

The University Interscholastic League

Number Sense Test • HS SAC • 2013

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) $213 + 214 =$ _____</p> <p>(2) $213 \times 4 =$ _____</p> <p>(3) $412 - 213 =$ _____</p> <p>(4) $312 \div 4 =$ _____</p> <p>(5) $34\% =$ _____ (proper fraction)</p> <p>(6) $43 \times 21 =$ _____</p> <p>(7) $2\frac{1}{3} + 2\frac{1}{4} =$ _____ (mixed number)</p> <p>(8) $13 \times 20 + 20 \times 14 =$ _____</p> <p>(9) $20.13 \div 0.4 =$ _____ (decimal)</p> <p>*(10) $927 + 1009 + 2013 =$ _____</p> <p>(11) $1 + 2 \times 3 \div 4 - 5 =$ _____</p> <p>(12) $63 \times 43 =$ _____</p> <p>(13) $25\% \text{ of } 25 =$ _____</p> <p>(14) Which is smaller, $\frac{7}{8}$ or $\frac{8}{9}$? _____</p> <p>(15) The GCD of 48 and 84 is _____</p> <p>(16) $12 \text{ feet} - 3 \text{ yards} =$ _____ inches</p> <p>(17) DLV = _____ (Arabic Number)</p> | <p>(18) The mean of 1, 4, 9, 16, and 25 is _____</p> <p>(19) $201314 \div 9$ has a remainder of _____</p> <p>*(20) $2013 \times 2014 =$ _____</p> <p>(21) $3 + 6 \times 10 - 6 \div 3 =$ _____</p> <p>(22) $6\frac{2}{5} \times 6\frac{3}{5} =$ _____ (mixed number)</p> <p>(23) $4.555... + 2.777... =$ _____</p> <p>(24) $3^{(-1)} - 3^{(-2)} =$ _____</p> <p>(25) Set A has 6 elements and set B has 8 elements. If $A \cap B$ has 4 elements, then $A \cup B$ has _____ elements</p> <p>(26) $(26 + 35 - 44) \div 8$ has a remainder of _____</p> <p>(27) The multiplicative inverse of 3.4 is _____</p> <p>(28) 30 inches/minute = _____ feet/hour</p> <p>(29) Find k if $26^2 - 21^2 = 5k$. $k =$ _____</p> <p>*(30) $14\frac{3}{4} \times 2006 \div 15 =$ _____</p> <p>(31) $11^3 =$ _____</p> <p>(32) $1 - 3 - 6 - 10 =$ _____</p> <p>(33) Find the sales tax on an item costing \$90.00 if the sales tax rate is 8%. \$ _____</p> |
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- (34) $4 \times 3! + 5 \times 4! =$ _____
- (35) If $4 - 3x = 10$, then $3x + 4 =$ _____
- (36) 321 base 4 = _____ base 10
- (37) If $a = 15$ and $b = 16$, then $a^2 + 2ab + b^2 =$ _____
- (38) $\frac{1}{4}(24^2 - 4^2) =$ _____
- (39) $\sqrt{54} + \sqrt{24} = \sqrt{x}$. Find x . _____
- *(40) $49 \times 61 \times 73 =$ _____
- (41) $9142013 \div 11$ has a remainder of _____
- (42) The slope of the line containing the points $(2, 3)$ and $(5, 7)$ is _____
- (43) If $6^x = 432$ then $6^{(x+1)} =$ _____
- (44) $101 \times 108 =$ _____
- (45) Let $4x - 2y = 1$ and $3x + 2y = 2$. Find x . _____
- (46) The leg opposite the 60° angle in a right triangle is $2\sqrt{3}$ cm. The hypotenuse is _____ cm
- (47) If $x - y = 2$ and $x + y = 3$ then $x^2 - y^2 =$ _____
- (48) $\frac{3}{8} - \frac{28}{71} =$ _____
- (49) $5^2 \times 2^5 =$ _____
- *(50) $8^2 \times 4^3 \div 2^4 =$ _____
- (51) $444 \times \frac{4}{37} =$ _____
- (52) $235_7 + 146_7 =$ _____ $_7$
- (53) The area of $x^2 + y^2 = 9$ is $k\pi$. $k^2 =$ _____
- (54) If $\log_4 8 = x$ then $x =$ _____
- (55) ${}_5C_3 + {}_5P_2 =$ _____
- (56) The larger root of $7x^2 + 22x + 3 = 0$ is _____
- (57) How many 3-element subsets does the set $\{n, u, m, b, e, r\}$ have? _____
- (58) $(2 - 3i)(2 - 3i) = (a + bi)$. Find $a - b$. _____
- (59) $24 + 18 + 13\frac{1}{2} + 10\frac{1}{8} + \dots =$ _____
- *(60) $18^2 \times 22^2 =$ _____
- (61) $28^2 - 26^2 + 24^2 - 22^2 =$ _____
- (62) If $4! + 3! + 2! \cong x \pmod{5}$, where $0 \leq x \leq 4$, then $x =$ _____
- (63) The sum of the coefficients of $(x + 2y)^3$ is _____
- (64) If $f(x) = 4x^3 + 3x^2 - 2x + 1$, then $f''(0) =$ _____
- (65) The sum of the first ten terms of the Fibonacci type sequence $3, 7, 10, 17, 27, \dots$ is _____
- (66) Change $0.333\dots$ base 6 to a base 6 fraction. _____ $_6$
- (67) How much time has past from 8:30 a.m. to 3:45 p.m. in one day? _____ minutes
- (68) $\frac{13}{37} \times 111 =$ _____
- (69) $\log_5 8 \div \log_5 4 \times \log_5 2 = \log_5 \sqrt{k}$. Find k . _____
- *(70) $\sqrt{956230} =$ _____
- (71) If $f(x) = 2x - 3$, then $f^{-1}(4) =$ _____
- (72) $2(\sin \frac{\pi}{6})(\cos \frac{\pi}{3}) =$ _____
- (73) $\frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30} =$ _____
- (74) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\frac{\sqrt{5}+1}{2}\right]$. _____
- (75) A number is randomly drawn from the set $\{2, 1, 3, 4, 7\}$. What are the odds that the number drawn is not a prime number? _____
- (76) If $\det \begin{bmatrix} 1 & -6 \\ 3 & x \end{bmatrix} = 28$, then $x =$ _____
- (77) The 18th triangular number is _____
- (78) $\int_0^1 (2 + 3x) dx =$ _____
- (79) If $x > 0$ and $x^2 = \sqrt{x^3 + x^3 + x^3}$ then $x =$ _____
- *(80) 5.5 rods = _____ inches

