

The University Interscholastic League Number Sense Test • HS SAC • 2010

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!

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| <p>(1) $2011 + 2010 =$ _____</p> <p>(2) $2010 \times 11 =$ _____</p> <p>(3) $211 - 122 =$ _____</p> <p>(4) $2010 \div 4 =$ _____ (decimal)</p> <p>(5) $.8 + \frac{1}{2} - 40\% =$ _____ (proper fraction)</p> <p>(6) $18 \times 61 + 32 \times 61 =$ _____</p> <p>(7) $.075 =$ _____ (proper fraction)</p> <p>(8) $32 \div 4 + 5 \times 6 - 1 =$ _____</p> <p>(9) $345 \div 9 =$ _____ (mixed number)</p> <p>* (10) $24 + 135 + 678 - 90 =$ _____</p> <p>(11) The sum of the positive integral divisors of 16 is _____</p> <p>(12) $13 \times 18 =$ _____</p> <p>(13) $16 \times \frac{16}{19} =$ _____ (mixed number)</p> <p>(14) $32 \times 23 =$ _____</p> <p>(15) $14 + 18 + 24 + 28 + 34 + 38 =$ _____</p> <p>(16) The GCD of 96 and 72 is _____</p> <p>(17) 28% of 30 = _____</p> <p>(18) 75% of a gallon is equivalent to _____ pints</p> | <p>(19) $25 \times 53 =$ _____</p> <p>* (20) $114 \times 280 =$ _____</p> <p>(21) The area of a square whose diagonal is 6" is _____ sq. inches</p> <p>(22) The LCM of 72 and 96 is _____</p> <p>(23) $(22 + 44 \times 8) \div 6$ has a remainder of _____</p> <p>(24) How many positive integral divisors does 48 have? _____</p> <p>(25) $101101 \div 14443 =$ _____</p> <p>(26) $49 \times 41 =$ _____</p> <p>(27) If a dozen red roses cost \$35.60 then three red roses cost \$ _____</p> <p>(28) $(13)^2 =$ _____</p> <p>(29) $3\frac{4}{5} - 6\frac{7}{8} =$ _____ (mixed number)</p> <p>* (30) $16875 \div 129 =$ _____</p> <p>(31) $(15)^2 + (45)^2 =$ _____</p> <p>(32) How many positive integers less than 20 are relatively prime to 20? _____</p> <p>(33) 28% of 32 is 56% of _____</p> <p>(34) If $3x + 5 = 4x - 9$, then $x =$ _____</p> |
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- (35) $4\frac{2}{7} \times 4\frac{5}{7} =$ _____ (mixed number)
- (36) The set {e,m,p,t,y} has _____ improper subsets
- (37) $(11)^3 =$ _____
- (38) Round $\sqrt{2} + \sqrt{3}$ to the $\frac{1}{10}$ place. _____
- (39) .3222... = _____ (fraction)
- *(40) $\sqrt{21347} =$ _____
- (41) A triangle has sides of 7, 9, and x. What is the greatest integral value of x? _____
- (42) $14 \times 16 + 1 =$ _____
- (43) $64 \div .125 =$ _____
- (44) If $8^{(x-1)} = 64$ then $8^{(x+1)} =$ _____
- (45) For what value of k does $x^2 - 3x + k = 0$ have equal roots? _____
- (46) $25^2 - 24^2 =$ _____
- (47) $55_7 \times 5_7 =$ _____₇
- (48) If the side of an equilateral triangle is 16 cm, then its area is $k\sqrt{3} \text{ cm}^2$. Find k. _____
- (49) $96 \times 97 =$ _____
- *(50) $119 \times 6.25 \div \frac{3}{4} =$ _____
- (51) If $\log_{12}(x) = 3$ then $x =$ _____
- (52) $(3 + 4i)(3 - 4i) =$ _____
- (53) How many ordered pairs are in the Cartesian product of {a,b,c} and {d,e,f}? _____
- (54) $(2 + 7i)(2 - 7i) = a + bi$. Find $a + b$. _____
- (55) $11^5 \div 15$ has a remainder of _____
- (56) If $\frac{x}{7}$ has a remainder of 4 and $\frac{y}{7}$ has a remainder of 6 then $\frac{xy}{7}$ has a remainder of _____
- (57) $213 \times 411 =$ _____
- (58) How many ways can 5 people be seated 3 at a time in a row of 3 chairs? _____
- (59) If A is 20% more than B and B is 25% less than C, then A is what % less than C? _____ %
- *(60) $8^4 \times 16^3 \div 4^2 =$ _____
- (61) $\ln(e^3) =$ _____
- (62) How many minutes are there from 6:30 a.m. to 4:15 p.m. the same day? _____ minutes
- (63) If $f(x) = 2x + 3$, then $f^{-1}(4) =$ _____
- (64) $18^2 - 17^2 + 16^2 - 15^2 =$ _____
- (65) The sum of the coefficients of $(x - y)^3$ is _____
- (66) $74 \times 111 =$ _____
- (67) $\sin\left(\frac{\pi}{6}\right) + \cos\left(\frac{\pi}{3}\right) =$ _____
- (68) How many lines are determined by 5 coplanar points no 3 of which are collinear? _____
- (69) Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$. $|AB| =$ _____
- *(70) $23 \times 24 \times 25 \times 26 =$ _____
- (71) Find x, $0 \leq x \leq 6$, if $x + 3 \cong 9(\text{mod}7)$. _____
- (72) If $\tan A = \sqrt{3}$, where $A \in Q1$, then $\cos A =$ _____
- (73) The 4th triangular number is _____
- (74) $\lim_{x \rightarrow 0} \left(\frac{e^x}{x-1} \right) =$ _____
- (75) $5! - 4! \times 3! =$ _____
- (76) A number is randomly drawn from {2,1,3,4,7}. What are the odds that the number drawn is an even number? _____ (proper fraction)
- (77) If $f(x) = x^3 - 2x^2 + 3x - 4$, then $f'(1) =$ _____
- (78) $\int_1^4 2x \, dx =$ _____
- (79) The 8th term of $-5, -1, 3, 7, \dots$ is _____
- *(80) 2.5 square miles = _____ acres

