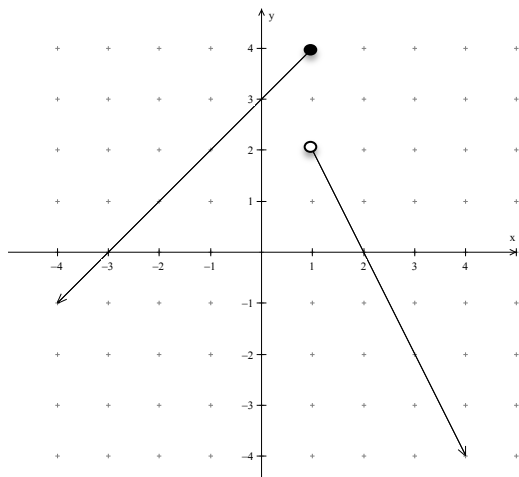


MONTANA COUNCIL OF TEACHERS OF MATHEMATICS
2014 MATH CONTEST
INTERMEDIATE TEST

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

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



A) $f(x) = \begin{cases} x + 3, x \geq 2 \\ -\frac{1}{2}x + 4, x < 2 \end{cases}$

B) $f(x) = \begin{cases} x + 3, x \leq 1 \\ -2x + 4, x > 1 \end{cases}$

C) $f(x) = \begin{cases} x + 3, x \leq 1 \\ -\frac{1}{2}x + 4, x > 1 \end{cases}$

D) $f(x) = \begin{cases} x + 3, x \geq 2 \\ -2x + 4, x < 2 \end{cases}$

E) None of these

2. Another way to write $|y + 5| < 3$ is:

A) $3 < y + 5 < -3$

B) $y + 5 > 3$

C) $y + 5 \leq 3$

D) $-3 < y + 5 < 3$

E) None of these

3. Most fish can adjust to a gradual change in water temperature up to 15°F . Suppose a lake trout is living comfortably in water that is 58°F . Which of the following represents the range at which the lake trout can survive?

A) $|x + 15| \leq 58$

B) $|15x - 58| \geq 0$

C) $|58 - x| \geq 15$

D) $|x - 58| \leq 15$

E) None of these

4. In 2005, a snowboarder killed a skier at Jackson Hole Mountain Resort when he decided to straight-line Laramie Bowl. Accident investigators determined that the boarder was traveling at approximately 47 mph when he hit the skier. About how fast was the boarder traveling in feet per second?

A) 32 fps

B) 69 fps

C) 76 fps

D) 689 fps

E) None of these

5. A bookstore took in \$167 on the sale of 5 copies of a new cookbook and 3 copies of a new novel. The next day the store took in \$248 on the sale of 6 cookbooks and 7 novels. Find the price of the cookbook and the novel.

A) \$14, \$25

B) \$25.50, \$14.50

C) \$14.50, \$25.50

D) \$25, \$14

E) None of these

6. Solve for x : $4x^2 + 20x = -25$

A) $x = \pm 2.5$

B) $x = -2.5$

C) $x = 1.5$

D) $x = \pm 1.5$

E) None of these

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7. Find the length of the diagonal of a square if the area of the square is 169 in^2 .

- A) $13\sqrt{3}$ in B) 42.25 in C) $13\sqrt{2}$ in D) $42.25\sqrt{2}$ in E) None of these

8. Locate the vertex of the parabola defined by the equation $y = 2(x - 3)^2 - 7$.

- A) (3, 7) B) (3, -7) C) (-3, -7) D) (-3, 7) E) None of these

9. MSU needs to upgrade their internet server on campus. Their online store sells "BOBCATS" baseball hats for \$27.50. It costs \$15.00 to produce each hat and \$2.50 to ship each hat. About how many hats will need to be sold for MSU to make a profit of at least \$10,000 to pay for the server upgrade?

- A) 650 hats B) 725 hats C) 875 hats D) 950 hats E) None of these

10. Factor: $6x^2 + x - 12$

- A) $(2x - 3)(3x + 4)$ B) $(2x - 4)(3x + 3)$ C) $(2x + 4)(3x - 3)$ D) $(2x + 3)(3x - 4)$
E) None of these

11. The product of an odd and an even number is _____.

- A) odd B) cannot determine C) even D) dependent on the larger number E) None of these

12. Find the next 3 numbers in the sequence: 4, 13, 40, 121, ...

- A) 364, 1093, 3280 B) 204, 318, 448 C) 130, 239, 348 D) 648, 900, 1210
E) None of these

13. Given the following information, find the probability that a student reads horror stories.

- 48% of the surveyed students are girls
- 72% of these girls read horror stories
- 27% of the surveyed boys read horror stories

- A) 0.19 B) 0.99 C) 0.35 D) 0.49 E) None of these

14. The scores on an exam are normally distributed with a mean of 83 and a standard deviation of 6. What percent of the scores fall between 71 and 83, inclusive?

- A) 47.5% B) 50% C) 34% D) 13.5% E) None of these

15. The volume of a rectangular box of a given height varies jointly with its width and length. A box with width 2 feet and length 3 feet has a volume of 21 ft^3 . Find the width of a box with the same height that is 5 feet long and has a volume of 26.25 ft^3 .

- A) 3.5 ft B) 1 ft C) 1.5 ft D) 2.25 ft E) None of these

16. Simplify.

$$\frac{cx^2 - 4c}{cx^2 + c} \div \frac{4 - x^2}{bx^2 + b}$$

- A) $-b$ B) $x - c$ C) c D) $x + b$ E) None of these

INTERMEDIATE 2014 Answer Key

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