

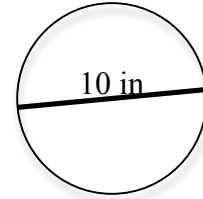
MONTANA COUNCIL OF TEACHERS OF MATHEMATICS  
2012 MATH CONTEST

Intermediate Math

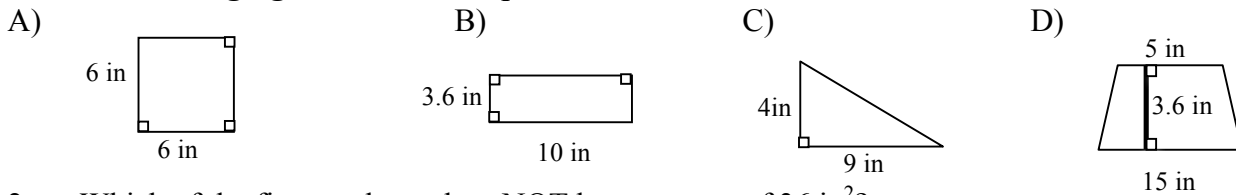
DIRECTIONS: DO NOT WRITE ON THIS TEST. Place the best answer for each question on the separate answer sheet.

1. What is the area and perimeter of the circle with the given diameter.

- A)  $A = 25\pi \text{ in}^2$ ,  $P = 10\pi \text{ in}$       B)  $A = 100\pi \text{ in}^2$ ,  $P = 20\pi \text{ in}$   
C)  $A = 100\pi \text{ in}^2$ ,  $P = 10\pi \text{ in}$       D)  $A = 5\pi \text{ in}^2$ ,  $P = 20\pi \text{ in}$



Use the following figures to answer questions 2 – 7.



2. Which of the figures above does NOT have an area of  $36 \text{ in}^2$ ?
3. In the triangle above, find the perimeter to the nearest integer.  
A) 23 in      B) 24 in      C) 26 in      D) 110 in
4. Find the length of the diagonal of the square shown above.  
A) 8.5 in      B)  $6\sqrt{2}$       C)  $6\sqrt{3}$       D) 12 in
5. Find the length of the median of the trapezoid shown above.  
A) 3.6 in      B) 5 in      C) 10 in      D) 15 in
6. If the dimensions of the rectangle shown above are tripled, then its area will be multiplied by a factor of:  
A)  $1/3$       B) 3      C) 6      D) 9
7. How many square tiles the size of the square above would it take to tile a floor that is 18 ft by 12 ft.  
A) 6 tiles      B) 216 tiles      C) 432 tiles      D) 864 tiles
8. Which expression is NOT equivalent to  $6x^2$ ?  
A)  $5x^2 + x^2$       B)  $(2x)(3x)$       C)  $\frac{12x^5}{2x^3}$       D)  $(6x)^2$
9. Find the slope of the line  $5x - 3y = 30$ .  
A)  $\frac{5}{3}$       B)  $-\frac{3}{5}$       C) 5      D) -10
10. If  $a < 0 < b$ , which expression is smallest?  
A)  $\frac{1}{3}b$       B)  $b - a$       C)  $-b$       D)  $-3a$
11. Multiply and simplify:  $(x + 3)(2x - 5)$   
A)  $2x^2 - 15$       B)  $2x^2 + x - 15$       C)  $2x^2 + 11x - 15$       D)  $3x - 2$

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Questions 12– 14: Tom and John take a road trip from Great Falls to Helena. The distance is 90 miles one way.

12. What would their average speed have to be in order to arrive in 1 hour and 15 minutes?  
A) 72 mph                      B) 78.3 mph                      C) 83.3 mph                      D) 90 mph
13. Which quantities would vary inversely (are inversely proportional)?  
A) Number of gallons of gas needed and the total cost of gas for their trip  
B) Miles already driven and miles left to finish the trip  
C) Average speed driven and total time needed to finish the trip  
D) Time needed to complete the trip and the type of car driven
14. At 65 mph the car gets 32 miles per gallon. At 75 mph the car gets 26 miles per gallon. How many more gallons of gas will they use for the round trip if they drive at the faster speed?  
A)  $\frac{1}{2}$  gallon                      B) 1.3 gallons                      C) 18 gallons                      D) 30 gallons

15. Find all possible values for  $x$  if  $5 - 3x < 4$ .

- A)  $x < \frac{1}{3}$                       B)  $x > -3$                       C)  $x > \frac{1}{3}$                       D)  $x > 3$

Use the following sequence for question 16 -17.      5, 8, 11, 14 . . . ( $a_1 = 5$ )

16. Which equation models the value of the term  $a_n$  for the  $n$ th term in the sequence.  
A)  $a_n = 2 + 3n$                       B)  $a_n = 5 + 3n$                       C)  $a_n = 5(3n)$                       D)  $a_n = 3 + 2n$
17. What is the value of the 100<sup>th</sup> term of the sequence?  
A) 302                      B) 305                      C) 1500                      D) 203
18. Where does the graph of  $y = -2x^2 - 9x + 5$  cross the  $x$ -axis?  
A)  $\left(\frac{-1}{2}, 0\right)$  and  $(5, 0)$       B)  $\left(0, \frac{-1}{2}\right)$  and  $(0, 5)$       C)  $(0, 5)$                       D)  $\left(\frac{1}{2}, 0\right)$  and  $(-5, 0)$
19. Which statement is FALSE?  
A) The bases of a trapezoid are parallel.  
B) The diagonals of a kite are perpendicular.  
C) The diagonals of a rectangle are congruent.  
D) The opposite angles in a parallelogram are supplementary.

20. If Mary rolls a 6-sided number cube (regular die) with numbers 1 through 6 on the faces, what is the probability that an odd number will be on top?  
A) 16.7%                      B) 25%                      C) 50%                      D) 67.7%

21. Find the value of  $x$  for the solution to the system:

$$\begin{cases} y = 2x + 3 \\ y = -\frac{1}{2}x + 7 \end{cases} \quad \text{A) 6.2} \quad \text{B) 1.6} \quad \text{C) 1.5} \quad \text{D) 6}$$

22. The sum of two consecutive odd integers is 208. Which equation can you solve to find the two integers.  
A)  $2n = 208$                       B)  $n + 2 = 208$                       C)  $n + (n+2) = 208$                       D)  $n + (n+1) = 208$

## Intermediate Math 2012: Answer Key

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