The University Interscholastic League
Number Sense Test ● HS SAC ● 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) $917 + 719 =$ _____

(2) $3.14 - .87 =$ _____

(3) $234 \times 5 =$ _____

(4) $123 \div 9 =$ _____ **(mixed number)**

(5) $37.5\% =$ _____ **(proper fraction)**

(6) $1\frac{3}{8} + 1\frac{3}{4} =$ _____ **(mixed number)**

(7) $13^2 =$ _____

(8) $1 + 3 \times 6 - 9 \div 12 =$ _____

(9) **15% of 22 is** _____

***(10)** $1836 + 1845 + 1861 + 1888 =$ _____

(11) $1996 \times 2 + 8 =$ _____

(12) $\frac{3}{4} - \frac{3}{8} - \frac{3}{16} =$ _____

(13) $13^3 =$ _____

(14) **If 4 ☐'s cost $4.44 then 6 ☐'s cost $** _____

(15) $25 \times 36 =$ _____

(16) **The GCD of 60 and 105 is** _____

(17) $17 \times 23 + 27 \times 17 =$ _____

(18) **92016 ÷ 6 has a remainder of** _____

(19) **3 pecks =** _____ **quarts**

***(20)** $389 \times 74 =$ _____

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

(22) **The additive inverse of — 1.2 is** _____

(23) **Let P = {p,r,i,m,e} and F = {f,a,c,t,o,r}. The number of distinct elements of (P ∩ F) is** _____.

(24) **(9 × 20 + 16) ÷ 4 has a remainder of** _____

(25) $1\frac{2}{3} \times 3\frac{1}{2} =$ _____ **(mixed number)**

(26) $9 - |1 + 7| - 20 + |1 - 6| =$ _____

(27) **If 2x + 3 = 5, then x + 4 =** _____

(28) **23 base 4 is** _____ **in base 10**

(29) **Given the set {2,1,3,4,7,p,18,29,q,76,... }. p + q =** __

***(30)** $14 \times 16 \times 22 =$ _____

(31) **A compact car travels 25 miles to the gallon. How many miles can it travel on 16 gallons?** _____

(32) **0.313131... =** _____ **(proper fraction)**

(33) $44\frac{4}{9}\%$ **of 18 =** _____

(34) The perimeter of a rectangle with a length of 6 dm and an area of 54 dm^2 is _____ dm

(35) Let $\frac{3}{8} = \frac{5}{x}$. Find $\frac{1}{x}$ = _____

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

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

(38) The number of prime divisors of 85 is _____

(39) 2x — y = 3 and x + y = — 2. x = _____

*(40) 1724225 ÷ 2016 = _____

(41) Let $(a^2b^3) \times (a^{-4}b) \div (ab^{-4}) = a^mb^n$. Find m. _____

(42) The sides of a triangle are 3", 3", and $3\sqrt{2}$ ". The smallest angle of the triangle is _____ degrees.

(43) $24^2 + 38^2$ = _____

(44) Let $(3i)(i^3) = a + bi$. Find a + b. _____

(45) The sum of the roots of $5x^2 — 2x — 5 = 0$ is _____

(46) The fourth triangular number is _____

(47) Find the measure of a central angle of a regular hexagon. _____ degrees

(48) The sum of the reciprocals of all of the positive integral divisors of 8 is _____

