Academic Excellence in Mathematics and Science through Competition

TMSCA MIDDLE SCHOOL
NUMBER SENSE
REGIONAL TEST©
MARCH 3, 2018

GENERAL DIRECTIONS

1. Write only the requested information on this coversheet. 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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2017-2018 TMSCA Middle School Number Sense Regional Qualifier

(1) $1800 - 443 =$ _____

(2) $63 \times 6 =$ _____

(3) $95 \times 25 =$ _____

(4) $13 \times 47 =$ _____

(5) $0.85 =$ _____ (fraction)

(6) $16\frac{1}{4}\% =$ _____ (fraction)

(7) $\frac{7}{11} + \frac{2}{9} =$ _____ (fraction)

(8) $6 \times 5 \times 4 \times 3 \times 2 \times 1 =$ _____

(9) $\frac{3}{11} \times 77 =$ _____

*(10) $317 - 713 + 1375 =$ _____

(11) Which of the following is greater 0.45 or $\frac{4}{9}$? _____

(12) $97 \times 92 =$ _____

(13) $16 \times 42 + 22 \times 42 =$ _____

(14) $2 + 4 + 6 + \ldots + 120 =$ _____

(15) $64^2 =$ _____

(16) The mean of 14, 23, and _____ is 23.

(17) $123 \div 8 - 5 - 43 \div 8 =$ _____

(18) $77 \times 45 - 32 \times 45 =$ _____

(19) $0.25 + \frac{5}{8} =$ _____ (fraction)

*(20) $93741 \div 468 =$ _____

(21) $6\frac{1}{7} \times 14 =$ _____

(22) The GCD of 18 and 63 is _____

(23) $163 \div 8 =$ _____ (decimal)

(24) $634 \times 111 =$ _____

(25) The largest prime divisor of 124 is _____

(26) The product of the additive inverse of 12 and the multiplicative inverse of 12 is _____

(27) The remainder when 4732 is divided by 9 is _____

(28) How many integers between 50 and 150 are the square of an integer? _____

(29) $18^2 + 54^2 - (18^2 + 36^2) =$ _____

*(30) $85^2 + 90^2 + 95^2 =$ _____

(31) 34 yards = _____ inches

(32) 88 has how many positive integral divisors? _____

(33) The sum of the distinct prime divisors of 56 is _____

(34) If 4 donuts cost $4.25, then a dozen donuts cost $ _____

(35) The area of a rectangle with width 20 and length 20% greater than the width is _____

(36) $16\frac{2}{3} \times 96 =$ _____

(37) If $x + (x + 5) + (x + 10) = 150$, then $x + 5 =$ _____

(38) $4225 = 61 \times 69 +$ _____

(39) $\frac{8}{15} + \frac{15}{8} =$ _____ (mixed number)

*(40) 44% of (749×869) is _____

(41) The measure of an exterior angle in a regular heptagon is _____ °

(42) Find the hypotenuse of a right triangle with legs 10 and 24. _____

(43) A set with 10 elements has how many 3-element subsets?_____

(44) The sum of the interior angles in a nonagon is _____°

(45) If $1 + 2 + 3 + 4 + ... + 35 = 9k$, then k =_____

(46) $12^3 =$_____

(47) If $2x + 1 = 14$, then $(2x)(2x + 2) =$_____

(48) $88^2 + 72^2 =$_____

(49) How many triangles can be drawn using any three vertices of a pentagon? _____

*(50) $428571 \times 489 =$ _____

(51) $23 \times \dfrac{23}{27} =$_____ (mixed number)

(52) The area of an equilateral triangle with height $9\sqrt{3}$ is $k\sqrt{3}$, k = _____

(53) $x^2 \le 70$ has how many integer solutions?_____

(54) If $f(x) = 9x + 32$, then $f(159) - f(49) =$_____

(55) Find the remainder of $13^{11} \div 14$. _____

(56) $31_4 =$ _____ ₂

(57) $9\sqrt{12} \times 4\sqrt{3} =$_____

(58) The 11th triangular number is how much greater than the 9th triangular number? _____

