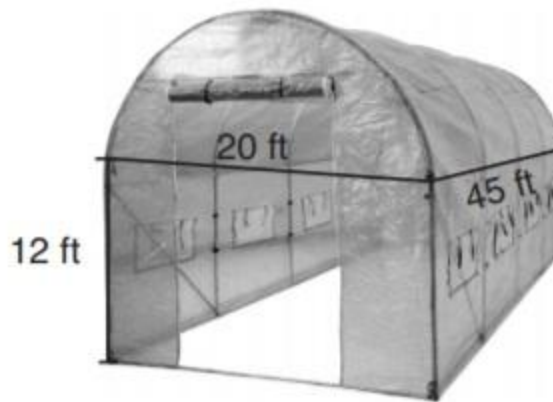


## Regents

An ice cream waffle cone can be modeled by a right circular cone with a base diameter of 6.6 centimeters and a volume of  $54.45\pi$  cubic centimeters. What is the number of centimeters in the height of the waffle cone?

- (1)  $3\frac{3}{4}$                       (3) 15  
(2) 5                          (4)  $24\frac{3}{4}$

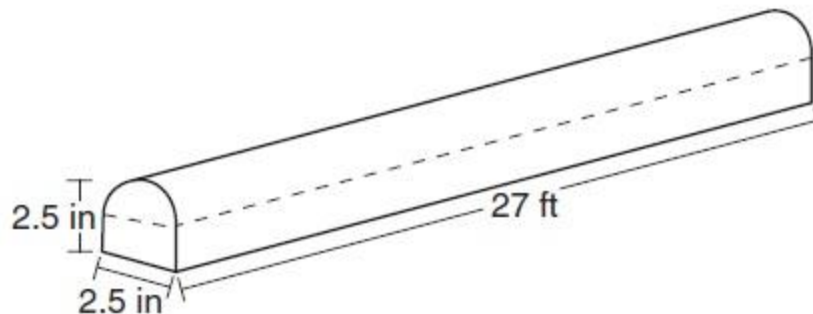
The greenhouse pictured below can be modeled as a rectangular prism with a half-cylinder on top. The rectangular prism is 20 feet wide, 12 feet high, and 45 feet long. The half-cylinder has a diameter of 20 feet.



To the *nearest cubic foot*, what is the volume of the greenhouse?

- (1) 17,869                      (3) 39,074  
(2) 24,937                      (4) 67,349

A fabricator is hired to make a 27-foot-long solid metal railing for the stairs at the local library. The railing is modeled by the diagram below. The railing is 2.5 inches high and 2.5 inches wide and is comprised of a rectangular prism and a half-cylinder.



How much metal, to the nearest cubic inch, will the railing contain?

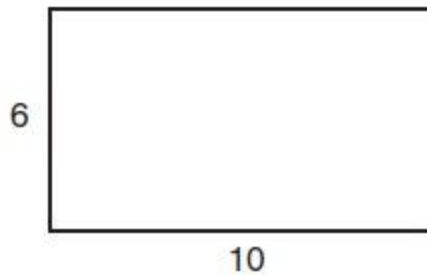
- (1) 151                          (3) 1808  
(2) 795                          (4) 2025

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

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.

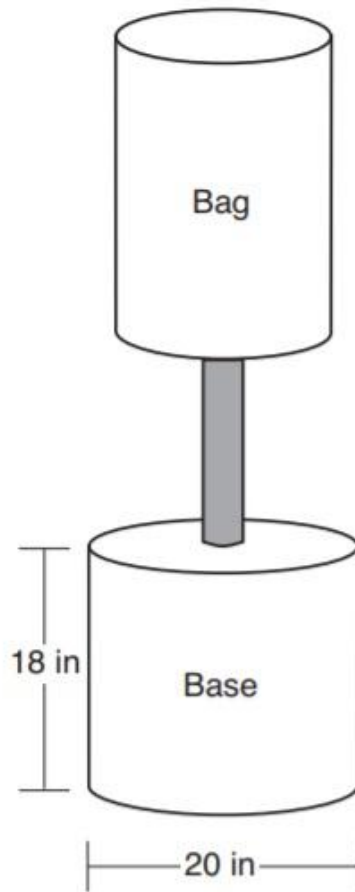
A rectangle whose length and width are 10 and 6, respectively, is shown below. The rectangle is continuously rotated around a straight line to form an object whose volume is  $150\pi$ .



