

The University Interscholastic League Number Sense Test • HS District • 2020

Contestant's Number _____

Final _____

2nd _____

1st _____

Read directions carefully
before beginning test

**DO NOT UNFOLD THIS SHEET
UNTIL TOLD TO BEGIN**

Score _____

Initials _____

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!

- | | |
|---|---|
| <p>(1) $2328 - 232 =$ _____</p> <p>(2) $543 \times (2 + 1) =$ _____</p> <p>(3) $\frac{5}{16} \div \frac{5}{18} =$ _____</p> <p>(4) $2328 \div 9$ has a remainder of _____</p> <p>(5) The LCM of 24 and 42 is _____</p> <p>(6) $\frac{1}{16} =$ _____ (decimal)</p> <p>(7) $2884 \div 28 =$ _____</p> <p>(8) $2 + 3 \times (2 - 8) \div (20) =$ _____</p> <p>(9) The median of {1, 9, 4, 7, 1, 8, 7, 5, 1, 6} is _____</p> <p>* (10) $8232 - 823 + 232 - 2328 =$ _____</p> <p>(11) $14 \times 312 =$ _____</p> <p>(12) 43 quarters = \$ _____</p> <p>(13) MMCCCXXVIII - XX = _____ (Arabic Numeral)</p> <p>(14) $28^2 =$ _____</p> <p>(15) 320 less 10% of 320 is _____</p> <p>(16) $54^2 =$ _____</p> <p>(17) $9\frac{2}{5} \times 5\frac{1}{3} =$ _____ (mixed number)</p> <p>(18) 2 gallons + 1 quart - 1 pint = _____ cups</p> | <p>(19) $2328 \div 6$ has a remainder of _____</p> <p>* (20) $232 \times 820 \div 20 =$ _____</p> <p>(21) $\sqrt[3]{2744} =$ _____</p> <p>(22) $14 + 21 + 28 + 35 + 42 =$ _____</p> <p>(23) $4^4 =$ _____</p> <p>(24) Let $(91)(111)(k) = 80,808$. Find k. _____</p> <p>(25) How many subsets containing 4 elements or 2 elements does the set {n,u,m,b,e,r} have? _____</p> <p>(26) $1893 \times 7 + 49 =$ _____</p> <p>(27) Find the simple interest on \$200.00 at a rate of 3% for 4 months. \$ _____</p> <p>(28) $1A1_{13} =$ _____ 10</p> <p>(29) Find the ratio of a square's area to its perimeter if the side length is 6". _____ in</p> <p>* (30) $(\sqrt{1598} + \sqrt{1226})(\sqrt{5600}) =$ _____</p> <p>(31) Let $(64x - 36)^2 = ax^2 + bx + c$. $a + b + c =$ _____</p> <p>(32) $(18 \times 16 - 15 \times 13) \div 11$ has a remainder of _____</p> <p>(33) Find the smallest integer k, where $k > 6$, such that $5k + 4$ is a perfect cube. _____</p> <p>(34) The smallest root of $(x + 1)^2 = \frac{121}{225}$ is _____</p> |
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- (35) 1.25 is _____ % greater than $\frac{5}{8}$
- (36) $232 =$ _____ $_8$
- (37) Given the sequence 2,4,8,13,20,k,41,... . $k =$ _____
- (38) The measure of a central angle of a regular pentagon is $k\pi$ radians. $k =$ _____
- (39) $(13^5 + 1) \div 6$ has a remainder of _____
- *(40) $\sqrt{250} \times \sqrt[3]{2750} =$ _____
- (41) $21 \times 25 + 4 =$ _____
- (42) The sum of the prime divisors of 78 is _____
- (43) Round $(\sqrt{2} + \sqrt{7})$ to the nearest tenth. _____
- (44) How many lines exist given nine coplanar points such that no three points are collinear? _____
- (45) If $23_b = 13$, then $20_b =$ _____
- (46) $34_8 - 5_8 \times 6_8 =$ _____ $_8$
- (47) 18% of $433\frac{1}{3} =$ _____
- (48) The midpoint of the line segment with endpoints (2, 3) and $(-2, 8)$ is (x, y) . Find $x + y$. _____
- (49) $(i)^{17} = a\sqrt{b}$, where $a, b \in \{-1, 1\}$. Find $\frac{a}{b}$. _____
- *(50) $27 \times (\pi)^3 =$ _____
- (51) $3 + 8 + 11 + 19 + 30 + \dots + 128 + 207 =$ _____
- (52) $(101)^3 =$ _____
- (53) The sum of the coefficients of the second and third term when $(2x - y)^4$ is expanded is _____
- (54) $10011010100_2 =$ _____ $_8$
- (55) $8 + 2 + 0.5 + 0.125 + \dots =$ _____
- (56) $(16)^3 - (17)^3 =$ _____
- (57) ${}_8P_2 + {}_8C_2 =$ _____
- (58) The length of the altitude to the hypotenuse of a $9' - 40' - 41'$ triangle is _____ ft
- (59) $555 \times \frac{5}{37} =$ _____
- *(60) $18 \times 36 \times 54 \times 72 =$ _____
- (61) $14 \times \frac{17}{20} =$ _____ (mixed number)
- (62) How many different 5-letter code words can be constructed using the letters SENSE? _____
- (63) $\cos(\frac{5\pi}{3}) =$ _____
- (64) $7531 \times 18 =$ _____
- (65) The shortest distance between $(-2, -2)$ and $24x + 7y - 8 = 0$ is _____
- (66) How many positive integers less than 50 are relatively prime to 50? _____
- (67) Find the sum of all positive integers x such that $2x + 3 \leq 28$. _____
- (68) Find the sum of the reciprocals of the first twenty-one triangular numbers. _____
- (69) Two dice are rolled. The odds that the sum of the top faces is less than 6 is _____
- *(70) $749 \times 66\frac{2}{3}\% \times .625 =$ _____
- (71) The first four digits of the decimal for $\frac{25}{50}$ base 6 is 0. _____ base 6
- (72) If $f(x) = 7 + \frac{2x-5}{3}$, then $f^{-1}(11) =$ _____
- (73) Let $f'(x) = 14x - 5$ and $f(-1) = 9$. Find $f(0)$. _____
- (74) The minimum value of $y = 8(x + 4)^2 + 1$ is _____
- (75) Find k , if $\begin{vmatrix} 1 & 3k \\ 6 & 10 \end{vmatrix} = 15$. _____
- (76) The sum of the critical values of $f(x) = x^3 - 3.5x^2 + 2x - 1.5$ is _____
- (77) The first four digits of the decimal for $\frac{7}{18}$ is 0. _____
- (78) The third octagonal number is _____
- (79) $(\log_8 9)(\log_9 256) =$ _____
- *(80) $2,125 \times 2,175 =$ _____

