1st Score: _____	2nd Score: _____	3rd Score: _____	**Final Score**
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 TEST 13 (UIL E) ©

MARCH 16, 2019

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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(36) The smaller of two integers whose sum is — 22 and whose product is 72 is _____

(37) If $(4x + 3)(2x — 5) = ax^2 + bx + c$, then $a + b + c$ = _____

(38) $\frac{3}{8}$ is _____ % less than $1\frac{1}{4}$

(39) 323_4 = _____ 8

*(40) $11^4 \div 12^2$ = _____

(41) $(36)^{\frac{3}{2}}$ = _____

(42) The smallest root of $(3x — 1)^2 = \frac{9}{16}$ is _____

(43) The area of a 30-60-90° triangle with a hypotenuse length of 16 cm is $k\sqrt{3}$ cm^2. k = _____

(44) $6! \div 5! \times 4!$ = _____

(45) $34^2 + 37^2$ = _____

(46) 41×1111 = _____

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

(48) If $3^x = 21$, then $3^{(x-2)}$ = _____

(49) $23_4 \times 13_4$ = _____ 4

*(50) 100 miles per hour = _____ feet per second

(51) $(i)^{23} = a\sqrt{b}$, where $a,b \in \{-1, 1\}$. $a — b$ = _____

(52) $5^6 \div 12$ has a remainder of _____

(53) The radius of the circle $x^2 + y^2 + 4y = 21$ is _____

(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) $\sqrt{-32} \times \sqrt{-8}$ = _____

(58) The roots of $x^3 — 8x^2 + 17x — 10 = 0$ are d, e, & f. Find $(d + e)(e + f)(f + d)$. _____

(59) 323×19 = _____

*(60) $\sqrt{323192119}$ = _____

(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 $\frac{5}{13}$ base 9 is 0._____ base 9

(64) The greatest integer function $f(x) = [x + 1]$ has a value of _____ for $f(\sqrt{7})$

(65) Let $f(x) = 9x^2 — 6x + 1$. Find $f(f(\frac{1}{3}))$. _____

(66) If ${}_5P_k = 60$, then k = _____

(67) 68° F = _____° C

(68) $\begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} a & c \\ b & d \end{bmatrix}$. $a + d$ = _____

(69) The sum of the product of the roots taken 4 at a time of $2x^4 — 13x^3 + 28x^2 — 23x + 6 = 0$ is ____

*(70) $1875 \div 0.3125 \times \frac{7}{16}$ = _____

(71) The domain of $y^2 = 9 — x^2$ is $m \leq x \leq n$. m = ___

(72) Find x, $0 \leq x \leq 4$, if $x + 4 \equiv 18 \pmod 5$. _____

(73) $\lim_{x \to \infty} \frac{\cos(x)}{x}$ = _____

(74) 322×323 = _____

(75) Let $f(x) = (3x — 4)^2$. Find $f'(— 2)$. _____

(76) $\int_{-1}^{1} (x — 1)\, dx$ = _____

(77) The slope of the line tangent to $y = x — x^5$ at (1, 0) is _____

(78) Let $f(x) = \frac{3x + 2}{3} + 2$. Find $f^{-1}(3)$. _____

(79) $14 \times \frac{14}{17} — 14$ = _____ (mixed number)

*(80) $375 \div 833 \times 555$ = _____

2018-19 TMSCA High School State Meet

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) $2019 - 322 - 323 =$ _____

(2) $910 + 2323 =$ _____

(3) $411 \div 9 =$ _____ **(mixed number)**

(4) $75 \times 5.6 =$ _____

(5) $64\% =$ _____ **(proper fraction)**

(6) $\frac{5}{8} - \frac{3}{5} =$ _____ **(proper fraction)**

(7) $23 + 31 + 39 + 47 + 55 =$ _____

(8) $1441 \div 11 =$ _____

(9) $3 \times 23 + 23 \times 17 =$ _____

***(10)** $32319 - 3231 + 323 - 32 + 3 =$ _____

(11) $16^2 \div 8 - 4 \times 2 =$ _____

(12) $27^2 =$ _____

(13) The LCM(70, 84) = _____

(14) The sum of the proper factors of 20 is _____

(15) Which is larger $-\frac{7}{8}$ or -0.8? _____

(16) 25% of half ton = _____ pounds

(17) $13 \times 323 =$ _____

(18) $9\frac{1}{2} + 3\frac{2}{3} =$ _____

(19) $1905 \times 5 - 25 =$ _____

***(20)** $323 \times 219 =$ _____

(21) $1 + 3 + 5 + 7 + ... + 23 + 25 =$ _____

(22) $(2\frac{1}{3})^3 =$ _____

(23) $27^2 - 31^2 =$ _____

(24) $(3 \times 23 - 19) \div 4$ has a remainder of _____

(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)** $\sqrt{323} \times 2019 =$ _____

(31) How many positive integers less than 28 are relatively prime to 28? _____

(32) If $x = 6$ and $y = 13$, then $4x^2 + 4xy + y^2 =$ _____

(33) $323_6 =$ _____ 10

(34) If $|x - 18| = 3x$ and $x > 0$, then $x =$ _____

(35) Set A has 12 elements, $A \cup B$ has 18 elements, and $A \cap B$ 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 $\frac{2}{3}$ it cannot be written as a repeating decimal

(1) 1,374

(2) 3,233

(3) $45\frac{2}{3}$

(4) 420

(5) $\frac{16}{25}$

(6) $\frac{1}{40}$

(7) 195

(8) 131

(9) 460

***(10) 27,913 — 30,851**

(11) 24

(12) 729

(13) 420

(14) 22

(15) — .8, — $\frac{4}{5}$

(16) 250

(17) 4,199

(18) $13\frac{1}{6}$

(19) 9,500

***(20) 67,201 — 74,273**

(21) 169

(22) $\frac{343}{27}$, $12\frac{19}{27}$

(23) — 232

(24) 2

(25) $\frac{5}{11}$

(26) 8

(27) $\frac{32}{99}$

(28) 35

(29) 17

***(30) 34,472 — 38,100**

(31) 12

(32) 625

(33) 123

(34) 4.5, $\frac{9}{2}$, $4\frac{1}{2}$

(35) 12

(36) — 18

(37) — 21

(38) 70

(39) 73

***(40) 97 — 106**

(41) 216

(42) $\frac{1}{12}$

(43) 32

(44) 144

(45) 2,525

(46) 45,551

(47) 201

(48) $\frac{7}{3}$, $2\frac{1}{3}$

(49) 1031

***(50) 140 — 154**

(51) 0

(52) 1

(53) 5

(54) — 2

(55) 35

(56) 8

(57) — 16

(58) 126

(59) 6,137

***(60) 17,079 — 18,876**

(61) 12

(62) 330

(63) 3666

(64) 3

(65) 1

(66) 3

(67) 20

(68) 26

(69) 3

***(70) 2,494 — 2,756**

(71) — 3

(72) 4

(73) 0

(74) 104,006

(75) — 60

(76) — 2

(77) — 4

(78) $\frac{1}{3}$

(79) $-2\frac{8}{17}$

***(80) 238 — 262**