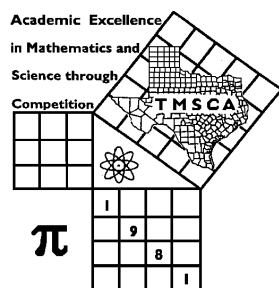


1st Score: _____	2nd Score: _____	3rd Score: _____	<b>Final Score</b>
Grader: _____	Grader: _____	Grader: _____	
Name: _____ School: _____			
SS/ID Number: _____ City: _____			
Grade: 9 10 11 12		Classification: 1A 2A 3A 4A 5A 6A	



**TMSCA HIGH SCHOOL  
NUMBER SENSE  
STATE MEET TEST ©  
MARCH 21, 2015**

**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.

[illegible]

# 2014-15 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!**

- |   |   |
|---|---|
| <p>(1) <math>1421 + 594 =</math> _____</p> <p>(2) <math>2015 - 1693 =</math> _____</p> <p>(3) <math>321 \times 8 =</math> _____</p> <p>(4) <math>2015 \div 4 =</math> _____ (decimal)</p> <p>(5) <math>33^2 =</math> _____</p> <p>(6) <math>3212015 \div 9</math> has a remainder of _____</p> <p>(7) <math>3\frac{1}{2} + 20\frac{1}{5} =</math> _____ (mixed number)</p> <p>(8) <math>3 + 2 \times 1 - 20 \div 15 =</math> _____</p> <p>(9) <math>3\frac{2}{5}\% =</math> _____ (proper fraction)</p> <p>*(10) <math>5102 - 2015 + 321 - 123 =</math> _____</p> <p>(11) <math>7\frac{2}{9} - 5\frac{1}{6} =</math> _____ (mixed number)</p> <p>(12) <math> 3 - 2  - 1 +  2 - 0  +  1 - 5  =</math> _____</p> <p>(13) 64 is _____ % of 96</p> <p>(14) Three-fourths of 2 quarts is _____ fluid ounces</p> <p>(15) <math>9 + 14 + 19 + 24 + \dots + 44 + 49 =</math> _____</p> <p>(16) The GCF of 68, 85, and 102 is _____</p> <p>(17) <math>\frac{15}{22} \times 15 =</math> _____ (mixed number)</p> <p>(18) CCCXIV + VII = _____ (Arabic Number)</p> | <p>(19) <math>253 \times 18 =</math> _____</p> <p>*(20) <math>494 \times 408 =</math> _____</p> <p>(21) <math>6\frac{2}{3} \times 3\frac{1}{3} =</math> _____ (mixed number)</p> <p>(22) The number of positive integral divisors of 160 is _____</p> <p>(23) <math>13^2 + 39^2 =</math> _____</p> <p>(24) If <math>5^2 + 3^3 - 2^5 = 4k</math>, then <math>k^2 =</math> _____</p> <p>(25) <math>3210_4 =</math> _____ <sub>10</sub></p> <p>(26) If 6 ties cost \$28.50 then 8 ties cost \$ _____</p> <p>(27) Find the ratio of the perimeter of an 8" x 10" picture frame to its area. _____</p> <p>(28) Which of the following is an odious number, 63, 31, or 15? _____</p> <p>(29) <math>3212015 \div 11</math> has a remainder of _____</p> <p>*(30) <math>26 \times 64 + 32 \times 52 =</math> _____</p> <p>(31) <math>321_6 + 20_6 - 15_6 =</math> _____ <sub>6</sub></p> <p>(32) <math>3 + 2 + 5 + 7 + 12 + \dots + 81 + 131 =</math> _____</p> <p>(33) How many subsets of the set {p,o,i,n,t} are 2-element or 3-element subsets? _____</p> <p>(34) Given <math>32120 \div 15 = 2141\frac{1}{3}</math>. Find <math>32120 \div 5</math>. _____</p> |
|---|---|

