The University Interscholastic League
Number Sense Test • HS District 1 • 2010

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

Contestant's Number _____

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) $2210 - 1030 =$ _____

(2) $\frac{7}{10} \times \frac{5}{14} =$ _____

(3) $326 \times 11 =$ _____

(4) $\frac{5}{24} \div \frac{3}{4} =$ _____

(5) $36\ \% =$ _____ (proper fraction)

(6) $(2 + 3) - 5 \div 6 \times 4 =$ _____

(7) $17^2 =$ _____

(8) $65 \times 56 =$ _____

(9) $9^3 =$ _____

*(10) $3221 + 4021 - 5112 =$ _____

(11) $4\frac{5}{6} - 2\frac{7}{12} =$ _____ (mixed number)

(12) The GCD of 52 and 78 is = _____

(13) 225 is 150 % of _____

(14) CXI + XLIV = _____ (Arabic Number)

(15) $3\frac{3}{4}$ pecks is equivalent to _____ quarts

(16) The number of positive prime integers that divide 76 is? _____

(17) Which is larger, $-2\frac{2}{5}$ or -2.35. _____

(18) The arithmetic mean of 10, 15, 12, 13, 13, 12, 10, & 14 is = _____ (decimal)

(19) $7 + 12 + 17 + 22 + \ldots + 47 =$ _____

*(20) $\sqrt{8679} =$ _____

(21) 0.120120120... = _____ (proper fraction)

(22) Which of the following is both a composite and an abundant number, 42, 43, or 44? _____

(23) Truncate $(\sqrt{2})(\sqrt{3})$ to the tenths place. ___

(24) A number squared gives the same results as half of it cubed. What is the number? _____

(25) If $f(x) = x^2 + 8x + 16$ then f(26) is _____

(26) 0.08333... + 0.41666... − 0.58333... = _____

(27) $|-1-1| - |2-3| - 5|8| =$ _____

(28) The product of the roots of $3x^2 + 8x = 3$ is ____

(29) 223355k is divisible by 9. Find k. _____

*(30) $6543 \times 876 =$ _____

(31) The diagonal of a square is $3\sqrt{5}$ inches. The area of this square is _____square inches

(32) Find k if $59^2 - 47^2 = 24k$. k = _____

(33) $241_6 - 43_6$ = _____ 6

(34) $5 \times 5! + 35 \times 4!$ = _____

(35) $11\frac{7}{9} \times 11\frac{2}{9}$ = _____ (mixed number)

(36) $(9 + 15 \times 21) \div 8$ has a remainder of _____

(37) The largest number of regions created by nine intersecting lines is _____

(38) $\sqrt{108} - \sqrt{48} = \sqrt{x}$. Find x. _____

(39) Set A has 10 elements, B has 7 elements, and $A \cup B$ has 15 elements. $A \cap B$ has ____ elements

*(40) $79.4 \div \frac{1}{9} \times 133\frac{1}{3}\%$ = _____

(41) $12 \times 39 + 13 \times 34$ = _____

(42) The x-intercept of the line going through (1, 3) and (3, 5) is (x, y). x = _____

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

(44) 221×133 = _____

(45) The greatest integer x such that $3x + 8 < 4$ is _____

(46) The sum of the product of the roots taken two at a time of $x^4 + 2x^3 - 3x^2 - 4x = -4$ is _____

(47) Find the geometric mean of 4, 6, and 9. _____

(48) $111_2 + 222_3 + 333_4$ = _____ 10

(49) 77 °F = _____ °C

*(50) 248248 ÷ 121 = _____

(51) $(3 + 4i)(5 - 6i) = (a + bi)$. Find a + b. _____

(52) Let $\log_8(x^2) = \frac{2}{3}$, where $x > 0$. x = _____

(53) $1 - 2^2 + 3^2 - 4^2 + 5^2 - \ldots - 10^2$ = _____

(54) ${}_5C_3 - {}_4P_2$ = _____

(55) $\sqrt{15129}$ = _____

(56) If two dice are rolled, the odds that the sum of the faces is 2, 3, or 12 is _____

(57) $\sin(\frac{5\pi}{4}) \times \cos(\frac{5\pi}{4})$ = _____

(58) The number of distinct diagonals of a convex decagon is _____

(59) How much time has passed from 8:20 a.m. to 3:50 p.m. the same day? _____ hours

