The University Interscholastic League
Number Sense Test • HS District 2 • 2007

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) $2007 \times 7 =$ _____

(2) $\frac{4}{5} + \frac{6}{7} =$ _____ **(mixed number)**

(3) $2007 \div 7 =$ _____ **(mixed number)**

(4) $27.97 - $7.02 = $ _____

(5) $26\% =$ _____ **(proper fraction)**

(6) $3\frac{1}{4}\% =$ _____ **(decimal)**

(7) $456 \div 9 =$ _____ **(mixed number)**

(8) $17^2 =$ _____

(9) $2 - 3 \div 6 \times 4 + 5 =$ _____

***(10)** $777 - 864 - 222 =$ _____

(11) $121 \times 121 =$ _____

(12) $4\frac{5}{6} + 10\frac{11}{12} =$ _____ **(mixed number)**

(13) $28^2 =$ _____

(14) $106 \times 107 =$ _____

(15) $27 \times 37 =$ _____

(16) Which is larger, $-.375$ or $-\frac{5}{12}$? _____

(17) MCCLX ÷ XV = _____ **(Arabic Numeral)**

(18) The LCM of 63 and 45 is _____

(19) 72 is x % of 400. Find x. _____%

***(20)** 123456 ÷ 789 = _____

(21) What number added to 5 and divided by 5, gives the same results? _____

(22) $7\frac{1}{7} \times 49\frac{1}{7} =$ _____ **(mixed number)**

(23) 1815 ÷ 15 = _____

(24) .08333... + .1666... + .25 = _____

(25) If $f(x) = 25x^2 - 10x + 1$ then f(4) is _____

(26) $24^2 - 6^2 =$ _____

(27) The sum of the positive divisors of 28 is ____

(28) $11 \times 75 \times 24 =$ _____

(29) 3 pints is what per cent of a cup? _____%

***(30)** $39 \times 40 \times 41 =$ _____

(31) $(1 + 2 - 3 \times 4^5) \div 6$ has a remainder of___

(32) 735246 ÷ 18 has a remainder of _____

(33) _____% of 56 is 110 % of 28

(34) $2^5 + 2 =$ _____ base 4

(35) Which of the following is an extravagant number, 9, 10, or 11? _____

(36) $4\frac{3}{5} \times 4\frac{2}{3} =$ _____ (mixed number)

(37) The product of the roots of $(2x - 1)(3x + 2)(4x - 3) = 0$ is _____

(38) If U = {n,u,m,b,e,r,s}, A $\subset$ U, and A = {e,u}, then the complement of set A contains how many distinct elements? _____

(39) $770 \times 13 =$ _____

*(40) 248% of 687 = _____

(41) $65 \times 95 =$ _____

(42) $2! - 3! \times 5! =$ _____

(43) An octagon has _____ distinct diagonals.

(44) A is 25% less than B and B is 25% less than C. A is what % less than C? _____%

(45) $71 \times 79 + 16 =$ _____

(46) If $n^6 = 1728$ then $n^4 =$ _____

(47) Let R, S, and T be the roots of $2x^3 + 4x = 5$. RS + RT + ST equals _____

(48) ..., 2, x, .75, y, ... is an arithmetic sequence. Find the value of x + y. _____

(49) The area of an equilateral triangle is $4\sqrt{3}$ cm^2. Its perimeter is _____ cm

*(50) $24^3 \times 21^2 \div 4^4 =$ _____

(51) ${}_7P_4 =$ _____

(52) $151 \times 115 =$ _____

(53) An obtuse triangle has integer sides of 6, x, and 11. The smallest value of x is _____

(54) How many ordered pairs are in the Cartesian product of {1,2,3} and {4, 5}? _____

