

**The University Interscholastic League
Number Sense Test • HS Invitational B • 2011**

Contestant's Number 5

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) $2011 + 369 - 45 =$ _____</p> <p>(2) $4433 \div 11 =$ _____</p> <p>(3) $1.6 \times 2.5 =$ _____</p> <p>(4) $\frac{1}{2} + 3 + \frac{1}{4} =$ _____ (improper fraction)</p> <p>(5) $2\frac{3}{8}\% =$ _____ (decimal)</p> <p>(6) $17 \times 24 =$ _____</p> <p>(7) $246 \div 9 =$ _____ (mixed number)</p> <p>(8) $14 \times 64 - 24 \times 14 =$ _____</p> <p>(9) $18^2 =$ _____</p> <p>*(10) $12 \times 121 + 2011 =$ _____</p> <p>(11) The simple interest on \$200.00 at 2.2% for 6 months is \$ _____</p> <p>(12) $(3)^0 + 2 \times 4 - 5 \div (6)^{-1} =$ _____</p> <p>(13) The LCM of 48 and 80 is _____</p> <p>(14) .75 of 8 feet 4 inches is _____ inches</p> <p>(15) $2011 - 1102 =$ _____</p> <p>(16) $MCXI + DLV =$ _____ (Arabic Numeral)</p> <p>(17) The median of 24, 31, 17, & 38 is _____</p> | <p>(18) 20% of 30 minus 40% of 50 is _____</p> <p>(19) $\frac{14}{15} + \frac{15}{14} =$ _____</p> <p>*(20) $9630 \times 5\frac{1}{3} \div 64 =$ _____</p> <p>(21) $1.454545\dots =$ _____ (mixed number)</p> <p>(22) How far will a car travel in 4 hours 15 minutes at a constant rate of 60 mph? _____ miles</p> <p>(23) $\frac{1}{2}$ gallon = _____ ounces</p> <p>(24) $14 \times 14 \times 14 =$ _____</p> <p>(25) The largest positive prime divisor of 30^2 is _____</p> <p>(26) $(36)^2 + (12)^2 =$ _____</p> <p>(27) $1\frac{2}{3} - 2\frac{3}{4} =$ _____ (mixed number)</p> <p>(28) Which of the following is an evil number, 8, 26, or 80? _____</p> <p>(29) 12% of 42 is 14% of _____</p> <p>*(30) $(9999 + 666) \div 33 =$ _____</p> <p>(31) 58 base 10 = _____ base 3</p> <p>(32) Round $\sqrt{2} \times \sqrt{3}$ to the $\frac{1}{10}$ place. _____</p> <p>(33) If $2x + 1 = 3x - 4$, then $5x =$ _____</p> |
|---|--|

