T M S C A M I D D L E S C H O O L
M A T H E M A T I C S
T E S T # 1 0 ©
F E B R U A R Y 7 , 2 0 1 5

GENERAL DIRECTIONS

1. About this test:
   A. You will be given 40 minutes to take this test.
   B. There are 50 problems on this test.
2. All answers must be written on the answer sheet/Scantron form/Chatsworth card provided. If you are using an answer sheet be sure to use **BLOCK CAPITAL LETTERS**. Clean erasures are necessary for accurate grading.
3. If using a scantron answer form be sure to correctly denote the number of problems not attempted.
4. You may write anywhere on the test itself. You must write only answers on the answer sheet.
5. You may use additional scratch paper provided by the contest director.
6. All problems have **ONE** and **ONLY ONE** correct [BEST] answer. There is a penalty for all incorrect answers.
7. Calculators **MAY NOT** be used on this test.
8. All problems answered correctly are worth **FIVE** points. **TWO** points will be deducted for all problems answered incorrectly. No points will be added or subtracted for problems not answered.
9. In case of ties, percent accuracy will be used as a tie breaker.

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2014-2015 TMSCA Middle School Mathematics Test #10

1. $912 - 367 - 179 =$ _____

A. 366 B. 367 C. 566 D. 365 E. 364

2. $15\frac{2}{5} + 4\frac{7}{10} + 5\frac{11}{20} =$ _____

A. $24\frac{17}{20}$ B. $24\frac{19}{20}$ C. $24\frac{9}{20}$ D. $25\frac{13}{20}$ E. $25\frac{17}{20}$

3. $1.2 \cdot 3.5 \cdot 4.7 =$ _____

A. 19.37 B. 19.54 C. 19.24 D. 19.62 E. 19.74

4. $348 \div 4 \div 29 =$ _____

A. 1 B. 2 C. 3 D. 4 E. 5

5. What number is five more than the reciprocal of the number $2\frac{2}{3}$?

A. $7\frac{2}{3}$ B. $5\frac{3}{8}$ C. $7\frac{3}{8}$ D. $5\frac{1}{3}$ E. $5\frac{8}{3}$

6. A triangle has side lengths of 4, 6, and 8 inches. If each side is dilated by a scale factor of ¼, what is the triangle's new perimeter?

A. 5 inches B. 5.5 inches C. 4.5 inches D. 4 inches E. 6 inches

7. 8.5×10^7 millimeters = _____ kilometers

A. 8.5 B. 85 C. 850 D. 8,500 E. 0.85

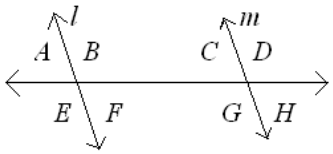
8. $245 \cdot 124 - 30{,}080 =$ _____ (Roman numeral)

A. *MCXL* B. *LXXX* C. *CCXC* D. *CCC* E. *CCD*

9. 36 is 12% of what number?

A. 300 B. 240 C. 320 D. 432 E. 280

10. Line *l* and line *m* are parallel in the picture below. Which of the following pairs of angle sum to 180°?



A. $\angle A$ & $\angle F$ B. $\angle C$ & $\angle F$ C. $\angle F$ & $\angle G$ D. $\angle D$ & $\angle E$ E. $\angle E$ & $\angle G$

11. 5 gallons = _____ cubic inches

A. 1,165 B. 1,155 C. 5,280 D. 1,760 E. 1,125

12. What is the product of the GCF of 24 and 36 and the LCM of 18 and 24?

A. 648 B. 1,224 C. 432 D. 864 E. 1,296

13. Simplify: $3(4m + 3n - 8) - 2(4m - 2n - 12)$

A. $4m + 13n - 48$ B. $4m + 13n$ C. $m + 10n - 19$ D. $m + 4n + 19$ E. $m + 10n$

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14. The prime factorization of the number 1,200 is $2^a \cdot 3^b \cdot 5^c$. What is the sum of $a + b + c$?
A. 6 B. 7 C. 10 D. 11 E. 9

15. The point (5, -7) is reflected over the vertical line with the equation $x = 2$. What are the new coordinates of the point?
A. (-1, -7) B. (8, -7) C. (5, -2) D. (5, -12) E. (-1, -12)

16. Clinton can eat four hotdogs in fifteen minutes. How many hotdogs can Clinton eat in five and one-half hours?
A. 44 B. 64 C. 84 D. 88 E. 96

17. Seven friends meet at the local hangout. Each of them gives everyone else a high five exactly one time. How many high fives will occur?
A. 42 B. 21 C. 18 D. 24 E. 15

