

MEASURING IN THE PLANE AND SPACE

G.MG.A.3: AREA AND SURFACE AREA

- 95 A farmer has 64 feet of fence to enclose a rectangular vegetable garden. Which dimensions would result in the biggest area for this garden?
- 1 the length and the width are equal
 - 2 the length is 2 more than the width
 - 3 the length is 4 more than the width
 - 4 the length is 6 more than the width
- 96 A gallon of paint will cover approximately 450 square feet. An artist wants to paint all the outside surfaces of a cube measuring 12 feet on each edge. What is the *least* number of gallons of paint he must buy to paint the cube?
- 1 1
 - 2 2
 - 3 3
 - 4 4

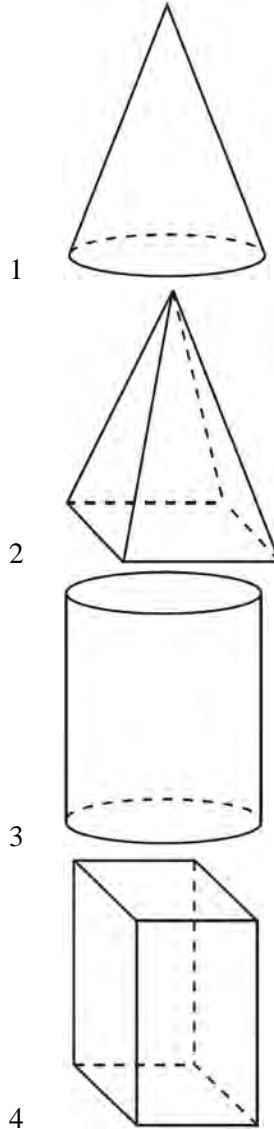
G.GMD.B.4: ROTATIONS OF TWO-DIMENSIONAL OBJECTS

- 97 If the rectangle below is continuously rotated about side w , which solid figure is formed?

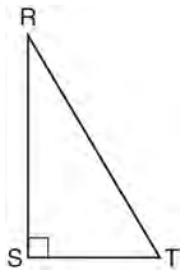


- 1 pyramid
- 2 rectangular prism
- 3 cone
- 4 cylinder

- 98 A student has a rectangular postcard that he folds in half lengthwise. Next, he rotates it continuously about the folded edge. Which three-dimensional object below is generated by this rotation?



- 99 Which object is formed when right triangle RST shown below is rotated around leg RS ?



- 1 a pyramid with a square base
 2 an isosceles triangle
 3 a right triangle
 4 a cone
- 100 If an equilateral triangle is continuously rotated around one of its medians, which 3-dimensional object is generated?
- 1 cone
 2 pyramid
 3 prism
 4 sphere

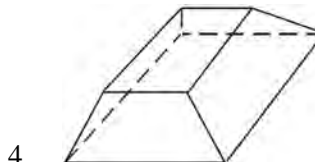
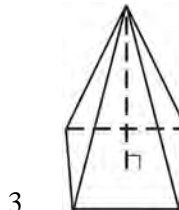
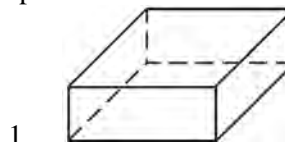
G.GMD.B.4: CROSS-SECTIONS OF THREE-DIMENSIONAL OBJECTS

- 101 The cross section of a regular pyramid contains the altitude of the pyramid. The shape of this cross section is a
- 1 circle
 2 square
 3 triangle
 4 rectangle

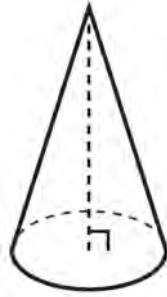
- 102 A plane intersects a hexagonal prism. The plane is perpendicular to the base of the prism. Which two-dimensional figure is the cross section of the plane intersecting the prism?

- 1 triangle
 2 trapezoid
 3 hexagon
 4 rectangle

- 103 Which figure can have the same cross section as a sphere?



- 104 William is drawing pictures of cross sections of the right circular cone below.

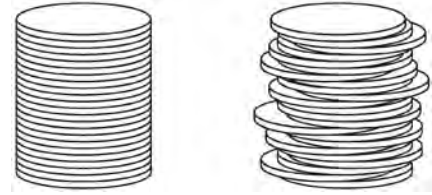


Which drawing can *not* be a cross section of a cone?

- 1
- 2
- 3
- 4

G.GMD.A.1, 3: VOLUME

- 105 Two stacks of 23 quarters each are shown below. One stack forms a cylinder but the other stack does not form a cylinder.