University Interscholastic League - Number Sense Answer Key HS • SAC • Fall 2013

*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) 427 | (18) 11 | (34) 144 | (59) 96 |
| (2) 852 | (19) 2 | (35) — 2 | *(60) 148,976 —
164,656 |
| (3) 199 | *(20) 3,851,473 —
4,256,891 | (36) 57 | (61) 200 |
| (4) 78 | (21) 61 | (37) 961 | (62) 2 |
| (5) $\frac{17}{50}$ | (22) $42\frac{6}{25}$ | (38) 140 | (63) 27 |
| (6) 903 | (23) $\frac{22}{3}, 7\frac{1}{3}$ | (39) 150 | (64) 6 |
| (7) $4\frac{7}{12}$ | (24) $\frac{2}{9}$ | *(40) 207,288 —
229,106 | (65) 781 |
| (8) 540 | (25) 10 | (41) 1 | (66) $\frac{3}{5}$ |
| (9) 50.325 | (26) 1 | (42) $\frac{4}{3}, 1\frac{1}{3}$ | (67) 435 |
| *(10) 3,752 — 4,146 | (27) $\frac{5}{17}$ | (43) 2,592 | (68) 39 |
| (11) — 2.5, — $\frac{5}{2}$, — $2\frac{1}{2}$ | (28) 150 | (44) 10,908 | (69) 8 |
| (12) 2,709 | (29) 47 | (45) $\frac{3}{7}$ | *(70) 929 — 1,026 |
| (13) 6.25, $\frac{25}{4}, 6\frac{1}{4}$ | *(30) 1,874 — 2,071 | (46) 4 | (71) 3.5, $\frac{7}{2}, 3\frac{1}{2}$ |
| (14) .875, $\frac{7}{8}$ | (31) 1,331 | (47) 6 | (72) .5, $\frac{1}{2}$ |
| (15) 12 | (32) 0 | (48) — $\frac{11}{568}$ | (73) $\frac{1}{3}$ |
| (16) 36 | (33) \$ 7.20 | (49) 800 | (74) 1 |
| (17) 555 | | *(50) 244 — 268 | (75) $\frac{2}{3}$ |
| | | (51) 48 | (76) 10 |
| | | (52) 414 | (77) 171 |
| | | (53) 81 | (78) 3.5, $\frac{7}{2}, 3\frac{1}{2}$ |
| | | (54) 1.5, $\frac{3}{2}, 1\frac{1}{2}$ | (79) 3 |
| | | (55) 30 | *(80) 1,035 — 1,143 |
| | | (56) — $\frac{1}{7}$ | |
| | | (57) 20 | |
| | | (58) 7 | |