

MONTANA COUNCIL OF TEACHERS OF MATHEMATICS
2019 MATH CONTEST
APPLIED

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

1. If x is 150% of y , what percent of $3x$ is $4y$? Express your answer to the nearest whole percent.

- A) 50% B) 75% C) 89% D) 113% E) none of these

For questions 2-4, use the diagram at right.

2. Name a pair of corresponding angles.

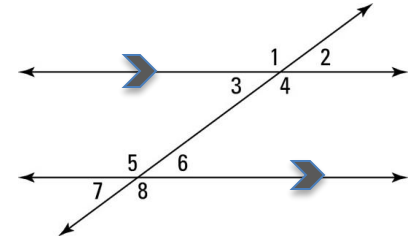
- A) $\angle 2, \angle 4$ B) $\angle 3, \angle 7$ C) $\angle 4, \angle 6$ D) $\angle 5, \angle 8$ E) none of these

3. Name a pair of supplementary angles.

- A) $\angle 1, \angle 5$ B) $\angle 1, \angle 6$ C) $\angle 2, \angle 7$ D) $\angle 3, \angle 6$ E) none of these

4. Name a pair of alternate interior angles.

- A) $\angle 1, \angle 8$ B) $\angle 3, \angle 5$ C) $\angle 4, \angle 5$ D) $\angle 6, \angle 7$ E) none of these



5. A rectangle has integer side lengths and its area is equal to 24 square units. The length of each side of the rectangle is increased by one unit. What is the largest possible number of square units in the area of the new rectangle?

- A) 35 sq units B) 36 sq units C) 39 sq units D) 50 sq units E) none of these

6. Western Saddlery purchases their faux leather brown western hats from the wholesaler for \$60 each. They mark up the price 85% to sell to their customers. Two months later, the remaining hats go on sale for 30% off the retail price. What is the sale price for one hat? Round to the nearest penny.

- A) \$15.30 B) \$33.30 C) \$77.70 D) \$81.00 E) none of these

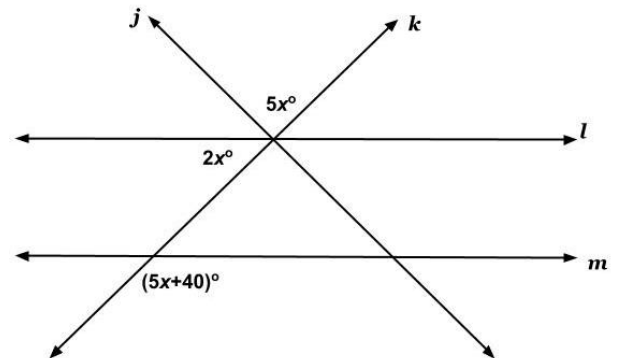
For 7-8, see diagram at right.

7. Find the value of x for which $l \parallel m$. Round to the nearest whole number.

- A) $x = 14$ B) $x = 20$ C) $x = 31$
D) $x = 40$ E) none of these

8. Find the value of x for which $j \perp k$. Round to the nearest whole number.

- A) $x = 10$ B) $x = 18$ C) $x = 20$
D) $x = 36$ E) none of these



9. What is the probability that a randomly selected two digit positive integer is a perfect square or a perfect cube? Express your answer as a common fraction.

- A) $\frac{7}{90}$ B) $\frac{8}{90}$ C) $\frac{7}{99}$ D) $\frac{8}{99}$ E) none of these

10. One-fourth of Markee's candies are blue, $\frac{1}{8}$ are green, $\frac{1}{4}$ are yellow, and the rest are red. Markee selects one candy. What is the probability that the selected candy is red?

- A) $\frac{1}{32}$ B) $\frac{1}{8}$ C) $\frac{3}{16}$ D) $\frac{3}{8}$ E) none of these

11. Which of the following function rules represent the values in the table?

domain	-3	-1	0	2
range	6	2	-3	1

- A) $f(x) = -4x - 3$ B) $f(x) = 2x - 3$ C) $f(x) = -2(x - 3)^2 + 6$ D) $f(x) = x^2 - 3$ E) none of these

For 12-14, use the diagram at right.

