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 4 ©

M A R C H 5 , 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 #14

1. 6,129,456 + 19,123,887 = _____(nearest hundred)

A. 25,000,000 B. 25,253,000 C. 25,253,400 D. 25,253,300 E. 25,253,340

2. 1,007 – 749 = _____(nearest ten)

A. 240 B. 250 C. 260 D. 270 E. 280

3. $14\frac{2}{3} \cdot 21\frac{1}{2}$ = _____(decimal)

A. 315.3 B. $315.\overline{3}$ C. 315.6 D. $315.\overline{6}$ E. 315.31

4. $25\frac{5}{6} \div 12\frac{1}{2} =$ _____

A. $2\frac{1}{15}$ B. $2\frac{1}{3}$ C. $2\frac{1}{5}$ D. $2\frac{1}{4}$ E. $2\frac{3}{4}$

5. Which of the following is not an irrational number?

A. $\sqrt{5}$ B. π C. $\frac{\pi}{2}$ D. 0.02022022202222… E. $-\sqrt{36}$

6. 34 is 2% of what number?

A. 1,500 B. 1,700 C. 1,450 D. 1,550 E. 1,600

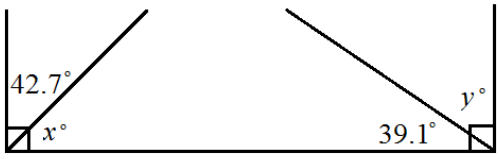
7. \$124.78 = 128 pennies + 74 nickels + 328 dimes + _____ quarters

A. 87 B. 128 C. 348 D. 478 E. 398

8. Shawn and Lidia want to watch two movies. Shawn's pick will last 2.4 hours and Lidia's movie pick will last 3 ¼ hours. If they watch both movies, how many minutes total will the movies last?

A. 315 B. 339 C. 342 D. 355 E. 346

9. Using the picture below, what is the sum of *x* and *y*?



A. 98.2 B. 86.4 C. 81.8 D. 104.6 E. 96.3

10. What is the remainder when the number 453,112,873 is divided by 9?

A. 6 B. 7 C. 8 D. 5 E. 1

11. How many digits will be before the decimal if the number 5.34×10^8 is written out in standard form?

A. 6 B. 8 C. 9 D. 10 E. 11

12. 564 + 811 – 745 = _____ (Roman Numeral)

A. *CDXXX* B. *DCXXL* C. *DCXXX* D. *DCXXVIII* E. *CDXIX*

13. 540 decimeters = _____ millimeters

A. 5.4 B. 0.54 C. 5,400 D. 54,000 E. 540,000

14. What is the sum of the GCF of 45 and 900 and the LCM of 60 and 90?
A. 225 B. 180 C. 720 D. 375 E. 930

15. The base of a prism has 18 sides. What is the sum of the number of faces, vertices and edges of the prism?
A. 90 B. 110 C. 100 D. 120 E. 108

16. Becky has a bag of one-lettered tiles labeled *A, B, C, D, E* and *F* on them. How many different groups of three tiles could be selected?
A. 40 B. 18 C. 120 D. 20 E. 36

17. The number 400 has how many positive integral divisors?
A. 8 B. 10 C. 15 D. 18 E. 24

18. Find the percent of decrease if 80 changes to 50.
A. 27.5% B. 40% C. 32.5% D. 32.5% E. 37.5%

19. If you have a pair of dice, one green and one blue, and you roll them, what is the probability of getting a green 6 and a blue odd number (in ratio form)?
A. 1:6 B. 5:6 C. 1:12 D. 1:8 E. 1:9

20. Find the sum of $54 + 56 + 58 + \ldots + 70 + 72 + 74$.
A. 632 B. 630 C. 700 D. 704 E. 716

21. If the point (-9, -5) is reflected over the *y*-axis and then rotated 180° counter-clockwise about the origin, what are its new coordinates?
A. (5, -9) B. (-5, 9) C. (9, -5) D. (-9, -5) E. (-9, 5)

22. How many proper subsets can be formed from {3, 4, 5, 6, 11, 13, 12}?
A. 124 B. 255 C. 512 D. 127 E. 65

23. *SubWorks* offers a choice of white, wheat or rye bread, chicken, turkey or pastrami and either mustard or mayonnaise and then five choices of vegetables. If Billy wants to order a sandwich, he must choose one bread, one meat, one condiment and two different vegetables. How many sandwich combinations can he choose from?
A. 540 B. 224 C. 360 D. 480 E. 180

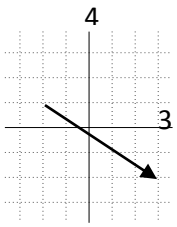
24. $12_4 + 43_6 = 4_5 + \_\_\_\_\_{}_7$
A. 41 B. 43 C. 51 D. 25 E. 35