(59) If $16 \times 27 + 16k = 256$, then k = _____

*(60) $104 \times 105 \times 109 =$_____

(61) Find the slope of a line perpendicular to a line with x-intercept 4 and y-intercept – 3. _____

(62) $\left(43_9\right)^2 =$_____ ₉

(63) $0.85555... =$ _____ (fraction)

(64) If there are 2 right angles in a pentagon with 3 other equal angles of measure x°, then x =_____

(65) $96 \times 108 =$ _____

(66) The length of the side of a rhombus with diagonals 24 and 32 is_____

(67) The length, *l*, width, *w*, and height, *h*, of a rectangular solid form an arithmetic sequence, *w*= 7 and the volume is 1155, then $h + l =$_____

(68) If p, q, and r are roots of $2x^3 + 5x^2 + 14x + 13=0$, then p+q+r + pqr = _____

(69) The sum of the infinite geometric series, $36 + 12 + 4 + ... =$ _____

*(70) A 105-sided regular polygon has k distinct diagonals, k = _____

(71) The function $f(x) = 4x^2 - 11x + 13$, has how many real roots?_____

(72) If set A = {p,e,r,k,i,n,s} and set B = {c,a,m,p,s}, then $A \cup B$ has ____ elements

(73) If $f(x) = x^3 - 3x^2 + 3x - 1$, then $f(8) =$ _____

(74) The x^2 coefficient of $(4x^2 + 3x - 5)(x^2 + x + 2)$ is _____

(75) If $f(x) = 3(x + 4)^2 + 11$, then $f(x + 2) + 5$ will have vertex (h, k). $h + k =$_____

(76) If $17^2 + k^2 = (k + 1)^2$ and k > 0, then k = _____

(77) $989^2 =$_____

(78) How many integers between 3 and 24 are relatively prime to 24?_____

(79) The constant term of $\dfrac{(n + 7)!}{(n + 4)!}$ is _____

*(80) A cone with a height of 20 and radius 9 has a volume of_____

2017-2018 TMSCA Middle School Number Sense Regional Qualifier Key

(1) 1357

(2) 378

(3) 2375

(4) 611

(5) $\frac{17}{20}$

(6) $\frac{13}{80}$

(7) $\frac{85}{99}$

(8) 720

(9) 21

*(10) 931 – 1027

(11) .45

(12) 8924

(13) 1596

(14) 3660

(15) 4096

(16) 32

(17) 5

(18) 2025

(19) $\frac{7}{8}$

*(20) 191 – 210

(21) 86

(22) 9

(23) 20.375

(24) 70374

(25) 31

(26) – 1

(27) 7

(28) 5

(29) 1620

*(30) 23133 – 25567

(31) 1224

(32) 8

(33) 9

(34) 12.75

(35) 480

(36) 1600

(37) 50

(38) 16

(39) $2\frac{49}{120}$

*(40) 272069 – 300707

(41) $\frac{360}{7}$ or $51\frac{3}{7}$

(42) 26

(43) 120

(44) 1260

(45) 70

(46) 1728

(47) 195

(48) 12928

(49) 10

*(50) 199092659 - 220049780

(51) $19\frac{16}{27}$

(52) 81

(53) 17

(54) 990

(55) 13

(56) 1101

(57) 216

(58) 21

(59) – 11

*(60) 1130766 – 1249794

(61) $-\frac{4}{3}$ or $-1\frac{1}{3}$

(62) 2070

(63) $\frac{77}{90}$

(64) 120

(65) 10368

(66) 20

(67) 26

(68) – 9

(69) 54

*(70) 5088 – 5622

(71) 0

(72) 10

(73) 343

(74) 6

(75) 10

(76) 144

(77) 978121

(78) 7

(79) 210

*(80) 1612 – 1781