

**The University Interscholastic League
Number Sense Test • HS B • 2013**

Contestant's Number _____

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|-------|-------|----------|
| 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) $2013 - 3102 =$ _____</p> <p>(2) $28 \times 15 =$ _____</p> <p>(3) $310.2 + 20.13 =$ _____ (decimal)</p> <p>(4) $2\frac{1}{3} \div 3\frac{1}{2} =$ _____</p> <p>(5) $0.875 =$ _____ (proper fraction)</p> <p>(6) $544536 \div 9 =$ _____</p> <p>(7) $6543 \times 9 - 2 =$ _____</p> <p>(8) $25 \times 20 - 15 + 10 \div 5 =$ _____</p> <p>(9) 2.5 gallons = _____ quarts</p> <p>* (10) $21347 + 1118 + 2947 + 76 =$ _____</p> <p>(11) The GCD of 54, 48, and 32 is _____</p> <p>(12) $2013 \div 11$ has a remainder of _____</p> <p>(13) CMLXIV = _____ (Arabic Numeral)</p> <p>(14) $32 \times 17 + 15 \times 32 =$ _____</p> <p>(15) $3 + 7 + 11 + 15 + \dots + 31 =$ _____</p> <p>(16) $\frac{15}{19} \times 15 =$ _____ (mixed number)</p> <p>(17) The largest prime factor of 285 is _____</p> <p>(18) $\frac{7}{12} - \frac{7}{24} - \frac{7}{36} =$ _____</p> | <p>(19) Which is smaller, -0.45 or $-\frac{4}{9}$? _____</p> <p>* (20) $8 \times 15 \times 1947 =$ _____</p> <p>(21) If 9 ★s cost \$6.30 then a dozen ★s cost \$ _____</p> <p>(22) $37^2 + 67^2 =$ _____</p> <p>(23) $-9 + -6 + 3 + 1 =$ _____</p> <p>(24) $(21 + 34 \times 7) \div 11$ has a remainder of _____</p> <p>(25) $9.111\dots - 3.333\dots =$ _____</p> <p>(26) $253 \times 14 =$ _____</p> <p>(27) $(8)^{-1} \div (4)^{-2} \times (2)^{-3} =$ _____</p> <p>(28) The sum of x and 5 gives the same result as the product of x and 5. Find x. _____</p> <p>(29) $3 + 7 + 10 + 17 + \dots + 71 + 115 =$ _____</p> <p>* (30) $88 \times 42 - 64 \times 42 =$ _____</p> <p>(31) $15 \times 15 \times 15 =$ _____</p> <p>(32) $15^2 + 45^2 =$ _____</p> <p>(33) If $x - y = -5$ and $x + y = -3$ then $x^2 - y^2 =$ _____</p> <p>(34) $f(x) = 9x^2 + 6x + 1$. $f(7) =$ _____</p> <p>(35) If $2x^3 + 3x^2 - 11x - 6 = 0$ and P, Q, and R are the real roots, then $PQ + QR + PR$ is _____</p> |
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- (36) 134 base 7 is equivalent to _____ base 10
- (37) $5 \times 4! - 4 \times 3! - 3 \times 2! =$ _____
- (38) The next term of the arithmetic sequence,
 $\dots \frac{2}{3}, \frac{7}{6}, \frac{5}{3}, \dots$ is _____
- (39) If $\sqrt{150} - \sqrt{54} = \sqrt{x}$, then $x =$ _____
- *(40) $201213 \div 748 =$ _____
- (41) If $x + y = 5$ and $xy = 2$ then $x^3 + y^3 =$ _____
- (42) $101_2 + 102_3 + 103_4 =$ _____ 10
- (43) $\frac{5}{8} - \frac{31}{47} =$ _____
- (44) 18% of $466\frac{2}{3} =$ _____
- (45) An interior angle of a regular decagon has a measure of _____ degrees
- (46) The sum of the product of the roots taken two at a time of $2x^3 - 3x^2 - 4x + 5 = 0$ is _____
- (47) $\frac{1}{4}(28^2 - 4^2) =$ _____
- (48) The y-intercept of the line going through (2, 3) and (5, 9) is (x, y). $y =$ _____
- (49) If $\frac{x+7}{x-4} + \frac{x-4}{x+7}$ is written as the mixed number $A\frac{B}{C}$ then $B =$ _____
- *(50) $44^2 =$ _____
- (51) $\sqrt{17424} =$ _____
- (52) If two dice are rolled, the probability that the sum of the faces is greater than 10 is _____
- (53) $87^2 + 62^2 =$ _____
- (54) ${}_5C_3 + {}_4C_2 =$ _____
- (55) $(6 - 5i)(5 - 6i) = (a + bi)$. Find $a + b$. _____
- (56) $\sin\left(\frac{5\pi}{3}\right) \times \sin\left(\frac{5\pi}{3}\right) =$ _____
- (57) Let $\log_9(x^3) = \frac{3}{2}$, where $x > 0$. Find x . _____
- (58) 90 miles per hour = _____ feet per second
- (59) $215 \times 152 =$ _____
- *(60) $10e \times 10\pi \times 10\phi =$ _____
- (61) $6 + 12 + 18 + 24 + \dots + 48 =$ _____
- (62) $(333_5) + (222_5) \div 4$ has a remainder of _____
- (63) A box contains black pens, red pens, blue pens, and green pens. How many different sets of 3 pens can be packaged? _____
- (64) The diameter of the circumscribed circle around a 7,24,25-right triangle is _____
- (65) The $\det\left(\begin{bmatrix} 1 & -2 \\ 3 & -4 \end{bmatrix} + \begin{bmatrix} 1 & 2 \\ -3 & -4 \end{bmatrix}\right)$ is = _____
- (66) $18 \times \frac{19}{20} =$ _____ mixed number
- (67) $\sin\left(\arctan\left(\frac{7}{24}\right)\right) =$ _____
- (68) $\frac{3}{8} + \frac{8}{3} - 2 =$ _____
- (69) If $f(x) = x^5 + 5x^4 + 10x^3 + 10x^2 + 5x + 1$, then $f(-2) =$ _____
- *(70) $94 \times 96 \times 102 \times 104 =$ _____
- (71) $101 \times 808 =$ _____
- (72) $6! \div 4! + 5! \div 3! - 2! \div 1! =$ _____
- (73) $g(x) = 2x + 3$ and $h(x) = 2 - 3x$. $g(h(4)) =$ _____
- (74) The slope of the line tangent to $f(x) = 2x^2 - x - 1$ at the point $(-1, 2)$ is _____
- (75) If $f(x) = 2x^3 + 3x^2 - 3x - 2$, then $f''(-1) =$ _____
- (76) $\int_{-1}^1 (3x^2 - x) dx =$ _____
- (77) $\frac{1}{30} + \frac{1}{42} + \frac{1}{56} + \frac{1}{72} =$ _____
- (78) Change .111, base 2, to a base 10 fraction. _____
- (79) The next term of 5, 6, 7, 9, 12, 17, ... is _____
- *(80) 47.2 miles = _____ feet