Use Cavalieri's principle to explain why the volumes of these two stacks of quarters are equal.

- 106 A barrel of fuel oil is a right circular cylinder where the inside measurements of the barrel are a diameter of 22.5 inches and a height of 33.5 inches. There are 231 cubic inches in a liquid gallon. Determine and state, to the *nearest tenth*, the gallons of fuel that are in a barrel of fuel oil.

- 107 The Great Pyramid of Giza was constructed as a regular pyramid with a square base. It was built with an approximate volume of 2,592,276 cubic meters and a height of 146.5 meters. What was the length of one side of its base, to the *nearest meter*?

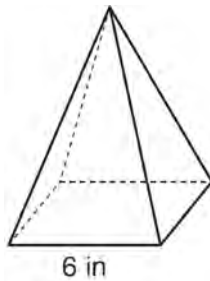
- 1 73
- 2 77
- 3 133
- 4 230

- 108 A fish tank in the shape of a rectangular prism has dimensions of 14 inches, 16 inches, and 10 inches. The tank contains 1680 cubic inches of water.

What percent of the fish tank is empty?

- 1 10
- 2 25
- 3 50
- 4 75

- 109 As shown in the diagram below, a regular pyramid has a square base whose side measures 6 inches.



If the altitude of the pyramid measures 12 inches, its volume, in cubic inches, is

- 1 72
- 2 144
- 3 288
- 4 432

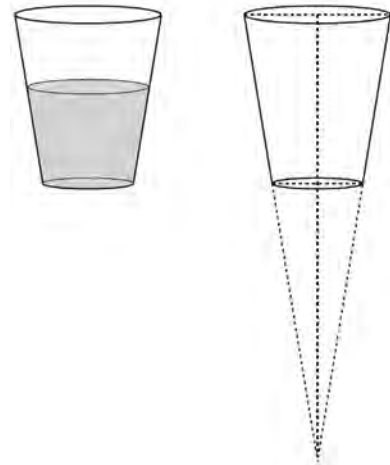
- 110 The diameter of a basketball is approximately 9.5 inches and the diameter of a tennis ball is approximately 2.5 inches. The volume of the basketball is about how many times greater than the volume of the tennis ball?

- 1 3591
- 2 65
- 3 55
- 4 4

- 111 A company is creating an object from a wooden cube with an edge length of 8.5 cm. A right circular cone with a diameter of 8 cm and an altitude of 8 cm will be cut out of the cube. Which expression represents the volume of the remaining wood?

- 1 $(8.5)^3 - \pi(8)^2(8)$
- 2 $(8.5)^3 - \pi(4)^2(8)$
- 3 $(8.5)^3 - \frac{1}{3}\pi(8)^2(8)$
- 4 $(8.5)^3 - \frac{1}{3}\pi(4)^2(8)$

- 112 A water glass can be modeled by a truncated right cone (a cone which is cut parallel to its base) as shown below.

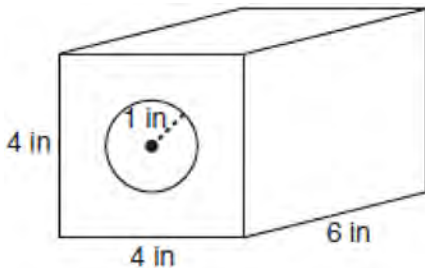


The diameter of the top of the glass is 3 inches, the diameter at the bottom of the glass is 2 inches, and the height of the glass is 5 inches. The base with a diameter of 2 inches must be parallel to the base with a diameter of 3 inches in order to find the height of the cone. Explain why. Determine and state, in inches, the height of the larger cone. Determine and state, to the *nearest tenth of a cubic inch*, the volume of the water glass.

- 113 Tennis balls are sold in cylindrical cans with the balls stacked one on top of the other. A tennis ball has a diameter of 6.7 cm. To the *nearest cubic centimeter*, what is the minimum volume of the can that holds a stack of 4 tennis balls?

- 1 236
- 2 282
- 3 564
- 4 945

- 114 A solid metal prism has a rectangular base with sides of 4 inches and 6 inches, and a height of 4 inches. A hole in the shape of a cylinder, with a radius of 1 inch, is drilled through the entire length of the rectangular prism.



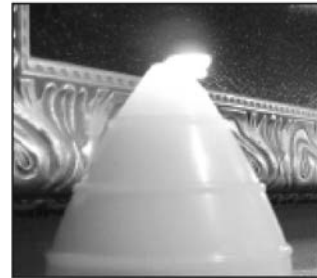
What is the approximate volume of the remaining solid, in cubic inches?

