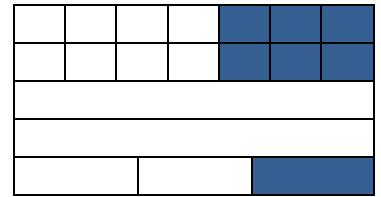


MONTANA COUNCIL OF TEACHERS OF MATHEMATICS
2019 MATH CONTEST
TEAM 9-10

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

1. Determine the fractional area of the rectangle that is shaded (at right).

- A) $\frac{5}{21}$ B) $\frac{1}{3}$ C) $\frac{16}{21}$ D) $\frac{21}{25}$ E) none of these



2. How does the function $f(x + 5)$ compare to its parent function, $f(x)$?

- A) shifted up 5 units B) shifted right 5 units C) shifted down 5 units D) shifted left 5 units E) none of these

3. How does the function $-f(x)$ compare to its parent function, $f(x)$?

- A) reflected over $y = x$ B) reflected over $y = -x$ C) reflected over $y = 0$ D) reflected over $x = 0$ E) none of these

4. Which famous mathematician is commonly credited with the first proof of the formula, $A = \pi r^2$?

- A) Archimedes B) Gauss C) Newton D) Pythagoras E) none of these

5. On a certain island, all Annaj are Borgs, all Cresles are Borgs, all Dwings are Annaj, and all Cresles are Dwings. Which of the following statements is implied by these facts?

- A) All Dwings are Borgs and are Cresles. B) All Borgs are Cresles and are Dwings.
C) All Annaj are Cresles and are Dwings. D) All Cresles are Annaj and are Borgs. E) none of these

6. Leilani and her five sisters are ages 3, 5, 7, 9, 11, 13. One afternoon two of her sisters whose ages sum to 16 went to the mall, two sisters younger than 10 went to play basketball, and Leilani and the 5-year-old stayed home. How old is Leilani?

- A) 7 B) 9 C) 11 D) 13 E) none of these

7. In a recent basketball game, Steph attempted only three-point shots and two-point shots. He was successful on 20% of his three-point shots and 30% of two-point shots. Steph attempted 30 shots. How many points did he score?

- A) 12 B) 18 C) 24 D) 30 E) none of these

8. Given: If Yvonne is 18 years old, then she is eligible to vote in the federal election. What word best describes the following statement?

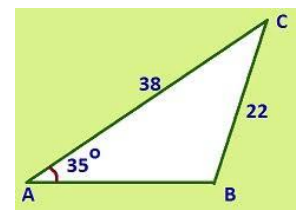
If Yvonne is not 18 years old, then she is not eligible to vote in the federal election.

- A) conditional B) contrapositive C) converse D) inverse E) none of these

9. Find the measure of angle B in the diagram at right. Figure is not drawn to scale.

- A) 19.39° B) 82.19° C) 83.25° D) 99.07°

E) none of these



10. Which of the following formulas can NOT be used to find the area of a triangle?

- A) $A = \frac{1}{2}bh$ B) $A = \frac{1}{2}(b_1 + b_2)h$ C) $A = \frac{1}{2}ab \sin C$ D) $A = \sqrt{s(s-a)(s-b)(s-c)}$
 E) none of these

11. What is the number of units in the perimeter of a triangle bound by the x -axis, the y -axis, and the line $y = -\frac{3}{4}x + 3$? Round your answer to the nearest hundredth.

- A) 9.65 B) 10.24 C) 12.00 D) 13.93 E) none of these

12. Mr. Riehl's class filled out a survey. Here are the results for his 30 students.

14 like hotdogs 18 like cheeseburgers 16 like tacos 8 like both hot dogs and cheeseburgers
 7 like tacos and cheeseburgers 6 like tacos and hotdogs 1 likes none of these

How many students like all three?

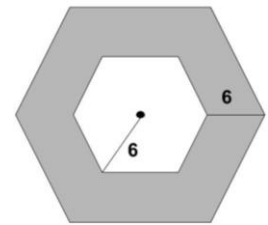
- A) 2 B) 3 C) 4 D) 5 E) none of these

13. A flagpole is placed in the sand with the top of the flag pole standing 10 feet above the ground. A 26 foot string is attached to the top of the flag pole. Holding the string to the ground, what is the number of square feet in the area of the largest circle that can be drawn in the sand with the end of the string? Express your answers in terms of π .

- A) $48\pi \text{ ft}^2$ B) $256\pi \text{ ft}^2$ C) $576\pi \text{ ft}^2$ D) $776\pi \text{ ft}^2$ E) none of these

14. The polygons are regular polygons. Find the area of the shaded region. Round your answer to the nearest hundredth.

- A) 187.06 B) 229.10 C) 280.59 D) 561.18
 E) none of these



15. Which of the following quadratic equations is easiest to solve by completing the square?

- A) $x^2 - 17 = 0$ B) $x^2 - 3x - 9 = 0$ C) $x^2 + 5x - 6 = 0$ D) $x^2 - 12x + 36 = 0$ E) none of these

16. Find the vertex of $y = -x^2 - 8x + 3$.

- A) (-4, 51) B) (-4, 19) C) (4, -45) D) (4, -13) E) none of these

17. A drawer contains eight red, eight yellow, eight green, and eight black socks. What is the probability of getting at least one pair of matching socks when five socks are randomly pulled from the drawer? Round your answer to the nearest percent.

- A) 0% B) 12% C) 63% D) 100% E) none of these

18. If the length of one side of a square is represented by the polynomial $7x - 4$, what polynomial represents the area of the square?

- A) $49x^2 - 16$ B) $49x^2 + 16$ C) $49x^2 - 28x + 16$ D) $49x^2 - 56x + 16$ E) none of these

TEAM 9-10 2019 Answer Key

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