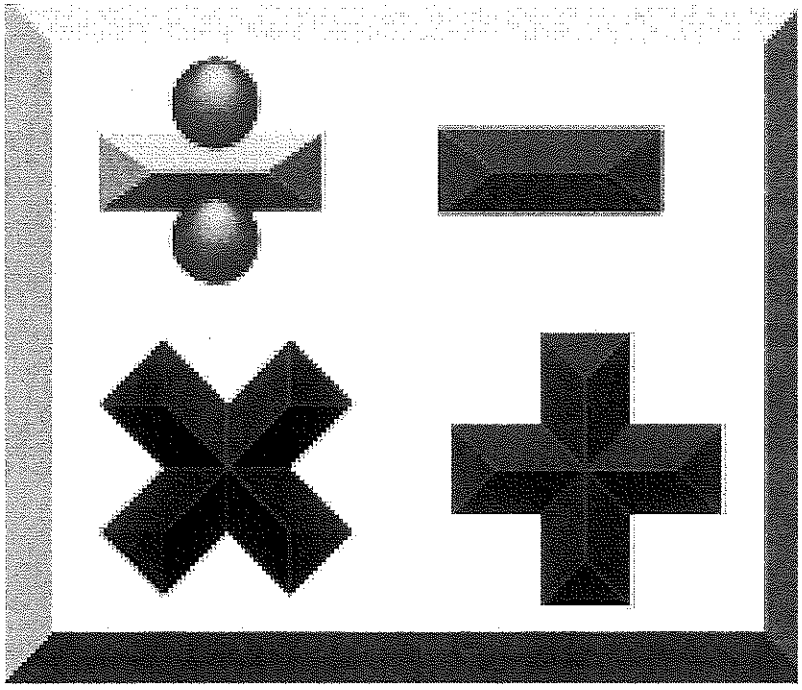
UNIVERSITY INTERSCHOLASTIC LEAGUE
Making a World of Difference

Number Sense

District 2 • 2015



DO NOT TURN THIS PAGE UNTIL
YOU ARE INSTRUCTED TO DO SO!

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The University Interscholastic League
Number Sense Test • HS District 2 • 2015

Final _____ _____

Contestant's Number _____ 2nd _____ _____

1st _____ _____

Score Initials

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) $4611 + 2015 =$ _____

(2) $6040 - 5102 =$ _____

(3) $11.4 \times 6 =$ _____ (decimal)

(4) $1511 \div 4 =$ _____ (mixed number)

(5) $\frac{3}{8}\% =$ _____ (decimal)

(6) $0.363636... =$ _____ (proper fraction)

(7) $4\frac{1}{6} + 2\frac{1}{5} =$ _____ (mixed number)

(8) $4 \times (6 - 11) + 20 \div 15 =$ _____

(9) $16^2 =$ _____

*(10) $20154 + 61115 =$ _____

(11) 78.4 is 28% of _____

(12) One-sixteenth of 1 gallon is _____ fluid ounces

(13) $6\frac{1}{4} - 1\frac{2}{5} =$ _____ (mixed number)

(14) $1 + 4 + 7 + 10 + ... + 40 =$ _____

(15) $76 - 56 - 36 - 64 - 44 + 24 =$ _____

(16) The GCF of 57, 95, and 133 is _____

(17) $15 \times 35 + 11 \times 15 =$ _____

(18) MMXV + DCXI = _____ (Arabic Number)

(19) $27 \times \frac{27}{31} =$ _____ (mixed number)

*(20) $51021 \div 164 =$ _____

(21) $33^2 + 99^2 =$ _____

(22) $(46 \times 11 + 51) \div 8$ has a remainder of _____

(23) $4\frac{2}{5} \times 6\frac{5}{11} =$ _____ (mixed number)

(24) Change 75 base 10 to base 6. _____ 6

(25) Find the simple interest on $1200 at 9% for 6 months. $ _____

(26) The number of positive integral divisors of 116 is _____

(27) If $4^3 - 3^4 - 2^5 = 7k$, then $k^2 =$ _____

(28) $0.4222... =$ _____ (proper fraction)

(29) If $x + (x + 5) + (x + 10) + ... + (x + 40) = 360$ then $(x + 20) =$ _____

*(30) $\sqrt{731} \times \sqrt[3]{1329} =$ _____

(31) The product of a number x and 4 has the save value as the sum of x and 13. Find x. _____

(32) If $x = 6$ and $y = 11$ then $4x^2 - 4y^2 =$ _____

(33) How many subsets containing only 3 elements does the set {d,e,c,i,m,a,l} have? _____

(34) $4611_7 - 2015_7 =$ _____ $_7$

(35) The length of a rectangle is twice the width. Find the area if the perimeter is 24". _____ sq. in

(36) $(0.25)^{-2} + (0.5)^{-1} + (0.75)^0 =$ _____

(37) 45% of $566\frac{2}{3} =$ _____

(38) $4\frac{2}{5} \div 1\frac{19}{25} =$ _____ (mixed number)

(39) Truncate $\sqrt{3} + \sqrt{5}$ to the tenths place. _____

*(40) $406 \times 411 \div 215 =$ _____

(41) If $9^8 \div 9^9 \times 9^k = 9^{11}$, then k = _____

(42) $5 + 7 + 12 + 19 + ... + 131 =$ _____

(43) $44 \times 0.454545... =$ _____

(44) The point (3, 8) is reflected across the line $y = -2$ to the point (h, k). Find $h + k$. _____

