

**The University Interscholastic League
Number Sense Test • HS Regional • 2009**

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!

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|---|--|
| <p>(1) $2009 - 209 + 29 =$ _____</p> <p>(2) $2.3 \times 3.2 =$ _____ (decimal)</p> <p>(3) $\frac{5}{9} \div \frac{2}{3} =$ _____</p> <p>(4) $29^2 =$ _____</p> <p>(5) $1\frac{2}{3}\% =$ _____ (proper fraction)</p> <p>(6) $15 - 12 + 9 \times 6 \div 3 =$ _____</p> <p>(7) The GCD of 171 and 57 is _____</p> <p>(8) $112358 \div 6$ has a remainder of _____</p> <p>(9) 15% of \$18.20 is \$ _____</p> <p>*(10) $55 \times 65 - 75 =$ _____</p> <p>(11) $5 - (-4) - 3(-2) =$ _____</p> <p>(12) $64 \times 66 =$ _____</p> <p>(13) $MCCCXXXI \div CXXI =$ _____ (Arabic Numeral)</p> <p>(14) The mean of 72, 65, 73, and 66 is _____</p> <p>(15) Which is smaller .45 or $\frac{4}{9}$? _____</p> <p>(16) 30 is what % less than 45? _____ %</p> <p>(17) The sum of the proper divisors 115 is _____</p> <p>(18) 12 square feet = _____ square inches</p> | <p>(19) If 9 \square's cost \$1.89 then 12 \square's cost \$ _____</p> <p>*(20) $\sqrt{4444} \times 59 =$ _____</p> <p>(21) $2.111... + 3.222... - 4.333... =$ _____</p> <p>(22) $2 + 1 + 3 + 4 + 7 + 11 + \dots + 47 =$ _____</p> <p>(23) The 9th triangular number is _____</p> <p>(24) The smallest root of $x^2 - 4x - 12 = 0$ is _____</p> <p>(25) If $\frac{2}{5} - \frac{1}{x} = \frac{3}{10}$, then $x =$ _____</p> <p>(26) Let $x - 3 = -5$. Find $x + 7$. _____</p> <p>(27) $13^3 =$ _____</p> <p>(28) If $g(x) = 9x^2 + 6x + 1$, then $g(13) =$ _____</p> <p>(29) $2.4 \times 1.1 \times 2.5 =$ _____ (decimal)</p> <p>*(30) $51 \times 49 + 62 \times 58 =$ _____</p> <p>(31) $77^2 + 63^2 =$ _____</p> <p>(32) $321 \times 18 =$ _____</p> <p>(33) $12345 \times 8 + 5 =$ _____</p> <p>(34) $8^7 \div 9$ has a remainder of _____</p> <p>(35) The perimeter of a square is 20 cm. The diagonal of the square is \sqrt{x} cm. $x =$ _____</p> |
|---|--|

