Final _____ _____

Contestant's Number _____

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 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!

(1) $2023 + 3202 =$ _____

(2) $2023 - 4 \times 2023 =$ _____

(3) $\frac{1}{8} \div 4.5 =$ _____

(4) $37\frac{1}{2}\% =$ _____ **(proper fraction)**

(5) $(1 + 2) \div 3 - 4 \times 5 =$ _____

(6) $23^2 =$ _____

(7) $111 \times \frac{1}{37} =$ _____

(8) MMXXIII = _____ **(Arabic Numeral)**

(9) $2023 \div 3$ has a remainder of _____

*(10) $3202 + 2023 - 322 =$ _____

(11) If a half dozen eggs cost $2.40, then 9 eggs should cost $ _____

(12) The LCM of 12 and 14 is _____

(13) 312×14 is _____

(14) $18 \times \frac{18}{19} =$ _____ **(mixed number)**

(15) $24^2 - 26^2 = 4 \times$ _____

(16) The largest prime less than 29 is _____

(17) $6\frac{1}{2} \times 16 =$ _____

(18) $6\frac{1}{4} \times 16 =$ _____

(19) $6\frac{3}{4} \times 16 =$ _____

*(20) $804 \times 649 =$ _____

(21) $27 \times 23 =$ _____

(22) $144 \div 0.08333... =$ _____

(23) Write twelve and three-eighths million in digits.
_____

(24) $[9 + 23 \times 21 + 11] \div 5$ has a remainder of _____

(25) $12\frac{1}{4} \times 8\frac{1}{4} =$ _____ **(mixed number)**

(26) $4.60 + $7.29 - $9.88 = $ _____

(27) $4.45 + $7.27 - $9.88 = $ _____

(28) $4.60 + $7.29 - $9.68 = $ _____

(29) 239 base 10 is written as _____ base 4

*(30) $\sqrt{992023} =$ _____

(31) $2399 \times 1 + 1 =$ _____

(32) $3600 = \left[4(12 + B)\right]^2$. Find B, B > 0. _____

(33) If $f(x) = x^2 - 6x + 9$, then $f(-20) =$ _____

(34) Given: 2, 3, 5, 7, 11, m, 17, n, ... Find m + n. ____

(35) The sum of three consecutive odd integers is 135. The larger of the integers is _____

(36) $4\frac{3}{5} \times 5\frac{3}{4} =$ _____

(37) How many integers between 9 and 63 are divisible by 7? _____

(38) $\{m,a,r,c,h\} \cup \big[\{a,p,r,i,l\} \cap \{m,a,y\}\big]$ contains how many elements? _____

(39) Let $\frac{x-5}{x+6} + \frac{x+6}{x-5} = 2\frac{B}{C}$. Find B. _____

*(40) $\sqrt[3]{9232111} =$ _____

(41) $(3^3 + 7^3) \div 10$ has a remainder of _____

(42) $23_7 \times 5_7 + 236_7 =$ _____ $_7$

(43) The coefficient of the x^3y^2 term of $(x + y)^5$ is _____

(44) The arithmetic mean of 9, 22, and 23 is _____

(45) If $x + y = 11$ and $2x - y = 13$, then $y =$ _____

(46) $(304)^2 =$ _____

(47) Let $4\frac{2}{m} \times n\frac{21}{22} = 13$, where m, n are natural numbers. Find $m + n$. _____

(48) The sum of the roots of $6x^2 + 8x - 7 = 0$ is _____

(49) $(8^3 - 2^3) \div (8 - 2) =$ _____

*(50) $992023 \div 923 =$ _____

(51) The 11th term of 1, 2, 5, 10, 17, 26, ... is 101. The 10th term is _____

(52) 0.25 is what per cent less than 2.5? _____%

(53) $\frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} =$ _____

(54) $(4 + 5 + 9 + 14 + 23 + 37 + 60 + 97) + (157 + 254 + 411) =$ _____

(55) If $\sqrt{16 - \sqrt{12\sqrt{4 - x}}} = 2$, then $x =$ _____

(56) Two dice are rolled. Find the probability that the sum of the numbers is greater than 10. _____

(57) $22^2 + 18^2 =$ _____

(58) The perimeter of a square is increased from 18 cm to 22 cm. Find the corresponding increase in its area. _____ cm^2

(59) $2023_4 \div 3_4$ has a remainder of _____

*(60) If 134.64 pesos equals 8 dollars, then 22 dollars equals _____ pesos.

(61) 5 fathoms = _____ feet

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

(63) Let $2x - y = 3$ and $x + y = 5$. Find $2x + y$. _____

(64) The det $\begin{vmatrix} x & 2 \\ 3 & 4 \end{vmatrix} = \det \begin{vmatrix} 2 & 3 \\ 5 & 7 \end{vmatrix}$ and $x =$ _____

(65) If $f(x) = 2 - x$ and $g(x) = 2x - 1$, then $g(f(3)) =$ ____

(66) Which of the following is not a pentagonal number, 12, 15, 35? _____

(67) $20^6 \div 11$ has a remainder of _____

(68) Change $\frac{8}{25}$ to a base 5 decimal. _____ $_5$

(69) $\left(\mathrm{Sin}\left(\mathrm{Arccos}\left(-0.5\right)\right)\right)^2 =$ _____

*(70) $(1 + 2 + 3 + ... + 9 + 10)^2 =$ _____

(71) $f(x) = \frac{7 - 2x}{3 + 5x}$ and $f^{-1}(6) =$ _____

(72) Let $g(x) = (2x + 1)^4$. Find $g'(1)$. _____

(73) Find x, $7 \le x \le 13$, if $2x + 1 \cong 23 \pmod 7$. _____

(74) $h(x) = x^3 - 2x$ has an inflection point at (a, b). $a + b =$ _____

(75) The axis of symmetry of $6x^2 + 8x = 7$ is $x =$ _____

(76) $\int_0^4 x\, dx =$ _____

(77) The slope of the tangent line to $4 = x^2 + y^2$ at $y = 2$ is _____

(78) Given: 2, 8, 18, 32, k, 72, 98,... . $k =$ _____

(79) $221 \times 17 =$ _____

*(80) $27 \times 142857 =$ _____