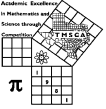
| 1st Score:  Grader: | 2nd Score:  Grader: | 3rd Score:  Grader: | **Final Score** |
| --- | --- | --- | --- |
| Name: School:  SS/ID Number: City:  Grade: 9 10 11 12 Classification: 1A 2A 3A 4A 5A 6A | | | |

**T M S C A H I G H S C H O O L** 

**N U M B E R S E N S E**

**S T A T E T E S T 1 3 (U I L E) ©**

**M A R C H 1 6 , 2 0 1 9**

**GENERAL DIRECTIONS**

1. Write only the requested information on this cover sheet. Do not make anyadditional marks on this coversheet.

2. You will be given 10 minutes to take this test.

3. There are 80 problems on thetest.

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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**TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA TMSCA**

**(36) The smaller of two integers whose sum is 22 and q whose product is 72 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**(37) If (4x 3)(2x 5) = ax bx c, then  q  2 a b c = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **

**(38) is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ % less than 1 3 1 8 4**

**(39) 323 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 4 8 \*(40) 11 12 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 4 2 ƒ**

**3~~2~~**

**(41) (36) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (42) The smallest root of (3 1 is \_\_\_\_\_\_\_\_\_\_\_ x = q )2 916**

**(43) The area of a 30-60-90° triangle with a hypotenuse  length of 16 cm is k 3 cm . k = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ È 2**

**(44) 6 5 4 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ xƒ x ‚ x (45) 34 37 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2 2  (46) 41 1111 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ‚**

**(47) How many terms are in the arithmetic sequence, 6, 13, 20, 27, ... , 1400, 1406. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**(48) If 3 = 21, then 3 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ x x ( 2) q (49) 23 13 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 44 4 ‚ \*(50) 100 miles per hour = \_\_\_\_\_\_\_\_\_\_\_\_ feet per second (51) 1, 1}. b = \_ ( ) a b , where a,b { a \_\_\_\_ *i =* 23 È −q q**

**(59) 323 19 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ‚ \*(60) 323192119 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ È**

**(61) How many ways can 3 people be seated in a circle of 5 chairs? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**(62) sin(60°) = cos A, 90° A 360°. A = \_\_\_\_\_\_\_\_\_°  **

**(63) The first four digits of the decimal for base 9 is 513 0.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ base 9**

**(64) The greatest integer function f(x) = x 1 has a [ ]   value of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for f( 7 È )**

**(65) Let f(x) = 9x 6x 1. Find f(f( )). \_\_\_\_\_\_\_\_\_\_ 2 1 q  3 (66) If P = 5 k 60, then k = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (67) 68 F = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ C ° °  (68) = . a d = \_\_\_\_\_\_\_\_ 32 14 ac 41 23 bd ” • ” •” • ‚ **

**(69) The sum of the product of the roots taken 4 at a time of 2x 13x 28x 23x 6 = 0 is \_\_\_\_ 432 q  q**

**\*(70) 1875 0.3125 ƒ ‚ 716 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (71) The domain of y = 9 x is m x n. m = \_\_\_ 2 2 q ŸŸ (72) Find x, 0 x 4, if x 4 18(mod 5). \_\_\_\_\_\_\_ ŸŸ ´ cos x**

**(73) ~~= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lim~~ x ( )**

**Ä \_**

**~~x~~**

**(52) 5 12 has a remainder of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 6 ƒ (53) The radius of the circle x y 4y = 21 is \_\_\_\_\_ 2 2   (54) Let 3x 23 19. The largest integer x is \_\_\_\_\_\_\_   (55) The 5th pentagonal number is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**(56) How many terms are in the binomial expansion of (3x 5y) ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  7**

**(57) 32 8 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ È È q ‚q**

**(58) The roots of x 8x 17x 10 = 0 are d, e, f. 3 2 qq & Find (d e)(e f)(f d). \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **

**(74) 322 323 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ‚ (75) Let f(x) = (3x 4) . Find f ( 2). \_\_\_\_\_\_\_\_\_\_\_\_\_ q q 2 w  (76) (x 1) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ' 1**

**1**

**q q *dx***

**(77) The slope of the line tangent to y = x x at (1, 0) q 5 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**x   1 q**

**(78) Let f(x) = 2. Find f (3). \_\_\_\_\_\_\_\_\_\_\_\_\_ 3 2 3**

**(79) 14 14 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (mixed number) ‚ q 1417 \*(80) 375 833 555 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ƒ ‚**