- 1 19
- 2 77
- 3 93
- 4 96

- 115 A water cup in the shape of a cone has a height of 4 inches and a maximum diameter of 3 inches. What is the volume of the water in the cup, to the *nearest tenth of a cubic inch*, when the cup is filled to half its height?

- 1 1.2
- 2 3.5
- 3 4.7
- 4 14.1

- 116 A candle maker uses a mold to make candles like the one shown below.



The height of the candle is 13 cm and the circumference of the candle at its widest measure is 31.416 cm. Use modeling to approximate how much wax, to the *nearest cubic centimeter*, is needed to make this candle. Justify your answer.

G.MG.A.2: DENSITY

- 117 Trees that are cut down and stripped of their branches for timber are approximately cylindrical. A timber company specializes in a certain type of tree that has a typical diameter of 50 cm and a typical height of about 10 meters. The density of the wood is 380 kilograms per cubic meter, and the wood can be sold by mass at a rate of \$4.75 per kilogram. Determine and state the minimum number of whole trees that must be sold to raise at least \$50,000.

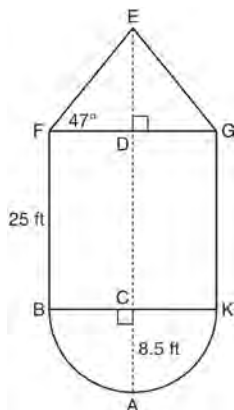
- 118 A contractor needs to purchase 500 bricks. The dimensions of each brick are 5.1 cm by 10.2 cm by 20.3 cm, and the density of each brick is 1920 kg/m^3 . The maximum capacity of the contractor's trailer is 900 kg. Can the trailer hold the weight of 500 bricks? Justify your answer.

- 119 A shipping container is in the shape of a right rectangular prism with a length of 12 feet, a width of 8.5 feet, and a height of 4 feet. The container is completely filled with contents that weigh, on average, 0.25 pound per cubic foot. What is the weight, in pounds, of the contents in the container?
- 1 1,632
 - 2 408
 - 3 102
 - 4 92

- 120 The water tower in the picture below is modeled by the two-dimensional figure beside it. The water tower is composed of a hemisphere, a cylinder, and a cone. Let C be the center of the hemisphere and let D be the center of the base of the cone.



Source: <http://en.wikipedia.org>



If $AC = 8.5$ feet, $BF = 25$ feet, and $m\angle EFD = 47^\circ$, determine and state, to the *nearest cubic foot*, the volume of the water tower. The water tower was constructed to hold a maximum of 400,000 pounds of water. If water weighs 62.4 pounds per cubic foot, can the water tower be filled to 85% of its volume and *not* exceed the weight limit? Justify your answer.

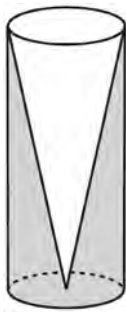
- 121 A hemispherical tank is filled with water and has a diameter of 10 feet. If water weighs 62.4 pounds per cubic foot, what is the total weight of the water in a full tank, to the *nearest pound*?
- 1 16,336
 - 2 32,673
 - 3 130,690
 - 4 261,381

- 122 A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*. State which type of wood the cube is made of, using the density table below.

Type of Wood	Density (g/cm ³)
Pine	0.373
Hemlock	0.431
Elm	0.554
Birch	0.601
Ash	0.638
Maple	0.676
Oak	0.711

- 123 Molly wishes to make a lawn ornament in the form of a solid sphere. The clay being used to make the sphere weighs .075 pound per cubic inch. If the sphere's radius is 4 inches, what is the weight of the sphere, to the *nearest pound*?
- 1 34
 - 2 20
 - 3 15
 - 4 4

- 124 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

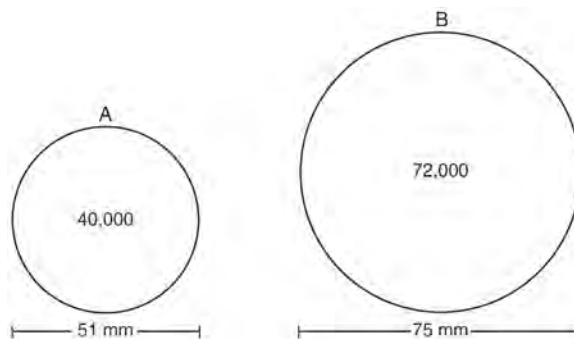


Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles? If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

- 125 Seawater contains approximately 1.2 ounces of salt per liter on average. How many gallons of seawater, to the *nearest tenth of a gallon*, would contain 1 pound of salt?
- 1 3.3
 - 2 3.5
 - 3 4.7
 - 4 13.3

