

MONTANA COUNCIL OF TEACHERS OF MATHEMATICS
2015 MATH CONTEST

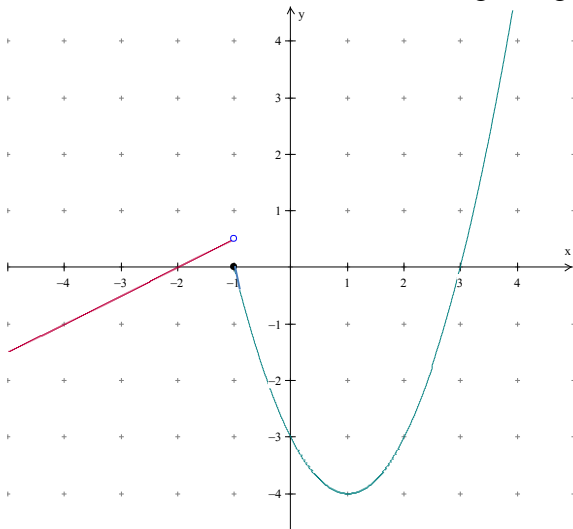
INTERMEDIATE TEST

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

1. Pirates of the Golden Age used three main forms of money: Escudos, Reales, and Doubloons. If $2 \text{ Escudos} = 32 \text{ Reales}$, and $2 \text{ Reales} = \frac{1}{64} \text{ Doubloon}$, then 6 Doubloons are worth how many Escudos?

A) 48 B) 49,152 C) 384 D) 0.75 E) None of these

2. Choose the correct function rule for the given graph:



A) $f(x) = \begin{cases} (x + 1)^2 - 4, & x \geq -1 \\ \frac{1}{2}x + 1, & x < -1 \end{cases}$

B) $f(x) = \begin{cases} (x - 1)^2 - 4, & x > -1 \\ \frac{1}{2}x + 1, & x \leq -1 \end{cases}$

C) $f(x) = \begin{cases} (x - 1)^2 - 4, & x \geq -1 \\ \frac{1}{2}x + 1, & x < -1 \end{cases}$

D) $f(x) = \begin{cases} (x - 1)^2 - 4, & x \leq -1 \\ \frac{1}{2}x + 1, & x > -1 \end{cases}$

E) None of these

3. The number of hours it takes for a block of ice to melt varies inversely as the temperature. If it takes 3 hours for a given block of ice to melt at 75F, how long will it take that same block to melt at 50F?

A) 2 hrs B) 4.5 hrs C) 6 hrs D) 9 hrs E) None of these

4. Solve for x : $x^2 - 2x + 3 < 4$

A) $x < 1 + \sqrt{2}$ B) $x < 1 - \sqrt{2}$ C) $1 - \sqrt{2} < x < 1 + \sqrt{2}$
D) $-\sqrt{2} < x < \sqrt{2}$ E) None of these

5. At Scallywag High School, there are 3 extracurricular activities: Swordplay, Deck Swabbing, and Treasure Hunting. If

- 27 students are in swordplay
- 32 are in deck swabbing
- 12 are in treasure hunt
- 7 are in deck swabbing & swordplay
- 5 are in deck swabbing & treasure hunt
- 9 are in swordplay & treasure hunt
- 3 are in all 3 activities

How many students participate in extracurricular activities at Scallywag High?

A) 50 B) 53 C) 71 D) 95 E) None of these

6. Which of the following best describes the number of candybars in a school vending machine?

A) Naturals B) Wholes C) Integers D) Rationals E) None of these

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7. At MontanaFair, a new game lets you randomly choose 2 cards from a deck of 100 unique Game of Thrones characters. If both of your cards are any of the 12 cards from House Stark, you win a plush direwolf. What is the probability of winning a direwolf (to the nearest tenth of a percent)?
A) 1.3% B) 1.4% C) 24.0% D) 23.0% E) None of these
8. Solve for x : $6x^2 + x + 5 = 7$
A) $\frac{1}{2}$ and $\frac{2}{3}$ B) $-\frac{1}{2}$ and $-\frac{2}{3}$ C) 2 and -6 D) -2 and 6 E) None of these
9. State the next term in the following sequence: 0, 2, 6, 12, 20, ...
A) 240 B) 40 C) 32 D) 30 E) None of these
10. State the next term in the following sequence: 64, -32, 16, -8, ...
A) 4 B) -4 C) 6 D) -6 E) None of these
11. Choose the equation that translates the basic absolute value graph left 7 and up 4.
A) $y = |x - 7| + 4$ B) $y = |x - 4| + 7$ C) $y = |x + 4| - 7$
D) $y = |x + 7| + 4$ E) None of these
12. Bacey Laker works at a skate shop. She earns \$220 a week and earns a commission of \$6 for each deck she sells. If she sold x decks this week, how much money did she earn this week?
A) $226x$ B) $220 + x$ C) $6x$ D) $220 + 6x$ E) None of these

Use the following information for 13-14.

$$2x^2 + 7x - 12 = 0$$

$$2\left(x^2 + \frac{7}{2}x\right) = 12$$

$$2\left(x^2 + \frac{7}{2}x + b\right) = c$$

13. Find b .
A) $\frac{7}{4}$ B) $\frac{49}{4}$ C) 7 D) $\frac{49}{16}$ E) None of these
14. Find c .
A) $\frac{241}{16}$ B) $\frac{55}{4}$ C) $\frac{145}{8}$ D) $\frac{49}{16}$ E) None of these
15. The Neptunon Co-Ed soccer team needs new equipment: cleats & headbands. Male Neptunons have 1 head & 5 feet. Female Neptunons have 2 heads & 3 feet. If their coach purchased 25 headbands & 62 cleats, how many male (m) & female (f) Neptunons are on the team?
A) 10 m, 4 f B) 11 m, 7 f C) 7 m, 9 f D) 15 m, 5 f E) None of these
16. How many solutions does the equation $g(x) = 2x + 1$ have?
A) 0 B) 1 C) 2 D) infinite E) None of these
17. How many solutions does the system $\begin{cases} y = x^2 - 1 \\ y = -x^2 - 1 \end{cases}$ have?
A) 0 B) 1 C) 2 D) infinite E) None of these

INTERMEDIATE 2015 Answer Key

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