- (35)  $4\frac{3}{8} \div 2\frac{1}{3} =$  \_\_\_\_\_ (mixed number)
- (36) If  $x = 18$  and  $y = 11$  then  $4x^2 - 12xy + 9y^2 =$  \_\_\_\_\_
- (37) 321 base 10 is equivalent to \_\_\_\_\_ base 4
- (38) Truncate  $\sqrt{2} + \sqrt{8}$  to a natural number. \_\_\_\_\_
- (39) If  $x + (x + 5) + (x + 10) + (x + 15) + \dots + (x + 30) = 385$ , then  $(x + 15) =$  \_\_\_\_\_
- \*(40)  $\sqrt{5102123} =$  \_\_\_\_\_
- (41) A triangle has sides of 9,  $x$ , and 13. What is the greatest integral value of  $x$ ? \_\_\_\_\_
- (42)  $20 + 15 + 35 + 50 + 85 + 135 + 220 + 355 =$  \_\_\_\_\_
- (43) If  $11^5 \times 11^6 \div 11^k = 11^4$ , then  $k =$  \_\_\_\_\_
- (44) Find the slope of a line perpendicular to the line containing the points  $(-2, -1)$  and  $(3, 4)$ . \_\_\_\_\_
- (45) 72% of  $833\frac{1}{3} =$  \_\_\_\_\_
- (46) A set containing  $k$  elements has 1023 proper subsets. Find  $k$ . \_\_\_\_\_
- (47) If  $4^{(x+1)} = 8^{(x-1)}$  then  $x =$  \_\_\_\_\_
- (48) If A is 20% more than B and B is 10% less than C, then A is \_\_\_\_\_ % more than C.
- (49)  $321_4 \div 3_4 =$  \_\_\_\_\_ 4
- \*(50)  $271.8 \times (e)^3 =$  \_\_\_\_\_
- (51) If  $\log_x (2744) = 3$  then  $x =$  \_\_\_\_\_
- (52) The point  $(3, 1)$  is reflected across the line  $y = x$  to the point  $(h, k)$ . Find  $k$ . \_\_\_\_\_
- (53)  $6^3 \div 3^3 \times (1.5)^3 =$  \_\_\_\_\_
- (54) If  $y$  varies inversely with  $x$  and  $y = 12$  when  $x = 8$ , find  $x$  when  $y = 4$ . \_\_\_\_\_
- (55)  $13^4 \div 11$  has a remainder of \_\_\_\_\_
- (56) If  $\frac{2x}{7}$  has a remainder of 5 and  $\frac{3y}{7}$  has a remainder of 4 then  $\frac{xy}{7}$  has a remainder of \_\_\_\_\_
- (57)  $\frac{6!}{8!} = \frac{(x-2)!}{x!}$ . Find  $x$ , where  $x < 0$ . \_\_\_\_\_
- (58)  $11 \times \frac{14}{17} =$  \_\_\_\_\_ (mixed number)
- (59)  $215 \times 321 =$  \_\_\_\_\_
- \*(60)  $16^3 \times 8^3 \div 4^3 =$  \_\_\_\_\_
- (61)  $1 - 2\sin^2\left(\frac{2\pi}{3}\right) =$  \_\_\_\_\_
- (62)  $2015_8 =$  \_\_\_\_\_ 2
- (63)  $f(x) = 5x^2 - 7$  and  $g(x) = 4 - 2x$ .  $f(g(3)) =$  \_\_\_\_\_
- (64) If  $\ln(27) = k\ln(3) - 2\ln(3)$ , then  $k =$  \_\_\_\_\_
- (65) How many positive integers less than 63 are relatively prime to 63? \_\_\_\_\_
- (66) Change 0.4666...  $_8$  to a base 10 fraction. \_\_\_\_\_
- (67) The base of a triangle is 16". If the altitude is increased from 10" to 13", the corresponding increase in the area is \_\_\_\_\_ sq. in.
- (68) The determinant of  $\begin{bmatrix} -1 & -6 \\ 3 & 10 \end{bmatrix}$  is \_\_\_\_\_
- (69) The horizontal phase shift of  $f(\theta) = 3\cos(4\pi\theta - 6\pi) + 5$  is \_\_\_\_\_
- \*(70) The volume of a sphere with a diameter of 24 cm is \_\_\_\_\_ cu. cm
- (71)  $F(x) = x^4 + 4x^3 + 6x^2 + 4x + 1$ .  $F'(-1) =$  \_\_\_\_\_
- (72) The Greatest Integer Function is written as  $f(x) = [x]$ . Find  $\left[\sqrt{6} + \sqrt{7}\right]$ . \_\_\_\_\_
- (73) The harmonic mean of the roots of  $x^3 - \frac{13}{12}x^2 - \frac{5}{12}x + \frac{1}{2} = 0$  is \_\_\_\_\_
- (74) If  $f(x) = 5 + \frac{2x}{3}$ , then  $f^{-1}(1) =$  \_\_\_\_\_
- (75)  $\int_{-1}^1 (2 - x^3) dx =$  \_\_\_\_\_
- (76) The third largest *perfect* number is \_\_\_\_\_
- (77)  $0.2353535\dots_6 =$  \_\_\_\_\_  $_6$  (proper fraction)
- (78)  $\text{GCD}(k, 24) = 6$ .  $\text{LCM}(k, 24) = 72$ .  $k =$  \_\_\_\_\_
- (79)  $143 \times 49 = 1001 \times$  \_\_\_\_\_
- \*(80)  $\sqrt[3]{3212015} =$  \_\_\_\_\_

