The Virtual Challenge Meets
Number Sense Test • HS VCM #1 • 2024-2025

Name _____

School _____

Grade 9 10 11 12

Classification: A 2A 3A 4A 5A 6A

Final _____ _____

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 proctor 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 without the help of paper, pencil, or calculator. Write only the answer in the space provided at the end of each problem. Problems marked with an (*) require approximate integral answers; any answer to a problem with an (*)*asterisk* that is within five percent of the exact answer will be scored correct; all other problems require exact answers.

STOP – WAIT FOR SIGNAL!

(1) $724 - 261 =$ _____

(2) $\frac{3}{7} + \frac{2}{3} =$ _____ **(fraction)**

(3) $4.04(12 + 13) =$ _____

(4) $40.32 \div 8 =$ _____ **(decimal)**

(5) $2138 \div 5$ **has a remainder of** _____

(6) $21^2 =$ _____

(7) $84 \times 25 =$ _____

(8) CCCXX ÷ XXXII = _____ **(Arabic Numeral)**

(9) The GCD of 30, 36 and 48 is _____

***(10)** 724 – 1999 + 2387 = _____

(11) $320.00 at 4% simple interest for 5 years will have a balance of $ _____

(12) $\frac{23}{19} \times 21 =$ _____ **(mixed number)**

(13) $\sqrt[3]{3375} =$ _____

(14) $66^2 - 34^2 =$ _____

(15) $193 \times 111 =$ _____

(16) GCD (18, x) = 2, LCM (18, x) = 360, and x = _____

(17) The average of 10, 15, 20, and 25 is _____

(18) The average of 40, 60, 80, and 100 is _____

(19) $\frac{1}{3} - \frac{1}{9} - \frac{1}{27} =$ _____ **(fraction)**

***(20)** $2025 \times 5! =$ _____

(21) Round $\sqrt{2}$ to the nearest hundredth place. _____

(22) $63 \times 67 =$ _____

(23) $96 \times 106 =$ _____

(24) 28% of 60 is _____ % of 120

(25) $[13 + 8 \times 7 + 18 \times 20] \div 6$ has a remainder of _____

(26) 2 gallons = _____ cups

(27) 2 gallons + 1 quart = _____ cups

(28) $8\frac{1}{3} \times 8\frac{2}{3} =$ _____ **(mixed number)**

(29) Let R = {f,r,i,e,n,d,s}. How many three member subsets of R are there? _____

***(30)** $\sqrt{4122398} =$ _____

(31) $587 \times 13 + 169 =$ _____

(32) $57B = [3(14 - B)]^2$. Find B, B > 0. _____

(33) If x + (x + 3) + (x + 6) + (x + 9) + (x + 12) = 150, then (x + 6) = _____

(34) If $f(x) = x^2 + 22x + 121$, then f(10) = _____

(35) If x + y = 12 and x – y = 8, then $x^2 + y^2 =$ _____

(36) $6\frac{2}{3} \times 15\frac{1}{2}$ = _____ (mixed number)

(37) How many subsets containing the element 5 are there in the set {1,2,3,4,5}? _____

(38) 105 base 10 is written as _____ base 6

(39) Let $\frac{x+18}{x-7} + \frac{x-7}{x+18} = 2\frac{B}{C}$. Find B. _____

*(40) $\sqrt[3]{125} \times \sqrt{125} \times 125$ = _____

(41) $11 \div 6\frac{2}{3}$ = _____ (improper fraction)

(42) The positive geometric mean of 25 and 49 is _____

(43) The arithmetic mean of 23, 28, and 45 is _____

(44) Which is larger, $\frac{7}{13}$ or $\frac{10}{13}$? _____

(45) $12^2 + 36^2$ = _____

(46) $47^2 + 66^2$ = _____

(47) $24^2 + 84^2$ = _____

(48) $5^3 - 3$ = _____ (base 5)

(49) $43_8 + 55_8 - 16_8$ = _____ 8

*(50) 45^3 = _____

(51) The 7th term of 1, 3, 6, 11, 18, 29, … is _____

(52) $2426_7 \div 11_7$ has a remainder of _____

(53) $\frac{1}{30} + \frac{1}{42} + \frac{1}{56}$ = _____ (fraction)

(54) $(5 + 9 + 14 + 23 + 37 + 60) + (97 + 157 + 254 + 411)$ = _____

(55) If $f(x) = 8x + log_2 x$, then f(32) = _____

(56) $3057_8 - 203_8$ = _____ 8

(57) The area of an equilateral triangle with sides $6\sqrt{3}$ inches is $k\sqrt{3}$ square inches, k = _____

(58) Let $4\frac{2}{m} \times n\frac{5}{14} = 25$, where m, n, are natural numbers. Find m + n. _____

(59) The coefficient of the x^2y^3 term in the expansion of $(4x - y)^5$ is _____

*(60) $\pi^3 \times e^3$ = _____

(61) $\sqrt{441_9}$ = _____ 9

(62) The fifth pentagonal number is _____

(63) If $\left(\sqrt[4]{a^9}\right)\left(\sqrt[3]{a^5}\right) = \sqrt[n]{a^k}$, where n and k are relatively prime, then n – k = _____

(64) What is the probability of getting a sum of 5 or 6, when rolling two six-sided dice? _____

(65) If $200° = k\pi$ radians, then k = _____

(66) $sin\left(\frac{\pi}{4}\right) cos\left(\frac{5\pi}{4}\right)$ = _____

(67) The second smallest perfect number is _____

(68) Change $\frac{5}{8}$ to a base 4 decimal. _____ 4

(69) $(8 + 10i) \div 4i = a + bi$. Find b. _____

*(70) $(5 + 6 + 7 + \cdots + 14 + 15)^2$ = _____

(71) If $f(x) = \frac{4}{5} - \frac{3}{7}x$ and $f^{-1}(x) = ax + b$, then b = _____

(72) If $g(x) = 3x^4 - 9x^2 + 4x - 11$, then $g'(2)$ = ___

(73) 73^2 mod 11 = _____

(74) $h(x) = 3x^2 - 12x + 15$ has a local minimum at (a, b). a + b = _____

(75) $\int_3^4 \int_5^6 xy\, dydx$ = _____

(76) The slope of the tangent line to $f(x) = -3.5x^2 + 10x - 14$ at x = 2 is _____

(77) $1^3 - 3^3 + 4^3 - 7^3$ = _____

(78) 1111×534 = _____

(79) Let (x, y) be the focus of $4x = y^2 - 8$. x = _____

*(80) $625 \times (44.44…\% \times 36.3636…)$ = _____