*(60) $2.72^{(e)} \times 3.14^{(\pi)} \times 1.62^{(\phi)}$ = _____

(61) 480 miles/hour = _____ feet/second

(62) $\begin{vmatrix} 1 & 1 \\ 2 & 3 \end{vmatrix} \times \begin{vmatrix} 2 & 1 \\ 3 & 4 \end{vmatrix} = \begin{vmatrix} a & c \\ b & d \end{vmatrix}$. Find a — d. _____

(63) $(123_5 + 321_5) \div 4$ has a remainder of _____

(64) If sec x = 2 then the value of $\tan^2 x$ is _____

(65) The greatest integer function $g(x) = [2x - 7]$ has a value of _____ for $g(\sqrt{7})$

(66) log 125 — log 25 + log 5 = log _____

(67) The simplified coefficient of the x^2y^3 term in the expansion of $(2x - y)^5$ is _____

(68) $(2!)(3!)(4!) \cong x \pmod 8$ and $0 \leq x \leq 7$. x = ____

(69) How many ways can Huey, Dewey, and Louie sit in a row of four chairs? _____

*(70) The surface area of a right cylinder with a radius of 3" and a height of 4" is _____ sq. in.

(71) Given $3192 \div 11\frac{1}{5} = 285$. Find $3192 \div 56$. ____

(72) $F(x) = \log(3x - 2)$ has an asymptote at x = ____

(73) If $f(x) = \sqrt{3 + 4x}$, where x, $f(x) \in \{\text{Reals}\}$ then the range of f(x) is $\{f(x) | f(x) \geq$ _____$\}$

(74) If $\sin\theta = .8$ then $\cos\theta$ = _____ in QIV

(75) $\sum_0^2 (1 - 3x)$ = _____

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

(77) The minimum value of $y = x^2 + 2x - 3$ is ____

(78) 3434×1001 = _____

(79) Change .34 base 5, to a base ten fraction. _____

*(80) 3.75 square miles = _____ acres

University Interscholastic League - Number Sense Answer Key HS • District 1 • 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) 1180

(2) .25, $\frac{1}{4}$

(3) 3586

(4) $\frac{5}{18}$

(5) $\frac{9}{25}$

(6) $\frac{5}{3}$, $1\frac{2}{3}$

(7) 289

(8) 3640

(9) 729

*(10) 2024 — 2236

(11) $2\frac{1}{4}$

(12) 26

(13) 150

(14) 155

(15) 30

(16) 2

(17) $-2.35, -\frac{47}{20}, -2\frac{7}{20}$

(18) 12.375

(19) 243

*(20) 89 — 97

(21) $\frac{40}{333}$

(22) 42

(23) 2.4, $\frac{12}{5}$, $2\frac{2}{5}$

(24) 8

(25) 900

(26) $-\frac{1}{12}$,

(27) −39

(28) −1

(29) 7

*(30) 5,445,085 — 6,018,251

(31) 22.5, $\frac{45}{2}$, $22\frac{1}{2}$

(32) 53

(33) 154

(34) 1440

(35) $132\frac{14}{81}$

(36) 4

(37) 46

(38) 12

(39) 2

*(40) 906 — 1000

(41) 910

(42) −2

(43) $-\frac{80}{27}, -2\frac{26}{27}$

(44) 29393

(45) −2

(46) −3

(47) 6

(48) 96

(49) 25

*(50) 1950 — 2154

(51) 41

(52) 2

(53) −55

(54) −2

(55) 123

(56) $\frac{1}{8}$

(57) .5, $\frac{1}{2}$

(58) 35

(59) 7.5, $\frac{15}{2}$, $7\frac{1}{2}$

*(60) 1146 — 1266

(61) 704

(62) −9

(63) 0

(64) 3

(65) −2

(66) 25

(67) −40

(68) 0

(69) 24

*(70) 126 — 138

(71) 57

(72) $\frac{2}{3}$

(73) 0

(74) .6, $\frac{3}{5}$

(75) −6

(76) 4

(77) −4

(78) 3,437,434

(79) $\frac{19}{25}$

*(80) 2280 — 2520