The University Interscholastic League
Number Sense Test • HS Regional • 2010

Contestant's Number 9A-56

Final _____ _____
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) $2010 - 424 + 508 =$ _____

(2) $\frac{8}{25} \times \frac{15}{16} =$ _____

(3) $\$201.00 \div 2.5 = \$$ _____

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

(5) $48\ \% =$ _____ (proper fraction)

(6) $2010 \div 9$ has a remainder of _____

(7) $1 - 1 \div 2 + 3 \times 5 =$ _____

(8) $31^2 =$ _____

(9) $72 \times 27 =$ _____

*(10) $11235 + 2134 - 162 =$ _____

(11) 37.5% of 320 is _____

(12) $GCD(15, 48) \times LCM(15, 48) =$ _____

(13) $8 \times 18 \times 12 =$ _____

(14) $1 + 5 + 9 + 13 + ... + 33 =$ _____

(15) 2.25 pecks is equivalent to _____ quarts

(16) The median of 85, 78, 92, 88, 90, & 76 is = ____

(17) $12.34 - 56.7 =$ _____ (decimal)

(18) $DLV + CXI =$ _____ (Arabic Number)

(19) $\{x \mid 20 < x < 40,\ x \in \{Primes\}\}$ contains how many elements? _____

*(20) $\sqrt{94835} =$ _____

(21) $0.4333... =$ _____ (proper fraction)

(22) $369 \times 101 =$ _____

(23) Round $\sqrt{5} \div \sqrt{4}$ to the tenths place. _____

(24) The sum of x and four gives the same results as twice x less eight. What is the number? _____

(25) If $f(x) = x^3 + 9x^2 + 27x + 27$ then f(9) is _____

(26) The 11^{th} hexagonal number is _____

(27) $|-1+2| - |3+4| - 5 + |-6| =$ _____

(28) The sum of the product of the roots taken two at a time of $4x^4 - 37x^2 + 9x = 0$ is _____

(29) 14253K is divisible by 6, but not by 5. K is ____

*(30) $24 \times 12 + 36 \times 72 =$ _____

(31) The multiplicative inverse of 2.0625 is _____

(32) Find k if $87^2 - 73^2 = 80k$. k = _____

(33) $222_8 - 44_8 =$ _____ 8

(34) $35 \times 4! + 3 \times 6! =$ _____

(35) $9\frac{8}{11} \times 9\frac{3}{11} =$ _____ (mixed number)

(36) $(13 \times 16 - 19) \div 11$ has a remainder of _____

(37) Given $5940 \div 44 = 135$. Find $5940 \div 5\frac{1}{2}$. _____

(38) $\sqrt{45} + \sqrt{180} = \sqrt{x}$. Find x. _____

(39) Set A has 12 elements, B has 14 elements, and $A \cap B$ has 5 elements. $A \cup B$ has _____ elements

*(40) $727272 \div 111 =$ _____

(41) The legs of a right $\triangle$ are 9 and 40. The length of the altitude to the hypotenuse is _____

(42) If P is 40% of Q and P is $\frac{3}{5}$ of R then Q is what percent greater than R? _____%

(43) If $x - y = \frac{1}{2}$ and $xy = 3$ then $x^3 - y^3 =$ _____

(44) $113 \times 211 =$ _____

(45) The greatest integer x such that $4 - 3x \geq 5$ is _____

(46) $\frac{2}{3} - \frac{101}{149} =$ _____

(47) The arithmetic mean of 0.4, 1.5, 2.6, 3.7, and 4.8 is _____(decimal)

(48) ..., x, 0.5, — 1, 2, y, ... is a geometric sequence. Find the value of $x + y$. _____

(49) 11 °C = _____ °F

*(50) $452 \times 25.4 \times \frac{2}{45} =$ _____

(51) $(144)^2 - (89)(233) =$ _____

(52) The number of distinct diagonals of a convex dodecagon is _____

(53) $\sqrt{207936} =$ _____

(54) ${}_5C_2 + {}_4P_3 =$ _____

(55) How much time has passed from 5:50 a.m. to 11:10 p.m. the same day? _____ hours

(56) $(67_9 + 78_9) \div 8$ has a remainder of _____

(57) Let $\log_{16}(x - 4) = \frac{3}{4}$. $x =$ _____

(58) $8^2 - 7^2 + 6^2 - 5^2 + 4^2 - \ldots - 1^2 =$ _____

(59) The largest number of regions created by 12 intersecting lines that are coplanar is _____

*(60) $(1.62)(2.72)(3.14)(\phi)(e)(\pi) =$ _____

(61) The slope of the line containing the points $(-1, 5)$ and $(2, -3)$ is _____

