

**The University Interscholastic League
Number Sense Test • HS District 1 • 2005**

Contestant's Number _____

Final _____

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!

- | | |
|--|---|
| <p>(1) $5002 - 2005 =$ _____</p> <p>(2) $52 \times 11 =$ _____</p> <p>(3) $\frac{2}{3} \div \frac{3}{7} =$ _____ (mixed number)</p> <p>(4) $404 \times 14 =$ _____</p> <p>(5) $8 + 24 \div 4 - 2 \times 12 =$ _____</p> <p>(6) Which is smaller, $\frac{11}{12}$ or $\frac{12}{13}$? _____</p> <p>(7) $66\% =$ _____ (proper fraction)</p> <p>(8) $23^2 =$ _____</p> <p>(9) $2.005 + 200.5 =$ _____ (decimal)</p> <p>*(10) $1234 - 567 + 89 =$ _____</p> <p>(11) The additive inverse of $\frac{2}{3}$ is _____</p> <p>(12) $14 + 28 + 42 + 56 + 70 + 84 =$ _____</p> <p>(13) $MMV \div V =$ _____ (Arabic Numeral)</p> <p>(14) The LCM of 51 and 34 is _____</p> <p>(15) 28 is what percent less than 35? _____ %</p> <p>(16) $32 \times 23 =$ _____</p> | <p>(17) $\frac{1}{4} + \frac{1}{16} + \frac{1}{64} =$ _____ (proper fraction)</p> <p>(18) 12 square feet = _____ square yards</p> <p>(19) $17 \times 34 - 51 \times 17 =$ _____</p> <p>*(20) $987 \times 654 \div 321 =$ _____</p> <p>(21) The number of positive integral divisors of 80 is _____</p> <p>(22) If $3x + 2 = 2x + 1$ then $4x + 3 =$ _____</p> <p>(23) $13 \times 13 \times 13 =$ _____</p> <p>(24) $(12 \times 34 - 56) \div 7$ has a remainder of _____</p> <p>(25) 123 base 10 equals _____ base 4</p> <p>(26) $67^2 - 66^2 =$ _____</p> <p>(27) $2475 \div 45 =$ _____</p> <p>(28) If $f(x) = x^2 - 10x + 25$ then $f(23) =$ _____</p> <p>(29) If a dozen folders cost \$1.56 then 7 folders will cost \$ _____</p> <p>*(30) $12^4 =$ _____</p> <p>(31) $66 \div 75 =$ _____</p> <p>(32) $123_4 =$ _____ 2</p> |
|--|---|

(33) $\frac{11}{14} =$ _____ % (mixed number)

(34) $\sqrt{96 \times 24} =$ _____

(35) $125 + 75 + 15 + 1 =$ _____ 5

(36) Set $A = \{o, p, q, r, s\}$. How many improper subsets does set A have? _____

(37) $.1232323\dots =$ _____ (fraction)

(38) The larger of two integers whose product is 76 and whose sum is -23 is _____

(39) $12\frac{1}{6} \times 6\frac{1}{6} =$ _____ (mixed number)

*(40) $66 \times 68 \times 70 =$ _____

(41) $707^2 =$ _____

(42) If $6^{2x} = 36$ then $6^{3x} =$ _____

(43) $(\sqrt{32})^3 = a\sqrt{2}$ and $a =$ _____

(44) $10 + 15 + 20 + 25 + \dots + 105 =$ _____

(45) ${}_8P_3 =$ _____

(46) 6% of $833\frac{1}{3}$ is _____

(47) The 8th term of 2, 9, 28, 65, 126, ... is _____

(48) The slope of the line $7 - 3y = 5x$ is _____

(49) $88 \times 82 + 9 =$ _____

*(50) $72 \times 68 + 71 \times 69 =$ _____

(51) A pentagon has _____ distinct diagonals.

