The University Interscholastic League
Number Sense Test • HS Invitational A • 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) $2005 \div 5 =$ _____

(2) $11 \times 38 =$ _____

(3) $200.5 - 20.05 =$ _____ (decimal)

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

(5) $\frac{1}{40} =$ _____ % (decimal)

(6) $2005 \times 5 + 2005 =$ _____

(7) $44\% =$ _____ (proper fraction)

(8) $24 \times 5 \div 6 - 31 =$ _____

(9) $16^2 =$ _____

*(10) $(48 + 53) \times 151 =$ _____

(11) 30 minus 30% of 30 is _____

(12) $1\frac{1}{8}\% =$ _____ (decimal)

(13) $75 \times 24 =$ _____

(14) $7 + 14 + 21 + 28 + 35 + 42 =$ _____

(15) The reciprocal of $1\frac{3}{8}$ is _____

(16) $CDI \times V =$ _____ (Arabic Numeral)

(17) The LCM of 28 and 52 is _____

(18) $3\frac{1}{5} \div 16 =$ _____

(19) $14 \times 38 - 14 \times 52 =$ _____

*(20) $\sqrt{80808} =$ _____

(21) How many odd natural numbers are between 17 and 83? _____

(22) If $3x + 4 = x - 5$ then $x =$ _____

(23) $\sqrt{(44)(11)} =$ _____

(24) $(1.728)^{\frac{1}{3}} =$ _____ (decimal)

(25) $15 \times 48 =$ _____

(26) $1575 \div 35 =$ _____

(27) $5\frac{2}{5} \times 5\frac{2}{5} =$ _____ (mixed number)

(28) The number of positive integral divisors of $2^3 \times 3^4 \times 4^5$ is _____

(29) $43 \times 42 =$ _____

*(30) $47985 \div 246 =$ _____

(31) $1011_2 =$ _____ $_4$

(32) One gallon equals _____ cubic inches

(33) $(9^2 - 7 \times 5) \div 4$ has a remainder of _____

(34) 48 inches is divided into two lengths such that the smaller length is 16 less than the larger length. The larger length is _____ in.

(35) $54^2 - 53^2 =$ _____

(36) .151515... = _____(proper fraction)

(37) $4^3 + 4 =$ _____base 8

(38) If 4 diskettes costs 39 cents then 2 dozen diskettes cost $_____

(39) $12^2 + 2(12)(13) + 13^2 =$ _____

*(40) $28 \times 30 \times 32 =$ _____

(41) The number of proper subsets of the set {M, A, T, H} is _____

(42) Find the slope of the line containing the points $(-3, 4)$ and $(5, -4)$. _____

(43) $96 \times 97 =$ _____

(44) $1 + 2 + 3 + ... + 21 =$ _____

(45) If $9^x = 108$, the $3^{2x+1} =$ _____

(46) 30 ft/min. = _____ ft/sec.

(47) (303)(303) = _____

(48) $57 \times 53 + 4 =$ _____

(49) $\frac{3}{14} =$ _____ %

*(50) $833 \times 612 =$ _____

(51) $\frac{4}{7} + \frac{8}{49} + \frac{16}{343} + ... =$ _____

(52) The number of terms in the expansion of $(3x + 4y)^5$ is _____

(53) $\cos(-300°) =$ _____

(54) $(3 + 4i) \div 5i = a + bi$ and b = _____

(55) The points (2 , 1), (x , 2), and (8 , 4) are collinear. x = _____

(56) For $x^2 - 2x - 3k = 0$ to have one Real solution, k has to have a value of _____

(57) 12% of $466\frac{2}{3}$ is _____

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

(59) $212 \times 131 =$ _____

*(60) $123456 \div 111 =$ _____

(61) $(32)^2 - (30^2 - 2^2) =$ _____

(62) The product of the coefficients of $(a - b)^2$ is _____

(63) .555... base 7 is equivalent to _____ base 10

(64) The graph of $y = 1 - 2\cos(3x + 4)$ has an amplitude of _____

(65) Change .44 base 5 to a base 10 decimal. ____

(66) In how many ways can you group 6 distinct objects in groups of 3? _____

(67) $29^2 + 29 =$ _____

(68) $33_4 \times 2_4 - 11_4 =$ _____4

(69) If $\log_4 X = 3$ then $\sqrt{X} =$ _____

*(70) $1^3 + 2^3 + 3^3 + 4^3 + ... + 11^3 =$ _____

(71) $65^2 - 64^2 + 63^2 - 62^2 =$ _____

(72) $1\frac{2}{3} \div 4\frac{5}{6} =$ _____

(73) $\lim_{x \to 0} \frac{x^2 - 3x}{x} =$ _____

(74) Let $3x - 2 \equiv 4 \pmod 7$, where $0 \leq x \leq 6$. Find x. _____

(75) Arcsin(sin 1) = _____

(76) If $f(x) = \frac{3x - 1}{x - 3}$ then $f^{-1}(-1) =$ _____

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

(78) $\int_{-1}^{2} 2x\,dx =$ _____

(79) $\log_2(\log_{10} 100) =$ _____

*(80) $6250 \div 8333 \times 8888 =$ _____

University Interscholastic League - Number Sense Answer Key HS • Invitation A • 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) 401

(2) 418

(3) 180.45

(4) $1\frac{3}{20}$

(5) 2.5

(6) 12030

(7) $\frac{11}{25}$

(8) — 11

(9) 256

*(10) 14489 — 16013

(11) 21

(12) .01125

(13) 1800

(14) 147

(15) $\frac{8}{11}$

(16) 2005

(17) 364

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

(19) — 196

*(20) 271 — 298

(21) 32

(22) $-\frac{9}{2}$ or $-4\frac{1}{2}$ or — 4.5

(23) 22

(24) 1.2

(25) 720

(26) 45

(27) $29\frac{4}{25}$

(28) 70

(29) 1806

*(30) 186 – 204

(31) 23

(32) 231

(33) 2

(34) 32

(35) 107

(36) $\frac{5}{33}$

(37) 104

(38) 2.34

(39) 625

*(40) 25536 — 28224

(41) 15

(42) — 1

(43) 9312

(44) 231

(45) 324

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

(47) 91809

(48) 3025

(49) $21\frac{3}{7}$

*(50) 484307 – 535285

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

(52) 6

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

(54) $-\frac{3}{5}$ or — .6

(55) 4

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

(57) 56

(58) $\frac{11}{328}$

(59) 27772

*(60) 1057 — 1167

(61) 128

(62) — 2

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

(64) 2

(65) .96

(66) 20

(67) 870

(68) 121

(69) 8

*(70) 4139 — 4573

(71) 254

(72) $\frac{10}{29}$

(73) — 3

(74) 2

(75) 1

(76) 1

(77) 2025000

(78) 3

(79) 1

*(80) 6333 — 6999