

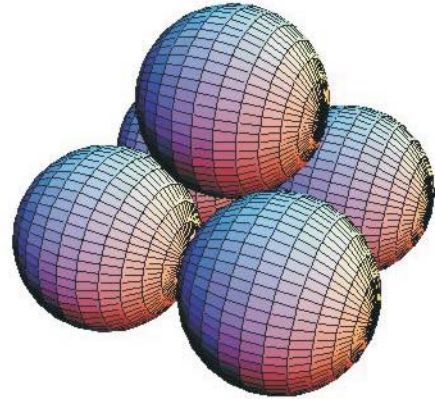
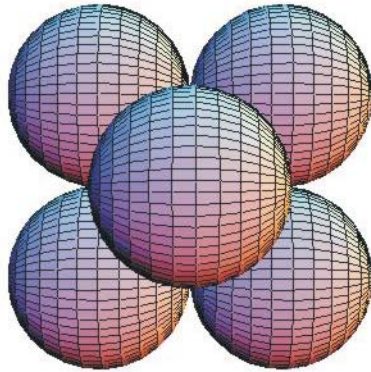
## Problem of the Week.

August 23-30

Proposed by Bernardo Ábrego and Silvia Fernández.

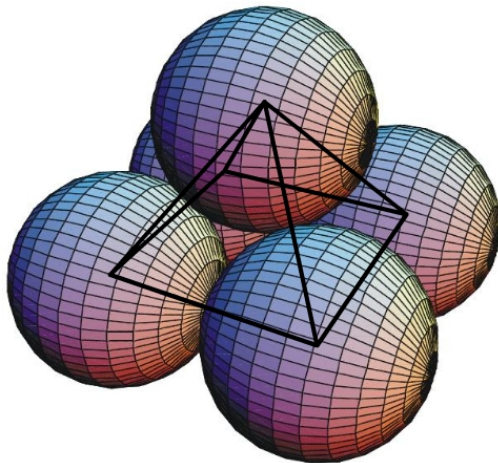
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Four basketballs, 12 inches in diameter, are placed on the floor forming a square. Any two balls forming a side of the square are touching (see figure below). A fifth basketball (same size) is placed on top of the previous four. It is perfectly centered and touches all other balls. What is the distance from the center of the fifth ball to the floor?

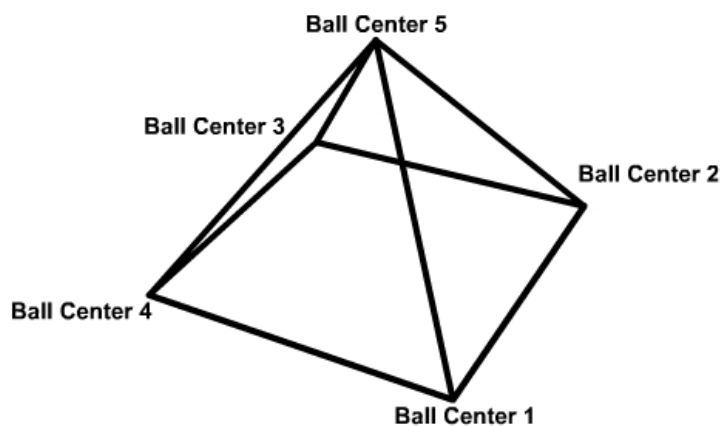


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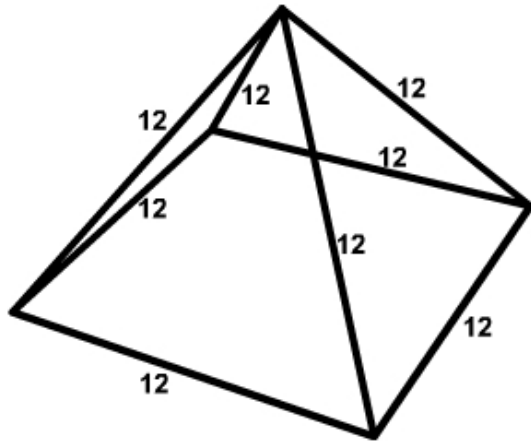
Solution by Jeffrey Liu.



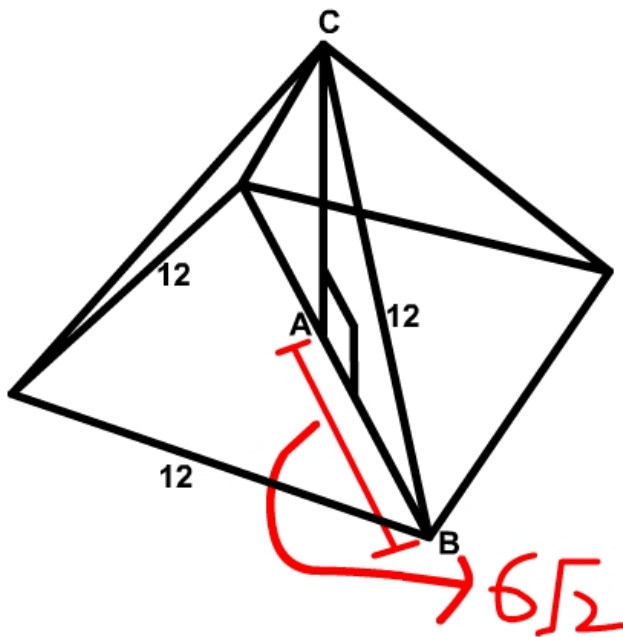
First, we just see the centers of the balls, and we match them together like the picture on the left.



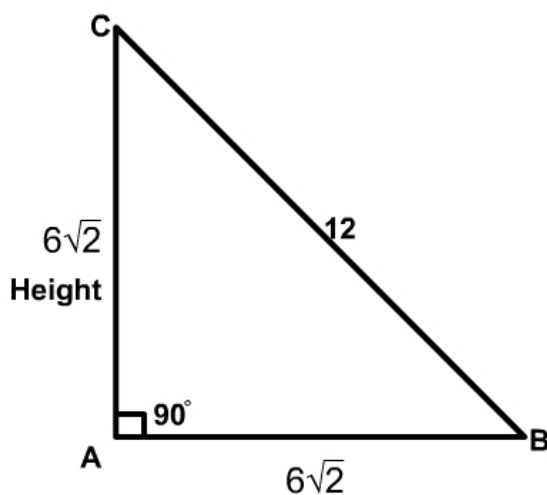
This is what the shape of the match of these 5 centers look like.



The diameter of the ball is 12 inches, so the radius is  $12 / 2 = 6$  inches. However, every single line of this shape is 12 inches, because they are exactly two straight radius joined together.



$$\text{Line AB} = [\sqrt{(12^2 + 12^2)}] / 2 = 6\sqrt{2}$$



$$\text{Line AC} = \sqrt{[12^2 - (6\sqrt{2})^2]} = 6\sqrt{2}$$

$6\sqrt{2}$  is the distance from the center of the fifth ball to the floor, the distance from the center of the fifth ball to the floor is  $6\sqrt{2} + 6$  inches. Don't forget there are 6 inches distance between the centers of Ball 1, 2, 3 and 4.

The answer is  $6\sqrt{2} + 6$  inches.