(45) P,Q, and R are the roots of $2x^3 - 9x^2 - 2x + 8 = 0$. Find PQ + PR + QR + PQR. _____

(46) If $2x + y = 1$ and $x - y = 3$ then y = _____

(47) $(4 + 6i)(20 + 15i) = a + bi$. Find a — b. _____

(48) $14 \times \frac{17}{20} =$ _____ (mixed number)

(49) The area of a right triangle with a base of 24" and a hypotenuse of 25" is _____ sq. in

*(50) The volume of a sphere with a radius of 30 cm is _____ cm^3

(51) Let $2\log_3(x) = 4$. Find $x > 0$. _____

(52) $411 \times 406 =$ _____

(53) $202_5 \div 4_5$ has a remainder of _____ $_5$

(54) Let $\frac{5!}{(x-1)!} = \frac{4!}{(x-2)!}$. Find x. _____

(55) The coefficient of the x^3y^2 term when $(2x + 3y)^5$ is expanded is _____

(56) $14^2 \div 7^2 \times (3.5)^2 =$ _____

(57) How much time has passed from 8:00 a.m. on 4/6/14 to 5:00 p.m. on 4/11/14? _____ hours

(58) The first 4 digits of the decimal of $\frac{211}{990}$ is 0._____

(59) The smaller root of $5x^2 + 7x - 6 = 0$ is _____

*(60) $38^2 \div 22^3 \times 9^4 =$ _____

(61) $2\cos^2\left(\frac{2\pi}{3}\right) - 1 =$ _____

(62) Change $0.3666..._7$ to a base 10 fraction. _____

(63) $f(x) = x^2 + 2x - 3$ and $g(x) = 3 - x$. $f(g(2)) =$ _____

(64) If $2\ln(8) = \ln(k) + 3\ln(2)$, then k = _____

(65) The determinant of $\begin{bmatrix} 11 & 7 \\ 3 & k \end{bmatrix} = -12$. k = _____

(66) How many positive integers less than 44 are relatively prime to 44? _____

(67) The base of a triangle is 10". If the altitude is increased from 12" to 15", the corresponding increase in the area is _____ sq. in.

(68) $(\cos 15° \cos 45° + \sin 15° \sin 45°)^2 =$ _____

(69) If $f(x) = 5 + \frac{1-2x}{3}$, then $f^{-1}(4) =$ _____

*(70) $(3e + 2\pi)^3 =$ _____

(71) Let $F(x) = (2x + 1)^4$. Find $F'(-3)$. _____

(72) $0.313131..._5 =$ _____ $_5$ (proper fraction)

(73) The frequency of $y = 2 - 3\cos(\pi x - 1)$ is _____

(74) $\frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} + \frac{1}{21} + \frac{1}{28} =$ _____

(75) The greatest value of k such that ${}_8C_k = 56$ is _____

(76) $\lim_{x \to -3} \frac{x^2 - 9}{x + 3} =$ _____

(77) The sum of the factors of the *perfect* number x, where $10 < x < 50$ is _____

(78) $\int_{-1}^{2} (4x)\, dx =$ _____

(79) $12^3 - 14^3 =$ _____

*(80) $833 \div \frac{5}{12} \times 0.19666... =$ _____

University Interscholastic League - Number Sense Answer Key HS • District 2 • 2015

*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) 6,626

(2) 938

(3) 68.4

(4) $377\frac{3}{4}$

(5) .00375

(6) $\frac{4}{11}$

(7) $6\frac{11}{30}$

(8) $-\frac{56}{3}, -18\frac{2}{3}$

(9) 256

*(10) 77,206 — 85,332

(11) 280

(12) 8

(13) $4\frac{17}{20}$

(14) 287

(15) — 100

(16) 19

(17) 690

(18) 2,626

(19) $23\frac{16}{31}$

*(20) 296 — 326

(21) 10,890

(22) 5

(23) $28\frac{2}{5}$

(24) 203

(25) $54.00

(26) 6

(27) 49

(28) $\frac{19}{45}$

(29) 40

*(30) 283 — 312

(31) $\frac{13}{3}, 4\frac{1}{3}$

(32) — 340

(33) 35

(34) 2563

(35) 32

(36) 19

(37) 255

(38) $2\frac{1}{2}$

(39) 3.9

*(40) 738 — 814

(41) 12

(42) 336

(43) 20

(44) — 9

(45) — 5

(46) $-\frac{5}{3}, -1\frac{2}{3}$

(47) — 190

(48) $11\frac{9}{10}$

(49) 84

*(50) 107,443 — 118,752

(51) 9

(52) 166,866

(53) 0

(54) 6

(55) 720

(56) 49

(57) 129

(58) 2131

(59) — 2

*(60) 846 — 934

(61) $-.5, -\frac{1}{2}$

(62) $\frac{4}{7}$

(63) 0

(64) 8

(65) $\frac{9}{11}$

(66) 20

(67) 15

(68) $.75, \frac{3}{4}$

(69) 2

*(70) 2,860 — 3,160

(71) — 1,000

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

(73) $.5, \frac{1}{2}$

(74) $.75, \frac{3}{4}$

(75) 5

(76) — 6

(77) 56

(78) 6

(79) — 1,016

*(80) 374 — 412