The University Interscholastic League
Number Sense Test • HS State • 2005

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) $2005 - 2004 - 2003 =$ _____

(2) $2005 \div 5 =$ _____

(3) $\frac{6}{7} \times \frac{35}{36} =$ _____

(4) $200.5 + 20.05 + 2.005 =$ _____ **(decimal)**

(5) **Which is smaller,** $-1\frac{2}{3}$ **or** -1.6**?** _____

(6) $(9 - 8 + 5 \times 7) \div 6 =$ _____

(7) $2233 \div 11 =$ _____

(8) $31^2 =$ _____

(9) $\frac{7}{40} =$ _____ **% (decimal)**

***(10)** $8765 - 4321 - 1234 + 5678 =$ _____

(11) $\frac{7}{8} - \frac{12}{13} =$ _____

(12) **The LCM of** $2^3 \times 3^2$ **and** $2^2 \times 3^3$ **is** _____

(13) $21 + 42 - 63 - 84 + 105 + 126 =$ _____

(14) $MI \times XI =$ _____ **(Arabic Numeral)**

(15) $46 \div 4\frac{3}{5} =$ _____

(16) $14 \times 14 \times 14 =$ _____

(17) $1\frac{1}{3}$ **cubic yards =** _____ **cubic feet**

(18) $43 \times 21 =$ _____

(19) **110% of 110 minus 110 is** _____

***(20)** $\sqrt{86420} =$ _____

(21) $94 \times 98 =$ _____

(22) $75 \div .555... =$ _____

(23) **The number of positive integral divisors of 100 is** _____

(24) $\sqrt[3]{1.331} =$ _____

(25) $322766211 \div 6$ **has a remainder of** _____

(26) **25% of 50% is** _____**%**

(27) $\frac{15}{14} =$ _____**% (mixed number)**

(28) $11011_2 =$ _____$_4$

(29) **If** $f(x) = 9x^2 - 12x + 4$ **then** $f(19) =$ _____

***(30)** $461357 \div 829 =$ _____

(31) **If 6 balls cost \$6.06 then 15 balls cost \$**_____

(32) $41 \times 17 - 17 \times 24 =$ _____

(33) $128 + 48 + 12 + 2 =$ _____ **base 4**

(34) $38^2 - 27^2$ = _____

(35) $2\frac{3}{4} + 4\frac{5}{6}$ = _____ (mixed number)

(36) 7 quarts and 6 pints equals _____ gallons

(37) If $\frac{x-4}{6} + \frac{x-5}{5} = \frac{x}{30}$ then x = _____

(38) The larger root of $x^2 + 8x + 12 = 0$ is _____

(39) $12\frac{2}{3} \times 12\frac{2}{3}$ = _____ (mixed number)

*(40) $63 \times 65 \times 67$ = _____

(41) (12012)(12012) = _____

(42) $\sqrt{45} \div \sqrt{80}$ = _____

(43) $36 + 32 + 28 + 24 + ... + 12$ = _____

(44) The slope of the line $3x - 4y = 5$ is _____

(45) 15% of $833\frac{1}{3}$ is _____

(46) 43 students like math and/or history. 28 like math and 34 like history. How many students like both math and history? _____

(47) $\frac{1}{3} + \frac{2}{3} + 1 + 1\frac{1}{3} ... + 2\frac{1}{3}$ = _____

(48) ${}_9C_2$ = _____

(49) $11^2 - 11^3$ = _____

*(50) $\sqrt{327} \times \sqrt{397} \times \sqrt{487}$ = _____

(51) $(46)^2 - (21^2 - 25^2)$ = _____

(52) $(4 - 2i)(3 - i) = a + bi$, and $a + b$ = _____

(53) $119^2 + 119$ = _____

(54) If $x + y = 6$ and $x^2 - y^2 = -6$ then $x - y$ = _____

(55) sec 120 ° = _____

(56) $64 \times 21 - 42 \times 16$ = _____

(57) $\frac{67}{81} - \frac{17}{20}$ = _____

(58) A line crosses the x-axis at 6 and the y-axis at 8. The slope of the line is _____