- (36) $15 \times 4! + 5! \times 4 =$ _____
- (37) 66 base 10 is equivalent to _____ base 6
- (38) If $\sqrt{5 - \sqrt{4 - 3\sqrt{x}}} = 2$ then $x =$ _____
- (39) How many 2-element or 3-element subsets does the set $\{e, m, p, t, y\}$ have? _____
- *(40) $\sqrt[3]{1860867} =$ _____
- (41) If $xy = -1$ and $x + y = -2$ then $x^3 + y^3 =$ _____
- (42) $104 \times 93 =$ _____
- (43) $\frac{8}{11} - \frac{31}{45} =$ _____
- (44) The slope of the line perpendicular to the line $5x - 3y = 4$ is _____
- (45) $5^4 \times 2^3 =$ _____
- (46) Let $a^3 \div a^{-2} \times a^4 = a^k$, where $a > 1$. $k =$ _____
- (47) If $7^{(x+1)} = 140$ then $7^{(x-1)} =$ _____
- (48) $450 \div 1.875 =$ _____
- (49) The point $(-4, 0)$ is rotated clockwise 270° about the origin to point (h, k) . Find k . _____
- *(50) $2^7 \div 4^5 \times 8^3 =$ _____
- (51) The integral sides of a triangle are 7, 11, and x . The greatest value of x is _____
- (52) ${}_8C_3 \div {}_8C_5 =$ _____
- (53) $2\frac{1}{2} + 3\frac{3}{4} + 5 + \dots + 8\frac{3}{4} =$ _____
- (54) $4321_9 - 1234_9 =$ _____ $_9$
- (55) If $777 \times \frac{k}{37} = 147$, then $k =$ _____
- (56) If $\log_4\left(\frac{1}{8}\right) = x$ then $x =$ _____
- (57) $5.6 + 1.12 + 0.224 + 0.0448 + \dots =$ _____
- (58) The probability of losing game X is 37.5%. The odds of winning game X is _____
- (59) The larger root of $12x^2 + 17x - 5 = 0$ is _____
- *(60) $55 \times 51 \times 59 =$ _____
- (61) $25^3 - 24^3 =$ _____
- (62) $\sin \frac{2\pi}{3} \times \cos \frac{5\pi}{6} =$ _____
- (63) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\frac{5 + \sqrt{6}}{7}\right]$. _____
- (64) $\sum_{k=1}^4 k - (k)^2 =$ _____
- (65) $1 + 3 + 8 + 21 + \dots + 377 =$ _____
- (66) The 11th term of 11, 16, 21, 26, ... is _____
- (67) The lateral surface area of a right circular cylinder 11 inches high with a diameter of 22 inches is $k\pi$ square inches. $k =$ _____
- (68) $\det \begin{vmatrix} 2 & -4 \\ -3 & 5 \end{vmatrix} =$ _____
- (69) $56^2 =$ _____
- *(70) $10\pi \times 10e \times 10\phi =$ _____
- (71) If $f(x) = \frac{7x+4}{3x-5}$, then $f'(2) =$ _____
- (72) Find x , $0 \leq x < 8$, if $\frac{(6!)(2!)}{(5!)} \cong x \pmod{8}$. _____
- (73) $\lim_{x \rightarrow 3} \frac{x^2 - 3x + 1}{x - 2} =$ _____
- (74) Change .44 base 6 to a base 10 fraction. _____
- (75) If $f(x) = x^3 + x^2 + 1$, then $f''(4) =$ _____
- (76) $\int_2^4 (3x) dx =$ _____
- (77) Find the slope of the line tangent to $y = x^3 + x^2 + 1$ at $x = -2$. _____
- (78) $\frac{1}{15} + \frac{1}{35} + \frac{1}{63} =$ _____
- (79) 75 miles per hour = _____ feet per second
- *(80) $654 \times \frac{2}{3} \times 16.7\% =$ _____

University Interscholastic League - Number Sense Answer Key HS • Regional • 2009

*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.

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| (1) 1829 | (19) \$ 2.52 | (36) 840 | (59) .25, $\frac{1}{4}$ |
| (2) 7.36 | *(20) 3739 — 4129 | (37) 150 | *(60) 157221 — 173769 |
| (3) $\frac{5}{6}$ | (21) 1 | (38) 1 | (61) 1801 |
| (4) 841 | (22) 122 | (39) 20 | (62) — .75, — $\frac{3}{4}$ |
| (5) $\frac{1}{60}$ | (23) 45 | *(40) 117 — 129 | (63) 1 |
| (6) 21 | (24) — 2 | (41) — 14 | (64) — 20 |
| (7) 57 | (25) 10 | (42) 9672 | (65) 609 |
| (8) 2 | (26) 5 | (43) $\frac{19}{495}$ | (66) 61 |
| (9) \$ 2.73 | (27) 2197 | (44) — .6, — $\frac{3}{5}$ | (67) 242 |
| *(10) 3325 — 3675 | (28) 1600 | (45) 5000 | (68) — 2 |
| (11) 15 | (29) 6.6 | (46) 9 | (69) 3136 |
| (12) 4224 | *(30) 5791 — 6399 | (47) $\frac{20}{7}, 2\frac{6}{7}$ | *(70) 13127 — 14508 |
| (13) 11 | (31) 9898 | (48) 240 | (71) — 47 |
| (14) 69 | (32) 5778 | (49) — 4 | (72) 4 |
| (15) $\frac{4}{9}$ | (33) 98765 | *(50) 61 — 67 | (73) 1 |
| (16) $33\frac{1}{3}$ | (34) 8 | (51) 17 | (74) $\frac{7}{9}$ |
| (17) 29 | (35) 50 | (52) 1 | (75) 26 |
| (18) 1728 | | (53) 33.75, $\frac{135}{4}, 33\frac{3}{4}$ | (76) 18 |
| | | (54) 3076 | (77) 8 |
| | | (55) 7 | (78) $\frac{1}{9}$ |
| | | (56) — 1.5, — $\frac{3}{2}, -1\frac{1}{2}$ | (79) 110 |
| | | (57) 7 | *(80) 70 — 76 |
| | | (58) $\frac{5}{3}, 1\frac{2}{3}$ | |