12. Find the area of the triangle.

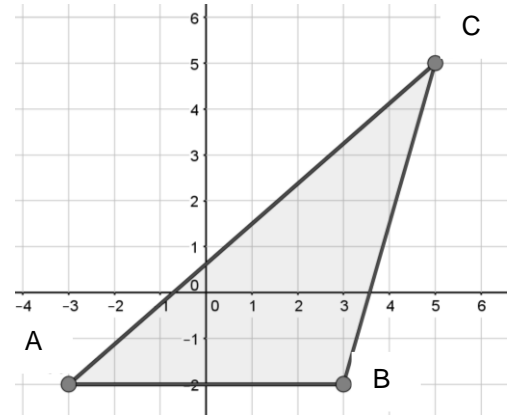
- A) 15 sq units B) 21 sq units C) 30 sq units
D) 42 sq units E) none of these

13. Find the midpoint of \overline{AC} .

- A) $(\frac{1}{2}, -2)$ B) $(1, 1\frac{1}{2})$ C) $(1\frac{1}{2}, 2)$
D) $(4, 1\frac{1}{2})$ E) none of these

14. Find the perimeter of $\triangle ABC$. Round to the nearest hundredth.

- A) 14.21 units B) 16.58 units C) 18.88 units
D) 23.91 units E) none of these



15. Wilcoxson's Ice Cream Shop sells ice cream cones. If a 6 inch long and 2.5 inch wide cone is filled with ice cream, and a hemisphere (of same width) of ice cream is added to the top of the cone, how many cubic inches of ice cream are sold? Round to the nearest whole cubic inch.

- A) 14 cu in B) 15 cu in C) 18 cu in D) 19 cu in E) none of these

16. A Progresso Traditional Hearty Chicken and Noodle soup can has a diameter of 8.5 cm and a height of 10.7 cm. Assuming the label covers the entire lateral surface, how many square centimeters of paper are needed to make a label?

- A) 91 sq cm B) 143 sq cm C) 286 sq cm D) 607 sq cm E) none of these

17. A base model 2018 Dodge Ram 1500 truck sells for \$28,395. This truck has a 6.8% annual depreciation rate. What is the value of this truck after 5 years? Round to the nearest dollar.

- A) \$4128 B) \$9654 C) \$18,741 D) \$19,967 E) none of these

18. Nathaniel's bike tire begins with a pressure of 60 psi. He rides for 5 minutes before hitting a nail that causes his tire pressure to fall at 15 psi per minute. This happens until his tire is flat. Nathaniel then stops and patches the tire. After five minutes of patching, he inflates his tire back to 55 psi over the course of two minutes. Which of the following piecewise functions models this situation?

- A) $f(x) = \begin{cases} 60, & 0 < x < 5 \\ -15x + 135, & 5 < x < 9 \\ 0, & 9 < x < 14 \\ 27.5x - 385, & 14 < x < 16 \end{cases}$ B) $f(x) = \begin{cases} 60, & 0 \leq x \leq 5 \\ -15x + 135, & 5 \leq x \leq 9 \\ 0, & 9 \leq x \leq 14 \\ 27.5x - 385, & 14 \leq x \leq 16 \end{cases}$ C) $f(x) = \begin{cases} 60, & 0 \leq x \leq 5 \\ -15x + 135, & 5 < x \leq 9 \\ 0, & 9 < x \leq 14 \\ 27.5x - 385, & 14 < x \leq 16 \end{cases}$

- D) $f(x) = \begin{cases} 60, & 0 < x < 5 \\ -15x + 135, & 5 \leq x < 9 \\ 0, & 9 \leq x < 14 \\ 27.5x - 385, & 14 \leq x < 16 \end{cases}$ E) none of these

19. Which of the following is another descriptor for domain?

- A) y-values B) outputs C) dependent variables D) all of these E) none of these

APPLIED 2019 Answer Key

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