18. Let $a \☺ b = a + b + 2ab$. If $a \☺ 3 = 31$, what is the value of a?
A. 7 B. 8 C. 4 D. 2 E. 5

19. What is the product of all the integers from -5 to 6, inclusive?
A. -30 B. -86,400 C. 720 D. 1 E. 0

20. The ratio of the measures of two complementary angles is 7:8. What is the measure of the larger angle?
A. 56° B. 49° C. 48° D. 42° E. 36°

21. What is the range of the following set of number? $\frac{2}{3}, \frac{4}{5}, \frac{1}{8}, \frac{1}{3}, \frac{3}{8}$
A. $\frac{27}{40}$ B. $\frac{13}{24}$ C. $\frac{1}{4}$ D. $\frac{31}{40}$ E. $\frac{5}{24}$

22. The odds of it raining today are 2:3. What is the probability of it not raining today?
A. $33\frac{1}{3}\%$ B. 60% C. 40% D. 20% E. $66\frac{2}{3}\%$

23. Find the arithmetic mean of the set of numbers {12, 56, 84, 122, 10, 4}.
A. 48 B. 52 C. 64 D. 54 E. 56

24. If $3x - 11 = -59$, then $4x - 7 =$ _____.
A. -16 B. -71 C. -64 D. -57 E. -23

25. The set {a, f, r, t, g, y} has _____ subsets.
A. 64 B. 32 C. 128 D. 16 E. 48

26. What is the percent decrease if 16 changes to 12?
A. 35% B. 40% C. 45% D. 30% E. 25%

27. $4\sqrt{40} =$ _____
A. $6\sqrt{10}$ B. $8\sqrt{10}$ C. $40\sqrt{4}$ D. $6\sqrt{6}$ E. $40\sqrt{2}$

28. $1201_3 - 21_3 - 12_3 =$ _____$_3$
A. 313 B. 121 C. 1021 D. 1201 E. 2101

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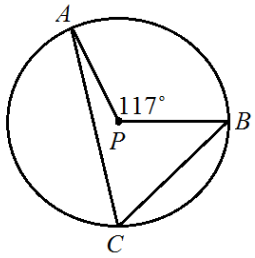
29. Using the picture below, the measure of $\angle ACB$ is equal to _____° ?



A. 29.25 B. 234 C. 58.5 D. 29.5 E. 39

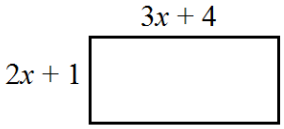
30. An exterior angle measure of a regular 16-sided polygon is equal to _____°.
A. 157.5 B. 67.5 C. 22.5 D. 16.5 E. 34.5

31. What is the 41st term in the following sequence? -23, -19, -15, -11, …
A. 137 B. 161 C. 141 D. 145 E. 149

32. What is the sum of the first and third quartiles of the data set {120, 124, 136, 136, 154}?
A. 134 B. 267 C. 256 D. 312 E. 136

33. How much will be in a bank account after depositing $3,500 at 4% for one year simple interest)?
A. $140 B. $3,514 C. $3,640 D. $3,780 E. $4,900

34. Using the rectangle below, if each side were to be tripled, the new perimeter would be equal to _____ units.



A. $15x + 15$ B. $30x + 30$ C. $6x^2 + 11x + 4$ D. $18x^2 + 33x + 12$ E. $125x + 125$

35. If y varies inversely with x, and $y = 7$ when $x = 6$, find the value of y when $x = 4$?
A. 10.5 B. 5 C. 3 D. 12.8 E. 6.5

36. How many permutations can be made using 5 items taken 3 at a time?
A. 20 B. 60 C. 40 D. 80 E. 120

37. $2x^6 - 32x^2$, when factored completely, has _____ factors.
A. 1 B. 2 C. 3 D. 4 E. 5

38. The area of a square with a side length of $(4x + 5)$ meters long is equal to _____ meters^2.
A. $8x + 10$ B. $16x + 20$ C. $16x^2 + 40x + 25$ D. $16x^2 + 25$ E. $16x^2 + 20x + 25$

39. What is the growth rate in the exponential growth function $f(x) = 45\left(\frac{8}{5}\right)^x$?
A. 60% B. 160% C. 45% D. 145% E. 240%

40. Calculate the mean absolute deviation for the data set 12, 20, 33, 35 and 40.
A. 28 B. 9.6 C. 12.2 D. 10.8 E. 13.4

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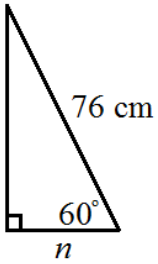
41. What is the area of a hexagon with its vertices located at (-3, 0), (-1, -2), (2, -2), (4, 0), (2, 2) and (0, 3)?

A. 21.5 units^2 B. 24 units^2 C. 24.5 units^2 D. 43 units^2 E. 41 units^2

42. What is the measure of *n* in the picture below?



A. $38\sqrt{3}$ cm B. $76\sqrt{3}$ cm C. $76\sqrt{2}$ cm D. 38 cm E. $38\sqrt{2}$ cm

43. In a bag, there are 5 red marbles and 15 blue marbles. Two marbles are randomly selected from the bag without replacement. What is the probability of having drawn a red marble and then a blue marble?

