

The University Interscholastic League

Number Sense Test • HS B • 2014

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!

- | | |
|---|--|
| <p>(1) $215 + 2014 =$ _____</p> <p>(2) $36 \times 25 =$ _____</p> <p>(3) $\frac{8}{9} \div \frac{16}{27} =$ _____</p> <p>(4) $201.4 - 21.5 =$ _____ (decimal)</p> <p>(5) $76\% =$ _____ (proper fraction)</p> <p>(6) $2014 \div 9 =$ _____ (mixed number)</p> <p>(7) $\frac{5}{16} =$ _____ (decimal)</p> <p>(8) $13^3 =$ _____</p> <p>(9) 11 yards = _____ inches</p> <p>* (10) $4102 + 512 + 215 + 2014 =$ _____</p> <p>(11) $\frac{14}{15} + \frac{15}{14} =$ _____ (mixed number)</p> <p>(12) $26 \times 14 + 12 \times 26 =$ _____</p> <p>(13) The number of positive prime factors of 285 is _____</p> <p>(14) $2152014 \div 6$ has a remainder of _____</p> <p>(15) $1 + 6 + 11 + 16 + \dots + 51 =$ _____</p> <p>(16) The GCD of 57 and 76 is _____</p> <p>(17) MMCCXXII = _____ (Arabic Numeral)</p> <p>(18) $40 \div 10 - 4 \times 18 + 28 =$ _____</p> | <p>(19) Which is smaller, 0.625 or $\frac{11}{16}$? _____</p> <p>* (20) $410 \times 25 \times 12 =$ _____</p> <p>(21) $4\frac{3}{7} \times 4\frac{4}{7} =$ _____</p> <p>(22) If 16 Sodies cost \$12.00 then 5 Sodies cost \$ _____</p> <p>(23) $(215 \times 20 + 14) \div 6$ has a remainder of _____</p> <p>(24) $4^{(-1)} + 4^{(-2)} =$ _____</p> <p>(25) $0.142857 + 0.857142 =$ _____</p> <p>(26) $21.52 \div 0.8 =$ _____ (decimal)</p> <p>(27) 135 base 6 = _____ base 10</p> <p>(28) The arithmetic mean of 46, 51, 45, & 54 is _____</p> <p>(29) If there are 8 elements in set A, 6 in set B, and 12 in $A \cup B$, then $A \cap B$ has _____ elements</p> <p>* (30) $\sqrt{361015} =$ _____</p> <p>(31) $666\frac{2}{3}\%$ of 24 is _____</p> <p>(32) Round $\sqrt{8}$ to the hundredths place. _____</p> <p>(33) $1^2 + 2^2 + 3^2 + 4^2 + 5^2 + 6^2 =$ _____</p> <p>(34) 2.01444... = _____ (mixed number)</p> <p>(35) $\frac{1}{4}(38^2 - 22^2) =$ _____</p> |
|---|--|

