The University Interscholastic League
Number Sense Test • HS Regional • 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) $2060 + 6020 =$ _____

(2) $2006 \times 11 =$ _____

(3) $\frac{1}{2} - \frac{3}{4} =$ _____ (decimal)

(4) $2006 \div 8 =$ _____ (mixed number)

(5) $(1 - 3 \times 4) \div 11 + 7 =$ _____

(6) $26\% =$ _____ (proper fraction)

(7) $18^2 =$ _____

(8) $12^3 =$ _____

(9) Which is smaller, $\frac{6}{25}$ or .25 = _____

*(10) $2006 - 602 + 206 =$ _____

(11) $23 \times 32 =$ _____

(12) $4 + 8 + 12 + \ldots + 44 =$ _____

(13) $10\frac{11}{12} - 5\frac{23}{24} =$ _____ (mixed number)

(14) MDXLV ÷ XV = _____ (Arabic Numeral)

(15) $\frac{1}{15} - \frac{1}{10} - \frac{1}{5} =$ _____

(16) $\frac{3^4}{(2^4)(5^4)} =$ _____ (decimal)

(17) The LCM of 108 and 81 is _____

(18) 44% of _____ = 88% of 22

(19) 745321 ÷ 11 has a remainder of _____

*(20) $\sqrt{2006 \times 6002} =$ _____

(21) The number of positive integral divisors of $12 \times 3^3 \times 2^4$ is _____

(22) 2.5 decameters = _____ kilometers

(23) $(6^4 \times 5^3 - 4^2) \div 3$ has a remainder of ____

(24) 50 — 60% of 70 is _____

(25) .0625 + .125 + .25 = _____ (proper fraction)

(26) $48^2 - 49^2 =$ _____

(27) 62.5% of a gallon is _____ quarts

(28) $123_4 =$ _____$_5$

(29) $17 \times 1\frac{17}{21} =$ _____ (mixed number)

*(30) $918576 \div 432 =$ _____

(31) If $x = -5$ and $y = -6$ then $x^3 + 3x^2y + 3xy^2 + y^3 =$ _____

(32) $94 \times 91 =$ _____

(33) Set A has 15 proper subsets. How many elements are in Set A? _____

(34) $11 \times 13 \times 42 =$ _____

(35) $8^2 + 2^4 + 4^0 =$ _____ base 4

(36) If 15 apples cost \$6.25, then 27 cost \$ _____

(37) $\sqrt{225} \div \sqrt[3]{3375} =$ _____

(38) GCF(24,44) — LCM(24,44) = _____

(39) $6.8 \times 7.2 =$ _____ (decimal)

*(40) $43 \times 56 + 47 \times 54 =$ _____

(41) $5! \div 3! \times 2! =$ _____

(42) If $6x - 5 = 4 + 3x$, then $2x - 1 =$ _____

(43) In a 30°-60°-90° triangle the hypotenuse is 9 cm. The smallest leg is _____ cm

(44) An icosahedron is a Platonic solid with 30 edges and _____ vertices

(45) $42\frac{6}{7}\% =$ _____ (proper fraction)

(46) $15 \times 75 + 45 \times 25 =$ _____

(47) $\frac{11}{15} + \frac{4}{11} =$ _____ (mixed number)

(48) If $x^3 = 64$ then $3^x =$ _____

(49) $24 \div .375 =$ _____

*(50) $13^3 \times 3^4 =$ _____

(51) $\frac{8! \times 7 - 8 \times 7!}{7!} =$ _____

(52) $\frac{8}{11} - \frac{87}{122} =$ _____

(53) $\cos\left(-\frac{4\pi}{3}\right) + \sin\left(-\frac{5\pi}{6}\right) =$ _____

(54) $81^2 + (80 + 1)(80 - 1) =$ _____

(55) $5 + 1 + \frac{1}{5} + \frac{1}{25} + \frac{1}{125} + \ldots =$ _____

(56) Two dice are tossed. What is the probability the sum is a multiple of 4? _____