(52) The number of terms in the expansion of $(x + 2y)^3(x - y)^2$ is _____

(53) $(0 + 4i)^3 = a + bi$ and $b =$ _____

(54) $(55 + 3)^2 + 55^2 - 3^2 =$ _____

(55) $79^2 + 79 =$ _____

(56) $\sec(-60^\circ) =$ _____

(57) $\frac{7}{11} - \frac{55}{89} =$ _____

(58) If $\log_{16}(k) = .75$, then $k =$ _____

(59) ${}_8C_3 =$ _____

*(60) $334455 \div 251 =$ _____

(61) How many 3-digit whole numbers less than 333 are there? _____

(62) $77^2 - 76^2 + 75^2 - 74^2 =$ _____

(63) $.777\dots$ base 9 is equivalent to _____ base 10

(64) $(13_5 + 12_5) \times 11_5 =$ _____ 5

(65) $\sin(\cos^{-1} \frac{\sqrt{3}}{2}) =$ _____

(66) $301 \times 113 =$ _____

(67) $(524)^2 =$ _____

(68) The determinant of $\begin{vmatrix} a & 1 \\ 2 & 3 \end{vmatrix}$ is $4a$. Find a . _____

(69) The minimum value of $4 - 2\cos 3x$ is _____

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

(71) $1.75 \div 2.25 =$ _____

(72) $87125643 \div 11$ has a remainder of _____

(73) $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x^2 - 4} =$ _____

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

(75) The remainder when $x^4 - 4x^2 + 4$ is divided by $x + 4$ is _____

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

(77) $(\sqrt{3}, 1)$ are rectangular coordinates for the polar coordinates (r, θ) . Find r . _____

(78) $\int_0^2 \frac{3x}{4} dx =$ _____

(79) $2^3 \times 3^2 \times 4^2 \times 5^3 =$ _____

*(80) $44.4 \times 33.3 \times 22.2 =$ _____

University Interscholastic League - Number Sense Answer Key HS • District 1 • 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) 2997 | (17) $\frac{21}{64}$ | (33) $78\frac{4}{7}$ | (57) $\frac{18}{979}$ |
| (2) 572 | (18) $1\frac{1}{3}$ or $\frac{4}{3}$ | (34) 48 | (58) 8 |
| (3) $1\frac{5}{9}$ | (19) - 289 | (35) 1331 | (59) 56 |
| (4) 5656 | *(20) 1911 - 2111 | (36) 1 | *(60) 1266 - 1399 |
| (5) - 10 | (21) 10 | (37) $\frac{61}{495}$ | (61) 233 |
| (6) $\frac{11}{12}$ | (22) - 1 | (38) - 4 | (62) 302 |
| (7) $\frac{33}{50}$ | (23) 2197 | (39) $75\frac{1}{36}$ | (63) $\frac{7}{8}$ or .875 |
| (8) 529 | (24) 2 | *(40) 298452 -
329868 | (64) 330 |
| (9) 202.505 | (25) 1323 | (41) 499849 | (65) $\frac{1}{2}$ or .5 |
| *(10) 719 - 793 | (26) 133 | (42) 216 | (66) 34013 |
| (11) - $\frac{2}{3}$ | (27) 55 | (43) 128 | (67) 274576 |
| (12) 294 | (28) 324 | (44) 1150 | (68) - 2 |
| (13) 401 | (29) .91 | (45) 336 | (69) 2 |
| (14) 102 | *(30) 19700 - 21772 | (46) 50 | *(70) 5053 - 5584 |
| (15) 20 | (31) .88 or $\frac{22}{25}$ | (47) 513 | (71) $\frac{7}{9}$ |
| (16) 736 | (32) 11011 | (48) - $\frac{5}{3}$ or - $1\frac{2}{3}$ | (72) 0 |
| | | (49) 7225 | (73) 3 |
| | | *(50) 9306 - 10284 | (74) - 224 |
| | | (51) 5 | (75) 196 |
| | | (52) 6 | (76) $\frac{3}{20}$ |
| | | (53) - 64 | (77) 2 |
| | | (54) 6380 | (78) 1.5 or $1\frac{1}{2}$ or $\frac{3}{2}$ |
| | | (55) 6320 | (79) 144000 |
| | | (56) 2 | *(80) 31182 - 34464 |