Which line could the rectangle be rotated around?

- (1) a long side                                      (3) the vertical line of symmetry  
 (2) a short side                                    (4) the horizontal line of symmetry

Shae has recently begun kickboxing and purchased training equipment as modeled in the diagram below. The total weight of the bag, pole, and unfilled base is 270 pounds. The cylindrical base is 18 inches tall with a diameter of 20 inches. The dry sand used to fill the base weighs 95.46 lbs per cubic foot.



To the *nearest pound*, determine and state the total weight of the training equipment if the base is filled to 85% of its capacity.

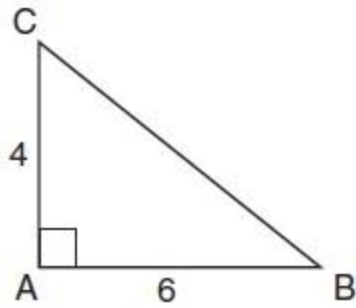
New streetlights will be installed along a section of the highway. The posts for the streetlights will be 7.5 m tall and made of aluminum. The city can choose to buy the posts shaped like cylinders or the posts shaped like rectangular prisms. The cylindrical posts have a hollow core, with aluminum 2.5 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  $2.7 \text{ g/cm}^3$ , 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?

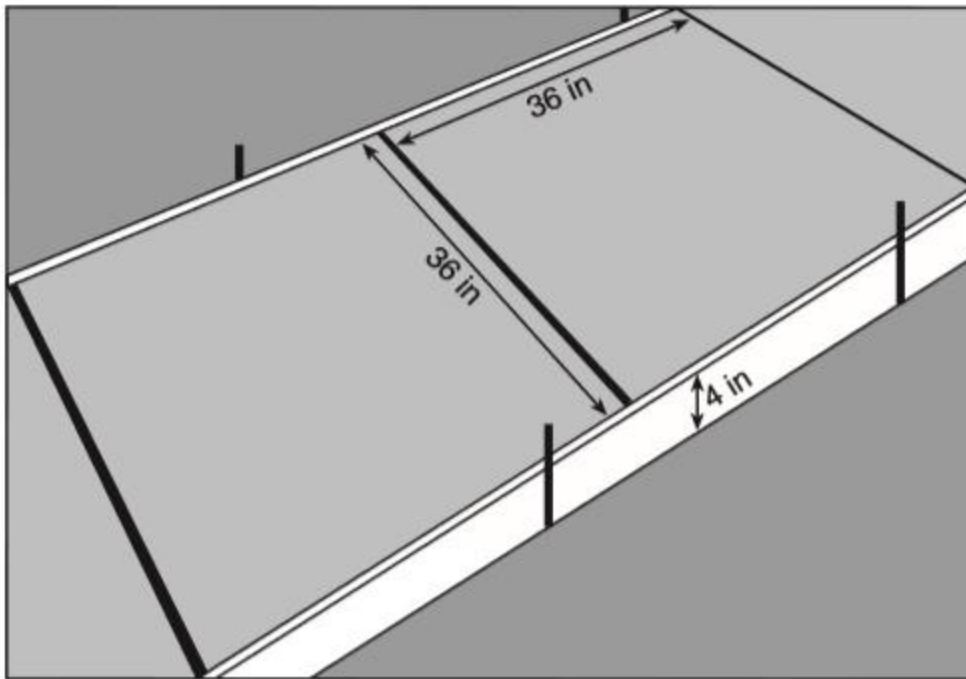
In the diagram below, right triangle ABC has legs whose lengths are 4 and 6.



What is the volume of the three-dimensional object formed by continuously rotating the right triangle around  $\overline{AB}$ ?

- (1)  $32\pi$                       (3)  $96\pi$
- (2)  $48\pi$                       (4)  $144\pi$

Ian needs to replace two concrete sections in his sidewalk, as modeled below. Each section is 36 inches by 36 inches and 4 inches deep. He can mix his own concrete for \$3.25 per cubic foot.

