

MONTANA COUNCIL OF TEACHERS OF MATHEMATICS  
2016 MATH CONTEST  
INTERMEDIATE

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

1. What is the equation for the given piecewise function?

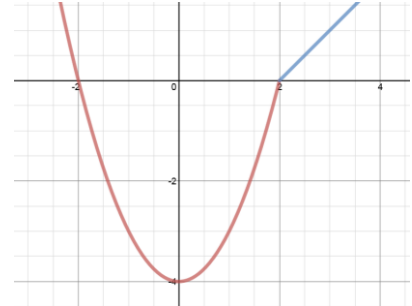
A)  $f(x) = \begin{cases} x^2 - 4; & x < 2 \\ 2x + 2; & x \geq 2 \end{cases}$

B)  $f(x) = \begin{cases} x^2 + 4; & x < 2 \\ 2x + 2; & x \geq 2 \end{cases}$

C)  $f(x) = \begin{cases} x^2 - 4; & x < 2 \\ x - 2; & x \geq 2 \end{cases}$

D)  $f(x) = \begin{cases} x^2 - 4; & x > 2 \\ x + 2; & x \leq 2 \end{cases}$

E) None of these



2. How many solutions does this equation have?  $-2 = y^2 + 2y - 4$

A) 2

B) 1

C) 0

D) Infinite # of solutions

E) None of these

3. Which of these is a solution to this set of inequalities?

$y \geq 0$

A) (0,0)

$x > 0$

B) (1,1)

$y \leq -2x + 5$

C) (1,2)

$y < 3x - 2$

D) (2,1)

E) None of these

4. If there are 51 Sickles in 3 Galleons, and 58 Knots in 2 Sickles, how many Knots are there in 12 Galleons?

A) 2958

B) 493

C) 612

D) 5916

E) None of these

5. JJ Nelson ran 40 yards in 4.28 seconds. How fast is that in kilometers per hour? (1 km  $\approx$  3280.8 ft.)

A) 30.8

B) 9.3

C) 8.5

D) 19.2

E) None of these

6. The weight of a body varies inversely as the square of its distance from the center of the earth. If the radius of the earth is 4,000 miles, how much would a 120 pound student weigh 1,000 miles above the surface of the earth?

A) 76.8 lb.

B) 96 lb.

C) 1920 lb.

D) 120 lb

E) None of these

7. What values satisfy the set of inequalities?  $x > -6$ ,  $x \leq 4$ ,  $-2 < x \leq 7$

A)  $-6 < x \leq 7$

B)  $-2 < x \leq 4$

C)  $-6 < x \leq 4$

D)  $-2 < x \leq 7$

E) None of these

8. State the next term in the following sequence: 5, 8, 13, 21, ...

A) 24

B) 29

C) 31

D) 34

E) None of these

9. How many solutions are there in the system of equations?

$$\begin{cases} y = 2x^2 - 4x + 7 \\ y = 2(x - 1)^2 + 5 \end{cases}$$

A) 0

B) 1

C) 2

D) Infinitely many solutions

E) None of these

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10. Solve for  $x$ .  $15x^2 - 14x - 6 = 2$   
 A)  $\frac{4}{3}$  and  $-\frac{2}{5}$  B)  $-\frac{3}{4}$  and  $\frac{5}{2}$  C)  $\frac{2}{3}$  and  $\frac{1}{5}$  D) 3 and 5 E) None of these

11. How is the graph of  $y = |x - 5| + 2$  shifted relative to the graph  $y = |x|$ ?  
 A) up 5, left 2 B) down 5, right 2 C) left 5, down 2  
 D) right 5, up 2 E) None of these

12. Find the solution to the system of equations.  $\begin{cases} 2x + y - z = 8 \\ 3x - y + 2z = 1 \\ -2x + y + 2z = -3 \end{cases}$   
 A) (2, 2, -2) B) (1, 0, -4) C) (0, -1, -1) D) (2, 3, -1) E) None of these

13. What value is equal to the next term in the sequence?  $\sqrt{1058}, \sqrt{1587}, \sqrt{2116}, \sqrt{2645}, \dots$   
 A)  $138\sqrt{6}$  B)  $529\sqrt{6}$  C)  $6\sqrt{23}$  D)  $23\sqrt{6}$  E) None of these

14. Jake is working part time at Electricland. He earns \$250 a week and gets a commission of \$10 for each i-Phone he sells. If he sold  $x$  i-Phones this week, write an expression representing his income for the week.  
 A)  $250x + 10$  B)  $250 + 10x$  C)  $260x$  D)  $10x$  E) None of these

15. There is a board of track records in the entry to the high school. Times are rounded to the nearest  $10^{\text{th}}$  of a second. What category do these numbers fall under?  
 A) Real numbers B) Integers C) Rational numbers  
 D) Natural numbers E) None of these

16. Colossus hurls Wolverine up in the air off a 100 meter cliff. Wolverine's path through the air models a parabolic function. He reaches a maximum height of 350 meters, 7.14 seconds later. How long was Wolverine aloft before he hits ground level?  
 A) 15.6 sec. B) 14.3 sec. C) 8.5 sec D) 7.1 sec E) None of these

17 and 18 refer to the following table

	<b>Grade 11</b>	<b>Grade 12</b>	<b>Total</b>
<b>Has a Cell Phone</b>	47	51	98
<b>No Cell Phone</b>	4	7	11
<b>Total</b>	51	58	109

17) What is the probability that a student from Grade 11 has a cell phone?  
 A) 11.75% B) 92.16% C) 87.93% D) 89.91% E) None of these

18) What is the probability that a student who does not have a cell phone is in Grade 12?  
 A) 36.4% B) 63.6% C) 57.1% D) 12.1% E) None of these

## **INTERMEDIATE 2016 Answer Key**

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