- (34) If $A = \{m, a, t, h\}$ and $B = \{g, r, a, d, e\}$, then $A \cap B$ contains how many elements? _____
- (35) $|-5 - (-3) - 7| =$ _____
- (36) If $P, Q,$ & R are the real roots of $x^3 - 7x = 16$ then $(P + Q + R) - (PQR) =$ _____
- (37) If $48^2 - 42^2 = 3y$ then $y =$ _____
- (38) $5\frac{3}{8} \times 5\frac{5}{8} =$ _____ (mixed number)
- (39) $1^2 + 1^2 + 2^2 + 3^2 + 5^2 + 8^2 + 13^2 =$ _____
- *(40) $\sqrt{75321} =$ _____
- (41) The leg opposite the 60° angle in a right triangle is $\sqrt{12}$. The hypotenuse is _____
- (42) If $5 - 4x > 32$ then $x <$ _____
- (43) $56 \times 0.0625 =$ _____
- (44) Find the slope of a line that has x and y intercepts of $(-3, 0)$ and $(0, 6)$. _____
- (45) The product of the roots of $3x^3 + 4x^2 - 17x - 6 = 0$ is _____
- (46) If $xy = 2$ and $x - y = 3$ then $x^3 - y^3 =$ _____
- (47) $12_5 + 23_5 + 34_5 =$ _____ $_5$
- (48) Find k , so that $3k58$ is the smallest 4-digit number divisible by 9. _____
- (49) If $4^{(x-1)} = 8^{(x+1)}$ then $x =$ _____
- *(50) $22\frac{2}{5}\%$ of $2011 + 53.2 =$ _____
- (51) If $2 \log_x 8 = 3$ then $x =$ _____
- (52) $108 \times 102 - 16 =$ _____
- (53) How many 3-element subsets does the set $\{n, u, m, b, e, r\}$ have? _____
- (54) $90 + 60 + 40 + 26.666... + ... =$ _____
- (55) The sum of the coefficients in the binomial expansion of $(2x - 5y)^3$ is _____
- (56) The reciprocal of $3 + 4i$ is $a + bi$. Find b . _____
- (57) $114 \times 221 =$ _____
- (58) The smaller root of $8x^2 + 10x + 3 = 0$ is _____
- (59) ${}_5C_3 \times {}_5C_2 =$ _____
- *(60) $33 \times 66 \times 99 =$ _____
- (61) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\frac{1+\sqrt{5}}{2}\right]$. _____
- (62) $(246_9) + (357_9) \div 8$ has a remainder of _____
- (63) $A = \begin{bmatrix} -2 & 1 \\ -3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 1 \\ -3 & -2 \end{bmatrix}$. $|AB| =$ _____
- (64) $\sin\left(\frac{\pi}{4}\right) \cos\left(\frac{\pi}{4}\right) \tan\left(\frac{\pi}{4}\right) =$ _____
- (65) A box contains 8 black and k red chips. Find k if the probability of a black chip is 40%. _____
- (66) $1 + 2 + 5 + 13 + 34 + \dots + 233 =$ _____
- (67) $\cos\left(\arcsin\left(\frac{5}{13}\right)\right) =$ _____
- (68) $58^2 =$ _____
- (69) If $f(x) = 2x^3 + x - 1$, then $f(f(-1)) =$ _____
- *(70) $173 \tan\left(\frac{\pi}{3}\right) =$ _____
- (71) If $f(x) = 2x^3 - 3x^2 + x - 1$, then $f''(4) =$ _____
- (72) $6! \div 5! + 4! \div 3! - 2! \div 1! =$ _____
- (73) The vertical asymptote of $f(x) = \frac{x-1}{x-2}$ is $x =$ _____
- (74) $\frac{1}{30} + \frac{1}{42} + \frac{1}{56} + \frac{1}{72} =$ _____
- (75) $111 \times 235 =$ _____
- (76) Change .67, base 9, to a base 10 fraction. _____
- (77) The 10th term of $6, 9, 14, 21, 30, \dots$ is _____
- (78) $\int_{-2}^2 (x^2) dx =$ _____
- (79) The slope of the line tangent to $f(x) = x^3 - 2x + 3$ at the point $(1, 2)$ is _____
- *(80) 25 square miles = _____ acres

University Interscholastic League - Number Sense Answer Key HS • Invitation B • 2011

*number) $x - y$ means an integer between x and y inclusive

NOTE: If an answer is of the type like $\frac{1}{3}$ it cannot be written as a repeating decimal

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|--|--|--|-----------------------------------|
| (1) 2335 | (18) -14 | (34) 1 | (57) 25194 |
| (2) 403 | (19) $\frac{421}{210}, 2\frac{1}{210}$ | (35) 9 | (58) $-.75, -\frac{3}{4}$ |
| (3) 4 | *(20) $763 - 842$ | (36) -16 | (59) 100 |
| (4) $\frac{15}{4}$ | (21) $1\frac{5}{11}$ | (37) 180 | *(60) $204841 - 226403$ |
| (5) .02375 | (22) 255 | (38) $30\frac{15}{64}$ | (61) 1 |
| (6) 408 | (23) 64 | (39) 273 | (62) 3 |
| (7) $27\frac{1}{3}$ | (24) 2744 | *(40) $261 - 288$ | (63) 25 |
| (8) 560 | (25) 5 | (41) 4 | (64) $.5, \frac{1}{2}$ |
| (9) 324 | (26) 1440 | (42) $-6.75, -\frac{27}{4}, -6\frac{3}{4}$ | (65) 12 |
| *(10) $3290 - 3636$ | (27) $-1\frac{1}{12}$ | (43) $3.5, \frac{7}{2}, 3\frac{1}{2}$ | (66) 377 |
| (11) (\$) 2.20 | (28) 80 | (44) 2 | (67) $\frac{12}{13}$ |
| (12) -21 | (29) 36 | (45) 2 | (68) 3364 |
| (13) 240 | *(30) $308 - 339$ | (46) 45 | (69) -133 |
| (14) 75 | (31) 2011 | (47) 124 | *(70) $285 - 314$ |
| (15) 909 | (32) 2.4 | (48) 2 | (71) 42 |
| (16) 1666 | (33) 25 | (49) -5 | (72) 8 |
| (17) $27.5, \frac{55}{2}, 27\frac{1}{2}$ | | *(50) $476 - 525$ | (73) 2 |
| | | (51) 4 | (74) $\frac{4}{45}$ |
| | | (52) 11000 | (75) 26085 |
| | | (53) 20 | (76) $\frac{61}{81}$ |
| | | (54) 270 | (77) 105 |
| | | (55) -27 | (78) $\frac{16}{3}, 5\frac{1}{3}$ |
| | | (56) $-.16, -\frac{4}{25}$ | (79) 1 |
| | | | *(80) $15200 - 16800$ |