25. What is the sum of the coordinates of the midpoint between the two points (18.4, 2.6) and (33.6, -5.4)?
A. 26 units B. 24.6 units C. 30 units D. 22.4 units E. 26.4 units

26. Simplify: $-3|-4-6+3^2|-5(7-11)+8^0$
A. 18 B. -34 C. -15 D. 15 E. 6

27. What is the surface area of a hemisphere with a radius of 8 inches, letting $\pi = 3$?
A. 192 in^2 B. 384 in^2 C. 576 in^2 D. 640 in^2 E. 288 in^2

28. What is the range of the graph below?



A. $y < 2$ B. $y > 2$ C. $-2 \leq y \leq 1$ D. $y \leq 1$ E. $y \geq -2$

29. Find the measure of $\overline{XY}$, if $\Delta ABC \sim \Delta XYZ$, $\overline{AB} = 12, \overline{BC} = 30$ and $\overline{YZ} = 7.5$.
A. 4 B. 3 C. 6 D. 5 E. 8

30. What is the length of the diameter of a circle that has an area of 16.81π cm^2?
A. 8.2 cm B. 4.9 cm C. 9.8 cm D. 9.2 cm E. 8.4 cm

31. A swimming pool holds 27,000 gallons. If the sun is evaporating the water by one-third of the remaining amount every 2 days, how many gallons will the pool have lost after the first 4 days?
A. 18,000 B. 12,000 C. 8,000 D. 15,000 E. 9,000

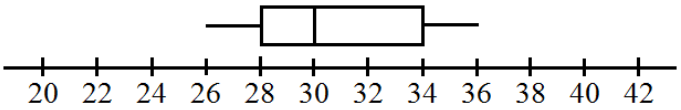
32. Yanoo deposited \$100 into a simple interest bank account at 5%, eight years ago. If she takes her interest she has acquired and deposits that amount into a simple interest account at 3% for five more years, how much interest will she make in her new account?
A. \$9.00 B. \$8.00 C. \$6.00 D. \$4.00 E. \$7.00

33. If $f(x) = 4x - x^2$ and $g(x) = \frac{1}{2}x^2 + 8$, find the value of $\frac{1}{4} f(6) + \frac{1}{2} g(4)$.
A. 5 B. 16 C. 11 D. 15 E. 3

34. Which of the following is two-tenths more than the mean absolute deviation of the data set 72, 74, 80, 19 and 45?
A. 20.8 B. 26.4 C. 24 D. 30 E. 21

35. Change the linear equation $y = -\frac{4}{7}x - 2$ into standard form.
A. $4x - 7y = -2$ B. $4x + 7y = -2$ C. $4x - 7y = 8$ D. $4x + 7y = -8$ E. $4x + 7y = -14$

36. Using the box-and-whisker plot below, what is the lower limit for outliers?



A. 26 B. 20 C. 19 D. 23 E. 0

37. What is the unit's digit of 7^{13}?
A. 1 B. 3 C. 7 D. 9 E. 0

38. Find n, if $\left(\sqrt[3]{4}\right)^6 = 2^n$.
A. -2 B. 3 C. ¾ D. ¼ E. 4

39. What is the growth rate of the exponential growth function $f(x) = \frac{3}{2}\left(\frac{9}{4}\right)^x$?
A. 2.25% B. 225% C. 25% D. 125% E. 75%

40. What is the area of a polygon with its vertices located at (-4, -1), (-1, -3), (-1, -5), (2, -3), (4, 0) and (0, 5)?
A. 39 units^2 B. 72 units^2 C. 45 units^2 D. 41 units^2 E. 19 units^2

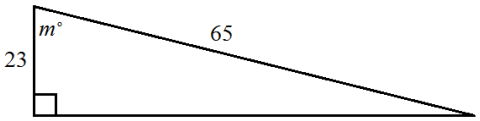
41. $(\sqrt{4}+2)(\sqrt{2}+4) =$ _____
A. $20\sqrt{2}$ B. $16+4\sqrt{2}$ C. $16+2\sqrt{2}$ D. $20+4\sqrt{2}$ E. $20+2\sqrt{2}$

42. When solving the following quadratic equation by completing the square, what would you add to both sides of the equal sign? $5x^2 + 6x +$ _____ $= 7 +$ _____
A. $\frac{6}{5}$ B. $\frac{7}{5}$ C. $\frac{49}{25}$ D. $\frac{36}{49}$ E. $\frac{9}{5}$

43. In a 45-45-90 right triangle, if the measure of the hypotenuse is 8 cm, what is the measure of one of its legs?
A. $8\sqrt{2}$ cm B. 4 cm C. $2\sqrt{2}$ cm D. $4\sqrt{2}$ cm E. $8\sqrt{3}$ cm

44. Find the distance between the two points (7, 2) and (2, -10).
A. 12 units B. 13 units C. 7 units D. 8 units E. 18 units

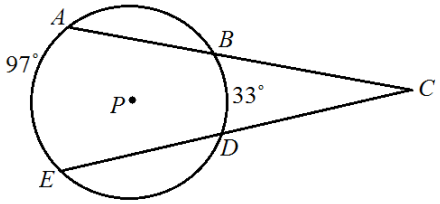
45. Which expression below could be used to find the measure of $\angle m$?



