

**The University Interscholastic League
Number Sense Test • HS Invitational A • 2010**

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) $210 + 21 - 2010 =$ _____</p> <p>(2) $\frac{3}{8} \times \frac{4}{9} =$ _____</p> <p>(3) $\\$20.10 \div 3 = \\$ _____</p> <p>(4) $2.01 - 2\frac{1}{10} + 21 =$ _____ (decimal)</p> <p>(5) $\frac{4}{9} \div .3 =$ _____</p> <p>(6) $44\% =$ _____ (proper fraction)</p> <p>(7) $9 \times 6 \div 3 - 6 + 9 =$ _____</p> <p>(8) $34 \times 43 =$ _____</p> <p>(9) $63 \times 15 - 82 \times 15 =$ _____</p> <p>* (10) $753 - 936 + 842 =$ _____</p> <p>(11) $17^2 =$ _____</p> <p>(12) If 8 ounces of M&M's costs \$1.10 then $1\frac{1}{2}$ pounds of M&M's will cost \$ _____</p> <p>(13) The GCD of 48 and 57 is _____</p> <p>(14) $(58 + 79 + 66) \div 4$ has a remainder of _____</p> <p>(15) $2\frac{1}{2}$ bushels is equivalent to _____ pecks</p> <p>(16) The median of 1, 5, 2, 3, 3, 2, 1, & 4 is _____</p> | <p>(17) The greatest prime number less than 99 is _____</p> <p>(18) $11^3 =$ _____</p> <p>(19) $MMX \div V =$ _____ (Arabic Numeral)</p> <p>* (20) $\sqrt{1243} \times 3421 =$ _____</p> <p>(21) 66% of 44 is 22% of _____</p> <p>(22) Which of the following is both a composite number and an evil number, 4, 9, or 11? _____</p> <p>(23) $235 \times 14 =$ _____</p> <p>(24) 48 has _____ positive integral divisors</p> <p>(25) 10 plus x is the same as tripling x. $x =$ _____</p> <p>(26) Let $k = \sqrt{7} + \sqrt{5}$. Truncate k to two decimal places. _____ (decimal)</p> <p>(27) $.333... - .1666... + .08333... =$ _____</p> <p>(28) $(26 \times 24 - 22) \div 7$ has a remainder of _____</p> <p>(29) 25836k is divisible by 6. Find $k > 0$. _____</p> <p>* (30) $30456 \div 141 =$ _____</p> <p>(31) If set A has 6 elements, $A \cap B$ has 3, and $A \cup B$ has 9, then set B has _____ elements.</p> <p>(32) $2 + 1 + 3 + 4 + 7 + \dots + 47 =$ _____</p> |
|--|--|

