The University Interscholastic League
Number Sense Test • HS A • 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!

(1) $511 - 115 =$ _____

(2) $88 \times 25 =$ _____

(3) $2013 \div 9 =$ _____ (mixed number)

(4) $115 + 2013 =$ _____

(5) $\frac{3}{5} =$ _____% (decimal)

(6) $2.4 \div 1.5 =$ _____

(7) $14^2 =$ _____

(8) $5\frac{3}{4} - 4\frac{2}{3} =$ _____ (mixed number)

(9) 11% of \$12.00 is \$ _____

*(10) $115 + 2013 - 511 + 3102 =$ _____

(11) Which is larger $\frac{7}{9}$ or 0.8? _____

(12) $40 \times 23 - 17 \times 23 =$ _____

(13) 2 bushels = _____ pecks

(14) $19 \times \frac{19}{23} =$ _____ (mixed number)

(15) $115 \div 25 =$ _____

(16) The mean of 1, 5, 12, 22, and 35 is _____

(17) $115 \times 13 =$ _____

(18) $2 + 4 + 6 + 8 + ... + 22 + 24 =$ _____

(19) $32 - 16 \div 8 + 4 \times 2 =$ _____

*(20) $(115 + 2013) \times 511 =$ _____

(21) A 6-element set has _____ subsets

(22) $\left| 2 - 3 - 4|5 - 6| + 7 \right| =$ _____

(23) 123 base 6 is equivalent to _____ base 10

(24) The multiplicative inverse of $-1.111...$ is _____

(25) If $\frac{1}{x} - \frac{4}{5} = \frac{9}{10}$, then x = _____

(26) If 6 Qtees cost \$1.50 then 21 Qtees cost \$ _____

(27) $0.41666... - 0.08333... =$ _____

(28) $66^2 + 54^2 =$ _____

(29) The length of a diagonal of a square is $3\sqrt{5}$ cm. The area of the square is _____ sq. cm.

*(30) $141 \times 72 + 67 \times 138 =$ _____

(31) $36_7 + 25_7 + 14_7 =$ _____ $_7$

(32) $3 + 7 + 11 + 15 + 19 + ... + 43 + 47 =$ _____

(33) $24^2 + 72^2 =$ _____

(34) The product of the roots of $5x^2 + 4x - 3 = 0$ is _____

(35) $13 \times 13 \times 13 =$ _____

(36) Let P = {t,h,e}, Q = {n,e,x,t}, and R = {t,e,r,m}. The number of distinct elements in P ∪ Q ∪ R is _____

(37) If $\sqrt{44} + \sqrt{99} = \sqrt{x}$, then x = _____

(38) The next term of the geometric sequence, ... $\frac{1}{3}$, $\frac{1}{4}$, $\frac{3}{16}$, ... is _____

(39) If a = 5 and b = 3 then $(a + b)(a^2 - ab + b^2)$ = ___

*(40) $\sqrt{887766}$ = _____

(41) $\frac{(1+4+9+16+25)}{(1+3+6+10+15)}$ = _____

(42) If $\frac{x-5}{x+4} + \frac{x+4}{x-5}$ is written as the mixed number $A\frac{B}{C}$ then B = _____

(43) $\frac{4}{11} - \frac{19}{56}$ = _____

(44) If P is $\frac{2}{3}$ of Q and Q is $33\frac{1}{3}$% of R, then P is what percent of R? _____%

(45) An exterior angle of a regular hexagon has a measure of _____ degrees

(46) $\frac{1}{4}(30^2 - 8^2)$ = _____

(47) If x + y = − 3 and xy = − 4 then $x^3 + y^3$ = _____

(48) 12% of $466\frac{2}{3}$ = _____

(49) The absolute value difference between the sum of the roots and the product of the roots of $x^3 + x^2 - 5x + 3 = 0$ is _____

*(50) 654 log 987 = _____

(51) 44 feet per second = _____ miles per hour

(52) Given the sequence 3, 8, 11, 19, ..., 79, k, 207. Find k. _____

(53) $\frac{7\pi}{4}$ radians = _____ degrees

(54) $\log_5 \sqrt{125}$ = _____

(55) A convex hexagon has _____ distinct diagonals.