- 126 A hemispherical water tank has an inside diameter of 10 feet. If water has a density of 62.4 pounds per cubic foot, what is the weight of the water in a full tank, to the *nearest pound*?
- 1 16,336
 - 2 32,673
 - 3 130,690
 - 4 261,381

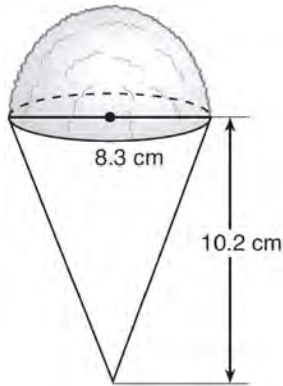
- 127 During an experiment, the same type of bacteria is grown in two petri dishes. Petri dish A has a diameter of 51 mm and has approximately 40,000 bacteria after 1 hour. Petri dish B has a diameter of 75 mm and has approximately 72,000 bacteria after 1 hour.



Determine and state which petri dish has the greater population density of bacteria at the end of the first hour.

- 128 The density of the American white oak tree is 752 kilograms per cubic meter. If the trunk of an American white oak tree has a circumference of 4.5 meters and the height of the trunk is 8 meters, what is the approximate number of kilograms of the trunk?
- 1 13
 - 2 9694
 - 3 13,536
 - 4 30,456

- 129 A snow cone consists of a paper cone completely filled with shaved ice and topped with a hemisphere of shaved ice, as shown in the diagram below. The inside diameter of both the cone and the hemisphere is 8.3 centimeters. The height of the cone is 10.2 centimeters.

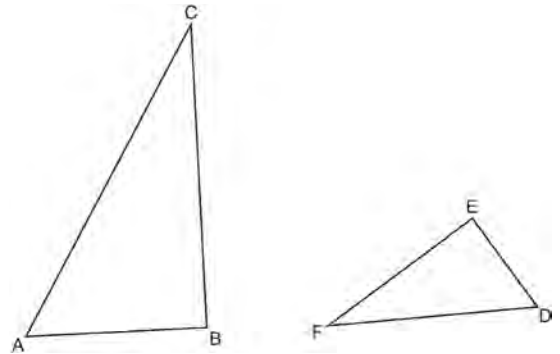


The desired density of the shaved ice is 0.697 g/cm^3 , and the cost, per kilogram, of ice is \$3.83. Determine and state the cost of the ice needed to make 50 snow cones.

- 130 New streetlights will be installed along a section of the highway. The posts for the streetlights will be 7.5 m tall and made of aluminum. The city can choose to buy the posts shaped like cylinders or the posts shaped like rectangular prisms. The cylindrical posts have a hollow core, with aluminum 2.5 cm thick, and an outer diameter of 53.4 cm. The rectangular-prism posts have a hollow core, with aluminum 2.5 cm thick, and a square base that measures 40 cm on each side. The density of aluminum is 2.7 g/cm^3 , and the cost of aluminum is \$0.38 per kilogram. If all posts must be the same shape, which post design will cost the town less? How much money will be saved per streetlight post with the less expensive design?

G.SRT.B.5: SIMILARITY

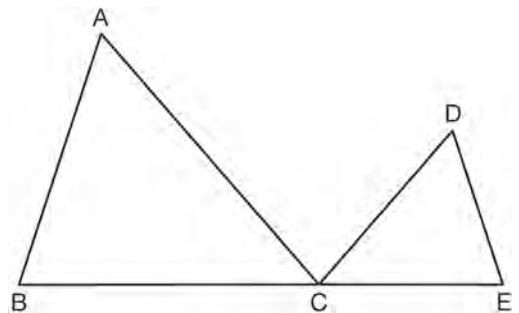
- 131 Triangles ABC and DEF are drawn below.



If $AB = 9$, $BC = 15$, $DE = 6$, $EF = 10$, and $\angle B \cong \angle E$, which statement is true?

- 1 $\angle CAB \cong \angle DEF$
- 2 $\frac{AB}{CB} = \frac{FE}{DE}$
- 3 $\triangle ABC \sim \triangle DEF$
- 4 $\frac{AB}{DE} = \frac{FE}{CB}$

- 132 In the diagram below, $\triangle ABC \sim \triangle DEC$.



If $AC = 12$, $DC = 7$, $DE = 5$, and the perimeter of $\triangle ABC$ is 30, what is the perimeter of $\triangle DEC$?

- 1 12.5
- 2 14.0
- 3 14.8
- 4 17.5