The University Interscholastic League
Number Sense Test ● HS District 2 ● 2016

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) $1865 - 1492 =$ _____

(2) $9.05 \times 8 =$ _____ **(decimal)**

(3) $357 + 1944 =$ _____

(4) $1948 \div 11 =$ _____ **(mixed number)**

(5) 64% = _____**(proper fraction)**

(6) $1\frac{1}{16} =$ _____ **(decimal)**

(7) $26^2 =$ _____

(8) 6102723 ÷ 9 has a remainder of _____

(9) $2\frac{4}{9} - \frac{2}{3} =$ _____

***(10)** $572 - 2016 + 1812 - 897 =$ _____

(11) $4\frac{2}{3} + 3\frac{4}{9} =$ _____ **(mixed number)**

(12) $72 \times 25 =$ _____

(13) 1965 ÷ 3 has a remainder of _____

(14) 3 yards + 2 feet — 8 inches = _____ inches

(15) $1 + 2 + 3 + 4 + 5 + ... + 24 + 25 =$ _____

(16) MXCVI = _____ **(Arabic numeral)**

(17) The GCD of 24, 54, and 72 is _____

(18) 15% of \$14.00 = \$ _____

(19) If 9♦'s cost \$15.45 then 12♦'s cost \$ _____

***(20)** $796854 \div 395 =$ _____

(21) $2^5 + 3^3 + 5^2 =$ _____

(22) The additive inverse of $-\frac{3}{8}$ is _____

(23) The sum of the prime numbers greater than 10 and less than 20 is _____

(24) $2 - |3 - 5| + |8 - 1| - 3 =$ _____

(25) $27 \times 33 =$ _____

(26) $\sqrt[3]{1728} =$ _____

(27) $109\frac{1}{11}$% of 66 = _____

(28) The number of proper divisors of 12 is _____

(29) Set A = {a,c,u,t,e}, O = {o,b,t,u,s,e}, and R = {r,i,g,h,t}. $O \cap (A \cup R)$ contains how many distinct elements? _____

***(30)** $4\frac{7}{8} \times 3198 \div 13 =$ _____

(31) If x = 39 and y = 13 then $x^2 - 2xy + y^2 =$ _____

(32) The LCM of 54 and 24 is _____

(33) 0.181818... = _____ **(proper fraction)**

(34) $4\frac{3}{5} \times 4\frac{2}{5} =$ _____ **(mixed number)**

(35) 35% of 30 minus 25 is _____

(36) $(60 \times 38 - 16) \div 7$ has a remainder of _____

(37) 135 base 6 in base 10 is _____

(38) $54 \times 35 =$ _____

(39) $37 \times 43 + 9 =$ _____

*(40) $\sqrt{61027} =$ _____

(41) 65% of 65 — 45% of 45 is _____

(42) Let $A^k \times A^{-2} \div A^{-3} = A^5$. If $A > 1$, then k = _____

(43) $22 \times 26 + 4 =$ _____

(44) The sum of the roots of $3x^2 - 2x = 5$ minus the product of the roots of $3x^2 - 2x = 5$ is _____

(45) The perimeter of a right triangle with a base of 7" and a hypotenuse of 25" is _____ inches

(46) $2016_8 \times 7_8 =$ _____ 8

(47) How many pentagons meet at each vertex of a Platonic dodecahedron? _____

(48) How many subsets containing 3 or 4 elements does the set {n,u,m,b,e,r} have? _____

(49) $1\frac{3}{7} \div 4\frac{2}{3} =$ _____

*(50) $24^2 \times 6^3 =$ _____

(51) The midpoint of the segment with endpoints (6, 1) and (— 5, 4) is (x, y). Find x + y. _____

(52) $7 + 12 + 19 + 31 + 50 + 81 + 131 + 212 =$ _____

(53) ${}_6C_4 \times {}_5P_3 =$ _____

(54) If $\frac{7!}{5!} = \frac{(x+2)!}{(x+1)!}$, then x = _____

(55) The probability of selecting an abundant number from the set of positive digits is _____