(49) 30% of 40 — 50% of 60 is _____

*(50) $\sqrt{9172016}$ = _____

(51) The coefficient of the xy term of $(3x + y)^2$ is _____

(52) 3! — 4! = _____

(53) 123 × 322 = _____

(54) ${}_5P_3$ = _____

(55) The probability of rolling a 3 or a 4 on a single die is _____%

(56) The shortest distance from point (4,3) to (0,6) is __

(57) $234_7 + 56_7$ = _____ 7

(58) $24^2 — 16^2$ = _____

(59) 6 + 10 + 14 + 18 + ... + 42 + 46 = _____

*(60) 13 × 27 + 14 × 26 = _____

(61) If $2^{(x+1)} = 32$ then x — 1 = _____

(62) If ln 576 = k(ln 24) then k = _____

(63) Change 0.34 base 5 to a base 10 fraction. _____

(64) Find the magnitude of vector b = (6, 8). _____

(65) Let f(x) = 3x — 2. Find f(f(— 1)). _____

(66) $\cos(\frac{2\pi}{3})$ = _____

(67) Find k if $\begin{vmatrix} -1 & 6 \\ 3 & 10 \end{vmatrix} = k + 15$. _____

(68) Round $\sqrt{5}$ to the nearest tenth. _____

(69) $8^5 \div 3$ has a remainder of _____

*(70) $24^2 \times 12^3 \div 6^4$ = _____

(71) If $2x — 5 \equiv 3 \pmod 7$, $0 \leq x \leq 6$, then x = _____

(72) 23 × 25 + 1 = _____

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

(74) The minimum value of $y = 2(x — 3)^2 + 1$ is _____

(75) The first four digits of the decimal for $\frac{8}{33}$ is 0.____

(76) $\lim_{x \to 5} \frac{x^2 — 25}{x — 5}$ = _____

(77) Find the slope of the line tangent to the graph of $f(x) = 2x^2 — 12x + 19$ at (1, 9). _____

(78) $\int_0^2 (x — 1)\,dx$ = _____

(79) The sum of the radii of the circumscribed circle and inscribed circle of a 3, 4, 5, right triangle is _____ units.

*(80) $3\frac{5}{16} \times 1875 \div 43.75$ = _____

University Interscholastic League - Number Sense Answer Key HS ● SAC ● Fall 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) 1,636

(2) 2.27, $\frac{227}{100}$, $2\frac{27}{100}$

(3) 1,170

(4) $13\frac{2}{3}$

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

(6) $3\frac{1}{8}$

(7) 169

(8) 18.25, $\frac{73}{4}$, $18\frac{1}{4}$

(9) 3.3, $\frac{33}{10}$, $3\frac{3}{10}$

***(10) 7,059 — 7,801**

(11) 4,000

(12) .1875, $\frac{3}{16}$

(13) 2,197

(14) $6.66

(15) 900

(16) 15

(17) 850

(18) 0

(19) 24

***(20) 27,347 — 30,225**

(21) 31

(22) 1.2, $\frac{6}{5}$, $1\frac{1}{5}$

(23) 1

(24) 0

(25) $5\frac{5}{6}$

(26) — 14

(27) 5

(28) 11

(29) 58

***(30) 4,682 — 5,174**

(31) 400

(32) $\frac{31}{99}$

(33) 8

(34) 30

(35) .075, $\frac{3}{40}$

(36) 12

(37) 121

(38) 2

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

***(40) 813 — 898**

(41) — 3

(42) 45

(43) 2,020

(44) 3

(45) .4, $\frac{2}{5}$

(46) 10

(47) 60

(48) $\frac{15}{8}$, $1\frac{7}{8}$

(49) — 18

***(50) 2,878 — 3,179**

(51) 6

(52) — 18

(53) 39,606

(54) 60

(55) $\frac{100}{3}$, $33\frac{1}{3}$

(56) 5

(57) 323

(58) 320

(59) 286

***(60) 680 — 750**

(61) 3

(62) 2

(63) $\frac{19}{25}$

(64) 10

(65) — 17

(66) — .5, — $\frac{1}{2}$

(67) — 43

(68) 2.2, $\frac{11}{5}$, $2\frac{1}{5}$

(69) 2

***(70) 730 — 806**

(71) 4

(72) 576

(73) 64

(74) 1

(75) 2424

(76) 10

(77) — 8

(78) 0

(79) 3.5, $\frac{7}{2}$, $3\frac{1}{2}$

***(80) 135 — 149**