

**The University Interscholastic League
Number Sense Test • HS State • 2011**

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) $213 + 4711 + 1829 =$ _____</p> <p>(2) $\frac{5}{6} \div \frac{25}{36} =$ _____</p> <p>(3) $1123 \div 9 =$ _____ (mixed number)</p> <p>(4) $136 - 1015 =$ _____</p> <p>(5) $0.275 =$ _____ (proper fraction)</p> <p>(6) $5.2 \times 2.5 =$ _____</p> <p>(7) 54 is 12% of _____</p> <p>(8) $35 \times 66 - 24 \times 66 =$ _____</p> <p>(9) $15 \times (10 - 6) \div 3 + 1 =$ _____</p> <p>* (10) $2357 - 111317 + 1923 - 29 =$ _____</p> <p>(11) $76 + 65 + 54 - 84 - 95 - 106 =$ _____</p> <p>(12) The GCD of 68, 51, and 34 is _____</p> <p>(13) $15 \times 15 \times 15 =$ _____</p> <p>(14) $3.6 \times 1\frac{1}{9} =$ _____</p> <p>(15) $312 \div 75 =$ _____ (decimal)</p> <p>(16) $(MDC - CD) \times V =$ _____ (Arabic Numeral)</p> <p>(17) $2\frac{3}{7} - \frac{5}{6} =$ _____ (mixed number)</p> | <p>(18) $33\frac{1}{3}\%$ of 1 yard 2 feet 3 inches = _____ inches</p> <p>(19) The number of positive prime divisors of 360 is _____</p> <p>* (20) $2134 \times 711 =$ _____</p> <p>(21) $3\frac{5}{8} + 8\frac{3}{5} =$ _____ (mixed number)</p> <p>(22) A car travels 121 miles in 2 hours 12 minutes. Its constant rate is _____ mph</p> <p>(23) 160 ounces = _____ gallons</p> <p>(24) $(3)^{-2} + (3)^0 - (3)^2 =$ _____</p> <p>(25) $(11 - 2^2 + 3 \times 5^2) \div 8$ has a remainder of _____</p> <p>(26) If $2197 = k^3$, then $k^2 =$ _____</p> <p>(27) $1.818181\dots =$ _____ (improper fraction)</p> <p>(28) Which of the following is an abundant number, 28, 32, or 36? _____</p> <p>(29) 19% of 38 is $12\frac{2}{3}\%$ of _____</p> <p>* (30) $(136 + 1015) \times 21 =$ _____</p> <p>(31) The largest positive prime divisor of 385 is _____</p> <p>(32) $51_6 + 42_6 - 33_6 =$ _____₆</p> <p>(33) How many positive integers less than 28 are relatively prime to 28? _____</p> |
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- (34) Truncate $\sqrt{2} \times \sqrt{3}$ to a whole number _____
- (35) $3\frac{5}{7} \div 2\frac{3}{5} =$ _____ (mixed number)
- (36) $(93)^2 + (31)^2 =$ _____
- (37) If 12 CDs cost \$87.00 then 8 CDs cost \$ _____
- (38) If $x = 11$ and $y = 61$ then $x^2 - 2xy + y^2 =$ _____
- (39) If $1 + 3x = 6x - 10$, then $15x =$ _____
- *(40) $\sqrt{1491625} =$ _____
- (41) A set containing k elements has 511 proper subsets. Find k . _____
- (42) $\sqrt{23 \times 19 + 4} =$ _____
- (43) $232_8 \div 7_8 =$ _____ 8
- (44) The hypotenuse of an isoscles right triangle is $\sqrt{32}$ cm . The sum of the lengths of the two legs is _____ cm
- (45) If $5^{(2x+3)} = 25^{(3x-2)}$ then $x =$ _____
- (46) $323 \times 414 =$ _____
- (47) Find the slope of a line parallel to the line containing the points $(-1,3)$ and $(6, -10)$. _____
- (48) $0.41666... \div 2.4 =$ _____
- (49) The product of the roots minus the sum of the roots of $3x^3 + 4x^2 - 17x - 6 = 0$ is _____
- *(50) $\left(\pi \div \left(\frac{\sqrt{5}+1}{2}\right)^{-1}\right)^3 =$ _____
- (51) $({}_5C_3)({}_5P_2) =$ _____
- (52) How many distinct 8-letter words, real or imaginary, can be made using the letters from the word 'distinct'? _____
- (53) If $83^2 + k^2 = 7373$ and $k > 0$, then $k =$ _____
- (54) The Cartesian product of the sets $\{e,i,g,h,t\}$ and $\{f,o,u,r\}$ contain how many ordered pairs? _____
- (55) $(5 + 12i)(5 - 12i) =$ _____
- (56) If $\frac{x}{5}$ has a remainder of 4 and $\frac{y}{5}$ has a remainder of 3 then $\frac{xy}{5}$ has a remainder of _____
- (57) If $\log_8(x) = \frac{2}{3}$ then $2x =$ _____
- (58) How many ways can Snow White and her 7 dwarfs be seated around a circular table? _____
- (59) A triangle has sides of 8, 12, and k . How many integral values of k will form a triangle? _____
- *(60) $12^2 \times 6^3 \div 3^4 =$ _____
- (61) A box contains 5 red chips, 3 blue chips and 1 white chip. What are the odds that a chip randomly drawn is not red? _____
- (62) $(\sin \frac{3\pi}{4})(\cos \frac{3\pi}{4}) + \tan \frac{3\pi}{4} =$ _____
- (63) Let $f(x) = x^2 + 3x + 6$, then $f(f(-1)) =$ _____
- (64) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\tan \frac{5\pi}{6}\right]$. _____
- (65) The sum of the positive integral divisors of $2 \times 3 \times 4 \times 6$ is _____
- (66) $(432_5 + 234_5) \div 4$ has a remainder of _____
- (67) The harmonic mean of 1, 3, and 6 is _____
- (68) $1 + 2 + 5 + 13 + 34 + \dots + 610 =$ _____
- (69) $A = \begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 2 \\ 3 & 1 \end{bmatrix}$. Find $|AB|$. _____
- *(70) $1 + 3 + 6 + 10 + 15 + \dots + 78 + 91 =$ _____
- (71) $5! + 4! + 3! + 2! + 1! + 0! =$ _____
- (72) Change .3125 to a base 4 decimal. _____
- (73) The slope of the line tangent to $f(x) = -x^2 + 9x - 14$ at the point $(6, 4)$ is _____
- (74) $1111 \times 34 =$ _____
- (75) $\sin(\arccos(-0.6)) =$ _____
- (76) $\int_1^2 (2x + 3) dx =$ _____
- (77) $F(x) = x^3 + 3x^2 - 6x - 10$. Find $f''(-3) =$ _____
- (78) The 9th triangular number is _____
- (79) The 6th term of $-3, 3, 9, 15, \dots$ is _____
- *(80) $857.142 \times 424 =$ _____

