The Virtual Challenge Meets
Number Sense Test • HS VCM #3 • 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) $1224 + 2025 + 2826 =$ _____

(2) $1537 - 2025 =$ _____

(3) $19(1 + 3 + 5 + 7 + 9) =$ _____

(4) $66\frac{2}{3}$ **% of 405 is** _____

(5) $1443 \div 9$ **has a remainder of** _____

(6) $23^2 =$ _____

(7) $92 \times 12 =$ _____

(8) $4\frac{3}{4}$ **minutes =** _____ **seconds**

(9) The reciprocal of 2.8 is _____

***(10)** $2025 \times 14 + 3176 =$ _____

(11) $6\frac{3}{10} - 2\frac{7}{10} =$ _____ **(mixed number)**

(12) $\frac{17}{21} \times 18 =$ _____ **(mixed number)**

(13) $\sqrt{784} =$ _____

(14) The GCD of 18 and 24 is _____

(15) The LCM of 18 and 24 is _____

(16) The product of the GCD and LCM of 18 and 24 is _____

(17) $36\% =$ _____ **(fraction)**

(18) $108 \times 107 =$ _____

(19) The number of positive prime digits is _____

***(20)** $384 \times 212 =$ _____

(21) $245_6 =$ _____$_{10}$

(22) If x + (x + 2) + (x + 4) + (x + 6) + (x + 8) = 120, then x = _____

(23) $7\frac{3}{11} \times 7\frac{8}{11} =$ _____ **(mixed number)**

(24) 38% of 64 is _____ **% of 32**

(25) $0.727272\ldots \times 77 =$ _____

(26) If A = 3, B = -2 **and C = 5, then** $(A + B + C)^A =$ _____

(27) 24 has _____ **positive integral divisors**

(28) The sum of the positive integral divisors of 24 is __

(29) $0.757575\ldots =$ _____ **(fraction)**

***(30)** $\sqrt{412098} =$ _____

(31) Let T = {t,e,x,a,s,l,o,n,g,h}. How many three element subsets of R are there? _____

(32) Let T = {t,e,x,a,s,l,o,n,g,h}. How many subsets contain all of following elements: t, e, x, a, and s? _____

(33) If x = 3 and y = 5, then $(x + y)(x^2 - xy + y^2) =$ _____

(34) $(8^7 + 14^7) \div 11$ **has a remainder of** _____

(35) $27 \times 87 =$ _____

(36) $8\frac{3}{4} \times 12\frac{1}{2}$ =_____(mixed number)

(37) If f(x) = $4x^2 + 12x + 9$, then f(11) = _____

(38) $\frac{1}{12} + \frac{1}{20} + \frac{1}{30} + \frac{1}{42}$ =_____ (fraction)

(39) The larger root of $(4x - 1)^2 = 25$ is _____

*(40) $\sqrt[3]{500} \times \sqrt{500} \times 500$ = _____

(41) $3^5 \times 9^3 \div 27^3$ = _____

(42) $(4x - 11)^2 = ax^2 + bx + c$. a + b + c =_____

(43) The point (7, 3) is reflected over the x-axis, then is reflected over the line y = x, to the point (h, k). h + k =_____

(44) $16^2 + 48^2$ = _____

(45) $16^2 + 32^2$ = _____

(46) $43^2 + 47^2$ = _____

(47) $43^2 + 63^2$ =_____

(48) The modulus of 5 + 14i is k. k^2 = _____

(49) The number of sides in a polygon with 27 distinct diagonals is _____

*(50) 4600 leagues of land = _____acres

(51) Let $6\frac{3}{m} \times n\frac{6}{11} = 63$, where m, n, are natural numbers. Find m + n. _____

(52) $53_8 \times 12_8$ = _____ 8

(53) $\left(\frac{27}{8}\right)^{\frac{2}{3}}$ =_____(improper fraction)

(54) If $8 + 8r + 8r^2 + 8r^3 + \ldots = 32$, then r = _____

(55) If $ln(18) + 2ln(x) = ln(72)$, then x =_____

(56) The sum of the reciprocal of the first 11 triangular numbers is_____

(57) The length of the median of a trapezoid with area 216 and height 18 is ____

(58) $22^{18} \div 37$ has a remainder of_____

(59) The area of an equilateral triangle with height $12\sqrt{2}$ inches is k square inches, k = _____

*(60) 31000 labors of land is equal to how many leagues of land?_____

(61) How many ways can 7 people be seated in row with 4 chairs? _____

(62) $3^k + k^3 = 145$, k^4 =_____

(63) If $\left(\sqrt[11]{a^5}\right)\left(\sqrt[6]{a^5}\right) = \sqrt[n]{a^k}$, where n and k are relatively prime, then k = _____

(64) $\begin{bmatrix}5 & 15\end{bmatrix} \times \begin{bmatrix}5\\3\end{bmatrix}$= [_____]

(65) If sin A = $\frac{2}{3}$, then $\cos^2 A$ =_____

(66) The first 4 digits after the decimal point in the expansion of $\frac{209}{900}$ are_____

(67) Change 0.2444… $_7$ to a base 7 fraction. _____

(68) If $210 = \frac{x!}{(x-3)!}$, then x = _____

(69) If $\frac{3x-2}{2x-5} + \frac{4x+2}{x-3} = \frac{ax^2+bx+c}{dx^2+ex+f}$, then $(a + b + c) + (d + e + f)$ =_____

*(70) The volume of a hemisphere with radius 15 is _____

(71) If $8 \sin 40° \cos 40° = k \sin x°$ and x° is in the first quadrant, then k + x =_____

(72) If $g(x) = 4x^3 - 3x^2 + 5x - 4$, then the slope of the tangent line at (2, 26) is_____

(73) 14^3 mod 9 = _____

(74) $f(x) = \frac{5}{2}x - 8$. $f^{-1}(x) = ax + b$, then b =_____

(75) $\int_2^3 \int_4^5 8xy\, dydx$ =_____

(76) $634_8 \div 4_8$ =_____ 8

(77) The perimeter of a square increases from 32 to 48, the corresponding increase in area is _____

(78) $ln\left(e^{\frac{1}{20}}\right) + ln\left(e^{\frac{1}{30}}\right) + ln\left(e^{\frac{1}{42}}\right)$ = _____

(79) Let $h(x) = a(4x + 5)^6$ and $h'(x) = 72(4x + 5)^5$, a =__

*(80) $\sqrt[4]{842130010}$ = _____