DO NOT DISTRIBUTE TO STUDENTS BEFORE OR DURING THE CONTEST

University Interscholastic League - Number Sense Answer Key HS • District • 2020

*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

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| (1) 2,096 | (19) 0 | (35) 100 | (59) 75 |
| (2) 1,629 | *(20) 9,037 — 9,987 | (36) 350 | *(60) 2,393,453 —
2,645,395 |
| (3) 1.125, $\frac{9}{8}$, $1\frac{1}{8}$ | (21) 14 | (37) 29 | (61) $11\frac{9}{10}$ |
| (4) 6 | (22) 140 | (38) $.4, \frac{2}{5}$ | (62) 30 |
| (5) 168 | (23) 256 | (39) 2 | (63) $.5, \frac{1}{2}$ |
| (6) .0625 | (24) 8 | *(40) 211 — 232 | (64) 135,558 |
| (7) 103 | (25) 30 | (41) 529 | (65) 2.8, $\frac{14}{5}$, $2\frac{4}{5}$ |
| (8) 1.1, $\frac{11}{10}$, $1\frac{1}{10}$ | (26) 13,300 | (42) 18 | (66) 20 |
| (9) 5.5, $\frac{11}{2}$, $5\frac{1}{2}$ | (27) \$2.00 | (43) 4.1, $\frac{41}{10}$, $4\frac{1}{10}$ | (67) 78 |
| *(10) 5,048 — 5,578 | (28) 300 | (44) 36 | (68) $\frac{21}{11}$, $1\frac{10}{11}$ |
| (11) 4,368 | (29) 1.5, $\frac{3}{2}$, $1\frac{1}{2}$ | (45) 10 | (69) $\frac{5}{13}$ |
| (12) \$10.75 | *(30) 5,332 — 5,892 | (46) — 2 | *(70) 297 — 327 |
| (13) 2,308 | (31) 784 | (47) 78 | (71) 3222 |
| (14) 784 | (32) 5 | (48) 5.5, $\frac{11}{2}$, $5\frac{1}{2}$ | (72) 8.5, $\frac{17}{2}$, $8\frac{1}{2}$ |
| (15) 288 | (33) 12 | (49) — 1 | (73) — 3 |
| (16) 2,916 | (34) $-\frac{26}{15}$, $-1\frac{11}{15}$ | *(50) 796 — 879 | (74) 1 |
| (17) $50\frac{2}{15}$ | | (51) 534 | (75) $-\frac{5}{18}$ |
| (18) 34 | | (52) 1,030,301 | (76) $\frac{7}{3}$, $2\frac{1}{3}$ |
| | | (53) — 8 | (77) 3888 |
| | | (54) 2324 | (78) 21 |
| | | (55) $\frac{32}{3}$, $10\frac{2}{3}$ | (79) $\frac{8}{3}$, $2\frac{2}{3}$ |
| | | (56) — 817 | *(80) 4,390,782 —
4,852,968 |
| | | (57) 84 | |
| | | (58) $\frac{360}{41}$, $8\frac{32}{41}$ | |