The Virtual Challenge Meets
Number Sense Test • HS VCM #2 • 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) $1118 - 2024 =$ _____

(2) $\frac{5}{11} - \frac{2}{9} =$ _____ **(fraction)**

(3) $19(36) - 19(11) =$ _____

(4) $14.321\ \% =$ _____ **(decimal)**

(5) $2025 \div 11$ **has a remainder of** _____

(6) $17^2 =$ _____

(7) $76 \times 11 =$ _____

(8) $MMXXV + CCXI =$ _____ **(Arabic Numeral)**

(9) The GCD of 44 and 64 is _____

***(10)** $3725 - 1889 + 1387 =$ _____

(11) 18 gallons + 3 quarts = _____ **quarts**

(12) $\frac{24}{23} \times 29 =$ _____ **(mixed number)**

(13) $\sqrt[3]{729} =$ _____

(14) 14 ounces = _____ **pounds**

(15) $83 \times 87 =$ _____

(16) GCD (18, 14) = 2, LCM (18, 14) = x, and x = _____

(17) 17.5 % = _____ **(fraction)**

(18) $98 \times 91 =$ _____

(19) $\frac{1}{3} + \frac{1}{6} + \frac{1}{12} =$ _____ **(fraction)**

***(20)** $183 \times 221 =$ _____

(21) $47_8 =$ _____ $_{10}$

(22) $57_8 =$ _____ $_2$

(23) $116 \times 103 =$ _____

(24) 44% of 60 is _____ **% of 11**

(25) $0.083333\ldots \times 96 =$ _____

(26) The number of positive integral factors of 28 is __

(27) The number of proper positive integral factors of 28 is _____

(28) $132\frac{15}{64} = 11\frac{3}{8} \times$ _____ **(mixed number)**

(29) Let R = {b,r,i,g,h,t}. How many two element subsets of R are there? _____

***(30)** $\sqrt{22098} =$ _____

(31) $486 \times 14 + 196 =$ _____

(32) Divide 72 into three parts in a ratio of 1:2:3. Find the sum of the two largest parts. _____

(33) If $2x + (2x + 4) + (2x + 8) + (2x + 12) + (2x + 16) = 160$, **then x =** _____

(34) $(3^7 + 5^7) \div 8$ **has a remainder of** _____

(35) If $x + y = 25$ and $x - y = 16$, then $x^2 - y^2 =$ _____

(36) $5\frac{2}{3} \times 15\frac{1}{5} =$ _____(mixed number)

(37) How many subsets not containing the element 2 or 3 are there in the set {1,2,3,4,5,6}? _____

(38) How many integer multiples of 7 are between 12 and 40? _____

(39) The smaller root of $(2x - 3)^2 = 49$ is _____

***(40)** $\sqrt[3]{200} \times \sqrt{200} \times 200 =$ _____

(41) The area of a rhombus with diagonals 35 and 70 is _____

(42) The positive geometric mean of 4 and 36 is _____

(43) The arithmetic mean of 4 and 36 is _____

(44) $44^2 + 45^2 =$ _____

(45) $32^2 + 72^2 =$ _____

(46) $32^2 + 38^2 =$ _____

(47) $85^2 + 42^2 =$ _____

(48) The measure of the exterior angle of a regular octagon is _____°

(49) The measure of an interior angle of a regular octagon is _____°

***(50)** $52 \times 55 \times 58 =$ _____

(51) Let $4\frac{2}{m} \times n\frac{1}{6} = 35$, where m, n, are natural numbers. Find m + n. _____

(52) $356_7 \times 11_7 =$ _____$_7$

(53) $\frac{1}{4\times7} + \frac{1}{7\times10} + \frac{1}{10\times13} =$ _____(fraction)

(54) $406^2 =$ _____

(55) If $ln(2x) + 2ln(3x) = ln(ax^b)$, then $a + b =$ _____

(56) If $\frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} + \cdots + \frac{1}{k} = \frac{9}{11}$, then $k =$ _____

(57) The sum of the first three perfect numbers is _____

(58) The area of an equilateral triangle with height 12 inches is $k\sqrt{3}$ square inches, $k =$ _____

(59) What is the probability of getting a king or a red card from a standard deck of 52 cards? _____

***(60)** ${}_{31}C_3 =$ _____

(61) $18^{14} \div 29$ has a remainder of _____

(62) The 8th hexagonal number is _____

(63) If $\left(\sqrt[7]{a^9}\right)\left(\sqrt[4]{a^5}\right) = \sqrt[n]{a^k}$, where n and k are relatively prime, then $k =$ _____

(64) What is the probability of getting a sum of 7 or 11, when rolling two six-sided dice? _____

(65) $\sin 210° =$ _____

(66) The first 4 digits after the decimal point in the expansion of $\frac{13}{30}$ are _____

(67) $512^{\frac{2}{3}} =$ _____

(68) Change $\frac{38}{49}$ to a base 7decimal. _____$_7$

(69) $(32 + 16i) \div 4i = a + bi$. Find $a + b$. _____

***(70)** 532 gallons = _____ounces

(71) $1732 \times 13 =$ _____

(72) If $g(x) = 5x^3 - 10x^2 + 3x - 4$, then $g'(2) =$ ___

(73) 77^2 mod 9 = _____

(74) If $f(x) = \frac{5}{2}x - 8$, then $f^{-1}(32) =$ _____

(75) $\int_4^5 \int_6^7 xy\, dydx =$ _____

(76) $523_8 \div 3_8 =$ _____$_8$

(77) The perimeter of a square increases from 40 to 52, the corresponding increase in area is _____

(78) $log_2 \sqrt[5]{8^3} =$ _____

(79) 1,1,3,5,6,12,10,22,15, p, q, … . p + q = _____

***(80)** The volume of a sphere with radius 15 is _____