The University Interscholastic League
Number Sense Test • HS B • 2025

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) $2725 + \_\_\_\_\_ = 3825$

(2) $528.3 - 27.25 =$ _____ **(decimal)**

(3) $\frac{2}{7} \times \frac{3}{8} \times \frac{2}{5} =$ _____

(4) $2738 \div (-5) =$ _____ **(mixed number)**

(5) $\frac{27}{25} =$ _____ **%**

(6) $27 \times 25 - 38 \times 25 =$ _____

(7) $13.5 \times 10^2 - 25 =$ _____

(8) $12 - 10 \times 9 + 8 \times 6 \div 4 =$ _____

(9) $23^2 =$ _____

***(10)** $207 + 2025 + 308 + 2025 =$ _____

(11) $27 + 38 + 49 + 60 + 71 =$ _____

(12) $\frac{3}{4}$ **of 3 gallons 2 quarts =** _____ **pints**

(13) 2738 ÷ 4 has a remainder of _____

(14) $1996 \times 4 + 16 =$ _____

(15) The largest prime divisor of 38×27 **is** _____

(16) If 3 pens cost 42¢, then 10 pens cost $ _____

(17) The LCM of 8, 20, and 32 is _____

(18) $(5 \times 3^2 \times 2^3) \div (2 \times 5) =$ _____

(19) $104 \times 109 =$ _____

***(20)** $\sqrt{2738} \times 2025 =$ _____

(21) The additive inverse of $(6)^{-1}$ **is** _____

(22) $27\frac{3}{7} \div 3 =$ _____ **(improper fraction)**

(23) Write two and a fifth million twenty-five thousand five hundred two in digits. _____

(24) $\sqrt{5041} =$ _____

(25) $8\frac{1}{5} \times 2\frac{1}{5} =$ _____ **(mixed number)**

(26) 275 base 8 is written as _____ **base 10**

(27) $|2 - 7| - |2 - 5| - |3 - 8| - 25 =$ _____

(28) $24^2 \div 12^2 \times 6^2 =$ _____

(29) 207308 ÷ 11 has a remainder of _____

***(30)** $\sqrt{20252738} =$ _____

(31) 28% of $133\frac{1}{3} =$ _____ **(mixed number)**

(32) If x = 7 and y = 8, then $(x - y)(x^2 + xy + y^2) =$ ___

(33) If $f(x) = 2x^2 + 4x + 1$, **then** $f(-0.5) =$ _____

(34) How many of the first six hexagonal numbers are triangular numbers? _____

(35) $\frac{1}{5}$ **of 275 is** _____

(36) $\frac{4}{5}$ **of 275 is** _____

(37) $\frac{2}{5}$ **of 275** $+$ $\frac{3}{5}$ **of 275 is** _____

(38) Set A = {2, 7, 3, 8, 2, 0, 2, 5). The range of set A minus the mode of set A is _____

(39) If $f(x) = x^3 + 3x^2 + 3x + 1$, **then** $f(-4)$ **is** _____

***(40)** $(0.151515... \times 2738)^2$ = _____

(41) 48 is what percent greater 36? _____ **%**

(42) The modulus of $7 + 23i = k$ **and** k^2 = _____

(43) The product of the roots of $2x^2 + 7x = 8$ **is** _____

(44) 207×14 = _____

(45) $71^2 + 13^2$ = _____

(46) If 75 cows need 120 acres to graze sufficiently, how many acres will 125 cows need? _____

(47) The point (— 3, 8) is reflected across the line y = 7 to the point (h, k). Find h + k. _____

(48) $B^4 - 4B = 8$ **and** 4^B = _____

(49) Let $(7x - 8)^2 = ax^2 + bx + c$. **Find** $a + b + c$. ____

***(50)** $\sqrt[3]{207308} + 2025$ = _____

(51) Let $\frac{7!}{8!} = \frac{(x)!}{(x+1)!}$. **Find x.** _____

(52) If a 3" by 6" picture is enlarged to a 9" by 18" picture, its perimeter is multiplied by _____