(62) $(\sin\frac{\pi}{6})(\cos\frac{\pi}{3}) - (\sin\frac{\pi}{3})(\cos\frac{\pi}{6}) =$ _____

(63) $\begin{vmatrix} 7 & 3 \\ 5 & 1 \end{vmatrix} \times \begin{vmatrix} 2 & 6 \\ 4 & 8 \end{vmatrix} = \begin{vmatrix} a & c \\ b & d \end{vmatrix}$. Find $b + c$. _____

(64) The odds of event A happening is $\frac{3}{5}$. The probability of A not happening is _____%

(65) The greatest integer function $g(x) = [3x + 1]$ has a value of _____ for $g(\sqrt{2})$

(66) 75 miles/hour = _____ feet/second

(67) $\log 27 \div \log 3 \times \log 1000 =$ _____

(68) If $[(2!) + (3!) + (5!)] \cong x \pmod 6$ and $0 \leq x \leq 5$, then x = _____

(69) If $f(x) = \frac{5-3x}{2}$, then $f^{-1}(1) =$ _____

*(70) 4 rods 3 yards 2 feet = _____ inches

(71) $1(1!) + 2(2!) + 3(3!) + \ldots + 6(6!) =$ _____

(72) If $f(x) = x^2 - x - 2$, then $f(f(-1)) =$ _____

(73) $f(x) = \sqrt{4x - 1}$ is a real value function. The domain of f(x) is $\{x \mid x \in \{\text{Reals}\} \text{ and } x \geq$ ____$\}$

(74) $\sum_{-1}^{2} [(-x)^3 + x] =$ _____

(75) $\int_1^2 (3 - x)\,dx =$ _____

(76) The sum of the first 10 terms of the Fibonacci characteristic sequence 4,5,9,14,23,... is _____

(77) How many ways can Donald and his 3 nephews sit in a row of 5 chairs? _____

(78) $0.111\ldots + 0.1666\ldots + 0.333\ldots =$ _____

(79) Change .55 base 6, to a base ten fraction. _____

*(80) 1800 feet = _____ rods

University Interscholastic League - Number Sense Answer Key HS • Regional • 2010

*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) 2094

(2) .3, $\frac{3}{10}$

(3) $ 80.40

(4) $5\frac{8}{15}$

(5) $\frac{12}{25}$

(6) 3

(7) 15.5, $\frac{31}{2}$, $15\frac{1}{2}$

(8) 961

(9) 1944

*(10) 12547 - 13867

(11) 120

(12) 720

(13) 1728

(14) 153

(15) 18

(16) 86.5, $\frac{173}{2}$, $86\frac{1}{2}$

(17) — 44.36

(18) 666

(19) 4

*(20) 293 — 323

(21) $\frac{13}{30}$

(22) 37269

(23) 1.1

(24) 12

(25) 1728

(26) 231

(27) — 5

(28) — 9.25, $-\frac{37}{4}$, $-9\frac{1}{4}$

(29) 6

*(30) 2736 — 3024

(31) $\frac{16}{33}$

(32) 28

(33) 156

(34) 3000

(35) $90\frac{24}{121}$

(36) 2

(37) 1080

(38) 405

(39) 21

*(40) 6225 — 6879

(41) $\frac{360}{41}$, $8\frac{32}{41}$

(42) 50

(43) 4.625, $\frac{37}{8}$, $4\frac{5}{8}$

(44) 23843

(45) — 1

(46) $-\frac{5}{447}$

(47) 2.6

(48) — 4.25, $-\frac{17}{4}$, $-4\frac{1}{4}$

(49) 51.8, $\frac{259}{5}$, $51\frac{4}{5}$

*(50) 485 — 535

(51) — 1

(52) 54

(53) 456

(54) 34

(55) $\frac{52}{3}$, $17\frac{1}{3}$

(56) 4

(57) 12

(58) 36

(59) 79

*(60) 182 — 200

(61) $-\frac{8}{3}$, $-2\frac{2}{3}$

(62) — .5, $-\frac{1}{2}$

(63) 80

(64) 62.5, $\frac{125}{2}$, $62\frac{1}{2}$

(65) 5

(66) 110

(67) 9

(68) 2

(69) 1

*(70) 878 — 970

(71) 5039

(72) — 2

(73) .25, $\frac{1}{4}$

(74) — 6

(75) 1.5, $\frac{3}{2}$, $1\frac{1}{2}$

(76) 660

(77) 120

(78) $\frac{11}{18}$

(79) $\frac{35}{36}$

*(80) 104 — 114