The University Interscholastic League
Number Sense Test • HS Invitational B • 2005

Final _____ _____

Contestant's Number _____ 2nd _____ _____

1st _____ _____

Score Initials

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) $2005 \times 5 =$ _____

(2) $44 + 66 - 88 =$ _____

(3) $\frac{3}{4} \div \frac{2}{5} =$ _____ (mixed number)

(4) $275 \div 11 =$ _____

(5) $\frac{3}{4}\% =$ _____ (decimal)

(6) $2005 - 5002 =$ _____

(7) $22^2 =$ _____

(8) $32\% =$ _____ (proper fraction)

(9) $12 \div 3 \times 4 - 56 =$ _____

*(10) $2005 - 205 + 5002 - 502 =$ _____

(11) $18 \times 36 - 18 \times 54 =$ _____

(12) Which is smaller, $\frac{9}{11}$ or .8 ? _____

(13) 40% of 50 minus 60 is _____

(14) $12\frac{1}{2}\%$ of 24 is _____

(15) The median of 2, 3, 5, 7, 3, 5, 3, & 7 is _____

(16) MMCCXXII = _____ (Arabic Numeral)

(17) 3 cubic yards = _____ cubic feet

(18) $\frac{6}{5} - \frac{5}{6} =$ _____

(19) $8 - 16 + 24 - 32 + 40 - 48 =$ _____

*(20) $456789 \div 123 =$ _____

(21) 34 is what percent less than 51? _____%

(22) $15 \times 15 \times 15 =$ _____

(23) If $f(x) = x^2 - 8x + 16$ then $f(5.7) =$ _____

(24) 36 in/sec. = _____ in/min.

(25) The LCM of 12, 18 and 20 is _____

(26) $4 + 8 + 12 + 16 + \ldots + 44 =$ _____

(27) 234 base 5 equals _____ base 10

(28) If $2x + 1 = x + 2$ then $2x - 1 = x -$ _____

(29) $11^2 - 22^2 =$ _____

*(30) $\sqrt{1025} \times \sqrt{63} =$ _____

(31) How many positive integers divide 48? _____

(32) $14\frac{1}{7} \times 7\frac{1}{7} =$ _____ (mixed number)

(33) $(8^2 \times 6 - 4) \div 3$ has a remainder of _____

(34) $\frac{3}{11}$ of a gallon equals _____ cubic inches

(35) $1 \times 2 + 3 \div 4 - 5 =$ _____

(36) $3^4 + 3^2 + 3^0 =$ _____ base 9

(37) $88^2 - 87^2 =$ _____

(38) $5^3 - 3^3 =$ _____

(39) The perimeter of a square whose diagonal is $\sqrt{2}$ feet is _____ feet

*(40) $29 \times 111 + 31 \times 109 =$ _____

(41) The next term of 1, 4, 10, 19, 31, ... is _____

(42) $10! \div 7! =$ _____

(43) $(\sqrt{27})^3 = a\sqrt{3}$ and $a =$ _____

(44) $53 \times 57 =$ _____

(45) $1^3 + 2^3 + 3^3 + 4^3 + 5^3 =$ _____

(46) $\frac{2}{7} =$ _____ %

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

(48) The modulus of $(24 + 7i)^2$ is _____

(49) $33 \times 23 =$ _____

*(50) $(0.666...)(246{,}531) =$ _____

(51) $62 \times 68 + 9 =$ _____

(52) The area of a 45°- 45° right triangle with a hypotenuse of $14\sqrt{2}$ cm is _____ sq. cm

(53) $(5 + 4i)(3 + 2i) = a + bi$ and $a =$ _____

(54) If $\sqrt{5x} = 3$ then $x =$ _____ (decimal)

(55) 12% of $833\frac{1}{3}$ is _____

(56) The y-intercept of $y = x^3 - 3x^2 - 2x - 1$ is (a,b). Find b _____

(57) $36^2 + 57^2 =$ _____

(58) $\tan(-225°) =$ _____

(59) A die is rolled. What are the odds that a composite number is shown? _____

*(60) $23 \times 34 + 43 \times 32 =$ _____

(61) $39^2 + 39 =$ _____

(62) The sum of the measures of the interior angles of a regular pentagon is _____°

(63) $\frac{8}{3} - \frac{41}{14} =$ _____

(64) 16 is _____ % of 128

(65) $44_5 \times 2_5 + 33_5 =$ _____ 5

(66) .666... base 8 is equivalent to _____ base 10

(67) $(30)^2 - (28^2 - 2^2) =$ _____

(68) $\cos(\text{Sin}^{-1}\ \frac{\sqrt{3}}{2}) =$ _____

(69) $122 \times 311 =$ _____

*(70) $1^3 + 2^3 + 3^3 + 4^3 + ... + 13^3 =$ _____

(71) $44^2 - 43^2 + 42^2 - 41^2 =$ _____

(72) $1 + 1 + 2 + 3 + 5 + 8 + 13 + ... + 55 =$ ____

(73) The graph of $y = 1 - 2\cos(3x + 4)$ reaches a maximum range value of _____

(74) 6253718 ÷ 11 has a remainder of _____

(75) $\frac{1}{30} + \frac{1}{42} + \frac{1}{56} =$ _____

(76) If $f(x) = x^2 - 9$, find $f[f(-3)]$. _____

(77) $2^5 \times 3^4 \times 5^2 =$ _____

(78) $\int_0^4 (3 - x)\,dx =$ _____

(79) If $f'(x) = 3$ and $f(2) = 5$ then $f(4) =$ _____

*(80) $375.1 \times 83.33 \times 1.595 =$ _____

University Interscholastic League - Number Sense Answer Key HS • Invitation B • 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) 10025

(2) 22

(3) $1\frac{7}{8}$

(4) 25

(5) .0075

(6) – 2997

(7) 484

(8) $\frac{8}{25}$

(9) – 40

*(10) 5985 – 6615

(11) – 324

(12) .8 or $\frac{4}{5}$

(13) – 40

(14) 3

(15) 4

(16) 2222

(17) 81

(18) $\frac{11}{30}$

(19) – 24

*(20) 3529 – 3899

(21) $33\frac{1}{3}$ or $\frac{100}{3}$

(22) 3375

(23) 2.89

(24) 2160

(25) 180

(26) 264

(27) 69

(28) 0

(29) – 363

*(30) 242 – 266

(31) 10

(32) $101\frac{1}{49}$

(33) 2

(34) 63

(35) – 2.25 or $-2\frac{1}{4}$ or $-\frac{9}{4}$

(36) 111

(37) 175

(38) 98

(39) 4

*(40) 6269 – 6927

(41) 46

(42) 720

(43) 81

(44) 3021

(45) 225

(46) $28\frac{4}{7}$

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

(48) 625

(49) 759

*(50) 156137 – 172571

(51) 4225

(52) 98

(53) 7

(54) 1.8

(55) 100

(56) – 1

(57) 4545

(58) – 1

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

*(60) 2051 – 2265

(61) 1560

(62) 540

(63) $-\frac{11}{42}$

(64) $12\frac{1}{2}$ or $\frac{25}{2}$ or 12.5

(65) 231

(66) $\frac{6}{7}$

(67) 120

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

(69) 37942

*(70) 7867 – 8695

(71) 170

(72) 143

(73) 3

(74) 9

(75) $\frac{3}{40}$ or .075

(76) – 9

(77) 64800

(78) 4

(79) 11

*(80) 47363 – 52347