

MONTANA COUNCIL OF TEACHERS OF MATHEMATICS
2016 MATH CONTEST

Dimensions and Shapes

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

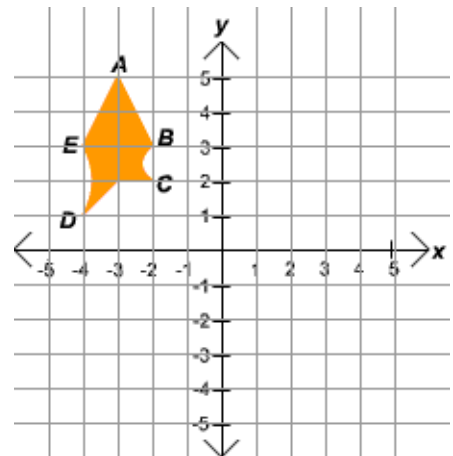
- In 2005, 18 year old Greg Doda straight lined Laramie Bowl at Jackson Hole Mountain Resort. Doda collided with skier Heather Donahue and killed her. Accident investigators determined that there was a 95% chance Doda was traveling 47 mph at the time of impact. What was his approximate speed in feet per second?
A) 75.98 B) 68.93 C) 32.05 D) 29.07 E) None of these
- Red Lodge Mountain Resort is hoping to hold slopestyle events next winter. The blueprint for one obstacle lists a jump height as 5.375 ft. How would this height be listed in feet and inches?
A) 5 ft $3\frac{3}{4}$ in B) 5 ft 4in C) 5 ft $4\frac{1}{2}$ in D) 5 ft $3\frac{1}{2}$ in E) None of these
- The diameter of the circular Hydro Luge at Lagoon measures approximately 3 feet. What is the approximate circumference of the Hydro Luge?
A) 9.42 ft B) 18.85 ft C) 28.27 ft D) 7.07 ft E) None of these
- An individual cylindrical log is 8 feet long at the Log flume, and has a diameter of $2\frac{1}{2}$ ft. What is the volume of 1 log?
A) 90 in^3 B) 180 in^3 C) 45 in^3 D) 60 in^3 E) None of these
- What is the area of a rhombus with diagonals of 12 inches and 15 inches?
A) 90 in^2 B) 180 in^2 C) 45 in^2 D) 60 in^2 E) None of these
- What is the perimeter to the nearest hundredth of the rhombus described in #5?
A) 19.21 in B) 38.42 in C) 64.62 in D) 76.84 in E) None of these
- Mr. Voeller has a 40 gallon aquarium in his classroom (1 gallon ≈ 0.133681 cubic feet). The length of the tank is 4 feet and the depth of the tank is $1\frac{1}{12}$ feet. What is the height of the tank to the nearest inch?
A) 15 in B) 14 in C) $1\frac{5}{12}$ ft D) 1ft E) None of these
- Reflect (3, -2) across the y-axis. What are the new coordinates?
A) (-2, 3) B) (3, 2) C) (-3,2) D) (-3, -2) E) None of these
- Reflect (3, -2) across the x-axis. What are the new coordinates?
A) (-2, 3) B) (3, 2) C) (-3,2) D) (-3, -2) E) None of these
- Reflect (3, -2) across the line $y = x$. What are the new coordinates?
A) (-2, 3) B) (3, 2) C) (-3,2) D) (-3, -2) E) None of these
- As of 2012, the Monster Beverage Corporation held nearly 35% of the \$31.9 billion energy drink market. How much money is this, to the nearest million?
A) 91,000,000 B) \$111,650,000,000 C) \$91,143,000,000
D) \$11,165,000,000 E) None of these

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12. Monster Beverage Corporation makes Peace Tea. One 23 ounce can typically sells for \$1.00. What is the cost per ounce?
 A) .04 ¢/oz B) .05 ¢/oz C) 4 ¢/oz D) 5 ¢/oz E) None of these
13. The cutter *Angelica* is 327 nautical miles south of port when it was attacked by pirates. USS *Kitty Hawk* was 512 miles east of port at this same time. What is the length of the direct line of response for the naval pilots, to the nearest mile?
 A) 1657 mi B) 403 mi C) 394 mi D) 608 mi E) None of these
14. The student council wants to install a sand volleyball court at your school. If the playing area dimensions are 80 feet long, 50 feet wide, and 2 feet deep, how many cubic yards of sand are needed to the nearest cubic yard?
 A) 296 yd³ B) 889 yd³ C) 2667 yd³ D) 8000 yd³ E) None of these
15. An isosceles right triangle has a height and a base of 5 inches. What is its perimeter, to the nearest inch?
 A) 17 in B) 13 in C) 7 in D) 32 in E) None of these
16. What is the length of a diagonal inside a 32 inch by 23 inch rectangle to the nearest inch?
 A) 55 in B) 19 in C) 14 in D) 36 in E) None of these

17. Rotate the figure in the graph 180°. Determine the new coordinates for the image of Point B.

- A) (-2 ,3) B) (2 ,3) C) (-2, -3)
 D) (2, -3) E) None of these



18. Dilate the figure in the graph by a factor of 5. Determine the new coordinates for the image of Point A.

- A) $(-1, \frac{-3}{5})$ B) $(\frac{-3}{5}, 1)$ C) (-15, 25)
 D) (25,-15) E) None of these

19. A kiva is a room used by Pueblos for religious rituals. Perfect Kiva is subterranean, circular, and located among ancient ruins in Bullet Canyon in southeastern Utah. Perfect Kiva is approximately 5 feet deep, and 12 feet in diameter. What is the area of the floor of Perfect Kiva, to the nearest square foot?

- A) 113 ft² B) 452 ft² C) 79 ft² D) 94 ft² E) None of these

20. What is the volume of Perfect Kiva, as described in #20, to the nearest cubic foot?

- A) 188 ft³ B) 94 ft³ C) 2261 ft³ D) 565 ft³ E) None of these

21. A cherry blossom tree is 35 ft. tall and casts a shadow of 48 ft. long. What is the distance from the top of the tree to the farthest tip of its shadow, to the nearest foot?

- A) 57 ft. B) 58 ft. C) 59 ft. D) 60 ft. E) None of these

Dimensions & Shapes 2016 Answer Key

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