(56) $(-2 + 5i)(7 + 3i) = (a + bi)$. Find a + b. _____

(57) $314 \times 319 =$ _____

(58) If $3^{-1} + x^{-1} + 2^{-1} = 1$ then x = _____

(59) The number of positive integral divisors of 64 is___

*(60) $123581 \div 321 =$ _____

(61) The sum of the reciprocals of all of the positive divisors of 15 is _____

(62) The Greatest Integer Function is written as $f(x) = [x]$. Find $\left[\sqrt{2} + \sqrt{3} + \sqrt{5}\right]$. _____

(63) If $\begin{vmatrix} 1 & 15 \\ 6 & -28 \end{vmatrix} = 6k$, then k = _____(mixed number)

(64) $\cos(\frac{5\pi}{6})\cos(\frac{5\pi}{6}) - \sin(\frac{5\pi}{6})\sin(\frac{5\pi}{6}) =$ _____

(65) If $2\log_4(x - 5) = 3$ then $x > 0$ is _____

(66) Change 0.1222... base 3 to a base 3 fraction. _____

(67) The volume of a rectangular pyramid with a base width of 2.4", a base length of 2.5", and a height 7" is _____ in^3

(68) $F(x) = x^3 - 4x^2 + x + 6$. $F(F(-1)) =$ _____

(69) The first four digits of the decimal for $\frac{23}{450}$ is 0.___

*(70) $1^2 + 2^2 + 3^2 + 4^2 + ... 11^2 + 12^2 =$ _____

(71) The 3rd hexagonal number plus the 3rd pentagonal number plus the 3rd triangular number is _____

(72) Let $f(x) = x^3 - 4x^2 + x + 6$. Find $f''(-2)$. _____

(73) $12^{10} \div 8$ has a remainder of _____

(74) If $6x - 4 \equiv 2 \pmod 8$, $2 \leq x \leq 7$, then x = _____

(75) If $f(x) = \sqrt[3]{2x - 1}$, then $f^{-1}(4) =$ _____

(76) Truncate $(\frac{\sqrt{5}+1}{2} \times \pi)$ to the nearest whole. ____

(77) $\int_0^2 (3x - 5)\,dx =$ _____

(78) The range of the function $y = e^{(-x)}$ is $y >$ _____

(79) The dot product of the vectors (2, — 1) and (— 3, 4) is _____

*(80) The interest on $2000 for 4 years at 6% compounded semiannually is ____ dollars (integer)

University Interscholastic League - Number Sense Answer Key HS • District 2 • 2016

***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) 373

(2) 72.4

(3) 2,301

(4) $177\frac{1}{11}$

(5) $\frac{16}{25}$

(6) 1.0625

(7) 676

(8) 3

(9) $\frac{16}{9}, 1\frac{7}{9}$

***(10) — 555 — — 502**

(11) $8\frac{1}{9}$

(12) 1,800

(13) 0

(14) 124

(15) 325

(16) 1,096

(17) 6

(18) $2.10

(19) $20.60

***(20) 1,917 — 2,118**

(21) 84

(22) .375, $\frac{3}{8}$

(23) 60

(24) 4

(25) 891

(26) 12

(27) 72

(28) 5

(29) 3

***(30) 1,140 — 1,259**

(31) 676

(32) 216

(33) $\frac{2}{11}$

(34) $20\frac{6}{25}$

(35) $-14.5, -\frac{29}{2}, -14\frac{1}{2}$

(36) 3

(37) 59

(38) 1,890

(39) 1,600

***(40) 235 — 259**

(41) 22

(42) 4

(43) 576

(44) $\frac{7}{3}, 2\frac{1}{3}$

(45) 56

(46) 16142

(47) 3

(48) 35

(49) $\frac{15}{49}$

***(50) 118,196 — 130,636**

(51) 3

(52) 543

(53) 900

(54) 40

(55) 0

(56) 0

(57) 100,166

(58) 6

(59) 7

***(60) 366 — 404**

(61) 1.6, $\frac{8}{5}, 1\frac{3}{5}$

(62) 5

(63) $-19\frac{2}{3}$

(64) .5, $\frac{1}{2}$

(65) 13

(66) $\frac{2}{10}$ (not reducible)

(67) 14

(68) 6

(69) 0511

***(70) 618 — 682**

(71) 33

(72) — 20

(73) 0

(74) 5

(75) 32.5, $\frac{65}{2}, 32\frac{1}{2}$

(76) 5

(77) — 4

(78) 0

(79) — 10

***(80) 507 — 560**