University Interscholastic League - Number Sense Answer Key HS • State • 2011

*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) 6,753 | (18) 21 | (34) 2 | (57) 8 |
| (2) $1.2, \frac{6}{5}, 1\frac{1}{5}$ | (19) 3 | (35) $1\frac{3}{7}$ | (58) 5,040 |
| (3) $124\frac{7}{9}$ | *(20) $1,441,411 - 1,593,137$ | (36) 9,610 | (59) 15 |
| (4) – 879 | (21) $12\frac{9}{40}$ | (37) \$58.00 | *(60) 365 – 403 |
| (5) $\frac{11}{40}$ | (22) 55 | (38) 2,500 | (61) $.8, \frac{4}{5}$ |
| (6) 13 | (23) $1.25, \frac{5}{4}, 1\frac{1}{4}$ | (39) 55 | (62) $-1.5, -\frac{3}{2}, -1\frac{1}{2}$ |
| (7) 450 | (24) $-\frac{71}{9}, -7\frac{8}{9}$ | *(40) 1,161 – 1,282 | (63) 34 |
| (8) 726 | (25) 2 | (41) 9 | (64) – 1 |
| (9) 21 | (26) 169 | (42) 21 | (65) 403 |
| *(10) $-112,419 - 101,712$ | (27) $\frac{20}{11}$ | (43) 26 | (66) 2 |
| (11) – 90 | (28) 36 | (44) 8 | (67) 2 |
| (12) 17 | (29) 57 | (45) $1.75, \frac{7}{4}, 1\frac{3}{4}$ | (68) 987 |
| (13) 3,375 | *(30) 22,963 – 25,379 | (46) 133,722 | (69) 1 |
| (14) 4 | (31) 11 | (47) $-\frac{13}{7}, -1\frac{6}{7}$ | *(70) 433 – 477 |
| (15) 4.16 | (32) 100 | (48) $\frac{25}{144}$ | (71) 154 |
| (16) 6,000 | (33) 12 | (49) $\frac{10}{3}, 3\frac{1}{3}$ | (72) .11 |
| (17) $1\frac{25}{42}$ | | *(50) 125 – 137 | (73) – 3 |
| | | (51) 200 | (74) 37,774 |
| | | (52) 10,080 | (75) $.8, \frac{4}{5}$ |
| | | (53) 22 | (76) 6 |
| | | (54) 20 | (77) – 12 |
| | | (55) 169 | (78) 45 |
| | | (56) 2 | (79) 27 |
| | | | *(80) 345,257 – 381,599 |