The University Interscholastic League
Number Sense Test • HS A • 2014

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) $2014 - 121 =$ _____

(2) $42 \times 15 =$ _____

(3) $2014 \div 5 =$ _____ **(decimal)**

(4) $4102 + 2014 =$ _____

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

(6) $1.6 \times 2.5 =$ _____

(7) $21^2 =$ _____

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

(9) \$4.80 is 24% of \$ _____

***(10)** $4102 + 511 - 115 + 2014 =$ _____

(11) $1200 \div 75 =$ _____

(12) $8 \times \frac{8}{11} =$ _____ **(mixed number)**

(13) 3 quarts = _____ cups

(14) $52 \times 19 - 19 \times 33 =$ _____

(15) Which is larger $\frac{7}{11}$ or 0.6? _____

(16) $1 \times 4 \div 8 + (12 - 16) =$ _____

(17) $123 \times 14 =$ _____

(18) $3 + 6 + 9 + 12 + ... + 36 + 39 =$ _____

(19) The median of 1, 1, 2, 3, 5, 8, 11, and 13 is _____

***(20)** $(4102 + 116) \times 131 =$ _____

(21) 3.636363... = _____ **(mixed number)**

(22) How far will a car travel in 3 hours 20 minutes at a constant rate of 75 mph? _____ miles

(23) 32 ounces is _____ % of a gallon.

(24) $13^3 =$ _____

(25) The largest positive prime divisor of 210 is _____

(26) $14^2 + 42^2 =$ _____

(27) $4\frac{4}{7} - 2\frac{2}{3} =$ _____ **(mixed number)**

(28) Which of the following is an abundant number, 27, 36, or 45? _____

(29) $(17 \times 27 - 37) \div 4$ has a remainder of _____

***(30)** $(8686 + 646) \div 42 =$ _____

(31) 77 base 10 = _____ base 6

(32) Truncate $\sqrt{7}$ to the hundredth place. _____

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

(34) $1172014 \div 11$ has a remainder of _____

(35) Let P = {p,r,i,m,e} and C = {n,u,m,b,e,r}. $P \cap C$ contains how many elements? _____

(36) P, Q, & R are the real roots of $2x^3 - x^2 - 25x = 12$. Find PQ + PR + QR. _____

(37) If 4 tees cost 25¢ then 4 dozen tees cost $ _____

(38) $4\frac{2}{5} \times 4\frac{3}{5}$ = _____ (mixed number)

(39) $\frac{1}{4}(13^2 - 12^2)$ = _____

*(40) $\sqrt{1162014}$ = _____

(41) If $7^{(x-1)} = 51$ then $7^{(x+1)}$ = _____

(42) $5^6 \times 2^3$ = _____

(43) $\frac{23}{31} - \frac{4}{5}$ = _____

(44) Let $2x + 3y = 4$ and $x + 2y = 5$. Find y = _____

(45) The smaller leg of a 30-60-90° triangle is 5.5 cm. The hypotenuse is _____ cm

(46) $\frac{10!}{8!\,2!}$ = _____

(47) The slope of the line perpendicular to the line $2x - 3y = 5$ is _____

(48) If $xy = 6$ and $x + y = 9$ then $x^3 + y^3$ = _____

(49) 97×96 = _____

*(50) 83.333×1728 = _____

(51) The sum of the measures of the interior angles of the faces of a regular tetrahedron is _____ degrees

(52) $2014_8 - 116_8$ = _____ 8

(53) The integral sides of a triangle are 8, 3, and x. The least value of x is _____

(54) The sum of the first 10 terms of the Lucas sequence 2, 1, 3, 4, 7, 11, 18, ... is _____

(55) The smaller root of $3x^2 + 5x - 2 = 0$ is _____

(56) $\left(\frac{x^2 + 6x + 9}{x - 3}\right)\left(\frac{x^2 - 6x + 9}{x^2 - 9}\right) = x +$ _____

(57) Change 0.555... base 8 to a base 8 fraction. _____ 8

(58) 116×214 = _____

(59) The simplified coefficient of the x^2y term in the expansion of $(2x - y)^3$ is _____