(55) The largest integer x such that $3 < 4 - 5x$ is _____

(56) $12_4 \times 2_4 \div 3_4 =$ _____$_4$

(57) $\cos(-\frac{\pi}{3}) \times \cos(\frac{\pi}{3}) =$ _____

(58) The slope of the line containing the points (— 1, 2) and (— 3, 4) is _____

(59) Find $k > 0$, so that the six digit number 456k89 is divisible by 11. _____

*(60) $416666 \div 555 \times 76 =$ _____

(61) $888 \times \frac{4}{37} =$ _____

(62) $111 \times 44 =$ _____

(63) How many minutes will pass from 9:15 p.m. to 2:00 a.m. the next day? _____ minutes

(64) Find k, $0 \leq k \leq 7$, if $\frac{(5!)(3!)}{(4!)} \cong k \pmod 8$. _____

(65) Change .202 base 5 to a base 10 fraction. _____

(66) The sum of the coefficients of $(x + y)^2$ is _____

(67) The phase shift of $f(x) = 2 \sin(3x - \frac{\pi}{2})$ is $k\pi$ radians. Find k. _____

(68) If $f(x) = \frac{3 - 2x}{4}$, then $f^{-1}(-1) =$ _____

(69) The sum of the first twelve terms of the Fibonacci sequence 1,2,3,5,8,13,21,... is _____

*(70) $1^3 + 2^3 + 3^3 + 4^3 + ... + 8^3 =$ _____

(71) $(\sin\frac{\pi}{3} - \cos\frac{\pi}{3})(\sin\frac{\pi}{3} + \cos\frac{\pi}{3}) =$ _____

(72) $\log_3[\log_4(\log_5 625)] =$ _____

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

(74) 2.25 is to 9 as 1.5 is to ? _____

(75) $666 \times \frac{16}{27} \times \frac{24}{37} =$ _____

(76) $i^{66} =$ _____

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

(78) $3^4 - 6^3 - 9^2 =$ _____

(79) The 8th octagonal number is _____

*(80) $888 \times 87.5\% \div \frac{7}{11} =$ _____

University Interscholastic League - Number Sense Answer Key HS • District 2 • 2007

*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) 14049

(2) $1\frac{23}{35}$

(3) $286\frac{5}{7}$

(4) 20.95

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

(6) .0325

(7) $50\frac{2}{3}$

(8) 289

(9) 5

*(10) (−324) − (−293)

(11) 14641

(12) $15\frac{3}{4}$

(13) 784

(14) 11342

(15) 999

(16) $-.375, -\frac{3}{8}$

(17) 84

(18) 315

(19) 18

*(20) 149 — 164

(21) $-6.25, -6\frac{1}{4}, -\frac{25}{4}$

(22) $351\frac{1}{49}$

(23) 121

(24) $.5, \frac{1}{2}$

(25) 361

(26) 540

(27) 56

(28) 19800

(29) 600

*(30) 60762 — 67158

(31) 3

(32) 0

(33) 55

(34) 202

(35) 9

(36) $21\frac{7}{15}$

(37) $-.25, -\frac{1}{4}$

(38) 5

(39) 10010

*(40) 1619 — 1788

(41) 6175

(42) — 718

(43) 20

(44) $43.75, 43\frac{3}{4}, \frac{175}{4}$

(45) 5625

(46) 144

(47) 2

(48) $1.5, 1\frac{1}{2}, \frac{3}{2}$

(49) 12

*(50) 22624 — 25004

(51) 840

(52) 17365

(53) 6

(54) 6

(55) 0

(56) 10

(57) $.25, \frac{1}{4}$

(58) — 1

(59) 4

*(60) 54205 — 59909

(61) 96

(62) 4884

(63) 285

(64) 6

(65) $\frac{52}{125}$

(66) 4

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

(68) $3.5, 3\frac{1}{2}, \frac{7}{2}$

(69) 608

*(70) 1232 — 1360

(71) $.5, \frac{1}{2}$

(72) 0

(73) 19

(74) 6

(75) 256

(76) — 1

(77) 4

(78) — 216

(79) 176

*(80) 1160 — 1282