University Interscholastic League - Number Sense Answer Key HS • SAC • Fall 2010

*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) 4021 | (19) 1325 | (35) $20\frac{10}{49}$ | (58) 10 |
| (2) 22110 | *(20) 30324 – 33516 | (36) 1 | (59) 10 |
| (3) 89 | (21) 18 | (37) 1331 | *(60) 996,148 – 1,101,004 |
| (4) 502.5 | (22) 288 | (38) $3.1, \frac{31}{10}, 3\frac{1}{10}$ | (61) 3 |
| (5) $\frac{9}{10}$ | (23) 2 | (39) $\frac{29}{90}$ | (62) 585 |
| (6) 3050 | (24) 10 | *(40) 139 – 153 | (63) $.5, \frac{1}{2}$ |
| (7) $\frac{3}{40}$ | (25) 7 | (41) 15 | (64) 66 |
| (8) 37 | (26) 2009 | (42) 225 | (65) 0 |
| (9) $38\frac{1}{3}$ | (27) \$ 8.90 | (43) 512 | (66) 8214 |
| *(10) 710 – 784 | (28) 169 | (44) 4096 | (67) 1 |
| (11) 31 | (29) $-3\frac{3}{40}$ | (45) $2.25, \frac{9}{4}, 2\frac{1}{4}$ | (68) 10 |
| (12) 234 | *(30) 125 – 137 | (46) 49 | (69) 4 |
| (13) $13\frac{9}{19}$ | (31) 2250 | (47) 404 | *(70) 340860 – 376740 |
| (14) 736 | (32) 8 | (48) 64 | (71) 6 |
| (15) 156 | (33) 16 | (49) 9312 | (72) $.5, \frac{1}{2}$ |
| (16) 24 | (34) 14 | *(50) 943 – 1041 | (73) 10 |
| (17) $8.4, \frac{42}{5}, 8\frac{2}{5}$ | | (51) 1728 | (74) – 1 |
| (18) 6 | | (52) 25 | (75) – 24 |
| | | (53) 9 | (76) $\frac{2}{3}$ |
| | | (54) 53 | (77) 2 |
| | | (55) 11 | (78) 15 |
| | | (56) 3 | (79) 23 |
| | | (57) 87543 | *(80) 1520 – 1680 |