The Collegiate Interscholastic League
Number Sense Test • HS Invitational A • 2008

Final _____ _____
2nd _____ _____
1st _____ _____
Score Initials

Contestant's Number _____

Read directions carefully before beginnning 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) $2008 + 208 - 23 =$ _____

(2) $50 \times 200.8 =$ _____

(3) $\frac{2}{7} + 2\frac{1}{8} =$ _____ (mixed number)

(4) $\frac{7}{8} \div 0.2 =$ _____ (improper fraction)

(5) $(24 + 18) \div 12 \times (3 - 6) =$ _____

(6) $7.5\% =$ _____ (proper fraction)

(7) $15 \times 28 =$ _____

(8) $28 \div 11 + 18 \div 11 =$ _____

(9) $23^2 =$ _____

*(10) $41 \times 411 + 4111 =$ _____

(11) The largest prime divisor of 65 is _____

(12) $11 \div 1\frac{2}{3} =$ _____ (decimal)

(13) If 12 ounces of nuts cost \$1.25 then 3 pounds of nuts will cost \$_____

(14) 280 plus 30% of 320 is _____

(15) Which is smaller, $1\frac{1}{3}$ or 1.3? _____

(16) 2 ft. × 3 ft. × 4 ft. = _____ cubic yards

(17) $(34 + 65 + 96) \div 3$ has a remainder of _____

(18) The mode of 2, 8,4, 8, 2,- 4, 8, 4, and 8 is _____

(19) MMVIIII − MIV = _____ (Arabic Numeral)

*(20) $987 - 654 \times 321 =$ _____

(21) If $A = 3$, $B = 5$, and $C = B$, then $BC + A =$ _

(22) $7.777\ldots - 3.333\ldots =$ _____

(23) Find the simple interest on \$500.00 at 5% for five years. \$_____

(24) $4^{-1} + 4^{-2} =$ _____

(25) 6 pints is what percent of a gallon? _____%

(26) Which of the following is a triangular number: 9, 15, or 18? _____

(27) $\sqrt[3]{2197}$ _____

(28) $\{s, l, o, p, e\} \cap \{l, i, n, e\}$ has _ distinct elements.

(29) If $\frac{3}{4} = \frac{3x}{5}$, then $x =$ _____

*(30) $118 \times 118 - 19 \times 121 =$_____

(31) $43_8 - 21_8 =$_____

(32) If $x - 3 = -4$, then $x + 3 =$_____

(33) $1^2 + 1^2 + 2^2 + 3^2 + 5^2 + 8^2 =$ _____

(34) $(4^4 + 3^3 \times 2^2) \div 5$ has a remainder of _____

(35) $15\frac{1}{5} \times 5\frac{1}{5} =$ _____

(36) $\Big|6 - |-3 - 6|\Big| =$ _____

(37) The area of rhombus is 135 in^2 and one diagonal is 18 in. The other diagonal is _____ in.

(38) If $a = 5$ and $b = 3$, then $(a - b)(a^2 + ab + b^2) =$ _____

(39) If $x + 3y = 5$ and $x - 2y = 4$, then $y =$ _____

*(40) $\sqrt[3]{1730} \times \sqrt{142} \times 12 =$ _____

(41) $63 \div 1.75 =$ _____

(42) $3^4 \times 3^k \div 3^5 = 3^2$, then $k =$ _____

(43) $212 \times 311 =$ _____

(44) The hypotenuse of right triangle with integral sides is 41 in. The shortest leg is _____ in.

(45) $45 \times 95 =$ _____

(46) (x, y) is the midpoint of the line segment whose endpoints are $(2, 5)$ and $(5, 9)$. $y =$ _____

(47) $31 \times 4! + 36 \times 3! =$ _____

(48) The measure of an exterior angle of a regular n-gon is 18°. $n =$ _____

(49) $\frac{3}{14} =$ _____

*(50) $18^2 \div 9^3 \times 3^6 =$ _____

(51) Let $|2x + 3| \leq 11$. The least value of x is _____

(52) 18% of $266\frac{2}{3}$ is _____

(53) The vertex of the parabola $y = x^2 + 8x$ is (h, k). Find h. _____

(54) $\frac{7}{9} - \frac{19}{29} =$ _____

(55) If y varies inversely with x and $x = 4$ when $y = 3$, find x when $y = 8$. _____

(56) $61 \times 69 + 16 =$ _____

(57) $(k - 4i)^2 = -7 - 24i$. Find k. _____

(58) ${}_6\mathrm{C}_3 =$ _____

(59) The tenth term of $2, 7, 12, 17, \ldots$ is _____

*(60) $24^4 =$ _____

(61) If $\sqrt{12} + \sqrt{27} = \sqrt{x}$, then $x =$ _____

(62) If $\log_x 3 = 0.5$, then $x =$ _____

(63) The dot product for $\vec{u} = \langle 2, 1 \rangle$ and $\vec{v} = \langle 4, 3 \rangle$ is _____

(64) $f(x) = 5x^3 + 4x^2 + 3x - 2$ divided by $x + 1$ has a remainder of _____

(65) $\cos \frac{4\pi}{3}$ _____

(66) If $A = \begin{bmatrix} 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 \\ 2 \end{bmatrix}$ then $AB =$ $\begin{bmatrix} \text{\_\_\_\_\_} \end{bmatrix}$.

(67) If $\sqrt[4]{a^2} \cdot \sqrt[3]{a} = \sqrt[n]{a^k}$, where n and k are relatively prime, $n =$ _____

(68) $\sqrt{444889} =$ _____

(69) The greatest integer function $f(x) = [\,x\,]$ has a value of _____ for $f(\pi)$.

*(70) $(e\pi)^2 \times (\pi e)^2 =$ _____

(71) The larger root of $8x^2 + 25x + 4 = 0$ is _____

(72) The smallest value of x in the domain of $f(x)$ so that $f(x) = \sqrt{4x + 5}$ has a real valued range is _____

(73) The rectangular coordinates of the polar coordinates $(3\sqrt{2}, \frac{\pi}{4})$ are (x, y). $x =$ _____

(74) $\lim\limits_{x \to 4} \frac{x^2 + x - 20}{x - 4} =$ _____

(75) If $f(x) = 3x^2 - 2x + 1$, then $f'(-4) =$ _____

(76) $\displaystyle\int_2^{-2} x^2 \, dx =$ _____

(77) If the initial point of a vector $\vec{v}$ is $(3, 7)$ and the terminal point is $(-1, 4)$, then $\|\vec{v}\| =$ _____

(78) $111 \times 27 =$ _____

(79) $\frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} =$ _____

*(80) $798 \div 44\frac{4}{9}\% \times 0.25 =$ _____

The Collegiate Interscholastic League
Number Sense Test • HS Invitational A • 2008
Answer Key