

Date Completed: \_\_\_\_\_

Mentor Initials: \_\_\_\_\_

A mentor can change everything.

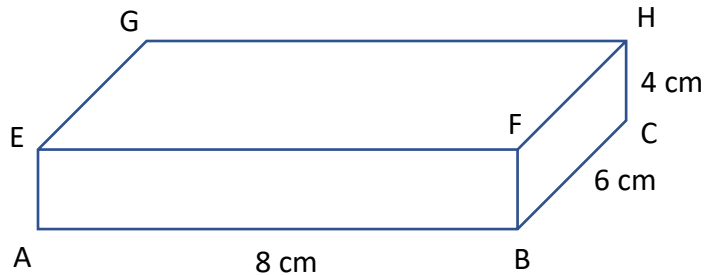


## 3-D Geometry

### Multiple Choice

1. A cone has a height of 8, radius of 6, and a slant height  $l$  of 10. What is the ratio of the volume of the cone to its surface area? (Surface Area of a cone =  $\pi r^2 + \pi rl$ )  
A) 1: 2  
B) 3: 4  
C) 1: 1  
D) 2: 1
2. The volume of a cube is 216 centimeters cubed. The surface area of the cube is equal to the expression  $6d^2$  centimeters squared, where  $d$  is a positive constant. What is the value of  $d$ , in centimeters?  
A) 6  
B) 24  
C) 36  
D) 216
3. Amanda is dabbling in the occult and purchases a spherical crystal ball. The crystal ball has a moonstone cube perfectly inscribed within it. If the moonstone has a volume of 8 cubic inches, what is the radius of the sphere, in inches?  
A) 2  
B)  $\sqrt{2}$   
C)  $\sqrt{3}$   
D) 3
4. Cube  $A$  has a side length of  $g$  feet. The volume of Cube  $B$  is 27 times as large as the volume of Cube  $A$ . What is the side length of Cube  $B$ , in feet, in terms of  $g$  ?  
A)  $3g$   
B)  $6g$   
C)  $9g$   
D)  $27g$

5.



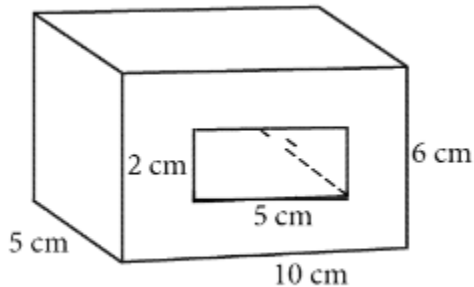
In the right rectangular prism shown, what is the length, in centimeters, of diagonal  $AH$  ((not shown) ?

- A)  $2\sqrt{13}$
- B) 10
- C)  $2\sqrt{29}$
- D) 12

### Grid-In

6. A right circular cylinder has a radius of 4 inches and a height of 7 inches. The volume of the cylinder is  $x\pi$  cubic inches. What is the value of  $x$  ?
  
7. Cassandra is craving lemonade on a hot summer day. She buys a square-based glass with base measurements of 6 centimeters and a height of 9 centimeters. She then adds 6 spherical ice cubes, each with a radius of 1 centimeter, and 200 cubic centimeters of lemonade into the glass. How much volume of empty space is left in the glass, rounded to the nearest whole number?
  
8. Vanessa just returned from a trip to Egypt, where she bought a replica of the Pyramid of Giza. Each side of the square base of the replica measures 6 centimeters. If the height of the pyramid is two-thirds the length of a side of the base, what is the total surface area of the replica, in square centimeters?

9. A brick had a portion removed from its center. Both the brick and the portion removed are in the shape of a right rectangular prism, as shown in the figure. The dimensions of the portion of brick removed are 2 centimeters (cm) by 5 cm by 5 cm. What is the volume, in cubic centimeters, of the brick remaining after the portion was removed?



10. A can in the shape of a right circular cylinder has a plastic label covering all of the can except the circular top and the circular bottom. If the radius of the top of the can is about 2.3 centimeters and the height of the can is 5 centimeters, what is the area, in square centimeters, of the part of the can covered by the label, rounded to the nearest whole number?