The University Interscholastic League
Number Sense Test • HS State • 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) $38 + 459 + 6712 =$ _____

(2) $\frac{24}{35} \div \frac{4}{7} =$ _____

(3) $245 \times 16 =$ _____

(4) $7.65 - 123.4 =$ _____ **(decimal)**

(5) 25% **of** $(\frac{3}{4} \div 0.125) =$ _____

(6) $72\% =$ _____ **(proper fraction)**

(7) $10 - 8 \times 6 \div 4 + 2 =$ _____

(8) $35 \div 1.5 + 64 \div 1.5 =$ _____

(9) $3\frac{1}{5} - 5\frac{1}{6} =$ _____**(mixed number)**

***(10)** $1307 - 259 - 84 =$ _____

(11) 18.75% **of 48 is** _____

(12) If $1\frac{1}{2}$ **pounds of pecans costs $8.76 then 8 ounces of pecans will cost $** _____

(13) The LCM of 12, 36, and 81 is _____

(14) The number of positive prime integers that divide 88 is? _____

(15) $\{x \mid 30 < x < 60,\ x \in \{\text{Multiples of 3}\}\}$ **contains how many elements?** _____

(16) $MMC - XC =$ _____ **(Arabic Number)**

(17) Which is larger, $-3\frac{1}{12}$ **or** -3.1**?** _____

(18) $14^3 =$ _____

(19) $92 \times 29 =$ _____

***(20)** $\sqrt{1936} \times 46 =$ _____

(21) 27% **of 36 is** 18% **of** _____

(22) If $x + 5 = 3$**, then** $3x - 5 =$ _____

(23) $0.2030303... =$ _____ **(proper fraction)**

(24) $5^3 + 4^2 + 3^1 = k^2$**, where** $k > 0$**.** $k =$ _____

(25) 24839K is divisible by 8. K is _____

(26) Round $\sqrt{6} - \sqrt{3}$ **to the tenths place.** _____

(27) Picture A is 3" by 5" and B is 4" by 4". The ratio of B's perimeter to A's perimeter is _____

(28) $5 + 6 + 11 + 17 + 28 + ... + 191 + 309 =$ ____

(29) $306_{16} \div 9_{16} =$ _____ **16**

***(30)** $85746 \div 312 =$ _____

(31) If set B has 13 elements, $A \cap B$ **has 8, and** $A \cup B$ **has 16, then set A has** _____ **elements.**

(32) The product of six and x gives the same results as the sum of three times x and three What is the number? _____

(33) If $113^2 - 109^2 = 8k$, then k = _____

(34) If $\sqrt{4 - \sqrt{3 + \sqrt{2x}}} = 1$ then x = _____

(35) How many subsets containing only 3 elements does the set {d,e,c,i,m,a,l} have? _____

(36) 0.090909... ÷ 0.111... × 0.333... = _____

(37) 24 is to 18 as 15 is to _____ (decimal)

(38) $\frac{9!}{4!\,3!\,2!}$ = _____

(39) Which of the following is an odious number, 9, 17, or 35? _____

*(40) 550 log 1100 = _____

(41) $(89)^2 - (144)(x) = 1$. Find x. _____

(42) If P is $\frac{5}{8}$ of Q and R is $\frac{3}{8}$ of Q, then R is what percent of P? _____%

(43) 323 × 232 = _____

(44) The units digit of 8^8 is _____

(45) The sum of the product of the roots taken 3 at a time of $x^4 + 2x^3 - 9x^2 - 2x + 8 = 0$ is ____

(46) $44_5 + 333_4 + 2222_3$ = _____ 10

(47) The harmonic mean of $\frac{1}{3}$, $\frac{1}{6}$, and $\frac{1}{12}$ is _____

(48) The slope of the line perpendicular to the line 4x — 2y = 6 is _____

(49) If x = 5 — y and $y = \frac{2}{x}$, then $x^3 + y^3$ = _____

*(50) $437.5 \times 32 \div \frac{7}{23}$ = _____

(51) The probability of randomly selecting a prime number from the set {1,2,3,4,5,6,7,8,9} is _____

(52) 315 degrees = $\frac{\pi}{k}$ radians. Find k. _____

(53) A convex polygon has 9 distinct diagonals. How many sides does it have? _____

(54) (5 — 7i)(6 + 8i) = (a + bi). Find b. _____

(55) How much time has passed from 8:22 a.m. to 2:28 a.m. the next day? _____ hours

