

# The University Interscholastic League

## Number Sense Test • HS District 2 • 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>2013 - 330 =</math> _____</p> <p>(2) <math>2013 + 330 =</math> _____</p> <p>(3) <math>325 \div 9 =</math> _____ (mixed number)</p> <p>(4) <math>2013 \times 4 =</math> _____</p> <p>(5) <math>5\frac{3}{5} =</math> _____ %</p> <p>(6) <math>6\frac{2}{7} - 3\frac{1}{8} =</math> _____ (mixed number)</p> <p>(7) <math>3 - 10 \times 2 + 5 \div (2 + 3) =</math> _____</p> <p>(8) <math>12^3 =</math> _____</p> <p>(9) 13610 <math>\div</math> 6 has a remainder of _____</p> <p>*(10) <math>34711 - 1829 + 4776 =</math> _____</p> <p>(11) <math>331 \times 13 =</math> _____</p> <p>(12) <math>5\frac{4}{5} + 3\frac{3}{4} =</math> _____ (mixed number)</p> <p>(13) <math>54 + 45 + 36 + 50 + 41 + 32 =</math> _____</p> <p>(14) The largest prime factor of 399 is _____</p> <p>(15) 5 yards + 5 feet + 5 inches = _____ inches</p> <p>(16) MCDLXIV = _____ (Arabic Number)</p> <p>(17) <math>2013 \div 5 =</math> _____ (decimal)</p> <p>(18) The arithmetic mean of 3, 30, 20, and 13 is _____</p> | <p>(19) The LCM of 105 and 180 is _____</p> <p>*(20) <math>33120 \div 13 =</math> _____</p> <p>(21) <math>2\frac{7}{10} \div \frac{12}{25} =</math> _____ (mixed number)</p> <p>(22) <math> 1 + 2  -  3 - 4  +  7 - 11  =</math> _____</p> <p>(23) 175 base 10 is equivalent to _____ base 8</p> <p>(24) <math>27 \times \frac{27}{31} =</math> _____ (mixed number)</p> <p>(25) A nonagon has _____ distinct diagonals</p> <p>(26) The next term of the arithmetic sequence,<br/>... <math>2\frac{1}{4}, \frac{3}{4}, -\frac{3}{4}, -2\frac{1}{4}, \dots</math> is _____</p> <p>(27) If 4.5 DECIS cost \$15.90 then 6 DECIS cost \$ _____</p> <p>(28) Five less than a number has the same value as the number divided by 3. What is the number? _____</p> <p>(29) <math>(85 \times 32 - 11) \div 7</math> has a remainder of _____</p> <p>*(30) <math>1000\sqrt{5} + 100\sqrt{3} =</math> _____</p> <p>(31) <math>21^2 + 63^2 =</math> _____</p> <p>(32) <math>213_9 - 47_9 - 11_9 =</math> _____ 9</p> <p>(33) <math>0.1666\dots + 0.666\dots + 1.666\dots =</math> _____</p> <p>(34) <math>R_1</math> and <math>R_2</math> are the roots of <math>3x^2 - 2x - 21 = 0</math>.<br/>Find <math>(R_1 + R_2)(R_1 \times R_2)</math>. _____</p> |
|--|---|

