1st Score: ______ Grader: ______	2nd Score: ______ Grader: ______	3rd Score: ______ Grader: ______	**Final Score**

Name:______________________ School:______________________

SS/ID Number:______________________ City:______________________

Grade: 9 10 11 12 Classification: 1A 2A 3A 4A 5A 6A

Academic Excellence
In Mathematics and
Science through
Competition
TMSCA

TMSCA HIGH SCHOOL
NUMBER SENSE
STATE MEET ©
MARCH 17, 2018

GENERAL DIRECTIONS

1. Write only the requested information on this cover sheet. Do not make any additional marks on this cover sheet.
2. You will be given 10 minutes to take this test.
3. There are 80 problems on the test.
4. Write in ink only! It would be advantageous to use non-black ink.
5. Solve as many problems as you can in the order that they appear.
6. Problems that are skipped are considered wrong.
7. Problems that appear after the last attempted problem do not count either for or against you.
8. ALL PROBLEMS ARE TO BE SOLVED MENTALLY! [No scratch work!]
9. Only the answer may be written in the answer blank.
10. Starred [*] problems require approximate INTEGRAL answers that are within 5% of the exact answers. All other problems require exact answers.
11. All problems answered correctly are worth FIVE points. FOUR points will be deducted for all problems answered incorrectly or skipped before the last problem attempted.

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2017-18 TMSCA High School State Meet

Final	______	______
2nd	______	______
1st	______	______
	Score	Initials

Contestant's Number __________

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) $2018 + 100 - 79 =$ ______________________

(2) $922 - 229 =$ ______________________

(3) $22 \times 85 =$ ______________________

(4) $357 \div 9 =$ ________________ (mixed number)

(5) Simplify: $\frac{126}{621}$. ______________________

(6) $\frac{3}{4} - \frac{5}{6} =$ ________________ (proper fraction)

(7) $15^3 =$ ______________________

(8) $48\% =$ ________________ (proper fraction)

(9) CXX = ______________________

*(10) $78 - 159 + 1642 + 352 =$ ______________________

(11) Which is larger, $-\frac{5}{7}$ or $-\frac{2}{5}$? ______________

(12) $(4 + 7)(34 + 17) =$ ______________________

(13) The GCD of 70 and 84 = ______________________

(14) $1\frac{3}{4} - 2\frac{7}{8} =$ ________________ (mixed number)

(15) $5 + 7 + 9 + 11 + \ldots + 33 + 35 =$ ______________

(16) The arithmetic mean of 34, 45, and 56 is __________

(17) 20% of 80 less 100 is ______________________

(18) $2\frac{1}{4} \times 2\frac{2}{3} =$ ______________________

(19) The smallest prime number greater than 89 is _____

*(20) $241 \times 801 + 298 =$ ______________________

(21) $(1993 \times 7 + 49) \div 2 =$ ______________________

(22) $24 + 6 \times 12 \div 6 =$ ______________________

(23) The simple interest on \$1200.00 at 3% for 9 months is \$ ______________________

(24) $(7 \times 15 - 5) \div 6$ has a remainder of __________

(25) The smaller root of $2x^2 + 7x + 6 = 0$ is __________

(26) $15^2 =$ ______________________

(27) Find the smallest prime number p, where $p > 3$ and $4p + 7$ is a prime number. ______________

(28) 0.727272... = ________________ (proper fraction)

(29) Given the set {2,3,5,7,11,p,17,19,q...}. $q - p =$ _____

*(30) 3 miles = ______________________ inches

(31) $5\frac{1}{3} \times 5\frac{2}{3} =$ ________________ (mixed number)

(32) Let $(4x + 5)^2 = ax^2 + bx + c$. Find b. __________

(33) $135_7 =$ ______________________ $_{10}$

(34) What number times 8 and added to 12, gives the same result? ______________________

(35) $94 \times 97 =$ ______________________

(36) A regular octagon has how many vertices? ________

(37) If $|x - 12| = 3x$ and $x > 0$ then $x =$ ________

(38) $\frac{5}{6}$ is ________ % more than $\frac{1}{2}$

(39) If $A = 6$, $A = B$, and $A = 2C$ then $AB \div C =$ ________

*(40) $\sqrt{81000} =$ ________

(41) Given: 2, 7, 9, 16, ..., k, 107, ... Find k. ________

(42) $33 \times 73 =$ ________

(43) Let $4^{(2x+1)} = 256$. Find x. ________

(44) The vertex of $y = 3x^2 - 6x + 5$ is (h, k).
$h - k =$ ________

(45) $36^2 - 41^2 =$ ________

(46) ${}_6P_4 =$ ________

(47) If $3^{(x+y)} = 6{,}561$ then $(x + y)^3 =$ ________

(48) Two dice are tossed. What are the odds that the sum of the faces is 6? ________ (proper fraction)