(59) 7.5 miles per hour = _____ feet per second

*(60) 5714.28×85 = _____

(61) $111^2 - 110^2 + 109^2 - 108^2$ = _____

(62) .111... base 5 is equivalent to _____ base 10

(63) 612^2 = _____

(64) The product of the coefficients of $(4x + 5)^2$ is _____

(65) $(22_4 + 33_4) \times 11_4$ = _____ 4

(66) $\sin 38° = \cos\theta$, $270° < \theta < 360°$ and θ = ____°

(67) The 6th hexagonal number is _____

(68) The determinant of $\begin{vmatrix} 4a & 3 \\ 2a & 1 \end{vmatrix}$ is 5. Find a. ____

(69) 505×404 = _____

*(70) $(\pi)^{\pi}$ $(e)^e$ = _____

(71) $3.8 \div 2.375$ = _____ (decimal)

(72) If $f(x) = 4 - 4x$, then $f^{-1}(-4)$ = _____

(73) $\frac{11}{15} + \frac{11}{21} + \frac{11}{28}$ = _____

(74) $\sqrt[4]{a^5} \times \sqrt[3]{a^4} = \sqrt[x]{a^y}$ and $x + y$ = _____

(75) The odds of drawing an ace followed by a king from a standard 52 card deck with replacement is _____

(76) $13 \times \frac{13}{16} + 13$ = _____ (mixed number)

(77) $\log_9(\log_3 27)$ = _____

(78) $\int_0^{14} (13 - x)\,dx$ = _____

(79) $4 + 6 + 10 + 16 + 26 + ... + 288$ = _____

*(80) $36 \times 72 \times 18 \div 54$ = _____

University Interscholastic League - Number Sense Answer Key HS • State • 2005

***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) — 2002

(2) 401

(3) $\frac{5}{6}$

(4) 222.555

(5) $-1\frac{2}{3}$ or $-\frac{5}{3}$

(6) 6

(7) 203

(8) 961

(9) 17.5

***(10) 8444 — 9332**

(11) $-\frac{5}{104}$

(12) 216

(13) 147

(14) 11011

(15) 10

(16) 2744

(17) 36

(18) 903

(19) 11

***(20) 280 — 308**

(21) 9212

(22) 135

(23) 9

(24) 1.1 or $\frac{11}{10}$ or $1\frac{1}{10}$

(25) 3

(26) 12.5 or $\frac{25}{2}$ or $12\frac{1}{2}$

(27) $107\frac{1}{7}$

(28) 123

(29) 3025

***(30) 529 — 584**

(31) 15.15

(32) 289

(33) 2332

(34) 715

(35) $7\frac{7}{12}$

(36) $2\frac{1}{2}$ or $\frac{5}{2}$ or 2.5

(37) 5

(38) — 2

(39) $160\frac{4}{9}$

***(40) 260647 — 288083**

(41) 144288144

(42) $\frac{3}{4}$ or .75

(43) 168

(44) $\frac{3}{4}$ or .75

(45) 125

(46) 19

(47) $9\frac{1}{3}$ or $\frac{28}{3}$

(48) 36

(49) — 1210

***(50) 7554 — 8348**

(51) 2300

(52) 0

(53) 14280

(54) — 1

(55) — 2

(56) 672

(57) $-\frac{37}{1620}$

(58) $-\frac{4}{3}$ or $-1\frac{1}{3}$

(59) 11

***(60) 461429 — 509999**

(61) 438

(62) .25 or $\frac{1}{4}$

(63) 374544

(64) 16000

(65) 1331

(66) 308

(67) 66

(68) — 2.5 or $-2\frac{1}{2}$ or $-\frac{5}{2}$

(69) 204020

***(70) 525 — 580**

(71) 1.6

(72) 2

(73) $1\frac{13}{20}$ or $\frac{33}{20}$ or 1.65

(74) 43

(75) $\frac{1}{168}$

(76) $23\frac{9}{16}$

(77) $\frac{1}{2}$ or .5

(78) 84

(79) 748

***(80) 821 — 907**