

1. A room is shaped like a cube with sides of length 4 meters. Suppose that A and B denote two corners of the room that are farthest from each other. A caterpillar is crawling from A to B along the walls. What is the shortest possible distance for the trip?

- a.  ~~$4\sqrt{2}$  meters~~      b.  ~~$4\sqrt{3}$  meters~~      c. 8 meters      d.  ~~$4\sqrt{5}$  meters~~  
e.  ~~$4\sqrt{6}$  meters~~

**The correct answer is d.**

2. Lysine is an amino acid which has the following elemental composition: C, H, O, N. In one experiment, 2.175 g of lysine was combusted to produce 3.94 g of  $\text{CO}_2$  and 1.89 g  $\text{H}_2\text{O}$ . In a separate experiment, 1.873 g of lysine was burned to produce 0.436 g of  $\text{NH}_3$ . The molar mass of lysine is 150 g/mol. Determine the empirical and molecular formula of lysine.

**Correct answer is  $\text{C}_3\text{H}_7\text{NO}$  and  $\text{C}_6\text{H}_{14}\text{N}_2\text{O}_2$**