**2018-19 TMSCA High School State Meet**

Final \_\_\_\_\_\_ \_\_\_\_\_\_ **Contestant's Number \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_** 2nd

**\_\_\_\_\_\_ \_\_\_\_\_\_** 1st **Read directions carefully DO NOT UNFOLD THIS SHEET Score Initials before beginning test 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) 2019 322 323 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ q q (2) 910 2323 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (3) 411 9 = ƒ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (mixed number) (4) 75 5.6 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ‚ (5) 64% = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (proper fraction) (6) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (proper fraction) 5 3 8 5 q**

**(7) 23 31 39 47 55 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (8) 1441 11 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ƒ (9) 3 23 23 17 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ‚‚ \*(10) 32319 3231 323 32 3 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ q  q (11) 16 8 4 2 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2 ƒq‚ (12) 27 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2 (13) The LCM(70, 84) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (14) The sum of the proper factors of 20 is \_\_\_\_\_\_\_\_\_\_\_ (15) Which is larger or 0.8? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ q q 78 (16) 25% of half ton = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pounds (17) 13 323 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ‚ (18) 9 3 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 1 2 2 3 **

**(19) 1905 5 25 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ‚ q \_\_ \*(20) 323 219 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ‚ (21) 1 3 5 7 ... 23 25 =    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (22) (2 ) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 133**

**(23) 27 31 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2 2 q (24) (3 23 19) 4 has a remainder of \_\_\_\_\_\_\_\_\_\_\_ ‚q ƒ (25) The multiplicative inverse of 2.2 is \_\_\_\_\_\_\_\_\_\_\_\_\_**

**(26) The simple interest on $400.00 for 6 months was $16.00. The annual rate was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_%**

**(27) 0.3232323... = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (proper fraction) (28) 23 base 10 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ base 6 (29) Given: 4, 1, 5, 6, 11, k, 28, 45, ... . k = \_\_\_\_\_\_\_\_\_\_\_ \*(30) 323 2019 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ È ‚**

**(31) How many positive integers less than 28 are relatively prime to 28? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**(32) If x 6 and y = 13, then 4x 4xy y = \_\_\_\_\_\_ œ  2 2**

**(33) 323 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 6 10  (34) If x 18 = 3x and x 0, then x = \_\_\_\_\_\_\_\_\_\_\_\_ ¸ ¸ q **

**(35) Set A has 12 elements, A B has 18 elements, and  A B has 6 elements. Set B has \_\_\_\_\_\_\_\_ elements **

**2018-19 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 it cannot be written as a repeating decimal 23**

**(1) 1,374**

**(2) 3,233**

**(3) 45 23**

**(4) 420**

**(5) 1625**

**(6) 140**

**(7) 195**

**(8) 131**

**(9) 460**

**\*(10) 27,913 30,851 q (11) 24**

**(12) 729**

**(13) 420**

**(14) 22**

**(15) .8, q q 45**

**(16) 250**

**(17) 4,199**

**(18) 13 16**

**(19) 9,500**

**\*(20) 67,201 74,273 q (21) 169**

**(22) , 12 343 19**

**27 27**

**(23) 232 q**

**(24) 2**

**(25) 511**

**(26) 8**

**(27) 3299**

**(28) 35**

**(29) 17**

**\*(30) 34,472 38,100 q (31) 12**

**(32) 625**

**(33) 123**

**(34) 4.5, , 4 9 1**

**2 2**

**(35) 12**

**(36) 18 q**

**(37) 21 q**

**(38) 70**

**(39) 73**

**\*(40) 97 106 q (41) 216**

**(42) 112**

**(43) 32**

**(44) 144**

**(45) 2,525**

**(46) 45,551 (47) 201**

**(48) , 2 7 1**

**3 3**

**(49) 1031**

**\*(50) 140 154 q (51) 0**

**(52) 1**

**(53) 5**

**(54) 2 q**

**(55) 35**

**(56) 8**

**(57) 16 q**

**(58) 126**

**(59) 6,137**

**\*(60) 17,079 18,876 q (61) 12**

**(62) 330**

**(63) 3666**

**(64) 3**

**(65) 1**

**(66) 3**

**(67) 20**

**(68) 26**

**(69) 3**

**\*(70) 2,494 2,756 q (71) 3 q**

**(72) 4**

**(73) 0**

**(74) 104,006**

**(75) 60 q**

**(76) 2 q**

**(77) 4 q**

**(78) 13**

**(79) 2 q 817**

**\*(80) 238 262 q**