The University Interscholastic League
Number Sense Test ● HS District 1 ● 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) $317 + 322 =$ _____

(2) $44 \times 15 =$ _____

(3) $4102 \div 5 =$ _____ **(decimal)**

(4) $713 - 223 =$ _____

(5) $\frac{6}{7} \times \frac{49}{50} =$ _____

(6) $22 \times 17 =$ _____

(7) $\frac{3}{16} =$ _____ **(decimal)**

(8) $3\frac{1}{7} + 2\frac{2}{3} =$ _____ **(mixed number)**

(9) $17^2 =$ _____

***(10)** $317 + 2014 + 322 + 201 + 4 =$ _____

(11) $3\frac{5}{12} - 1\frac{3}{4} =$ _____ **(mixed number)**

(12) 23% of 23 = _____ **(decimal)**

(13) $3 + 2 \times 2 \div 3 - (1 + 7) =$ _____

(14) 7131402 ÷ 11 has a remainder of _____

(15) 1.5 gallons = _____ pints

(16) 75% of $36.08 = $_____

(17) CCCLXXI = _____ **(Arabic Number)**

(18) LCM of 48 and 84 is _____

(19) $14^3 =$ _____

***(20)** $(324 + 329) \times 2014 =$ _____

(21) $3 - \left|1 - \left|7 - 3\right| + 2\right| - 2 =$ _____

(22) $(3)^{-1} + (3)^{-2} =$ _____

(23) $(32 \times 23 + 17) \div 6$ has a remainder of _____

(24) The sum of three consecutive integers is —117. The largest of the three integers is _____

(25) $5\frac{2}{3} - 8\frac{3}{5} =$ _____ **(mixed number)**

(26) 3.222... = _____**(improper fraction)**

(27) 2014 base 5 = _____ base 10

(28) If 42 eggs cost $12.84 then 14 eggs cost $ _____

(29) Truncate $\sqrt{5}$ to the hundredth place. _____

***(30)** $\sqrt{322} \times 317 =$ _____

(31) If $22^2 - 28^2 = 12x$, then x = _____

(32) $833\frac{1}{3}$% of 90 is _____

(33) P, Q, & R are the real roots of $2x^3 - x^2 - 25x = 12$. Find PQR — (P + Q + R). _____

(34) $\frac{6!\,5!}{4!\,3!}$ = _____

(35) 25% of $(73^2 - 37^2)$ = _____

(36) $542_{\,8} - 367_{\,8}$ = _____ 8

(37) If a = 6 and b = 5,
then $a^3 + 3a^2b + 3ab^2 + b^3$ = _____

(38) If 3A + B = 7 and 3A — 2B = 2 then B = _____

(39) Find the amount of sales tax on an item costing $24.00 if the sales tax rate is 8.25%. $ _____

*(40) $1123 \times 5\frac{8}{13} \div 21$ = _____

(41) If $13^{(x+1)} = 676$ then $13^{(x-1)}$ = _____

(42) The smaller root of $2x^2 - 7x - 15 = 0$ is _____

(43) 0.41666... × 12 = _____

(44) The first 4 digits of the decimal of $\frac{17}{330}$ is 0._____

(45) $3\frac{3}{8} \times 4\frac{4}{9}$ = _____

(46) The measure of a central angle of a regular nonagon is _____ degrees

(47) $\frac{41}{46} - \frac{14}{15}$ = _____

(48) ${}_6P_2 + {}_6C_2$ = _____

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

*(50) $16^4 \div 8^3 \times 4^2$ = _____

(51) $888 \times \frac{8}{37}$ = _____

(52) If $\log_4(5x + 6) = 3$ then x = _____

(53) If $\frac{4x}{7}$ has a remainder of 4 and $\frac{3y}{7}$ has a remainder of 3 then $\frac{xy}{7}$ has a remainder of _____

(54) 322 × 317 = _____

(55) Let $|4x + 3| \leq 2$. The largest value of x, where x is an integer, is _____

(56) $36^2 - 40^2 + 44^2 - 48^2$ = _____

(57) Change 0.2111... base 4 to a base 4 fraction. ____ 4

(58) $\frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \frac{1}{81}$ = _____