A. $cos^{-1}\left(\frac{23}{65}\right)$ B. $sin^{-1}\left(\frac{23}{65}\right)$ C. $tan^{-1}\left(\frac{65}{23}\right)$ D. $tan^{-1}\left(\frac{23}{65}\right)$ E. $cos^{-1}\left(\frac{42}{65}\right)$

46. Jamie has 47 coins consisting of quarters and dimes. If the total value of his coins is $6.95, how many more dimes than quarters does Jamie have?
A. 16 B. 17 C. 12 D. 15 E. 30

47. Using the picture of $\odot P$ below, arc AE $= 97^\circ$ and arc BD $= 33^\circ$, what is the measure of $\angle BCD$?



A. 16.5° B. 97° C. 48.5° D. 66° E. 32°

48. Simplify: $\frac{n^3-1}{n^2-1} \cdot \frac{3n+3}{2n^2+2n+2}$
A. 1.5 B. $0.\overline{6}$ C. $\frac{n+1}{n-1}$ D. $\frac{n^2+n+1}{3}$ E. $1.5(n-1)$

49. Let the vertex of the quadratic equation $y = 3x^2 + 6x + 4$ be (a, b). If the vertex is translated to the right eight units and then down six units, what are the new coordinates of the vertex?
A. (-9, 5) B. (-9, -3) C. (7, -5) D. (-7, 9) E. (-1, 1)

50. Which of the following is equivalent to $\frac{15}{5-\sqrt{5}}$?
A. $\frac{15-3\sqrt{5}}{4}$ B. $\frac{75+3\sqrt{5}}{20}$ C. $\frac{75-3\sqrt{5}}{20}$ D. $\frac{15+3\sqrt{5}}{4}$ E. $\frac{15+15\sqrt{5}}{4}$

2014-2015 TMSCA Middle School Mathematics Test #14 Answer Key

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

2014-2015 TMSCA Middle School Mathematics Test #14 Selected Answers

18. $\frac{80-50}{80} = \frac{30}{80} = \frac{3}{8} = 0.375 = 37.5\%$ decrease.

22. The number of proper subsets can be found by $2^n - 1$, where *n* is equal to the number of elements in the set. We are given the set {3, 4, 5, 6, 11, 13, 12}, which has 7 elements. Therefore, the number of proper subsets is equal to $2^7 - 1 = 127$.

29. Since $\Delta ABC \sim \Delta XYZ$, the sides of the two triangles are proportional. Now, create a proportion using the corresponding sides and solve. $\frac{AB}{BC} = \frac{XY}{YZ} \rightarrow \frac{12}{30} = \frac{n}{7.5} \rightarrow \frac{2}{5} = \frac{n}{7.5} \rightarrow 5n = 15 \rightarrow n = 3$. Therefore, $\overline{XY} = 3$.

35. Remember, standard form of a linear equation is $Ax + By = C$. To change the linear equation $y = -\frac{4}{7}x - 2$ into standard form, first multiply all by 7. $7\left(y = -\frac{4}{7}x - 2\right) = 7y = -4x - 14$. Now, add $4x$ to both sides to get the standard form equation $4x + 7y = -14$.

36. To find the lower limit for outliers in a box-and-whisker plot, find the inter-quartile range and multiply it by 1.5 and subtract it from the lower quartile. In the picture given, the inter-quartile range is 34 – 28 = 6. 1.5 times 6 = 9. The lower quartile is 28, so 28 – 9 = 19, which is the lower limit for finding outliers in the given box-and-whisker plot.

41. $\left(\sqrt{4}+2\right)\left(\sqrt{2}+4\right) = (2+2)\left(\sqrt{2}+4\right) = 4\left(\sqrt{2}+4\right) = 4\sqrt{2}+16 = 16+4\sqrt{2}$.

48. $\frac{n^3-1}{n^2-1} \cdot \frac{3n+3}{2n^2+2n+2} = \frac{\cancel{(n-1)}(n^2+n+1)}{\cancel{(n-1)}(n+1)} \cdot \frac{3\cancel{(n+1)}}{2\cancel{(n^2+n+1)}} = \frac{3}{2} = 1.5$.