2$ = _____

(55) $\frac{1}{4} + \frac{3}{4} + 1 + 1\frac{3}{4} + 2\frac{3}{4} + 4\frac{1}{2} + 7\frac{1}{4} + 11\frac{3}{4}$ = _____

(56) A bag contains golf balls; 8 white, 3 yellow, 4 pink. The probability of drawing a pink one is _____%

(57) The fifth pentagonal number is _____

(58) P and Q are roots of $6x^2 - 5x = 4$. Find the smaller of roots P and Q. _____

(59) $\log_3(9) + \log_3(27)$ = _____

*(60) $\sqrt[3]{10181123}$ = _____

(61) $42 \times 45 + 9$ = _____

(62) $333 \times \frac{1}{27}$ = _____ (mixed number)

(63) $1 - 4 + 9 - 16 + 25 - ... + 169$ = _____

(64) The volume of a 3" by 4" by 5" rectangular prism is _____cu. in

(65) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\sqrt{5} + \sqrt{3}\right]$. _____

(66) $(x^3 + 4x^2 + 6) \div (x + 5)$ has a remainder of _____

(67) $\sin\left(\frac{\pi}{6}\right)\cos\left(\frac{\pi}{3}\right)$ = _____

(68) The determinant of $\begin{bmatrix} -1 & -3 \\ 6 & 10 \end{bmatrix}$ = 5k. k = _____

(69) The first four digits of the decimal for $\frac{14}{40}$ base 5 is 0._____ base 5

*(70) 1200 gallons = _____ fluid ounces

(71) Find x, $1 \leq x \leq 6$, if $2x - 3 \cong 5 \pmod 7$. _____

(72) $\lim_{x \to 3} \frac{2x^2 - 5x - 3}{x - 3}$ = _____

(73) Let $f(x) = 2x^2 - 5x - 3$. Find $f'(3)$. _____

(74) The slope of the line tangent to $y = 2x^2 - 5x - 3$ at x = 3 is _____

(75) The sum of the critical values of $f(x) = x^3 - 3x + 1$ is _____

(76) The horizontal asymptote of $y = (x - 2)^{-1}$ is y = _____

(77) $\int_1^3 (2x + 3)\,dx$ = _____

(78) $(3)^{-3}$ = _____

(79) $1^3 - 2^3 + 3^3 - 4^3 + 5^3$ = _____

*(80) 87.5% of $(625 \div \frac{3}{8})$ = _____

**University Interscholastic League - Number Sense Answer Key HS ● SAC ● Fall 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) 665**

**(2) $2\frac{3}{10}$**

**(3) 1.62**

**(4) .9, $\frac{9}{10}$**

**(5) — .4, — $\frac{2}{5}$**

**(6) 990**

**(7) .375**

**(8) 900**

**(9) 256**

***(10) 3,764 — 4,160**

**(11) $\frac{11}{13}$**

**(12) 16**

**(13) 36**

**(14) 36**

**(15) 6**

**(16) 7.32**

**(17) 8**

**(18) 884**

**(19) $2\frac{9}{70}$**

***(20) 892,159 — 986,069**

**(21) — 3**

**(22) 36**

**(23) 27**

**(24) 7**

**(25) 1**

**(26) .375, $\frac{3}{8}$**

**(27) 225**

**(28) 3**

**(29) 166**

***(30) 4,206 — 4,648**

**(31) 1**

**(32) $\frac{14}{33}$**

**(33) 1**

**(34) 42**

**(35) 165**

**(36) 18**

**(37) 2,849**

**(38) 2,020**

**(39) $21\frac{3}{7}$**

***(40) 406 — 448**

**(41) 54**

**(42) 1**

**(43) 12.5, $\frac{25}{2}$, $12\frac{1}{2}$**

**(44) 5**

**(45) 4**

**(46) 6**

**(47) 870**

**(48) 76**

**(49) 10**

***(50) 770 — 850**

**(51) — 95**

**(52) 333**

**(53) $\frac{25}{3}$, $8\frac{1}{3}$**

**(54) 15**

**(55) 30**

**(56) $\frac{80}{3}$, $26\frac{2}{3}$**

**(57) 35**

**(58) — .5, — $\frac{1}{2}$**

**(59) 5**

***(60) 206 — 227**

**(61) 1,899**

**(62) $12\frac{1}{3}$**

**(63) 91**

**(64) 60**

**(65) 3**

**(66) — 19**

**(67) .25, $\frac{1}{4}$**

**(68) 1.6, $\frac{8}{5}$, $1\frac{3}{5}$**

**(69) 2111**

***(70) 145,920 — 161,280**

**(71) 4**

**(72) 7**

**(73) 7**

**(74) 7**

**(75) 0**

**(76) 0**

**(77) 14**

**(78) $\frac{1}{27}$**

**(79) 81**

***(80) 1,386 — 1,531**