



**MONTANA COUNCIL OF TEACHERS OF MATHEMATICS**  
**2014 MATH CONTEST**  
**TEAM 9-10**

**DIRECTIONS: DO NOT WRITE ON THIS TEST. Place the best answer for each question on the separate answer sheet.**

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- The inlet pipe on a water tank can fill the tank in 8 hours. When the tank was full the inlet pipe was open letting water in and at the same time the drain pipe was open letting water out. 24 hours later the tank was empty. How many hours would it take to empty a full tank if only the drain pipe were open?  
A. 6 hours      B. 12 hours      C. 9 hours      D. 10 hours      E. none of these
- The stop sign at the corner of 10<sup>th</sup> and 15<sup>th</sup> is in the shape of a regular octagon. The length of a side of the octagon is 16 inches. If the stop sign is to be painted red, approximately what is the area to be painted?  
A. 2472 in<sup>2</sup>      B. 256 in<sup>2</sup>      C. 1236 in<sup>2</sup>      D. 512 in<sup>2</sup>      E. none of these
- There are approximately 231 cubic inches in a gallon. Approximately how many gallons fit into a cube whose sides measure 3 ft?  
A. 5.61      B. 1.40      C. 201.97      D. 203.54      E. none of these
- A rhombus contains a 120° angle. Find the ratio of the length of the longer diagonal to the length of the shorter diagonal.  
A.  $\sqrt{3}:1$       B.  $\sqrt{3}:3$       C.  $\sqrt{2}:2$       D.  $\sqrt{2}:1$       E. none of these
- The area of a circle is  $\frac{4\pi}{9}$ . What is the diameter?  
A.  $\frac{4}{9}$       B.  $\frac{4}{3}$       C.  $\frac{2}{3}$       D.  $\frac{2}{9}$       E. none of these
- Two six-sided dice are rolled. What is the probability of getting a sum of 4.  
A.  $\frac{1}{9}$       B.  $\frac{1}{2}$       C.  $\frac{1}{3}$       D.  $\frac{1}{12}$       E. none of these
- Which of the following equations is perpendicular to the line passing through points A(-2, -2) and B(1, 7)? The perpendicular line does not necessarily go through either point A or B.  
A.  $y = \frac{1}{3}x + 7$       B.  $2y = -3x + 4$       C.  $3x + 4y = 2$       D.  $3y = -x + 6$       E. none of these
- Sally goes to the ATM and cannot remember her PIN number. She knows it is 4 digits long and the digits are from 0 – 9 and the digits can be used more than once. What is the probability her PIN is 2345?  
A.  $1 \times 10^{-3}$       B.  $1 \times 10^{-4}$       C.  $1 \times 10^3$       D.  $1 \times 10^4$       E. none of these
- How much further will a 10-foot ladder reach up a wall when placed at a 70° angle to the ground rather than a 20° angle?  
A. 3 feet      B. 4 feet      C. 5 feet      D. 6 feet      E. none of these
- You invest \$4000 earning 6% compounded yearly. After 2 years, what are your earnings?  
A. \$452.40      B. \$454.40      C. \$494.40      D. \$462.80      E. none of these

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11. If a sphere were inscribed in a cube (tangent to all sides) with edges measuring 4 cm, what would be the sphere's surface area?  
A.  $8\pi \text{ cm}^2$       B.  $64\pi \text{ cm}^2$       C.  $16 \text{ cm}^3$       D.  $16\pi \text{ cm}^2$       E. none of these
12. How many sets of four consecutive integers are there such that half the sum of the first three is greater than the fourth, and the sum of the last three is at least four times the first?  
A. none      B. one      C. two      D. three      E. none of these
13. The volume of cylinder varies jointly as the height and the square of the base radius. If a cylinder's height is doubled and its base radius is halved, then its volume:  
A. is quadrupled      B. is halved      C. is doubled      D. remains the same      E. none of these
14. What is the absolute value of the difference between 2 times the sum of an angle and its supplement and 3 times the sum of the angle and its complement?  
A. 45      B. 60      C. 90      D. 120      E. none of these
15. Sheena will have seven test scores. Each of the scores is an integer value. The first five scores are 82, 87, 92, 96, and 98. How many distinct values are possible for the median of Sheena's seven scores once she takes the last two tests?  
A. 11      B. 10      C. 9      D. 8      E. none of these

**Use the following information for questions 16-17.** Car A travels 260 miles on 20 gallons of gas. Car B travels 340 miles on 25 gallons of gas. The cost of gas for both cars is \$4.05 per gallon.

16. Which car gets the best gas mileage?  
A. Car A      B. Car B      C. Not enough information      D. Both the same      E. none of these
17. How much would the driver pay per mile using the car with the best fuel efficiency?  
A. \$0.31      B. \$0.33      C. \$0.30      D. \$0.28      E. none of these
18. In which quadrant or quadrants is the shaded region when you graph the solution to the system:  
 $x + y \leq 10$ ,  $x + y > 3$  ?  
A. I, II, III, IV      B. I, II, III      C. I, II      D. I, II, IV      E. none of these
19. Eddie did a total of 301 push ups in a 7 day period. Each day he did 8 more than the previous day. How many push ups did he do on Day 1?  
A. 21      B. 19      C. 17      D. 15      E. none of these
20. In long-distance races, speed is referred to as pace. Pace is a rate measured in minutes per mile rounded to the nearest hundredth. If a runner completes a marathon, 26.2 miles, in 4 hours, 24 minutes, 30 seconds, what is the runner's pace?  
A. 10.10 min/mi      B. 10.00 min/mi      C. 11.07 min/mi      D. 8.52 min/mi      E. none of these

TEAM 9-10 2014 Answer Key

1. A
2. C
3. C
4. A
5. B
6. D
7. D
8. B
9. D
10. C
11. D
12. D
13. B
14. C
15. B
16. B
17. C
18. D
19. B
20. A