The University Interscholastic League
Number Sense Test • HS District 1 • 2011

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!

(1) $1123 + 5813 =$ _____

(2) $2134 - 711 =$ _____

(3) $2.3 \times 4.5 =$ _____ (decimal)

(4) $\frac{4}{7} \div \frac{16}{21} =$ _____

(5) $.175 =$ _____ (proper fraction)

(6) $2011 \div 9 =$ _____ (mixed number)

(7) $8 \div (5 + 3) \times 2 - 11 =$ _____

(8) $13 \times 88 + 12 \times 88 =$ _____

(9) 40% of $(\frac{3}{4} + 0.3)$ is _____

*(10) $21 - 138 + 5321 + 10 =$ _____

(11) $6\frac{7}{8} - 1\frac{2}{3} =$ _____ (mixed number)

(12) The GCD of 57 and 76 is _____

(13) The number of positive integral divisors of 100 is _____

(14) $(14)^3 =$ _____

(15) $532 \times 11 =$ _____

(16) $43 + 48 + 53 + 58 + 63 + 68 =$ _____

(17) $88 \div 25 =$ _____ (decimal)

(18) $12\frac{1}{2}\%$ of a mile is equivalent to _____ yards

(19) $(14)^2 =$ _____

*(20) $876 \times 345 =$ _____

(21) $1.08333... + 3.1666... =$ _____

(22) The simple interest on $240.00 at 2.5% for 3 months is $ _____

(23) $(23 + 33 \times 43) \div 8$ has a remainder of _____

(24) $(6)^{-1} + (6)^{-2} =$ _____

(25) $3\frac{3}{8} \times 3\frac{5}{8} =$ _____

(26) $27.12 \div 0.6 =$ _____ (decimal)

(27) Which of the following is an odious number, 10, 12, or 14? _____

(28) 30 inches/second = _____ yards/minute

(29) Find k if $41^2 - 46^2 = 5k$. k = _____

*(30) $6543 \times 4\frac{2}{13} \div 9 =$ _____

(31) 46 base 10 = _____ base 8

(32) Truncate $\sqrt{3} + \sqrt{6}$ to the $\frac{1}{10}$ place. _____

(33) $1^2 + 2^2 + 3^2 + 4^2 + ... + 11^2 + 12^2 =$ _____

(34) How many positive integers less than 50 are relatively prime to 50? _____

(35) $-6-\left|-4-2\right|$ = _____

(36) The real roots of $x^2 - x - 12 = 0$ are P and Q. Find (P + Q) + (PQ). _____

(37) If there are 6 elements in set A, 9 in set B, and 3 in $A \cap B$, then $A \cup B$ has _____ elements

(38) The median of 43, 55, 27, & 39 is _____

(39) If $2x + 3 = 4 - 5x$, then $7x$ = _____

*(40) $\sqrt{756431}$ = _____

(41) $16_7 + 25_7 + 34_7$ = _____ $_7$

(42) $\sqrt{16 \times 18 + 1}$ = _____

(43) 96×0.3125 = _____

(44) The leg opposite the 45° angle in a right triangle is $\sqrt{18}$. The hypotenuse is _____

(45) The sum of the product of the roots taken two at a time of $3x^3 + 4x^2 - 17x - 6 = 0$ is _____

(46) If $xy = -1$ and $x + y = 5$ then $x^3 + y^3$ = _____

(47) If $9^{(x)} = 2187$ then $9^{(x-1)}$ then x = _____

(48) Find k, so that 917k55 is the smallest 6-digit number divisible by 11. _____

(49) The slope of a line containing the points (3, 2) and (−4, 5) is _____

*(50) $41\frac{2}{3}\%$ of 3690 − 58.7 = _____

(51) If $\log_x 108 - \log_x 4 = 3$ then x = _____

(52) Let $(10 + 5i)(8 - 4i) = a + bi$. Find a + b. _____

(53) If A is 24% more than B and B is 25% more than C, then A is _____ % more than C.