(59) 25 + 20 + 16 + 12.8 + ... = _____

*(60) 1,116 feet per second = _____ miles per hour

(61) $79^2 + 79$ = _____

(62) If $x^3 - 8x^2 + 17x - 10 = 0$, then the harmonic mean of the roots is _____

(63) The frequency of $y = 5 - 3\cos(4\pi x)$ is _____

(64) Find k if $\det\begin{bmatrix} 1 & -3 \\ k & 6 \end{bmatrix} = 15$. k = _____

(65) A money bag contains $1, $5, $10, and $20 bills. How many different gift envelopes containing 3 bills can be made? _____

(66) $\sin\frac{7\pi}{6} + \cos\frac{4\pi}{3}$ = _____

(67) GCD(x, 30) = 6. LCM(x, 30) = 60. x = _____

(68) $7\frac{1}{3} \div 2\frac{2}{3}$ = _____ (mixed number)

(69) $h(x) = 1 - x + x^2$. h(h(— 2)) = _____

*(70) $(27e + 31\pi)^2$ = _____

(71) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\frac{\sqrt{5}+\sqrt{6}}{4}\right]$. _____

(72) The sum of the first nine terms of the Fibonacci type sequence 2, 5, 7, 12, 19, ... is _____

(73) $f(x) = x^3 - 8x^2 + 17x + 10$. Find $f'(-1)$ = _____

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

(75) 63 × 16 = k × 48. k = _____

(76) Find x, $0 \leq x \leq 7$, if $5x - 3 \cong 2 \pmod 8$. _____

(77) $\int_{-1}^{1} (2x - 3)\,dx$ = _____

(78) $\sqrt{17689}$ = _____

(79) The probability of winning is 68%. The odds of losing is _____ (proper fraction)

*(80) $3125 \div \frac{5}{16} \times 1.6$ = _____

University Interscholastic League - Number Sense Answer Key HS ● District 1 ● 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) 639

(2) 660

(3) 820.4

(4) 490

(5) .84, $\frac{21}{25}$

(6) 374

(7) .1875

(8) $5\frac{17}{21}$

(9) 289

***(10) 2,716 — 3,000**

(11) $1\frac{2}{3}$

(12) 5.29

(13) $-\frac{11}{3}, -3\frac{2}{3}$

(14) 3

(15) 12

(16) $27.06

(17) 371

(18) 336

(19) 2,744

***(20) 1,249,385 — 1,380,899**

(21) 0

(22) $\frac{4}{9}$

(23) 3

(24) — 38

(25) $-2\frac{14}{15}$

(26) $\frac{29}{9}$

(27) 259

(28) $4.28

(29) 2.23

***(30) 5,404 — 5,972**

(31) — 25

(32) 750

(33) 5.5, $\frac{11}{2}, 5\frac{1}{2}$

(34) 600

(35) 990

(36) 153

(37) 1,331

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

(39) $1.98

***(40) 286 — 315**

(41) 4

(42) $-1.5, -\frac{3}{2}, -1\frac{1}{2}$

(43) 5

(44) 0515 **
(0 is required)**

(45) 15

(46) 40

(47) $-\frac{29}{690}$

(48) 45

(49) — 3

***(50) 1,946 — 2,150**

(51) 192

(52) 11.6, $\frac{58}{5}, 11\frac{3}{5}$

(53) 1

(54) 102,074

(55) — 1

(56) — 672

(57) $\frac{13}{30}$

(58) $\frac{40}{81}$

(59) 125

***(60) 723 — 798**

(61) 6,320

(62) $\frac{30}{17}, 1\frac{13}{17}$

(63) 2

(64) 3

(65) 20

(66) — 1

(67) 12

(68) $2\frac{3}{4}$

(69) 43

***(70) 27,709 — 30,625**

(71) 1

(72) 338

(73) 36

(74) — 3

(75) 21

(76) 1

(77) — 6

(78) 133

(79) $\frac{8}{17}$

***(80) 15,200 — 16,800**