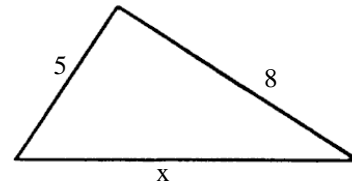


MONTANA COUNCIL OF TEACHERS OF MATHEMATICS  
2016 MATH CONTEST  
TEAM 9-10

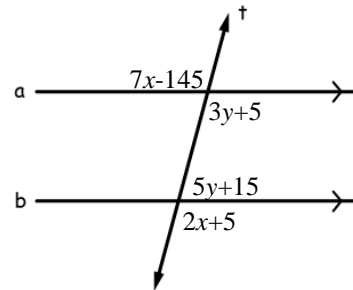
DIRECTIONS: DO NOT WRITE ON THIS TEST. Place the best answer for each question on the separate answer sheet.

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- Determine the equation of a circle if the endpoints of a diameter are (2, -3) and (8, 5).  
A)  $x^2 + y^2 = 25$     B)  $(x-2)^2 + (y+3)^2 = 25$     C)  $(x-5)^2 + (y-1)^2 = 25$   
D)  $(x-3)^2 + (y-4)^2 = 5$     E) none of these
- Find the perimeter of a triangle with vertices at (-5, 1), (3, 7), and (-1, -2).  
A)  $15 + 2\sqrt{5}$     B)  $25 + \sqrt{97}$     C)  $25 + 2\sqrt{5}$     D)  $15 + \sqrt{97}$     E) none of these
- A rectangle is inscribed in a circle. The sum of the distances from the center of the circle to the vertices of the rectangle is 40. What is the area of the circle?  
A)  $100\pi$     B)  $40\pi$     C)  $10\pi$     D)  $25\pi$     E) none of these
- What is the average of all integers  $n$  for which  $400 < |n| < 800$ ?  
A) 600    B) 200    C) 0    D) 1200    E) none of these
- Which of the following is not a possible value for  $x$  in the triangle (diagram not necessarily to scale.)  
A) 4  
B) 8  
C) 12  
D) 14  
E) none of these



- Given  $a \parallel b$ , solve for  $x$  and  $y$  in the diagram at right.  
A)  $x = 20, y = 20$   
B)  $x = 20, y = 30$   
C)  $x = 30, y = 20$   
D)  $x = 30, y = 30$   
E) none of these



- If A has coordinates (-3.25, 5.75) and the midpoint of AB has coordinates (4.35, -2.35), what are the coordinates of point B?  
A) (1.1, 3.4)    B) (7.6, -8.1)    C) (0.55, 1.7)    D) (11.95, -10.45)    E) none of these
- The height of a cone is  $x$ . The radius of the cone is also  $x$ . The volume of the cone is  $200\pi$ . Find  $x$  (to the nearest tenth).  
A) 8.4    B) 5.8    C) 4.1    D) 14.1    E) none of these
- Freddy the frog is at the bottom of a 30 foot well. Each day he climbs up 3 feet. At night, he slides back down 2 feet. How many days will it take for Freddy to get out of the well?  
A) 30    B) 29    C) 28    D) 27    E) none of these
- Scrat collects acorns exponentially. He collects 1 acorn the first day. He collects 2 the second day and 4 the third day. How many full days will it take Scrat to collect a total of 10,000 acorns?  
A) 14    B) 13    C) 12    D) 11    E) none of these

11. While training for a biathlon race, Kevin covered a total distance of 9 km by swimming for 45 minutes and running for 20 minutes. The next day he swam for 30 minutes and ran for 40 minutes, covering 14 km. Find his rates in km/hr for swimming and running. (Assume that these rates are constant.)  
 A) Swim – 4; Run – 18                      B) Swim – 10; Run – 14                      C) Swim – 3; Run – 15  
 D) Swim – 6; Run – 16                      E) none of these
12. A regular decagon has side length of 15 meters. To the nearest meter, what is the length of the apothem?  
 A) 30 meters              B) 23 meters      C) 15 meters      D) 8 meters      E) none of these
13. Smalltown has only two people who have the same (two-letter) initials. What is the largest population that Smalltown can possibly have?  
 A) 52              B) 676              C) 677              D) 729              E) none of these
14. If the probability of Dale Jr. passing a driving test is  $p$  and the probability that he fails is  $6p^2$ , what is the value of  $p$ ?  
 A)  $1/4$               B)  $1/3$               C)  $2/3$               D)  $3/4$               E) none of these
15. Tony the handy homeowner cleared a rectangular plot of land and covered it with gravel. Then he purchased 9 square wooden sections of side-lengths 2, 5, 7, 9, 16, 25, 28, 33, 36. By placing the squares on the gravel with no two overlapping, Tony built a patio which exactly covered the gravelled surface. What is the perimeter of Tony's new patio?  
 A) 260              B) 161              C) 50.75              D) 644              E) none of these
16. I have 1 brother and 2 sisters. My mother's parents have 10 grandchildren, while my father's parents have 11 grandchildren. If no divorces or re-marriages occur, and if none of my father's brothers or sisters married any of my mother's sisters or brothers, how many first cousins do I have?  
 A) 21              B) 17              C) 15              D) 13              E) none of these
17. In the World of Warcraft 2 Acidic Jaws are worth 17 Hoods of Oblivion, 2 Gnomish Battle Goggles are worth 5 Hallowed Crowns, 4 Gnomish Battle Goggles are worth 5 Hoods of Oblivion, and 1 Firecracker Cap is worth 3 Gnomish Battle Goggles. How many Acidic Jaws could you get for 3 Hoods of Oblivion?  
 A) 17              B) 33              C) 51              D) 69              E) none of these
18. Ali, Bobby, and Carmen take turns flipping the same fair coin in order. The first one to toss a head wins. What is the probability Ali wins?  
 A)  $1/2$               B)  $1/3$               C)  $4/7$               D)  $5/9$               E) none of these
19. In a class election, one candidate received more than 94% (but less than 100%) of the votes cast. What is the least possible number of votes cast?  
 A) 33              B) 20              C) 17              D) 15              E) none of these
20. Find the solution(s) to the system of equations  $\begin{cases} y - 7 = 3(x - 5)^2 \\ y = x^2 + 55x - 716 \\ y + 7x = 348 \end{cases}$   
 A) (28.5, 1663.75)              B) (14, 250)              C) (-6.3, 392.3), (28.5, 1663.75)  
 D) (28.5, 1663.75), (14, 250)              E) none of these

## **TEAM 9-10 2016 Answer Key**

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