The University Interscholastic League
Number Sense Test • HS District 2 • 2006

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) $602 - 2006 =$ _____

(2) $20.06 + 600.2 =$ _____ (decimal)

(3) $1616 \div 25 =$ _____ (decimal)

(4) $\frac{3}{8} \times \frac{4}{9} =$ _____

(5) $1 + 9 \div 3 - 7 \times 5 =$ _____

(6) $27.5\% =$ _____ (proper fraction)

(7) Which is larger, $\frac{7}{25}$ or .25 = _____

(8) $34^2 =$ _____

(9) $357 \times 11 =$ _____

*(10) $75 + 236 - 4198 =$ _____

(11) $38 \times 74 =$ _____

(12) $13^3 =$ _____

(13) $3 + 8 + 13 + ... + 43 =$ _____

(14) The multiplicative inverse of -6.2 is _____

(15) CMIX − CDIV = _____ (Arabic Numeral)

(16) $\frac{1}{36} - \frac{1}{18} - \frac{1}{6} =$ _____ (proper fraction)

(17) .3222... = _____ (proper fraction)

(18) 24% of 80 = _____ % of 240

(19) $48 \times 22 - 22 \times 78 =$ _____

*(20) $\sqrt{262626} =$ _____

(21) The number of positive integral divisors of $6^1 \times 3^2 \times 2^3$ is _____

(22) 50 minus 60% of 70 is _____

(23) A square has an area of 12.25 sq. cm. Its perimeter is _____ cm.

(24) 123 base 10 equals _____ base 5

(25) $4\frac{4}{5} \div .444... =$ _____ (decimal)

(26) $(15 \times 30 - 45) \div 7$ has a remainder of ____

(27) 37.5% of a gallon is _____ pints

(28) $55^2 - 52^2 =$ _____

(29) The sum of 5 and 2x equals the product of 5 and 2x. Find x. _____

*(30) $248 \times 250 \times 252 =$ _____

(31) Set A = {m,e,n,t,a,l} and set B = {m,a,t,h}. $A \cap B$ contains how many elements? _____

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

(33) $97 \times 89 =$ _____

(34) The 5th hexagonal number is _____

(35) If $\frac{x-1}{3} + \frac{x-2}{4} = \frac{x-4}{12}$ then $x =$ _____

(36) $\sqrt{98 \times 8} =$ _____

(37) $\frac{13}{14} =$ _____ % (mixed number)

(38) GCD(18,33) + LCM(18,33) = _____

(39) $3904 \div 61 =$ _____

*(40) $48 \times 106 + 52 \times 114 =$ _____

(41) $78\frac{4}{7}\% =$ _____ (proper fraction)

(42) $312_4 =$ _____ $_2$

(43) In a 30° - 60° - 90° triangle the length of the leg opposite of the 30° angle is 7 cm. The length of the hypotenuse is _____ cm

(44) $63 \div .875 =$ _____

(45) The 11th term of the arithmetic sequence 12, 9.5, 7, 4.5, ... is _____

(46) If $5^x = 125$ then $x^5 =$ _____

(47) The modulus of $14 + 48i$ is _____

(48) $2! \times 3! - 5! =$ _____

(49) $369 \times 101 =$ _____

*(50) $566472 \div 748 =$ _____

(51) If $(2 - 5i)^2 = a + bi$, then $a + b =$ _____

(52) $466\frac{2}{3}\%$ of 60 is _____

(53) $\cos(-3\pi) - \sin(-3\pi) =$ _____

(54) $53 \times 53 + 50 \times 50 - 3 \times 3 =$ _____

(55) If 852k is divisible by 6 then the largest units digit value for k is _____

(56) $47 \times 43 + 4 =$ _____

(57) ${}_8C_6 =$ _____

(58) An equilateral triangle has an area of $27\sqrt{3}$ sq. cm. Its height is _____ cm.

(59) $124 \times 312 =$ _____

*(60) $\sqrt[3]{215346} \times \sqrt{3690} \times 57 =$ _____

(61) If $\text{Log}_2 X = 9$, then $\sqrt[3]{X} =$ _____

(62) $(33_4 + 22_4) \times 11_4 =$ _____ $_4$

(63) $909 \times 909 =$ _____

(64) The slope of the line perpendicular to the line $3x + 4y = 5$ is _____

(65) $999 \times \frac{3}{37} =$ _____

(66) $69^2 + 69 =$ _____

(67) The period of $y = 2 + 3\sin(\frac{x}{5})$ is _____ °

(68) $56^2 - 55^2 + 54^2 - 53^2 =$ _____

(69) $\frac{1}{21} + \frac{1}{28} + \frac{1}{36} =$ _____

*(70) The area of the ellipse $141x^2 + 171y^2 = 24111$ is _____

(71) The sum of the first nine terms of the Fibonacci sequence 1, 1, 2, 3, 5,... is _____

(72) $666 \times \frac{3}{27} =$ _____

(73) $15 \times \frac{15}{17} - 15 =$ _____

(74) A pair of dice is thrown. The odds that the sum is 6 or 8 is _____

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

(76) The maximum value of $5 - \cos 3x$ is _____

(77) $y = \frac{1}{x+1} - 3$ has a horizontal asymptote at $y =$ _____

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

(79) $(3^3 - 2^3 + 1^3) \times 5^3 =$ _____

*(80) $62.5 \div 83.3 \times 888 =$ _____

University Interscholastic League - Number Sense Answer Key HS • District 2 • 2006

*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) — 1404

(2) 620.26

(3) 64.64

(4) $\frac{1}{6}$

(5) — 31

(6) $\frac{11}{40}$

(7) .28 or $\frac{7}{25}$

(8) 1156

(9) 3927

*(10) (— 4081) — (— 3693)

(11) 2812

(12) 2197

(13) 207

(14) $-\frac{5}{31}$

(15) 505

(16) $-\frac{7}{36}$

(17) $\frac{29}{90}$

(18) 8

(19) — 660

*(20) 487 — 538

(21) 20

(22) 8

(23) 14

(24) 443

(25) 10.8

(26) 6

(27) 3

(28) 321

(29) .625 or $\frac{5}{8}$

*(30) 14,842,800 — 16,405,200

(31) 3

(32) 225

(33) 8633

(34) 45

(35) 1

(36) 28

(37) $92\frac{6}{7}$

(38) 201

(39) 64

*(40) 10466 — 11566

(41) $\frac{11}{14}$

(42) 110110

(43) 14

(44) 72

(45) — 13

(46) 243

(47) 50

(48) — 108

(49) 37269

*(50) 720 — 795

(51) — 41

(52) 280

(53) — 1

(54) 5300

(55) 6

(56) 2025

(57) 28

(58) 9

(59) 38688

*(60) 197163 – 217916

(61) 8

(62) 1331

(63) 826281

(64) $1\frac{1}{3}$ or $\frac{4}{3}$

(65) 81

(66) 4830

(67) 1800

(68) 218

(69) $\frac{1}{9}$

*(70) 464 — 512

(71) 88

(72) 74

(73) $-1\frac{13}{17}$, $-\frac{30}{17}$

(74) $\frac{5}{13}$

(75) — 68

(76) 6

(77) — 3

(78) 3.75, $3\frac{3}{4}$, $\frac{15}{4}$

(79) 2500

*(80) 633 — 699