

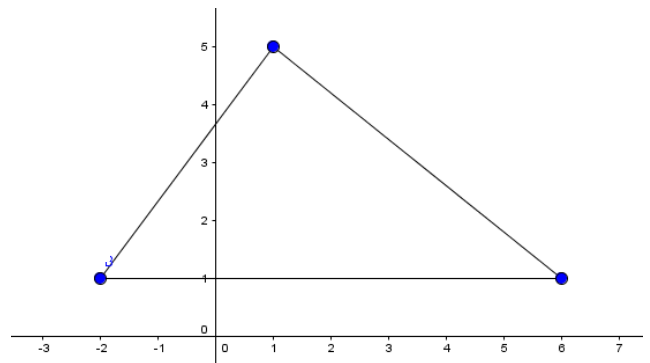
MONTANA COUNCIL OF TEACHERS OF MATHEMATICS  
2017 MATH CONTEST

Dimensions and Shapes

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

1. An osprey nesting pole casts a shadow of 15 feet. At the same time, an 8 foot tall stop sign casts a shadow 3 feet long. How tall is the nesting pole? Round your answer to the nearest foot.
- A) 20 ft                      B) 32 ft                      C) 40 ft                      D) 55 ft                      E) none of these
2. The world record for the most revolutions hanging from a spinning power drill is held by Huy Giang. He rotated 148 times hanging from a power drill in one minute. The distance between his belly button and his toes is 32 inches. If he held his legs perpendicular to his body while rotating around the power drill, what is the total distance that one set of his toes traveled in that minute? (Round your answer to the nearest foot.)
- A) 2480 ft                      B) 16,833 ft                      C) 29,757 ft                      D) 39,676 ft                      E) none of these
3. Which of the following units was used to measure athletes' long jump performances in the 2016 Summer Olympics?
- A) millimeters                      B) centimeters                      C) meter                      D) kilometer                      E) none of these
4. The corporate office of Michael's craft stores donated 500 feet of glow sticks and connectors to your school's student council. This length is going to be used to create a perimeter for a dance area on the football field during homecoming week. What shape would create the largest dance area?
- A) pentagon                      B) rectangle                      C) square                      D) circle                      E) none of these
5. The peregrine falcon is the fastest member of the animal kingdom, with a diving speed of approximately 355 feet per second. How fast can a peregrine falcon dive in miles per hour (mph)? Round your answer to the nearest whole unit.
- A) 150 mph                      B) 220 mph                      C) 242 mph                      D) 521 mph                      E) none of these

6. Find the area of the triangle shown in the diagram.
- A) 14 sq units                      B) 15 sq units                      C) 16 sq units  
D) 20 sq units                      E) none of these
7. Find the perimeter of the triangle shown in the diagram. Round to the nearest whole unit.
- A) 14 units                      B) 17 units                      C) 19 units  
D) 24 units                      E) none of these

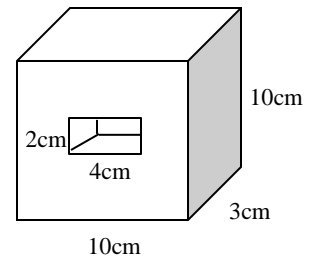


8. Reflect the triangle in the diagram over the  $x$ -axis. The new coordinates for the vertices are:
- A)  $A'$  (-1,5),  $B'$  (2,1),  $C'$  (-6,1)                      B)  $A'$  (1,-5),  $B'$  (-2,-1),  $C'$  (6,-1)                      C)  $A'$  (1,-3),  $B'$  (-2,1),  $C'$  (6,1)  
D)  $A'$  (-1,-5),  $B'$  (2,-1),  $C'$  (-6,-1)                      E) none of these
9. Dilate the triangle in the diagram by a factor of 3. The new coordinates for the vertices are:
- A)  $A'$  (-3,15),  $B'$  (6,3),  $C'$  (-18,3)                      B)  $A'$  (3,-15),  $B'$  (-6,-3),  $C'$  (18,-3)                      C)  $A'$  (3,15),  $B'$  (-6,3),  $C'$  (18,3)  
D)  $A'$  (-3,-15),  $B'$  (6,-3),  $C'$  (-18,-3)                      E) none of these

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10. Find the height of an equilateral triangle with sides of 10 centimeters. Round your answer to one decimal place.  
A) 5                      B) 10                      C) 8.7                      D) 7.1                      E) none of these
11. You can buy a coffee card for fourteen 20oz Americanos at City Brew for \$35. What is the cost for 1 coffee at this rate?  
A) \$1.30                      B) \$1.75                      C) \$2.50                      D) \$3.00                      E) none of these
12. A square has side lengths of 10 centimeters. What is the length of its diagonal? (Round to one decimal place.)  
A) 14.1                      B) 17.3                      C) 141.4                      D) 173.2                      E) none of these
13. The Great Pyramid of Giza located in Egypt is the oldest of the 7 World Wonders. Its square base has a length of 756 ft long, and the pyramid's height is 455 ft. What is the volume of the Great Pyramid?  
A) 229,320 ft<sup>3</sup>                      B) 687,960 ft<sup>3</sup>                      C) 86,682,960 ft<sup>3</sup>                      D) 260,048,880 ft<sup>3</sup>                      E) none of these
14. An aquarium is built in the shape of a rectangular prism. The length is 1 meter, the width is 75 centimeters and the height is 90 centimeters. How many liters of water will it hold?  
A) 0.675 L                      B) 6.75 L                      C) 67.5 L                      D) 675 L                      E) none of these
15. Carlos had a personal best of 9.8 seconds in the 100 meter dash. How fast does he run in km/hr?  
A) 0.6 km/hr                      B) 2.7 km/hr                      C) 26.4 km/hr                      D) 36.7 km/hr                      E) none of these

**For 16 – 17, a square prism has a rectangular hole cut through it. See the diagram at right.**



16. All the surfaces are to be painted. What is the total surface area?  
A) 300 cm<sup>2</sup>                      B) 320 cm<sup>2</sup>                      C) 340 cm<sup>2</sup>  
D) 400 cm<sup>2</sup>                      E) none of these
17. What is the volume of the figure in the diagram?  
A) 92 cm<sup>3</sup>                      B) 276 cm<sup>3</sup>                      C) 300 cm<sup>3</sup>                      D) 400 cm<sup>3</sup>                      E) none of these
18. A cylinder is considered “square” if its height and diameter are equal. Find the volume of such a can if height = diameter = 12 cm. Round your answer to the nearest cubic centimeter.  
A) 1357 cm<sup>3</sup>                      B) 3571 cm<sup>3</sup>                      C) 5429 cm<sup>3</sup>                      D) 7052 cm<sup>3</sup>                      E) none of these
19. The total number of surfaces of an octagonal prism is:  
A) 10                      B) 9                      C) 8                      D) 6                      E) none of these

## **Dimensions & Shapes 2017 Answer Key**

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