A. $\frac{15}{76}$ B. $\frac{3}{16}$ C. $\frac{3}{8}$ D. $\frac{76}{79}$ E. $\frac{3}{32}$

44. What is the unit's digit of 8^{13}?

A. 2 B. 4 C. 6 D. 8 E. 1

45. Letting $\pi = 3$, what is the circumference of a circle with the equation $(x - 9)^2 + (y + 3)^2 = 361$?

A. 38 units B. 76 units C. 228 units D. 176 units E. 114 units

46. Simplify: $27^{\frac{4}{6}}$

A. ⅓ B. 3 C. 54 D. ⅔ E. 9

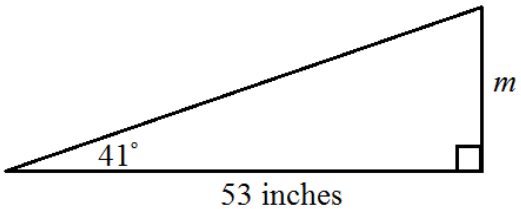
47. If $a + b = 12$ and $a - b = 24$, what is the product of *a* and *b*?

A. -108 B. -36 C. -144 D. -288 E. -120

48. If $f(x) = 2(x - 3a)^2$, find $2f(5a)$.

A. $2a^2$ B. $4a^2$ C. $8a^2$ D. $16a^2$ E. $32a^2$

49. Which equation below can be used to find the measure of *m*?



A. $\tan(41) = \frac{m}{53}$ B. $\sin(41) = \frac{m}{53}$ C. $\sin(53) = \frac{41}{m}$ D. $\cos(41) = \frac{53}{m}$ E. $\tan(53) = \frac{m}{41}$

50. Simplify by rationalizing the denominator: $\frac{1}{6-\sqrt{5}}$

A. $\frac{6-\sqrt{5}}{31}$ B. $\frac{1}{6+\sqrt{5}}$ C. $\frac{6+\sqrt{5}}{6-\sqrt{5}}$ D. $\frac{6+\sqrt{5}}{31}$ E. $\frac{6-\sqrt{5}}{31-12\sqrt{5}}$

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2014-2015 TMSCA Middle School Mathematics Test #10 Answer Key

1. A
2. D
3. E
4. C
5. B
6. C
7. B
8. D
9. A
10. C
11. B
12. D
13. B
14. B
15. A
16. D
17. B
18. C
19. E
20. C
21. A
22. B
23. A
24. B
25. A
26. E
27. B
28. C
29. C
30. C
31. A
32. B
33. C
34. B
35. A
36. B
37. D
38. C
39. A
40. B
41. A
42. D
43. A
44. D
45. E
46. E
47. A
48. D
49. A
50. D

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2014-2015 TMSCA Middle School Mathematics Test #10 Selected Answers

7. 8.5×10^7 millimeters = 85,000,000 millimeters. Since 1 kilometer is equal to 1,000,000 millimeters, 85,000,000= 85 kilometers.

19. The product of all the integers from -5 to 6, inclusive, is equal to $-5 \cdot -4 \cdot -3 \cdot -2 \cdot -1 \cdot 0 \cdot 1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 = 0$.

20. The ratio of the measures of two complementary angles is 7:8. This means that $7x + 8x = 180$, which is the same as $15x = 90$. After dividing both sides by 15, $x = 6$. Now, to find the larger angle, multiply 8 by 6 and the larger angle is equal to 48°.

37. $2x^6 - 32x^2 = 2x^2(x^4 - 16) = 2x^2(x^2 + 4)(x^2 - 4) = 2x^2(x^2 + 4)(x + 2)(x - 2)$. Therefore, there are four factors of $2x^6 - 32x^2$.

39. The growth factor is $\frac{8}{5} = 1\frac{3}{6} = 1.6$. To find the growth rate, subtract 1 from the growth factor and then multiply that decimal by 100. $1.6 - 1 = 0.6$. $0.6 \cdot 100 = 60\%$.

46. $27^{\frac{4}{6}} = 27^{\frac{2}{3}} = (\sqrt[3]{27})^2 = 3^2 = 9$.

50. To simplify $\frac{1}{6-\sqrt{5}}$, use the conjugate of the denominator, which is $6 + \sqrt{5}$.
$\frac{1}{6-\sqrt{5}} \cdot \frac{6+\sqrt{5}}{6+\sqrt{5}} = \frac{6+\sqrt{5}}{36-6\sqrt{5}+6\sqrt{5}-5} = \frac{6+\sqrt{5}}{36-5} = \frac{6+\sqrt{5}}{31}$.

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