- (36) The real roots of $x^2 - x - 12 = 0$ are P and Q. Find $(PQ)(P + Q)$. _____
- (37) Find k if $34^2 - 38^2 = 8k$. $k =$ _____
- (38) 15 miles/hour = _____ feet/second
- (39) If $x + 3y = 6$ and $3x - 6y = 8$, then $2x =$ _____
- *(40) $8642 \times 5\frac{7}{9} \div 13 =$ _____
- (41) The slope of the line passing through the points (2, 5) and (-1, 3) is _____
- (42) $55 \div 0.625 =$ _____
- (43) $32_6 + 54_6 + 11_6 =$ _____ 6
- (44) If $6^{(x+1)} = 402$ then $6^{(x)} =$ _____
- (45) $5^4 \times 2^5 =$ _____
- (46) Let $x - y = -2$ and $xy = 2$. Find $x^3 - y^3 =$ _____
- (47) The measure of an interior angle of a regular hexagon is _____ degrees
- (48) $\left(\frac{x^2 + 4x + 4}{x - 2}\right) \left(\frac{x^2 - 4x + 4}{x^2 - 4}\right) = x +$ _____
- (49) Which of the following is considered to be a happy number, 99, 100, or 101? _____
- *(50) $215 \times 21^3 \div 15^2 =$ _____
- (51) $18 + 12 + 8 + 5\frac{1}{3} + \dots =$ _____
- (52) The larger root of $10x^2 + 3x - 1 = 0$ is _____
- (53) $555 \times \frac{5}{37} =$ _____
- (54) ${}_6P_3 =$ _____
- (55) The integral sides of a triangle are 12, 13, and x. The greatest value of x is _____
- (56) Let $|2x - 3| \leq 4$. The least value of x is _____
- (57) $532 \times 312 =$ _____
- (58) The simplified coefficient of the xy^3 term in the expansion of $(2x + y)^4$ is _____
- (59) The radius of the circle $x^2 + 2x + y^2 + 2y = 22$ is $2\sqrt{k}$. Find k. _____
- *(60) $21 \times 34 \times 711 =$ _____
- (61) $38^2 - 40^2 + 42^2 - 44^2 =$ _____
- (62) How many sets of five items can be put in a bag if the items available include pens, pencils, crayons, and markers? _____
- (63) The product of the coefficients of $(x + y)^5$ is _____
- (64) If $f(x) = 2x^3 - 3x^2 + 2x - 3$, then $f''(1) =$ _____
- (65) The sum of the first 11 terms of the Fibonacci sequence 1,1,2,3,5,8,13,... is _____
- (66) Change 0.4333... base 5 to a base 5 fraction. _____ 5
- (67) If $2x^3 - 3x^2 + 2x - 3 = 0$, then the harmonic mean of the roots is _____
- (68) $\frac{5}{27} \times 111 =$ _____ (mixed number)
- (69) Let $g(x) = x^2 + 2x + 1$ and $h(x) = (x - 1)(x^2 - 2x + 1)$. Find $h(g(1)) =$ _____
- *(70) $(5^2 + 4^3)(3^4 + 2^5) =$ _____
- (71) $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{32} =$ _____
- (72) $1 - 2(\sin^2(45^\circ)) =$ _____
- (73) The 3rd hexagonal number is _____
- (74) If $f(x) = \frac{3x - 6}{10}$, then $f^{-1}(1) =$ _____
- (75) If $\det \begin{bmatrix} 2 & -1 \\ x & 4 \end{bmatrix} = 7$, then $x =$ _____
- (76) The ratio of x to y is 1 to 3 and $x - y = 6$. $x =$ _____
- (77) $\int_0^{10} (x + 1) dx =$ _____
- (78) 150 degrees = $k\pi$ radians. $k =$ _____
- (79) $12 \times 56 = 48 \times$ _____
- *(80) The speed of a rocket is 26,400 feet per second. How many miles per hour does it travel? _____

University Interscholastic League - Number Sense Answer Key HS • Invitation B • 2014

*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) 2,229 | (19) $.625, \frac{5}{8}$ | (36) -12 | (59) 6 |
| (2) 900 | *(20) $116,850 - 129,150$ | (37) -36 | *(60) $482,272 - 533,036$ |
| (3) $1.5, \frac{3}{2}, 1\frac{1}{2}$ | (21) $20\frac{12}{49}$ | (38) 22 | (61) -328 |
| (4) 179.9 | (22) \$3.75 | (39) 8 | (62) 56 |
| (5) $\frac{19}{25}$ | (23) 0 | *(40) $3,649 - 4,032$ | (63) 2,500 |
| (6) $223\frac{7}{9}$ | (24) $.3125, \frac{5}{16}$ | (41) $\frac{2}{3}$ | (64) 6 |
| (7) .3125 | (25) 1 | (42) 88 | (65) 232 |
| (8) 2,197 | (26) 26.9 | (43) 141 | (66) $\frac{34}{40}$ |
| (9) 396 | (27) 59 | (44) 67 | (67) $4.5, \frac{9}{2}, 4\frac{1}{2}$ |
| *(10) $6,501 - 7,185$ | (28) 49 | (45) 20,000 | (68) $20\frac{5}{9}$ |
| (11) $2\frac{1}{210}$ | (29) 2 | (46) -20 | (69) 27 |
| (12) 676 | *(30) $571 - 630$ | (47) 120 | *(70) $9,555 - 10,559$ |
| (13) 3 | (31) 160 | (48) 2 | (71) $.90625, \frac{29}{32}$ |
| (14) 0 | (32) $2.83, \frac{283}{100}, 2\frac{83}{100}$ | (49) 100 | (72) 0 |
| (15) 286 | (33) 91 | *(50) $8,407 - 9,291$ | (73) 15 |
| (16) 19 | (34) $2\frac{13}{900}$ | (51) 54 | (74) $\frac{16}{3}, 5\frac{1}{3}$ |
| (17) 2,222 | (35) 240 | (52) $.2, \frac{1}{5}$ | (75) -1 |
| (18) -40 | | (53) 75 | (76) -3 |
| | | (54) 120 | (77) 60 |
| | | (55) 24 | (78) $\frac{5}{6}$ |
| | | (56) $-.5, -\frac{1}{2}$ | (79) 14 |
| | | (57) 165,984 | |
| | | (58) 8 | *(80) $17,100 - 18,900$ |