(49) $994^2 =$ ________

*(50) $(27.18)^4 =$ ________

(51) The number of positive divisors of 84 is ________

(52) $(111)(91)(k) = 191{,}919$. $k =$ ________

(53) If a side of an equilateral triangles is $8\sqrt{3}$ " then its altitude is ________ inches

(54) Let $3x - 8 < 14$. The largest integer x is ________

(55) $\frac{2}{3} + \frac{4}{9} + \frac{8}{27} + \ldots =$ ________

(56) $42_5 - 113_5 + 444_5 =$ ________$_5$

(57) If $\log_x(8) = 1.5$ then $x^3 =$ ________

(58) $514 \times 213 =$ ________

(59) If $x^2 + y^2 = 61$, $x > y$ and both x and y are positive integers, then $x =$ ________

*(60) $9 \times 18 \times 27 \times 36 =$ ________

(61) Find the sum of all negative integers x such that $3x + 2 \geq -5$. ________

(62) ${}_5P_3 \times {}_5C_2 =$ ________

(63) 0.4333... base 6 = ________ base 10 (fraction)

(64) The simplified coefficient of the x^2y^3 term in the expansion of $(x - 2y)^5$ is ________

(65) Let $f(x) = x^2 - 6x + 9$. Find $f(f(2))$. ________

(66) $\cos(240°) =$ ________

(67) $\sec(\frac{4\pi}{3}) =$ ________

(68) Find x if $\begin{vmatrix} 4 & x \\ 7 & x \end{vmatrix} = 28$. $x =$ ________

(69) If $20^5 \div 32 = (2^x)(5^y)$, then $xy =$ ________

*(70) $(\pi \times e \times \phi)^3 =$ ________

(71) Find x, $0 \leq x \leq 4$, if $3x - 4 \equiv 2 \pmod 5$. ________

(72) The length of the tangent from (10, 0) to the circle $x^2 + y^2 = 36$ is ________

(73) $f'(x) = 2$, $f(3) = 4$, find $f(5)$. ________

(74) If $x < 0$ and $|3x + 6| = 9$ then $x =$ ________

(75) The minimum value of $y = 2x^2 + 3x + 1$ is ________

(76) $\int_0^8 (8 - x)\,dx =$ ________

(77) $\lim_{x \to 0} \frac{\sin(x)}{x} =$ ________

(78) $(0.857142857142857142\ldots) \div (0.666\ldots) =$ ________

(79) The eighth term in the arithmetic sequence 16, 13, 10, ... is ________

*(80) How many seconds are in 30 days? ________

2017-18 TMSCA High School State Meet Number Sense - Answer Key

*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

(1) 2,039
(2) 693
(3) 1,870
(4) $39\frac{2}{3}$
(5) $\frac{14}{69}$
(6) $-\frac{1}{12}$
(7) 3,375
(8) $\frac{12}{25}$
(9) 120
*(10) 1,818 — 2,008
(11) $-.4, -\frac{2}{5}$
(12) 561
(13) 14
(14) $-1\frac{1}{8}$
(15) 320
(16) 45
(17) -84
(18) 6
(19) 97
*(20) 183,673 — 203,005
(21) 7,000
(22) 36
(23) $27.00
(24) 4
(25) -2
(26) 225
(27) 13
(28) $\frac{8}{11}$
(29) 10
*(30) 180,576 — 199,584
(31) $30\frac{2}{9}$
(32) 40
(33) 75
(34) $\frac{12}{7}, 1\frac{5}{7}$
(35) 9,118
(36) 8
(37) 3
(38) $\frac{200}{3}, 66\frac{2}{3}$
(39) 12
*(40) 271 — 298
(41) 66
(42) 2,409
(43) $1.5, \frac{3}{2}, 1\frac{1}{2}$
(44) -1
(45) -385
(46) 360
(47) 512
(48) $\frac{5}{31}$
(49) 988,036
*(50) 518,468 — 573,042
(51) 12
(52) 19
(53) 12
(54) 7
(55) 2
(56) 423
(57) 64
(58) 109,482
(59) 6
*(60) 149,591 — 165,337
(61) -3
(62) 600
(63) $\frac{23}{30}$
(64) -80
(65) 4
(66) $-.5, -\frac{1}{2}$
(67) -2
(68) $-\frac{28}{3}, -9\frac{1}{3}$
(69) 25
*(70) 2,507 — 2,770
(71) 2
(72) 8
(73) 8
(74) -5
(75) $-.125, -\frac{1}{8}$
(76) 32
(77) 1
(78) $\frac{9}{7}, 1\frac{2}{7}$
(79) -5
*(80) 2,462,400 — 2,721,600