(57) $141 \times 212 =$ _____

(58) If 555k is divisible by 6 then the smallest units digit value for k is _____

(59) $36 \times 34 + 1 =$ _____

*(60) $\sqrt[4]{4095} \times \sqrt[3]{510} \times \sqrt{66} =$ _____

(61) $888 \times \frac{24}{37} =$ _____

(62) $235_6 \div 5_6 =$ _____ 6

(63) $505 \times 505 =$ _____

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

(65) $2^4 \times 7^2 \times 5^3 =$ _____

(66) $109^2 + 109 =$ _____

(67) $999 \times \frac{1}{27} =$ _____

(68) $74^2 - 76^2 + 78^2 - 80^2 =$ _____

(69) If $\log_x 64 = 3$ then $x^{-2} =$ _____

*(70) The perimeter of the ellipse $143x^2 + 170y^2 = 24310$ is _____

(71) $\frac{1}{15} + \frac{1}{21} + \frac{1}{28} + \frac{1}{36} =$ _____

(72) If $h(x) = 5x - 3$, then $h^{-1}(2) =$ _____

(73) $13 \times \frac{13}{15} - 13 =$ _____ (mixed number)

(74) The sum of the first nine terms of the Fibonacci sequence — 3,2, — 1,1,0, ... is _____

(75) If $f(x) = 4 - 3x^2 + 2x^3$, then $f''(5) =$ _____

(76) The graph $y = \frac{2x^2 - 11}{x^2 + 9}$ has a horizontal asymptote at $y =$ _____

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

(78) If $\csc\theta = -3$, where $270° < \theta < 300°$, then $\sin\theta =$ _____

(79) $2^3 + 3^3 + 5^3 =$ _____

*(80) $(e)^4(\pi)^4 =$ _____

University Interscholastic League - Number Sense Answer Key HS • Regional • 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) 8080

(2) 22066

(3) — .25

(4) $250\frac{3}{4}$

(5) 6

(6) $\frac{13}{50}$

(7) 324

(8) 1728

(9) .24 or $\frac{6}{25}$

*(10) 1530 — 1690

(11) 736

(12) 264

(13) $4\frac{23}{24}$

(14) 103

(15) $-\frac{7}{30}$

(16) .0081

(17) 324

(18) 44

(19) 5

*(20) 3297 — 3643

(21) 35

(22) .025 or $\frac{1}{40}$

(23) 2

(24) 8

(25) $\frac{7}{16}$

(26) — 97

(27) 2.5, $2\frac{1}{2}$, $\frac{5}{2}$

(28) 102

(29) $30\frac{16}{21}$

*(30) 2021 — 2232

(31) — 1331

(32) 8554

(33) 4

(34) 6006

(35) 1101

(36) $ 11.25

(37) 1

(38) — 260

(39) 48.96

*(40) 4699 — 5193

(41) 40

(42) 5

(43) 4.5, $4\frac{1}{2}$, $\frac{9}{2}$

(44) 12

(45) $\frac{3}{7}$

(46) 2250

(47) $1\frac{16}{165}$

(48) 81

(49) 64

*(50) 169060 - 186854

(51) 48

(52) $\frac{19}{1342}$

(53) — 1

(54) 12960

(55) 6.25, $6\frac{1}{4}$, $\frac{25}{4}$

(56) .25 or $\frac{1}{4}$

(57) 29892

(58) 0

(59) 1225

*(60) 494 — 545

(61) 576

(62) 31

(63) 255025

(64) — 1

(65) 98000

(66) 11990

(67) 37

(68) — 616

(69) .0625 or $\frac{1}{16}$

*(70) 75 — 82

(71) $\frac{8}{45}$

(72) 1

(73) $-1\frac{11}{15}$

(74) 6

(75) 54

(76) 2

(77) 4

(78) $-\frac{1}{3}$

(79) 160

*(80) 5053 — 5584