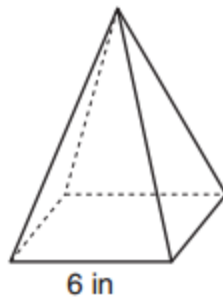


How much money will it cost Ian to replace the two concrete sections?

A regular pyramid has a square base. The perimeter of the base is 36 inches and the height of the pyramid is 15 inches. What is the volume of the pyramid in cubic inches?

- (1) 180                                      (3) 540
- (2) 405                                      (4) 1215

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

A child's tent can be modeled as a pyramid with a square base whose sides measure 60 inches and whose height measures 84 inches. What is the volume of the tent, to the *nearest cubic foot*?

- (1) 35
- (2) 58
- (3) 82
- (4) 175

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

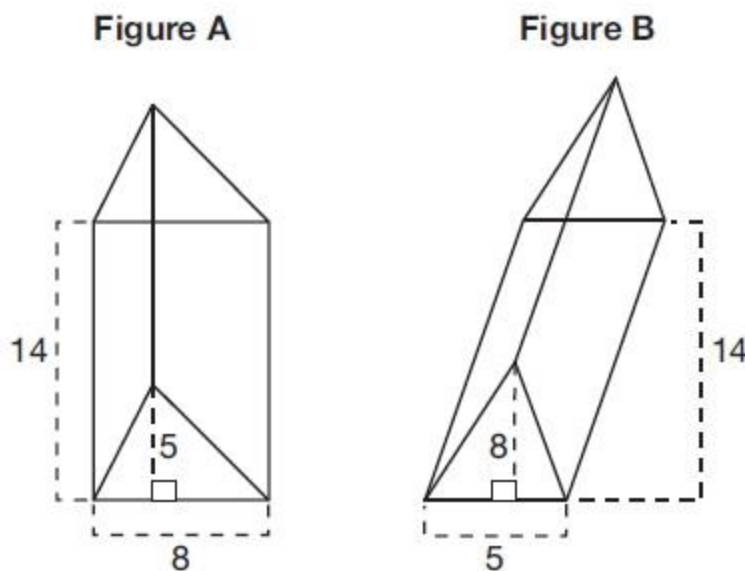
The diameter of a basketball is approximately 9.5 inches and the diameter of a tennis ball is approximately 2.5 inches. The volume of the basketball is about how many times greater than the volume of the tennis ball?

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

A bakery sells hollow chocolate spheres. The larger diameter of each sphere is 4 cm. The thickness of the chocolate of each sphere is 0.5 cm. Determine and state, to the *nearest tenth of a cubic centimeter*, the amount of chocolate in each hollow sphere.

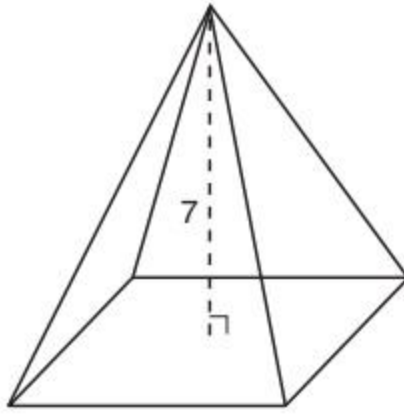
The bakery packages 8 of them into a box. If the density of the chocolate is  $1.308 \text{ g/cm}^3$ , determine and state, to the *nearest gram*, the total mass of the chocolate in the box.

The diagram below shows two figures. Figure *A* is a right triangular prism and figure *B* is an oblique triangular prism. The base of figure *A* has a height of 5 and a length of 8 and the height of prism *A* is 14. The base of figure *B* has a height of 8 and a length of 5 and the height of prism *B* is 14.



Use Cavalieri's Principle to explain why the volumes of these two triangular prisms are equal.

The pyramid shown below has a square base, a height of 7, and a volume of 84.



What is the length of the side of the base?

- (1) 6
- (2) 12
- (3) 18
- (4) 36