(56) $(45_8)(56_8)(67_8) \div 7$ has a remainder of _____

(57) If $\log_{16}(5 - 3x) = .75$ then x = _____

(58) ${}_6C_4 + {}_6P_4$ = _____

(59) 196 — 169 + 144 — 121 + ... — 1 = _____

*(60) $[(\pi)(e)(\phi)]^3$ = _____

(61) The simplified coefficient of the x^2y^2 term in the expansion of $(2x - y)^4$ is _____

(62) Change .23 base 6, to a base ten fraction. _____

(63) 1 + 8 + 15 + 22 + 29 + ... + 78 = _____

(64) If $f(x) = \frac{1-3x}{4}$, then $f^{-1}(2)$ = _____

(65) Truncate $\frac{-3\pi}{2}$ to the hundreths place. _____

(66) $(3!)(4!)(5!) \cong x \pmod 6$ and $0 \leq x \leq 5$. x = ___

(67) M varies inversely with N and M = 4.5 when N = 3. If N = 2 then M = _____

(68) $\sin(75°)\cos(75°)$ = _____

(69) $\begin{bmatrix} 1 & 3 \\ 5 & 7 \end{bmatrix} - \begin{bmatrix} 8 & 6 \\ 4 & 2 \end{bmatrix} = \begin{bmatrix} a & c \\ b & d \end{bmatrix}$. a + b + c + d =___

*(70) The area of $121x^2 + 225y^2 = 27225$ is _____

(71) Find the slope of the line tangent to $f(x) = x^2 - 4x + 10$ at x = 7. _____

(72) 80% of $\frac{1}{4}$ of 0.125 = $\frac{1}{k}$. Find k. _____

(73) If $f(x) = \frac{5x+8}{7x+4}$, then $f'(-1)$ = _____

(74) $F(x) = x^2 - 1$. G(x) = x — 1. F(G(1)) = _____

(75) If sec θ = 1.5 then cos θ = _____

(76) $F(x) = x^4 + x^3 + x^2 + x + 1$. $F''(-1)$ = _____

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

(78) $\int_1^5 (2x + 3)\,dx$ = _____

(79) 1234 × 1001 = _____

*(80) 317 rods × 323 rods = _____ acres

University Interscholastic League - Number Sense Answer Key HS ● State ● 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) 7209

(2) 1.2, $\frac{6}{5}$, $1\frac{1}{5}$

(3) 3920

(4) — 115.75

(5) 1.5, $\frac{3}{2}$, $1\frac{1}{2}$

(6) $\frac{18}{25}$

(7) 0

(8) 66

(9) $-1\frac{29}{30}$

***(10) 916 — 1012**

(11) 9

(12) $ 2.92

(13) 324

(14) 2

(15) 9

(16) 2010

(17) $-\frac{37}{12}$, $-3\frac{1}{12}$

(18) 2744

(19) 2668

***(20) 1923 — 2125**

(21) 54

(22) — 11

(23) $\frac{67}{330}$

(24) 12

(25) 2

(26) .7, $\frac{7}{10}$

(27) 1

(28) 803

(29) 56

***(30) 262 — 288**

(31) 11

(32) 1

(33) 111

(34) 18

(35) 35

(36) $\frac{3}{11}$

(37) 11.25

(38) 1260

(39) 35

***(40) 1590 — 1756**

(41) 55

(42) 60

(43) 74936

(44) 6

(45) 2

(46) 167

(47) $\frac{1}{7}$

(48) — .5, $-\frac{1}{2}$

(49) 95

***(50) 43700 — 48300**

(51) $\frac{4}{9}$

(52) $\frac{4}{7}$

(53) 6

(54) — 2

(55) 18.1, $\frac{181}{10}$, $18\frac{1}{10}$

(56) 6

(57) — 1

(58) 375

(59) 105

***(60) 2507 — 2770**

(61) 24

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

(63) 474

(64) $-\frac{7}{3}$, $-2\frac{1}{3}$

(65) — 4.71, $-\frac{471}{100}$, $-4\frac{71}{100}$

(66) 0

(67) 6.75, $\frac{27}{4}$, $6\frac{3}{4}$

(68) .25, $\frac{1}{4}$

(69) — 4

***(70) 493 — 544**

(71) 10

(72) 40

(73) — 4

(74) — 1

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

(76) 8

(77) 12

(78) 36

(79) 1,235,234

***(80) 608 — 671**