(56) The legs of a right triangle are 3 and 4. The length of the altitude to the hypotenuse is _____

(57) $(35_9 + 48_9) \div 8$ has a remainder of _____

(58) $(4 + i)^2 = a + bi$. Find a. _____

(59) 243 × 151 = _____

*(60) $3.14e \times 2.72\pi \div \frac{\sqrt{5}-1}{2}$ = _____

(61) A golf store has white balls, yellow balls, pink balls, and orange balls. How many different packs of 3 balls can the store package? _____

(62) $\frac{7}{11} + \frac{11}{7} - 2$ = _____

(63) $[2\sin(\frac{\pi}{6})\cos(\frac{\pi}{6})] \times [\tan(\frac{\pi}{6})]$ = _____

(64) The $\det\left(\begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix} \times \begin{bmatrix} 4 & 3 \\ 1 & 2 \end{bmatrix}\right)$ is _____

(65) 1111 × 52 = _____

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

(67) The first 4 digits of the decimal of $\frac{17}{90}$ is 0. _____

(68) $f(x) = x^2 + 2x + 1$ and $g(x) = x^3$. f(g(− 2)) = _____

(69) The odds of winning a medal is $\frac{3}{16}$. The probability of not winning a medal is _____

*(70) 48 miles per hour = _____ feet per minute

(71) The volume of a sphere with a radius of 3 inches is $k\pi$ cubic inches. Find k _____

(72) Find k, $0 < k < 5$, if $4k - 1 \cong 1 \pmod 6$. _____

(73) If $\log_b 3 = .6$ and $\log_b x = 1.8$ then x = _____

(74) Given 2, 6, 12, 20, 30, ..., 90, k, 132, ... Find k _____

(75) The slope of the line tangent to $f(x) = x^2 - 5x + 4$ at (− 1, 10) is _____

(76) The polar coordinates of the rectangular coordinates $(1, \sqrt{3})$ are $(r, k\pi)$. r = _____

(77) $\int_0^1 (2 - 3x)\,dx$ = _____

(78) The function $\frac{2x^2 + 5x + 11}{x + 1}$ has _____ asymptotes

(79) The fifth pentagonal number is _____

*(80) 28.5714 x 4285.71 = _____

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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) 396

(2) 2,200

(3) $223\frac{2}{3}$

(4) 2,128

(5) 60

(6) 1.6, $\frac{8}{5}$, $1\frac{3}{5}$

(7) 196

(8) $1\frac{1}{12}$

(9) $1.32

*(10) 4,484 — 4,954

(11) .8, $\frac{4}{5}$

(12) 529

(13) 8

(14) $15\frac{16}{23}$

(15) 4.6, $\frac{23}{5}$, $4\frac{3}{5}$

(16) 15

(17) 1,495

(18) 156

(19) 38

*(20) 1,033,038 — 1,141,778

(21) 64

(22) 2

(23) 51

(24) — .9, — $\frac{9}{10}$

(25) $\frac{10}{17}$

(26) $5.25

(27) $\frac{1}{3}$

(28) 7,272

(29) 22.5, $\frac{45}{2}$, $22\frac{1}{2}$

*(30) 18,429 — 20,367

(31) 111

(32) 300

(33) 5,760

(34) — .6, — $\frac{3}{5}$

(35) 2,197

(36) 7

(37) 275

(38) .140625, $\frac{9}{64}$

(39) 152

*(40) 896 — 989

(41) $\frac{11}{7}$, $1\frac{4}{7}$

(42) 81

(43) $\frac{15}{616}$

(44) $\frac{200}{9}$, $22\frac{2}{9}$

(45) 60

(46) 209

(47) — 63

(48) 56

(49) 2

*(50) 1,861 — 2,056

(51) 30

(52) 128

(53) 315

(54) 1.5, $\frac{3}{2}$, $1\frac{1}{2}$

(55) 9

(56) 2.4, $\frac{12}{5}$, $2\frac{2}{5}$

(57) 4

(58) 15

(59) 36,693

*(60) 113 — 123

(61) 20

(62) $\frac{16}{77}$

(63) .5, $\frac{1}{2}$

(64) 25

(65) 57,772

(66) 27

(67) 1888

(68) 49

(69) $\frac{16}{19}$

*(70) 4,013 — 4,435

(71) 36

(72) 2

(73) 27

(74) 110

(75) — 7

(76) 2

(77) .5, $\frac{1}{2}$

(78) 2

(79) 35

*(80) 116,327 — 128,571