University Interscholastic League - Number Sense Answer Key HS • Invitation B • 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) -1,089 | (19) $-.45, -\frac{9}{20}$ | (36) 74 | (58) 132 |
| (2) 420 | *(20) 221,958 — 245,322 | (37) 90 | (59) 32,680 |
| (3) 330.33 | (21) \$8.40 | (38) $\frac{13}{6}, 2\frac{1}{6}$ | *(60) 13,127 — 14,508 |
| (4) $\frac{2}{3}$ | (22) 5,858 | (39) 24 | (61) 216 |
| (5) $\frac{7}{8}$ | (23) 5 | *(40) 256 — 282 | (62) 3 |
| (6) 60,504 | (24) 6 | (41) 95 | (63) 20 |
| (7) 58,885 | (25) $\frac{52}{9}, 5\frac{7}{9}$ | (42) 35 | (64) 25 |
| (8) 487 | (26) 3,542 | (43) $-\frac{13}{376}$ | (65) -16 |
| (9) 10 | (27) $.25, \frac{1}{4}$ | (44) 84 | (66) $17\frac{1}{10}$ |
| *(10) 24,214 — 26,762 | (28) $1.25, \frac{5}{4}, 1\frac{1}{4}$ | (45) 144 | (67) $.28, \frac{7}{25}$ |
| (11) 2 | (29) 294 | (46) -2 | (68) $\frac{25}{24}, 1\frac{1}{24}$ |
| (12) 0 | *(30) 958 — 1,058 | (47) 192 | (69) -1 |
| (13) 964 | (31) 3,375 | (48) -1 | *(70) 90,940,263 — 100,512,921 |
| (14) 1,024 | (32) 2,250 | (49) 121 | (71) 81,608 |
| (15) 136 | (33) 15 | *(50) 1,840 — 2,032 | (72) 48 |
| (16) $11\frac{16}{19}$ | (34) 484 | (51) 132 | (73) -17 |
| (17) 19 | (35) $-5.5, -\frac{11}{2},$ $-5\frac{1}{2}$ | (52) $\frac{1}{12}$ | (74) -5 |
| (18) $\frac{7}{72}$ | | (53) 11,413 | (75) -6 |
| | | (54) 16 | (76) 2 |
| | | (55) -61 | (77) $\frac{4}{45}$ |
| | | (56) $.75, \frac{3}{4}$ | (78) $\frac{7}{8}$ |
| | | (57) 3 | (79) 25 |
| | | | *(80) 236,756 — 261,676 |