*(60) $23 \times 34 \times 45$ = _____

(61) The sum of the coefficients of $(4x + 3)^2$ is _____

(62) The slope of the line $5x - 3y = 1$ is _____

(63) $45_7 \times 6_7$ = _____7

(64) $21^2 - 22^2 + 23^2 - 24^2$ = _____

(65) $\frac{8}{15} - \frac{39}{76}$ = _____

(66) If $2x^3 - x^2 - 25x - 12 = 0$, then the harmonic mean of the roots is _____

(67) $\sin \frac{5\pi}{3} \times \cos \frac{5\pi}{6}$ = _____

(68) A notepad contains white, blue, yellow, orange, and pink pages. How many different sets of 4 pages can be packaged? _____

(69) Find x, $0 \leq x \leq 10$, if $3x - 5 \cong 2 \pmod{11}$. _____

*(70) 1162014 ÷ 2013 = _____

(71) Let $h(x) = x^2 - 2x - 6$ and $g(x) = 20 - x - 4x^2$. Find g(h(3)) = _____

(72) If $f(x) = \frac{11x + 6}{5}$, then $f^{-1}(10)$ = _____

(73) Two numbers are randomly drawn from the set {1,2,3,4,5}. What is the probability that their sum is 6? _____%

(74) If $f(x) = x^3 - x^2 + x - 6$, then $f'(-2)$ = _____

(75) The period of $4\sin(3\pi x + 2) - 1$ is _____

(76) Change 0.36 base 8 to a base 10 fraction. _____

(77) Which of the following is an odious number, 25, 15, or 5? _____

(78) $\int_{-1}^{1} (2 - 6x)\,dx$ = _____

(79) $\frac{\pi}{5}$ radians = _____ degrees

*(80) $903 \div 18.75\% \times \frac{1}{4}$ = _____

University Interscholastic League - Number Sense Answer Key HS ● Invitation A ● 2014

***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) 1,893

(2) 630

(3) 402.8

(4) 6,116

(5) .375

(6) 4

(7) 441

(8) $6\frac{3}{8}$

(9) $20.00

***(10) 6,187 — 6,837**

(11) 16

(12) $5\frac{9}{11}$

(13) 12

(14) 361

(15) $\frac{7}{11}$

(16) $-3.5, -\frac{7}{2}, -3\frac{1}{2}$

(17) 1,722

(18) 273

(19) 4

***(20) 524,931 — 580,185**

(21) $3\frac{7}{11}$

(22) 250

(23) 25

(24) 2,197

(25) 7

(26) 1,960

(27) $1\frac{19}{21}$

(28) 36

(29) 2

***(30) 212 — 233**

(31) 205

(32) 2.64, $\frac{66}{25}$, $2\frac{16}{25}$

(33) — 3

(34) 8

(35) 3

(36) $-12.5, -\frac{25}{2}, -12\frac{1}{2}$

(37) $3.00

(38) $20\frac{6}{25}$

(39) 6.25, $\frac{25}{4}$, $6\frac{1}{4}$

***(40) 1,025 — 1,131**

(41) 2,499

(42) 125,000

(43) $-\frac{9}{155}$

(44) 6

(45) 11

(46) 45

(47) $-1.5, -\frac{3}{2}, -1\frac{1}{2}$

(48) 567

(49) 9,312

***(50) 136,800 — 151,199**

(51) 720

(52) 1,676

(53) 6

(54) 198

(55) — 2

(56) 3

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

(58) 24,824

(59) — 12

***(60) 33,431 — 36,949**

(61) 49

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

(63) 402

(64) — 90

(65) $\frac{23}{1140}$

(66) $-1.44, -\frac{36}{25}, -1\frac{11}{25}$

(67) .75, $\frac{3}{4}$

(68) 70

(69) 6

***(70) 549 — 606**

(71) — 13

(72) 4

(73) 20

(74) 17

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

(76) $\frac{15}{32}$

(77) 25

(78) 4

(79) 36

***(80) 1,144 — 1,264**