

# The University Interscholastic League Number Sense Test • HS Regional • 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!**

- |  |   |
|--|---|
| <p>(1) <math>41813 + 31914 =</math> _____</p> <p>(2) <math>25 \times 64 =</math> _____</p> <p>(3) <math>3181 - 1913 =</math> _____</p> <p>(4) <math>1819 \div 4 =</math> _____ (decimal)</p> <p>(5) <math>4192013 \div 9</math> has a remainder of _____</p> <p>(6) <math>25^2 =</math> _____</p> <p>(7) <math>7\frac{5}{6} - 5\frac{3}{4} =</math> _____ (mixed number)</p> <p>(8) <math>4 \times (8 - 12) \div 16 + 20 =</math> _____</p> <p>(9) <math>8\frac{3}{8}\%</math> = _____ (proper fraction)</p> <p>*(10) <math>41718 - 1920 + 13 =</math> _____</p> <p>(11) <math>313 \times 13 =</math> _____</p> <p>(12) <math>\frac{14}{17} \times 14 =</math> _____ (mixed number)</p> <p>(13) The LCM of 48 and 84 is _____</p> <p>(14) <math>6\frac{7}{8} + 4\frac{5}{6} =</math> _____ (mixed number)</p> <p>(15) How many positive integers divide 108? _____</p> <p>(16) MMCDLXXVII = _____ (Arabic Number)</p> <p>(17) Three-eighths of a gallon is _____ fluid ounces</p> <p>(18) 44 is what % 80? _____ %</p> | <p>(19) The average of 45, 87 and 61 is _____</p> <p>*(20) <math>1942013 \div 123 =</math> _____</p> <p>(21) The multiplicative inverse of <math>-2\frac{3}{4}</math> is _____</p> <p>(22) <math>(11 + 23 \times 5) \div 8</math> has a remainder of _____</p> <p>(23) If <math>3x + 4 = 7</math> then <math>5 - 6x =</math> _____</p> <p>(24) <math>75^2 + 25^2 =</math> _____</p> <p>(25) 60% of 70 minus 80 is _____</p> <p>(26) <math>0.434343... - 0.101010... =</math> _____</p> <p>(27) 147 base 10 is equivalent to _____ base 9</p> <p>(28) <math>1\frac{3}{5} \div 1\frac{1}{15} =</math> _____ (mixed number)</p> <p>(29) If 4 ♦s cost \$16.20 then 10 ♦s cost \$ _____</p> <p>*(30) <math>\sqrt{4490} \times 63 =</math> _____</p> <p>(31) If <math>a = 7</math> and <math>b = 6</math> then<br/><math>(a + b)(a^2 + 2ab + b^2) =</math> _____</p> <p>(32) <math>123_4 \div 3_4 =</math> _____ 4</p> <p>(33) <math>2\frac{1}{3} \times 3\frac{1}{2} =</math> _____ (mixed number)</p> <p>(34) <math>(5! + 3! + 1!) - (4! + 2! + 0!) =</math> _____</p> <p>(35) Find k if <math>89^2 - 83^2 = 3k</math>. k = _____</p> |
|--|---|