(53) $24^2 + 25^2$ = _____

(54) $1.1 + 2.2 + 3.3 + 5.5 + 8.8 + 13.13 + 21.21 + 34.34$ = _____ **(decimal)**

(55) $(7^3 - 8^3) \div (7 - 8)$ = _____

(56) $207_9 + 308_9 + 2025_9$ = _____ $_9$

(57) The probability of drawing a black king or an ace from a standard deck is _____

(58) $2345_7 \div 6_7$ **has a remainder of** _____

(59) 105 miles per hour = _____ feet per second

***(60)** $[0.2666... \times 4444]^2$ = _____

(61) $\text{Arccos}\left(-\frac{1}{2}\right) = k\pi$ **rads,** $0 < k < 1$, **and k =** ____

(62) $1^3 + 3^3 + 5^3 + 7^3$ = _____

(63) The Greatest Integer Function is written as $f(x) = [x]$. **Find** $\left[\sqrt{10} + \sqrt{7}\right]$. _____

(64) $f(x) = x - 2$, $g(x) = 3x + 4$, **and** $f(g(-1))$ = _____

(65) The coefficient in the x^2y^2 **term if** $(2x + y)^4$ **is** ____

(66) The total surface area of a hemisphere with a 10 inch diameter is $k\pi$ **sq. inches. k =** _____

(67) If $\sqrt{6 + 5\sqrt{18\sqrt{9 - x}}} = 6$, **then x =** _____

(68) If $\frac{3x-1}{x+3} - \frac{2x-1}{x+2} = \frac{ax^2+bx+c}{dx^2+ex+f}$, **then** $(a + b + c) + (d + e + f)$ = _____

(69) If $\frac{3}{11}$ **base 7 = 0.ababab... base 7, then** $a + b$ = ____

***(70)** $1^3 + 2^3 + 3^3 + 4^3 + ... + 13^3$ = _____

(71) The sum of the digits of a 3-digit number is 11. How many such numbers exist? _____

(72) 354×356 = _____

(73) If $N \div 3$ **has a remainder of 2, then** $5N \div 3$ **has a remainder of** _____

(74) If the initial point of vector v is (1, 3) and the terminal point is (1, — 4), then $||v||$ = _____

(75) $\int_1^3 (4x - 2)\,dx + \int_3^5 (4x - 2)\,dx$ = _____

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

(77) The ratio of p to q is 1 to 3 and p — q = 6. p = ____

(78) Given: 2, 2, 5, 8, 14, k, 38, 62,... . Find k. _____

(79) The harmonic mean of 1, 4, and 4 is _____

(80) 2738 yards =** _____ ***varas **(Texas)**

University Interscholastic League - Number Sense Answer Key HS ● Invitation B ● 2025

***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) 1,100

(2) 501.05

(3) $\frac{3}{70}$

(4) — $547\frac{3}{5}$

(5) 108

(6) — 275

(7) 1,325

(8) — 66

(9) 529

***(10) 4,337 — 4,793**

(11) 245

(12) 21

(13) 2

(14) 8,000

(15) 19

(16) 1.40

(17) 160

(18) 36

(19) 11,336

***(20) 100,662 — 111,257**

(21) — $\frac{1}{6}$

(22) $\frac{64}{7}$

(23) 2,225,502

(24) 71

(25) $18\frac{1}{25}$

(26) 189

(27) — 28

(28) 144

(29) 2

***(30) 4,276 — 4,725**

(31) $37\frac{1}{3}$

(32) — 169

(33) — .5, — $\frac{1}{2}$

(34) 6

(35) 55

(36) 220

(37) 275

(38) 6

(39) — 27

***(40) 163,495 — 180,704**

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

(42) 578

(43) — 4

(44) 2,898

(45) 5,210

(46) 200

(47) 3

(48) 16

(49) 1

***(50) 1,980 — 2,188**

(51) 7

(52) 3

(53) 1,201

(54) 89.58

(55) 169

(56) 2542

(57) $\frac{3}{26}$

(58) 2

(59) 154

***(60) 1,334,164 — 1,474,602**

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

(62) 496

(63) 5

(64) — 1

(65) 24

(66) 75

(67) 5

(68) 7

(69) 6

***(70) 7,867 — 8,695**

(71) 61

(72) 126,024

(73) 1

(74) 7

(75) 40

(76) — 12

(77) — 3

(78) 23

(79) 2

***(80) 2,810 — 3,104**