- (33) $|-6-1| + |-5+2| - |4-3| =$ _____
- (34) $\sqrt{125} + \sqrt{20} = \sqrt{x}$. Find x. _____
- (35) The discriminant of $6x^2 + 7x + 2 = 0$ is _____
- (36) Picture A is 8" by 10" and B is 9" by 12". The ratio of A's perimeter to B's perimeter is _____
- (37) Find k if $67^2 - 59^2 = 16k$. $k =$ _____
- (38) $5 \times 5! + 20 \times 4! =$ _____
- (39) $7\frac{4}{9} \times 7\frac{5}{9} =$ _____ (mixed number)
- *(40) $400 \log 800 =$ _____
- (41) $(13)^2 - (8)(21) =$ _____
- (42) $38 \times 11 + 33 \times 24 =$ _____
- (43) If $x + y = -1$ and $xy = 2$ then $x^3 + y^3 =$ _____
- (44) The x-intercept of the line $3x - 4y = 5$ is (h, k). Find h. _____
- (45) The product of the roots of $x^4 + 2x^3 - 9x^2 - 2x + 8 = 0$ is _____
- (46) $\frac{7}{20} - \frac{22}{59} =$ _____
- (47) The arithmetic mean of 17, 22, and 25 is _____
- (48) Given $1690 \div 26 = 65$. Find $1690 \div 5\frac{1}{5}$. _____
- (49) $25^\circ\text{C} =$ _____ $^\circ\text{F}$
- *(50) $833 \times 2.5 \div \frac{5}{12} =$ _____
- (51) The odds of drawing an ace from a standard 52 card deck is _____
- (52) The legs of a right \triangle are 8 and 15. The length of the altitude to the hypotenuse is _____
- (53) A convex octagon has _____ distinct diagonals
- (54) $123_6 - 45_6 =$ _____ $_6$
- (55) $(2 - 5i)(2 - 5i) = (a + bi)$. Find a. _____
- (56) If $\log_2(7x + 4) = 5$ then $x =$ _____
- (57) The set $\{e, m, p, t, y\}$ has _____ 3-element subsets
- (58) 8 intersecting lines create at most _____ regions
- (59) $7^2 - 6^2 + 5^2 - 4^2 + \dots + 1 =$ _____
- *(60) $8^3 \div 4^6 \times 2^{10} =$ _____
- (61) $(66_9)(77_9) \div 8$ has a remainder of _____
- (62) If $\log_5 X - \log_5 8 = 1$ then $x =$ _____
- (63) If A is $\frac{2}{3}$ of B and B is 60% of C then A is what fractional part of C? _____ (proper fraction)
- (64) How many ways can Larry, Mo, and Curly sit in a row of five chairs? _____
- (65) The greatest integer function $g(x) = [3 - 2x]$ has a value of _____ for $g(\pi)$
- (66) $2! + 3! + 4! \cong x \pmod{5}$ & $0 \leq x \leq 4$. $x =$ _____
- (67) $\sqrt{12544} =$ _____
- (68) $2 \sin 105^\circ \cos 105^\circ =$ _____
- (69) $3 + 4 + 7 + 11 + 18 + 29 + \dots + 123 =$ _____
- *(70) The area of $40x^2 + 45y^2 = 1800$ is _____
- (71) If $f(x) = \frac{5x-2}{4x+3}$, then $f'(-1) =$ _____
- (72) $1(1!) + 2(2!) + 3(3!) + \dots + 6(6!) =$ _____
- (73) Let $f(x) = \sqrt{3 - 4x}$ be a real valued function, where $x \in \{\text{Reals}\}$. The domain of $f(x)$ is $\{x | x \leq$ _____ $\}$
- (74) $\int_0^1 \sqrt{x} \, dx =$ _____
- (75) If $h(x)$ is the slant asymptote of $f(x) = \frac{x^2 - 3x + 1}{x - 3}$, then $h(1) =$ _____
- (76) If $f(x) = x^4 + x^2 - x$, then $f''(-3) =$ _____
- (77) If $\csc \theta = 1.2$ then $\sin \theta =$ _____
- (78) $\lim_{x \rightarrow 0} \left(\frac{\sin 3x}{x} \right) =$ _____
- (79) $f(x) = 5x - 6$ and $g(x) = 3x - 4$. $f(g(2)) =$ _____
- *(80) 6666 feet/second = _____ miles/hour

University Interscholastic League - Number Sense Answer Key HS • Invitation A • 2010

*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) -1779 | (17) 97 | (33) 9 | (58) 37 |
| (2) $\frac{1}{6}$ | (18) 1331 | (34) 245 | (59) 28 |
| (3) \$6.70 | (19) 402 | (35) 1 | *(60) 122 — 134 |
| (4) 20.91 | *(20) 114581 — 126642 | (36) $\frac{6}{7}$ | (61) 0 |
| (5) $\frac{40}{27}, 1\frac{13}{27}$ | (21) 132 | (37) 63 | (62) 40 |
| (6) $\frac{11}{25}$ | (22) 9 | (38) 1080 | (63) $\frac{2}{5}$ |
| (7) 21 | (23) 3290 | (39) $56\frac{20}{81}$ | (64) 60 |
| (8) 1462 | (24) 10 | *(40) 1104 — 1219 | (65) — 4 |
| (9) — 285 | (25) 5 | (41) 1 | (66) 2 |
| *(10) 627 — 691 | (26) 4.88 | (42) 1210 | (67) 112 |
| (11) 289 | (27) $.25, \frac{1}{4}$ | (43) 5 | (68) — .5, — $\frac{1}{2}$ |
| (12) \$3.30 | (28) 0 | (44) $\frac{5}{3}, 1\frac{2}{3}$ | (69) 318 |
| (13) 3 | (29) 6 | (45) 8 | *(70) 127 — 139 |
| (14) 3 | *(30) 206 — 226 | (46) — $\frac{27}{1180}$ | (71) 23 |
| (15) 10 | (31) 6 | (47) $\frac{64}{3}, 21\frac{1}{3}$ | (72) 5039 |
| (16) $2.5, \frac{5}{2}, 2\frac{1}{2}$ | (32) 122 | (48) 325 | (73) $.75, \frac{3}{4}$ |
| | | (49) 77 | (74) $\frac{2}{3}$ |
| | | *(50) 4749 — 5247 | (75) 1 |
| | | (51) $\frac{1}{12}$ | (76) 110 |
| | | (52) $\frac{120}{17}, 7\frac{1}{17}$ | (77) $\frac{5}{6}$ |
| | | (53) 20 | (78) 3 |
| | | (54) 34 | (79) 4 |
| | | (55) — 21 | *(80) 4318 — 4772 |
| | | (56) 4 | |
| | | (57) 10 | |