- (36) The area of a square is  $10.24 \text{ cm}^2$ . The perimeter of this square is \_\_\_\_\_ cm
- (37)  $1 + 5 + 6 + 11 + 17 + \dots + 118 + 191 =$  \_\_\_\_\_
- (38) Let  $R = \{r,i,g,h,t\}$ ,  $S = \{s,q,u,a,r,e\}$ , and  $T = \{t,r,i,a,n,g,l,e\}$ . The number of distinct elements in  $(R \cap T) \cup S$  is \_\_\_\_\_
- (39) The next term of the arithmetic sequence,  $\dots 2\frac{1}{4}, \frac{3}{4}, -\frac{3}{4}, -2\frac{1}{4} \dots$  is \_\_\_\_\_
- \*(40)  $\sqrt{918273} =$  \_\_\_\_\_
- (41)  $\frac{1}{4}(17^2 - 43^2) =$  \_\_\_\_\_
- (42)  $\frac{4}{7} - \frac{21}{34} =$  \_\_\_\_\_
- (43) If  $\frac{x-12}{x+15} + \frac{x+15}{x-12}$  is written as the mixed number  $A\frac{B}{C}$  then  $B =$  \_\_\_\_\_
- (44)  $\frac{1}{18} + \frac{1}{54} + \frac{1}{108} =$  \_\_\_\_\_
- (45) The number of sides of a regular polygon with an interior angle measure of  $144^\circ$  is \_\_\_\_\_
- (46) Point  $P(-1, k)$  lies on the line going through  $(2, 3)$  and  $(5, 9)$ .  $k =$  \_\_\_\_\_
- (47)  $18\%$  of  $466\frac{2}{3} =$  \_\_\_\_\_
- (48) The roots of  $2x^3 + 3x^2 - 3x - 2 = 0$  are  $P, Q,$  &  $R$ . Find  $(P + Q + R)(PQ + QR + PR)(PQR)$ . \_\_\_\_\_
- (49)  $105$  miles per hour = \_\_\_\_\_ feet per second
- \*(50)  $\frac{1+\sqrt{5}}{2} \times \pi \times 10^4 =$  \_\_\_\_\_
- (51)  $(\frac{7}{11} + \frac{11}{7}) \div 2 =$  \_\_\_\_\_
- (52) If  $\log_9(x) = 1.5$  then  $x =$  \_\_\_\_\_
- (53)  $75^2 + 43^2 =$  \_\_\_\_\_
- (54)  ${}_8C_4 =$  \_\_\_\_\_
- (55) The number of positive integral divisors of  $32 \times 81 \times 64$  is \_\_\_\_\_
- (56)  $14^6 \div 8$  has a remainder of \_\_\_\_\_
- (57) If  $A$  is  $40$  more than  $B$  and  $C$  is  $60$  less than  $A$ , then  $C$  is how much less than  $B$ ? \_\_\_\_\_
- (58) A box of colored pencils contains  $6$  red,  $9$  black, and  $3$  green. The probability of randomly selecting a red or a green pencil is \_\_\_\_\_%
- (59)  $(4 - 5i)(3 + 2i) = a + bi$ . Find  $a + b$ . \_\_\_\_\_
- \*(60)  $42.5$  radians = \_\_\_\_\_ degrees
- (61) If  $\frac{3x}{5}$  has a remainder of  $2$  and  $\frac{3y}{5}$  has a remainder of  $1$  then  $\frac{xy}{5}$  has a remainder of \_\_\_\_\_
- (62)  $241 \times 352 =$  \_\_\_\_\_
- (63) The first  $4$  digits of the decimal of  $\frac{427}{990}$  is  $0.$ \_\_\_\_\_
- (64)  $A = \begin{bmatrix} 2 & -3 \\ 3 & 2 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & 4 \\ 4 & 1 \end{bmatrix}$ . Find  $|AB|$ . \_\_\_\_\_
- (65) A bank contains pennies, nickels, dimes, quarters and half-dollars. How many different sets of three coins can be formed? \_\_\_\_\_
- (66)  $\sin(135^\circ) \times \cos(225^\circ) \times \tan(315^\circ) =$  \_\_\_\_\_
- (67)  $g(x) = -x^2$  and  $h(x) = 1 - 2x$ .  $g(h(2)) =$  \_\_\_\_\_
- (68) The diameter of the circumscribed circle around a  $5,12,13$ -right triangle is \_\_\_\_\_
- (69)  $4! \times 5! \div 6! =$  \_\_\_\_\_
- \*(70)  $11^{(4)} =$  \_\_\_\_\_
- (71)  $72 \times 1111 =$  \_\_\_\_\_
- (72)  $F(x) = (x - 1)^6$ . Find  $F'(3) =$  \_\_\_\_\_
- (73)  $|3 - 2| - |5 - 7| - |12 - 19| =$  \_\_\_\_\_
- (74) Change  $0.102$  base  $3$  to a base  $10$  fraction. \_\_\_\_\_
- (75)  $\int_0^{\frac{\pi}{4}} \cos(2x) dx =$  \_\_\_\_\_
- (76) Given:  $1,3,3,5,7,11,\dots,43,k,111,\dots$ . Find  $k$ . \_\_\_\_\_
- (77) The sixth hexagonal number is \_\_\_\_\_
- (78)  $49 \times \frac{50}{51} =$  \_\_\_\_\_ mixed number
- (79)  $\sqrt{1234321} =$  \_\_\_\_\_
- \*(80)  $16$  gallons +  $8$  quarts +  $4$  pints = \_\_\_\_\_ cups

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\*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

- |                        |                                     |   |                        |
|------------------------|-------------------------------------|---|------------------------|
| (1) 73,727             | (19) $\frac{193}{3}, 64\frac{1}{3}$ | (36) 12.8, $\frac{64}{5}, 12\frac{4}{5}$        | (58) 50                |
| (2) 1,600              | *(20) 15,000 — 16,578               | (37) 495  | (59) 15                |
| (3) 1,268              | (21) $-\frac{4}{11}$                | (38) 9  | *(60) 2,314 — 2,556    |
| (4) 454.75             | (22) 6                              | (39) $-3.75, -\frac{15}{4},$<br>$-3\frac{3}{4}$ | (61) 3                 |
| (5) 2                  | (23) $-1$                           | *(40) 911 — 1,006                               | (62) 84,832            |
| (6) 625                | (24) 6,250                          | (41) $-390$                                     | (63) 4313              |
| (7) $2\frac{1}{12}$    | (25) $-38$                          | (42) $-\frac{11}{238}$                          | (64) $-221$            |
| (8) 19                 | (26) $\frac{1}{3}$                  | (43) 729  | (65) 35                |
| (9) $\frac{67}{800}$   | (27) 173                            | (44) $\frac{1}{12}$                             | (66) $.5, \frac{1}{2}$ |
| *(10) 37,821 — 41,801  | (28) $1\frac{1}{2}$                 | (45) 10   | (67) $-9$              |
| (11) 4,069             | (29) \$40.50                        | (46) $-3$                                       | (68) 13                |
| (12) $11\frac{9}{17}$  | *(30) 4,011 — 4,432                 | (47) 84   | (69) 4                 |
| (13) 336               | (31) 2,197                          | (48) 2.25, $\frac{9}{4}, 2\frac{1}{4}$          | *(70) 13,909 — 15,373  |
| (14) $11\frac{17}{24}$ | (32) 21                             | (49) 154  | (71) 79,992            |
| (15) 12                | (33) $8\frac{1}{6}$                 | *(50) 48,291 — 53,373                           | (72) 192               |
| (16) 2,477             | (34) 100                            | (51) $\frac{85}{77}, 1\frac{8}{77}$             | (73) $-8$              |
| (17) 48                | (35) 344                            | (52) 27   | (74) $\frac{11}{27}$   |
| (18) 55                |                                     | (53) 7,474                                      | (75) $.5, \frac{1}{2}$ |
|                        |                                     | (54) 70   | (76) 69                |
|                        |                                     | (55) 60   | (77) 66                |
|                        |                                     | (56) 0  | (78) $48\frac{2}{51}$  |
|                        |                                     | (57) 20   | (79) 1,111             |
|                        |                                     |   | *(80) 282 — 310        |