(54) $48^2 + 76^2$ = _____

(55) $11^4 \div 14$ has a remainder of _____

(56) If $\frac{x}{8}$ has a remainder of 7 and $\frac{y}{8}$ has a remainder of 5 then $\frac{xy}{8}$ has a remainder of _____

(57) 422×311 = _____

(58) How many different sets of 5 books can be made from 8 different books? _____

(59) The Cartesian product of the sets {f,i,v,e} and {f,o,u,r} contain how many ordered pairs? _____

*(60) $8^4 \times 6^3 \div 4^2$ = _____

(61) 405×111 = _____

(62) $(234_7) + (432_7) \div 6$ has a remainder of _____

(63) $\sin\left(\arccos\left(\frac{24}{25}\right)\right)$ = _____

(64) A bag contains 12 white and k yellow golf balls. Find k if the probability of randomly drawing a yellow ball is 25%. _____

(65) If $g(x) = 3x^2 - 4x + 2$, then $g(g(1))$ = _____

(66) $1 + 3 + 8 + 21 + \ldots + 144$ = _____

(67) $A = \begin{bmatrix} -1 & 3 \\ 5 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 3 \\ 5 & -1 \end{bmatrix}$. $\left|AB\right|$ = _____

(68) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\tan\frac{2\pi}{3}\right]$. _____

(69) $\sin\left(\frac{5\pi}{6}\right) - \cos\left(\frac{4\pi}{3}\right) + \tan(3\pi)$ = _____

*(70) $14 \times 24 \times 34 \times 44$ = _____

(71) $6! \div 5! + 4! \div 3! - 2! \div 1!$ = _____

(72) $\sqrt{103041}$ = _____

(73) $\frac{1}{6} + \frac{1}{15} + \frac{1}{20} + \frac{1}{24}$ = _____

(74) The next term of 2, 3, 4, 6, 9, 14, ... is _____

(75) The horizontal asymptote for $f(x) = \frac{3-4x}{x-5}$ is y = _____

(76) If $f(x) = 3x^2 - 4x + 2$, then $f'(-1)$ = _____

(77) If the rectangular coordinates of the polar coordinates $(2, \frac{\pi}{4})$ are (x, y), then $x \times y$ = _____

(78) $\int_2^4 (x + 3)\,dx$ = _____

(79) Change $\frac{11}{36}$ to a base 6 decimal. _____

*(80) 428.571 x 349 = _____

University Interscholastic League - Number Sense Answer Key HS • District 1 • 2011

*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) 6936

(2) 1423

(3) 10.35

(4) .75, $\frac{3}{4}$

(5) $\frac{7}{40}$

(6) $223\frac{4}{9}$

(7) — 9

(8) 2200

(9) .42, $\frac{21}{50}$

*(10) 4954 — 5474

(11) $5\frac{5}{24}$

(12) 19

(13) 9

(14) 2744

(15) 5852

(16) 333

(17) 3.52

(18) 220

(19) 196

*(20) 287,109 — 317,331

(21) 4.25, $\frac{17}{4}$, $4\frac{1}{4}$

(22) $1.50

(23) 2

(24) $\frac{7}{36}$

(25) 12.234375, $\frac{783}{64}$, $12\frac{15}{64}$

(26) 45.2

(27) 14

(28) 50

(29) — 87

*(30) 2869 — 3170

(31) 56

(32) 4.1, $\frac{41}{10}$, $4\frac{1}{10}$

(33) 650

(34) 20

(35) — 12

(36) — 11

(37) 12

(38) 41

(39) 1

*(40) 827 — 913

(41) 111

(42) 17

(43) 30

(44) 6

(45) $-\frac{17}{3}$, $-5\frac{2}{3}$

(46) 140

(47) 243

(48) 4

(49) $-\frac{3}{7}$

*(50) 1405 — 1552

(51) 3

(52) 100

(53) 55

(54) 8080

(55) 11

(56) 3

(57) 131242

(58) 56

(59) 16

*(60) 52532 — 58060

(61) 44955

(62) 0

(63) .28, $\frac{7}{25}$

(64) 4

(65) 1

(66) 232

(67) 484

(68) — 2

(69) 1

*(70) 477,524 — 527,788

(71) 8

(72) 321

(73) $\frac{13}{40}$

(74) 22

(75) — 4

(76) — 10

(77) 2

(78) 12

(79) .15

*(80) 142,093 — 157,049