- (35) If  $x = 12$  and  $y = -10$  then  $x^2 - 2xy + y^2 =$  \_\_\_\_\_
- (36) How many distinct elements are in  $(\{t, e, x, a, s\} \cup \{u, n, i, v\}) \cap \{a, u, s, t, i, n\}$ ? \_\_\_\_\_
- (37) 75 miles per hour = \_\_\_\_\_ feet per second
- (38)  $2 + 7 + 9 + 16 + 25 + \dots + 107 + 173 =$  \_\_\_\_\_
- (39)  $5\frac{1}{4} \times 3\frac{5}{7} =$  \_\_\_\_\_ (mixed number)
- \*(40)  $678 \times 54 + 46 \times 786 =$  \_\_\_\_\_
- (41) If  $8^{(4)} = 4^{(2x)}$  then  $x =$  \_\_\_\_\_
- (42) An interior angle of a regular hexagon has a measure of  $k\pi$  radians. Find  $k$ . \_\_\_\_\_
- (43)  $\frac{29}{43} - \frac{7}{11} =$  \_\_\_\_\_
- (44)  $\frac{1}{4}(45^2 - 15^2) =$  \_\_\_\_\_
- (45) A triangle has sides of 11, 14, and  $x$ . What is the greatest integral value of  $x$ ? \_\_\_\_\_
- (46)  $67^2 + 64^2 =$  \_\_\_\_\_
- (47) The slope of the line going through the points (2, 3) and (5, 9) is \_\_\_\_\_
- (48) If  $\frac{x+9}{x-8} + \frac{x-8}{x+9}$  is written as the mixed number  $A\frac{B}{C}$  then  $B =$  \_\_\_\_\_
- (49)  $\sqrt{6889} =$  \_\_\_\_\_
- \*(50)  $345 \log 9876 =$  \_\_\_\_\_
- (51) The product of the simplified coefficients of the  $x^3y$  and  $xy^3$  terms in the expansion of  $(x + y)^4$  is \_\_\_\_\_
- (52) 21% of  $666\frac{2}{3} =$  \_\_\_\_\_
- (53)  ${}_6C_4 \div {}_6C_2 =$  \_\_\_\_\_
- (54)  $(123_8 + 456_8) \div 7$  has a remainder of \_\_\_\_\_
- (55)  $(3 - 2i)(2 + 3i) = a + bi$ . Find  $a + b$ . \_\_\_\_\_
- (56) The 8th triangular number is \_\_\_\_\_
- (57)  $15^6 \div 12$  has a remainder of \_\_\_\_\_
- (58) If  $P$  varies directly with  $Q$  and  $P = 18$  when  $Q = 4$ , find  $P$  when  $Q = 3$ . \_\_\_\_\_
- (59)  $245 \times 331 =$  \_\_\_\_\_
- \*(60)  $23^2 \times 32^2 =$  \_\_\_\_\_
- (61) If  $\frac{2x}{5}$  has a remainder of 4 and  $\frac{2y}{5}$  has a remainder of 1 then  $\frac{xy}{5}$  has a remainder of \_\_\_\_\_
- (62)  $21 \times \frac{22}{23} =$  \_\_\_\_\_ mixed number
- (63)  $g(x) = (x! - 3)$  and  $h(x) = x \div 7$ .  $h(g(4)) =$  \_\_\_\_\_
- (64) The odds of losing the game is  $\frac{5}{8}$ . The probability of winning a the game is \_\_\_\_\_
- (65) If  $A$  is 75% of  $B$  and  $B$  is  $66\frac{2}{3}\%$  of  $C$ , then  $C$  is what percent of  $A$ ? \_\_\_\_\_%
- (66) The first 4 digits of the decimal of  $\frac{39}{90}$  is 0. \_\_\_\_\_
- (67)  $(802)^2 =$  \_\_\_\_\_
- (68) The diameter of the circumscribed circle around a right triangle with legs of 11" and 60" is \_\_\_\_\_"
- (69) Given the sequence 1, 3, 7, 13, 21, ... 57,  $k$ , 91, ..., find  $k$ . \_\_\_\_\_
- \*(70) 24 days + 60 hrs + 60 min = \_\_\_\_\_ seconds
- (71) A teacher has blue pens, black pencils, red markers, and white chalk. How many different sets of 4 of these items can the teacher pass out? \_\_\_\_\_
- (72)  $F(x) = (x + 1)^5$ . Find  $F'(-2) =$  \_\_\_\_\_
- (73)  $F(x) = x + \frac{2}{(x+3)}$  has how many asymptotes? \_\_\_\_\_
- (74)  $53 \times 1111 =$  \_\_\_\_\_
- (75)  $\frac{1}{8} + \frac{1}{24} + \frac{1}{48} + \frac{1}{80} =$  \_\_\_\_\_
- (76) Change  $\frac{15}{16}$  to a base 4 decimal. \_\_\_\_\_ 4
- (77) The Greatest Integer Function is written as  $f(x) = [x]$ . Find  $[\sqrt{6} + \sqrt{3}]$ . \_\_\_\_\_
- (78)  $\int_{\pi}^{2\pi} \sin(3x) dx =$  \_\_\_\_\_
- (79)  $\sqrt{24025} =$  \_\_\_\_\_
- \*(80) 14,320 degrees = \_\_\_\_\_ radians

University Interscholastic League - Number Sense Answer Key HS • District 2 • 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

- |   |   |   |                                |
|---|---|---|--------------------------------|
| (1) 1,683                                   | (19) 1,260  | (35) 484                                    | (59) 81,095                    |
| (2) 2,343                                   | *(20) 2,421 — 2,675                                 | (36) 6                                      | *(60) 514,612 —<br>568,780     |
| (3) $36\frac{1}{9}$                         | (21) $5\frac{5}{8}$                                 | (37) 110                                    | (61) 1                         |
| (4) 8,052                                   | (22) 6  | (38) 446                                    | (62) $20\frac{2}{23}$          |
| (5) 560                                     | (23) 257  | (39) $19\frac{1}{2}$                        | (63) 3                         |
| (6) $3\frac{9}{56}$                         | (24) $23\frac{16}{31}$                              | *(40) 69,130 — 76,406                       | (64) $\frac{8}{13}$            |
| (7) — 16                                    | (25) 27   | (41) 3                                      | (65) 200                       |
| (8) 1,728                                   | (26) — 3.75, — $\frac{15}{4}$ ,<br>— $3\frac{3}{4}$ | (42) $\frac{2}{3}$                          | (66) 4333                      |
| (9) 2                                       | (27) \$21.20  | (43) $\frac{18}{473}$                       | (67) 643,204                   |
| *(10) 35,776 — 39,540                       | (28) 7.5, $\frac{15}{2}$ , $7\frac{1}{2}$           | (44) 450                                    | (68) 61                        |
| (11) 4,303                                  | (29) 0  | (45) 24                                     | (69) 73                        |
| (12) $9\frac{11}{20}$                       | *(30) 2,289 — 2,529                                 | (46) 8,585                                  | *(70) 2,178,540 —<br>2,407,860 |
| (13) 258                                    | (31) 4,410  | (47) 2                                      | (71) 35                        |
| (14) 19                                     | (32) 144  | (48) 289                                    | (72) 5                         |
| (15) 245                                    | (33) 2.5, $\frac{5}{2}$ , $2\frac{1}{2}$            | (49) 83                                     | (73) 2                         |
| (16) 1,464                                  | (34) — $\frac{14}{3}$ , — $4\frac{2}{3}$            | *(50) 1,310 — 1,447                         | (74) 58,883                    |
| (17) 402.6                                  |   | (51) 16                                     | (75) $\frac{1}{5}$             |
| (18) 16.5, $\frac{33}{2}$ , $16\frac{1}{2}$ |   | (52) 140                                    | (76) .33                       |
|   |   | (53) 1                                      | (77) 4                         |
|   |   | (54) 0                                      | (78) — $\frac{2}{3}$           |
|   |   | (55) 17                                     | (79) 155                       |
|   |   | (56) 36                                     | *(80) 238 — 262                |
|   |   | (57) 9                                      |                                |
|   |   | (58) 13.5, $\frac{27}{2}$ , $13\frac{1}{2}$ |                                |