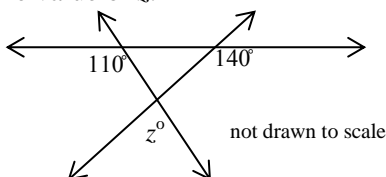


**MONTANA COUNCIL OF TEACHERS OF MATHEMATICS**  
**2014 MATH CONTEST**  
**APPLIED**

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

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1. The length of a rectangle is 5 cm greater than its width. The perimeter is 58 cm. Find the dimensions of the rectangle.
- A) 10cm x 15cm    B) 29cm x 34cm    C) 24cm x 29cm    D) 12cm x 17cm    E) None of these
2. Which equation(s) is/are perpendicular to  $y - 7 = -\frac{3}{4}(x + 2)$ ?
- I.  $y - 7 = \frac{3}{4}(x + 2)$   
II.  $y = \frac{4}{3}x - \frac{3}{2}$   
III.  $4x - 3y = 5$
- A) III only    B) II & III    C) I, II, & III    D) I only    E) None of these
3. A softball player attempted to steal a base 70 times and was successful 49 times. Find the experimental probability that she will not be successful on her next attempt to steal a base.
- A) cannot be determined    B)  $\frac{49}{70}$     C)  $\frac{21}{49}$     D)  $\frac{21}{70}$     E) None of these
4. Given  $f(x) = \frac{x+1}{x-2}$ . Find  $f\left(-\frac{1}{2}\right)$ .
- A) -1    B)  $\frac{5}{2}$     C)  $-\frac{1}{5}$     D)  $\frac{1}{2}$     E) None of these
5. Which of the following could represent a function?
- I.  $\{(-1, 2), (2, 2), (3, 2)\}$   
II. A horizontal line  
III.  $y = |x - 7|$
- A) II only    B) I & III    C) I, II, & III    D) III only    E) None of these
6. Lydia paid \$64.80 for a dress that was 20% off. What was the original price of the dress?
- A) \$77.76    B) \$81.00    C) \$93.76    D) \$73.00    E) None of these
7. Tyson is going to install a hot tub on his deck. If the dimensions of the deck are 14ft x 10ft and the hot tub has an 8ft diameter, what percentage of the deck will be covered by the circular hot tub? Round to the nearest percent.
- A) 36%    B) 72%    C) 57%    D) 27%    E) None of these
8. The midpoint of segment  $CT$  is  $(3, 2.5)$ . Point  $C$  is  $(8, 1)$ . Find point  $T$ .
- A)  $(0.5, 3.25)$     B)  $(5.5, 1.75)$     C)  $(-1, 2)$     D)  $(-2, 4)$     E) None of these
9. Find the value of  $z$ .



- A)  $70^\circ$   
B)  $40^\circ$   
C)  $110^\circ$   
D)  $180^\circ$   
E) None of these

Use the following information for 10 – 11.

$M(1, 4)$  and  $T(6, 6)$  are the endpoints of a diagonal of rectangle  $MATH$  with sides parallel to the  $x$  – and  $y$ – axes.

10. What is the perimeter of the rectangle?

- A) 14                      B) 11                      C) 10                      D) 7                      E) None of these

11. What is the length of segment  $MT$  ? Round to the nearest hundredth.

- A) 9.06                      B) 2.61                      C) 5.39                      D) 7.83                      E) None of these

12. In 2013, 137 seniors graduated from a Montana high school. The following data is given for their plans for the upcoming year:

Military: 24	Community College: 43	Technical School: 34
Work Force: 7	University: 16	None: 13

What percentage of the graduates plan to pursue more schooling after high school? Round to the nearest percent.

- A) 31%                      B) 12%                      C) 68%                      D) 25%                      E) None of these

13. A parking garage in Great Falls charges \$4.00 for the first hour and \$2.50 for each additional hour during the week. On Saturday and Sunday, the rates decrease by 30%. How much does it cost to park a car from 8pm Friday night until 4pm Saturday afternoon?

- A) \$40                      B) \$44                      C) \$25.75                      D) \$36.50                      E) None of these

Use the following information for 14-15. Menard is building a loft office in his garage. Because of the angle of the roof, he will need to put windows at each end of the loft. The ends are isosceles triangles with sides of 17ft with a base of 12 ft. Menard has decided that his windows will be inverted similar triangles with half the perimeter of the two isosceles ends.

14. Using the mid-segment theorem, what is the perimeter of one of the windows?

- A) 46 ft                      B) 34 ft                      C) 29 ft                      D) 23 ft                      E) None of these

15. What is the total area of glass Menard will need for his two new windows? Round to the nearest hundredth.

- A) 15.9 ft<sup>2</sup>                      B) 47.7 ft<sup>2</sup>                      C) 95.4 ft<sup>2</sup>                      D) 190.8 ft<sup>2</sup>                      E) None of these

16. Which of the following equations, when graphed, is parallel to the line passing through points  $A(-2, -2)$  and  $B(-1, 7)$ ?

- A)  $y = \frac{1}{3}x + 7$                       B)  $2y = -3x + 4$                       C)  $3x + 4y = 2$                       D)  $3y = -x + 6$                       E) None of these

17. The volume of a sphere is equal to  $\frac{4}{3}\pi r^3$ , where  $r$  is the radius. How many times greater is the volume if the diameter is tripled?

- A) 3                      B) 6                      C) 9                      D) 27                      E) None of these

18. The measures of the angles of a triangle are  $2x$ ,  $3x + 4$ , and  $5x - 2$ . What is the measure of the largest angle?

- A) 17.8                      B) 87                      C) 35.6                      D) 94                      E) None of these

19. Two acute angles can never be

- A) complementary                      B) vertical                      C) adjacent                      D) supplementary                      E) None of these

20. Leslie is moving from Miles City to Circle, a distance of 96 miles. She can move herself by renting a truck that costs \$49.95 per day and \$2.75 per mile. Another option is to hire a moving company which charges \$4.95 per mile. Which option is cheaper if it will take two days to move and by how much?

- A) renting, \$161.25                      B) hire, \$111.30                      C) renting, \$111.30                      D) hire, \$161.25                      E) None of these

## APPLIED 2014 ANSWER KEY

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