## 2014-15 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) 2,015                           | (19) 4,554               | (35) $1\frac{7}{8}$ | (58) $9\frac{1}{17}$                   |
| (2) 322                             | *(20) 191,475 — 211,629  | (36) 9              | (58) 69,015                            |
| (3) 2,568                           | (21) $22\frac{2}{9}$     | (37) 11001          | *(60) 31,130 — 34,406                  |
| (4) 503.75                          | (22) 12                  | (38) 4              | (61) — .5, — $\frac{1}{2}$             |
| (5) 1,089                           | (23) 1,690               | (39) 55             | (62) 10000001101                       |
| (6) 5                               | (24) 25                  | *(40) 2,146 — 2,371 | (63) 13                                |
| (7) $23\frac{7}{10}$                | (25) 228                 | (41) 21             | (64) 5                                 |
| (8) $\frac{11}{3}, 3\frac{2}{3}$    | (26) \$38.00             | (42) 915            | (65) 36                                |
| (9) $\frac{17}{500}$                | (27) .45, $\frac{9}{20}$ | (43) 7              | (66) $\frac{17}{28}$                   |
| *(10) 3,121 — 3,449                 | (28) 31                  | (44) — 1            | (67) 24                                |
| (11) $2\frac{1}{18}$                | (29) 4                   | (45) 600            | (68) 8                                 |
| (12) 6                              | *(30) 3,162 — 3,494      | (46) 10             | (69) 1.5, $\frac{3}{2}, 1\frac{1}{2}$  |
| (13) $\frac{200}{3}, 66\frac{2}{3}$ | (31) 322                 | (47) 5              | *(70) 6,877 — 7,600                    |
| (14) 48                             | (32) 341                 | (48) 8              | (71) 0                                 |
| (15) 261                            | (33) 20                  | (49) 103            | (72) 5                                 |
| (16) 17                             | (34) 6,424               | *(50) 5,187 — 5,732 | (73) 3.6, $\frac{18}{5}, 3\frac{3}{5}$ |
| (17) $10\frac{5}{22}$               |                          | (51) 14             | (74) — 6                               |
| (18) 321                            |                          | (52) 3              | (75) 4                                 |
|                                     |                          | (53) 27             | (76) 496                               |
|                                     |                          | (54) 24             | (77) $\frac{51}{154}$                  |
|                                     |                          | (55) 5              | (78) 18                                |
|                                     |                          | (56) 1              | (79) 7                                 |
|                                     |                          | (57) — 7            | *(80) 141 — 154                        |